

Instrument Manual

Interface to Leica system 1200

LSSTM

Leica
Geosystems

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Introduction

As modern surveying equipment and methods have evolved, LSS has also developed much more functionality in order to make the most of the techniques available. This is especially true when it comes to data acquisition, field coding and transfer from survey instruments. McCarthy Taylor Systems Ltd has strived to ensure that LSS surveyors are able to make the most of the options available.

This manual has been prepared to help with the configuration of both the survey instrument hardware and LSS software.

Chapter 1

1.1 Install LSS and Testdata

Note: Leica Installs may be required (such as the DBX Reader) on the PC in order to fully connect LSS to Leica Captivate.

It is best to complete all installation steps in one go especially if administrator rights are required.

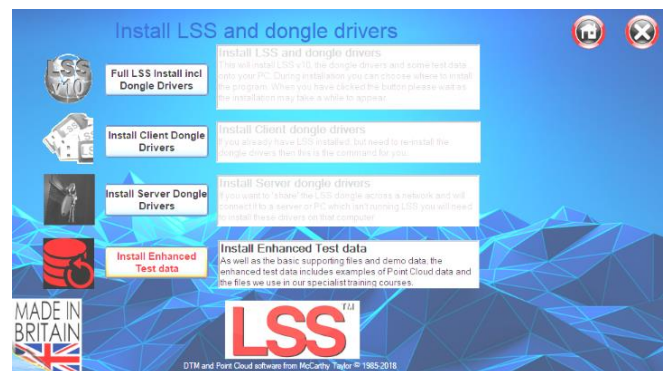
Select 'Install LSS & Test Data';



For a new install use 'Full LSS Install Incl Dongle Drivers'



We can ignore here 'Install Enhanced Test Data', which includes examples of Point Cloud data and the files we use in our specialist training courses



1.2 Survey Instrument and Machine Control Support Files

Return to the Install Home Page;

Select

'Survey & Machine Control',



and access the files/documents for your instrument type-

For Leica instruments and loggers select

'Leica survey and machine control'



Choose '1200/Viva/Nova/Captivate';



There follows pages for the Leica PDF Manuals and other Leica related installs and files;

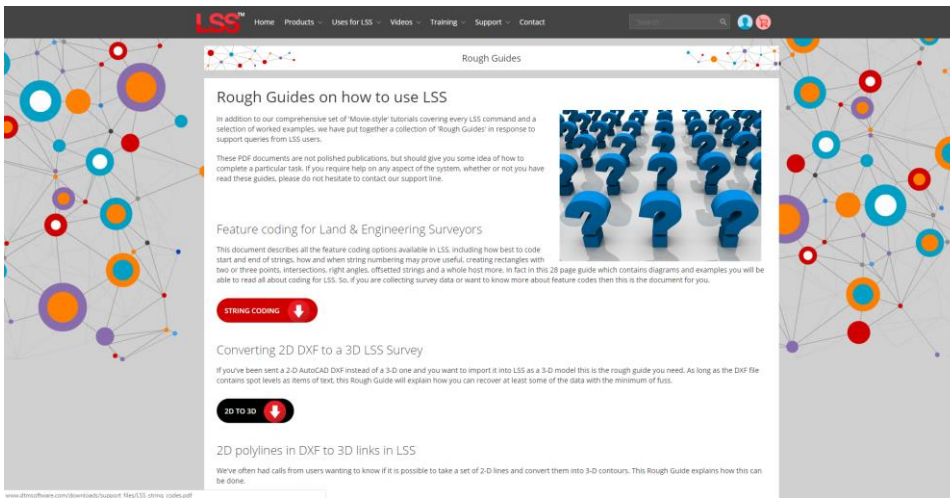
1.3 LSS Rough (How to) Guide

In the main window there are some other useful items that can be installed.

The 'How to Guides' are pdfs documents.



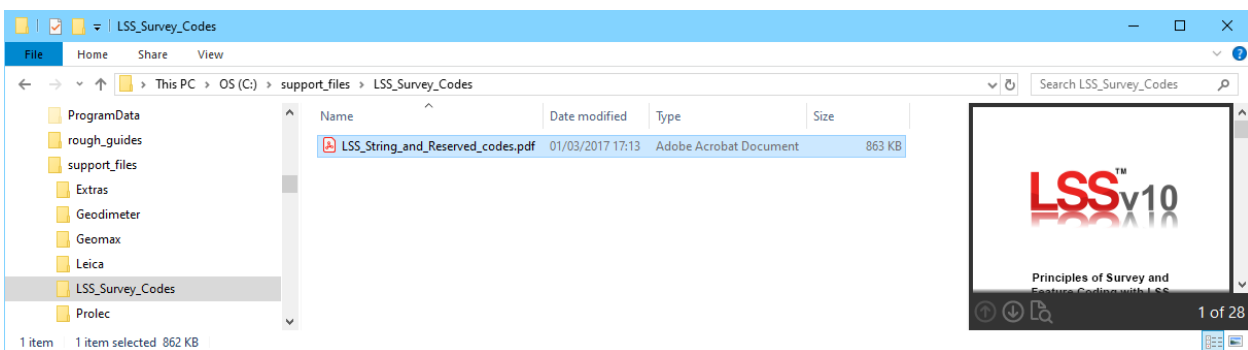
1.3.1 LSS String coding and Reserved codes



The PDF file '[LSS_String_and_Reserved_codes.pdf](#)' contains very useful information on the principles of Survey and Feature Coding in LSS as well as a complete list of diagrams and descriptions of all the LSS Reserved codes. It is located on the LSS media folder

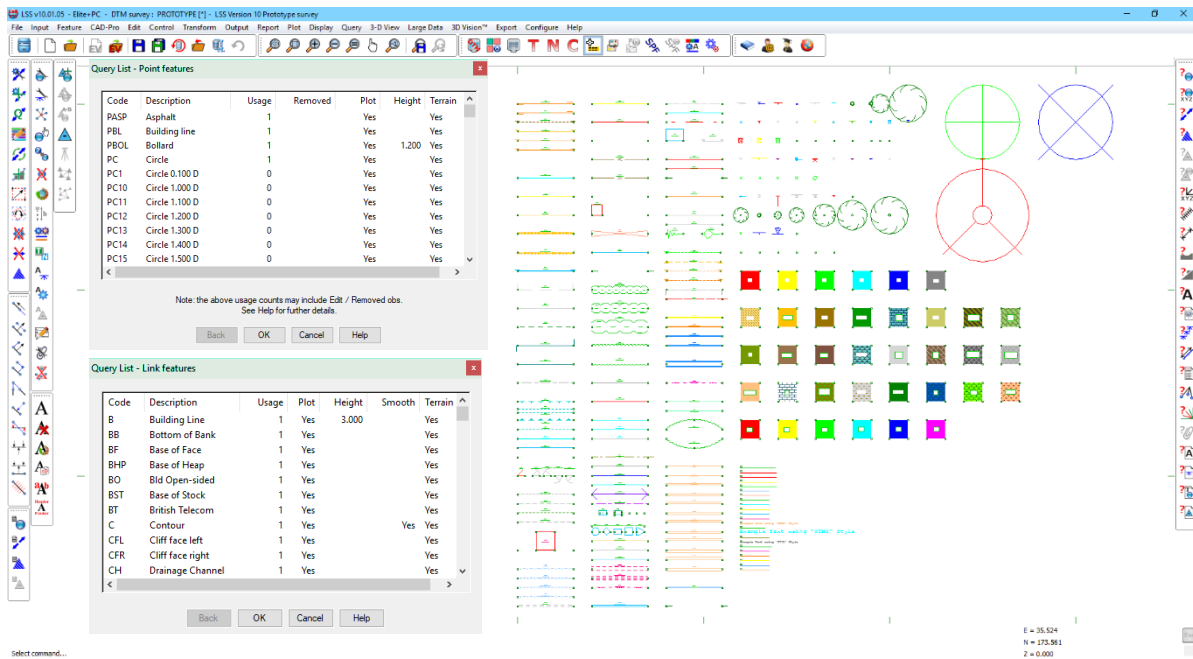
'[Support_Files\LSS_Survey_Codes](#)'

The rough_guides folder can also be accessed via the Windows Explorer window;



1.4 Example Codelists

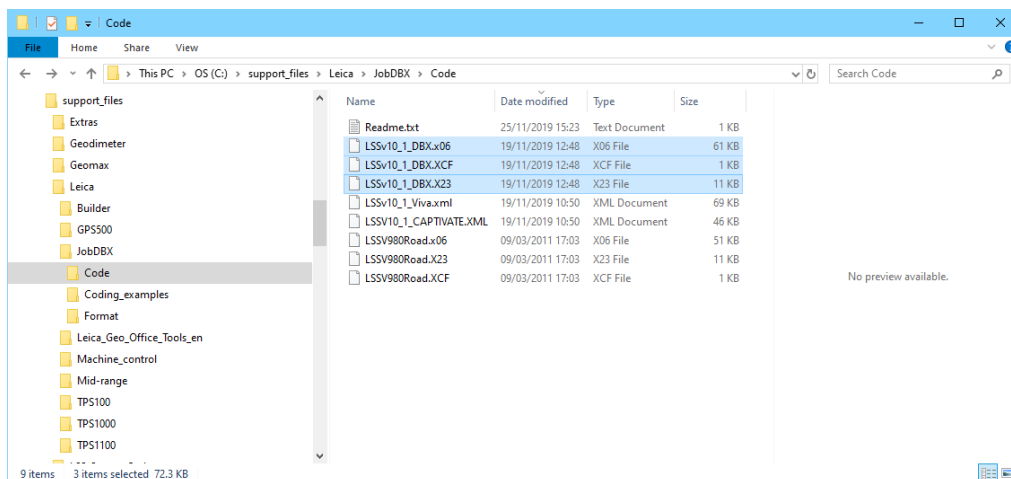
It is recommended that a feature library is copied to the instrument prior to carrying out any surveying tasks and code lists for many loggers have been created based on the standard LSS Prototype Survey File - PROTOTYPE.LSS ;



Query List as displayed can be used to list the legend entries.

Traditionally the format to use for Leica System X instruments and loggers has been the system X files themselves that make up the code list - .x06, .x23 and .xcf.

Three **Example Codelists** are supplied on the LSS media. They are pre-formatted for immediate upload to the Leica instrument (how to transfer a code list to the instrument via a data card or USB stick is shown later in this document):



LSSv10_1_DBX – derived from the standard LSS Prototype for Leica 1200 and Viva.

LSSV980Road – derived from the LSS Road markings Prototype for Leica 1200 and Viva.

LSSv10_1_Viva.XML - Exported for Leica Viva as .XML file

LSSv10_1_Captivate.XML – Exported for Leica Captivate as XML file

1.5 Configuring Leica System 1200

The two requirements for using LSS coding to the best advantage are a relevant **code list** and a subset of the **config set** both of which have identical usage for both TPS and GPS.

Note: the instrument firmware is important for the support of some of the functions in this section. If you do not have the latest firmware, particularly if it is earlier than Version 5.62, not all the options will be available.

1.5.1 Code List

An example code list has been built from the LSS prototype legend (supplied with Testdata) on the LSS media (in 'Support_files\Leica\JobDBX\code_list').

The LSS point features translate as 'point codes' and the LSS link features as 'point codes with lines' (replacing the use of 'line codes' for processing purposes which are deliberately avoided by the Job reader owing to a problem relating to the ordering of data when they are used).

The following steps explain the method of transferring this code list to the System 1200;

Copy the required Code list files .XCF, .X06 and .X23, from the LSS media 'Code lists' folder to the 'Code' folder on the card.

Note : The 1200 Simulator card folders are in 'Configuration/Data Paths/PC card path'

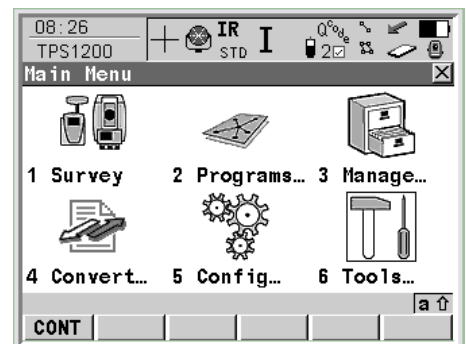
Transfer the Compact Flash card from your computer to the *System 1200* sensor.

Note : The Compact Flash card must always be "Stopped" before removing it from the PC and the *System 1200* must always be switched **off** before removing the Compact Flash.

Select option **6 Tools...** from the **Main Menu**.

Note : This option can be selected by pressing the number **6** key, or by navigating to **6 Tools...** and pressing the **Enter** key, or by touching the **Tools...** icon when using an active touch screen.

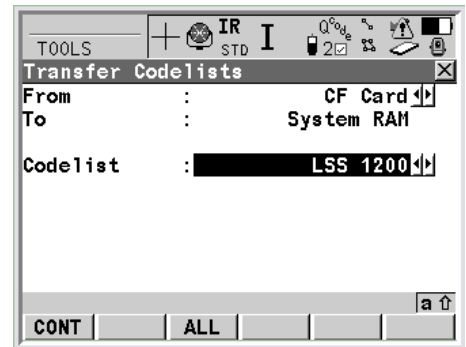
Select option **2 Transfer Objects...** from the **Tools Menu**.



and **Codelists** from the **Transfer Objects Menu**.



In the 'Transfer Codelists' screen copy 'From CF Card' and 'To System RAM', select the copied code list and CONT [F1].

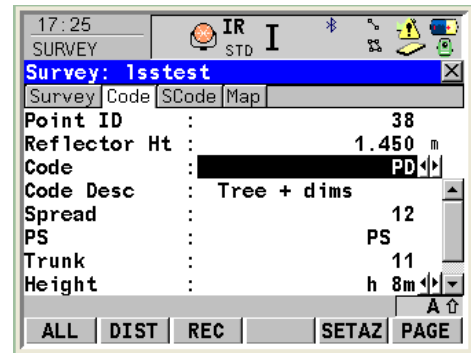


1.5.2 Config Set Alterations

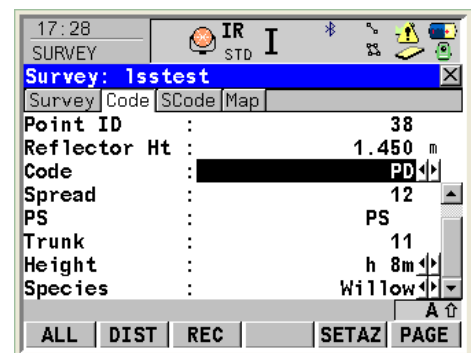
This indicates the settings for a System 1200 instrument (especially within the Display mask and the Coding/Linework) that enable it to work well with LSS;

Display Settings (Display masks)

The LSS example display mask tab shows the Code and its description along with up to five associated attributes (as used by the example prototype tree feature PD).



Use the scroll bar to reach the fifth attribute e.g. the tree species in the LSS example code list.



To amend your display mask to match that shown above choose **Management / Configuration Sets** from the main menu. Highlight the configuration set to be updated then select **New** to create a copy of this config set (select **[F3] Edit** to change the existing one) typing in the new **Name** and **Description** etc. Click **Store** to create the copy.

On the Wizard Mode screen select **[F6] List / Display Settings** and **[F3] Edit**.

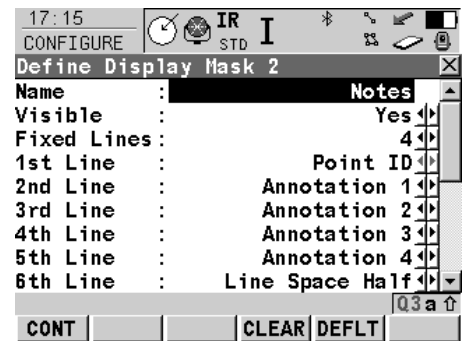
We suggest the following settings;

Mask 1 Survey - leave as your preferred view of the measurements etc

Mask 2 Offset - rename this by setting to 'Notes' and select

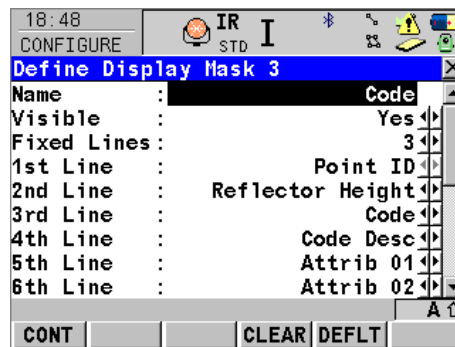
Annotation 1' through to 'Annotation 4'.

This will allow notes to be added conveniently in the field.

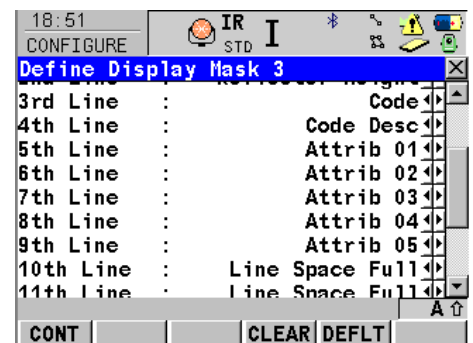


Mask 3 Code – change to see the code list attributes as below by clicking DMASK

Enter the Lines as shown below using the scroll bar to access the settings as shown in the second screen capture.



Then select [F1] 'CONT' twice to accept these changes.



1.5.3 Coding & Linework Settings

Note: These changes are necessary in order for the LSS coding to perform correctly.

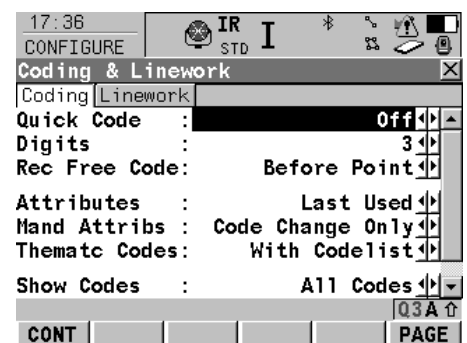
On the Wizard Mode screen again select 'Coding and Linework Settings' / [F3] 'Edit'.

This is essential for the correct use of the Code list etc.

'Quick Code' set 'Off' although the prototype code list has been set to use 3 digit codes if this is switched 'On'.

The 'Rec Free Code' set to 'Before Point'.

'Attributes' set to 'Last Used' means that values added for a feature code will be remembered when it is used again.



'Mand Attribs' set to 'Code change Only' so that shots without a change of code will not request the attribute values again e.g. a row of trees all with the same dimensions.

'Thematc Codes' set to 'With Codelist' allows the Code input to enter the codelist.

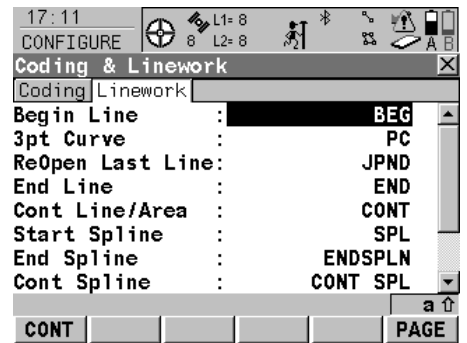
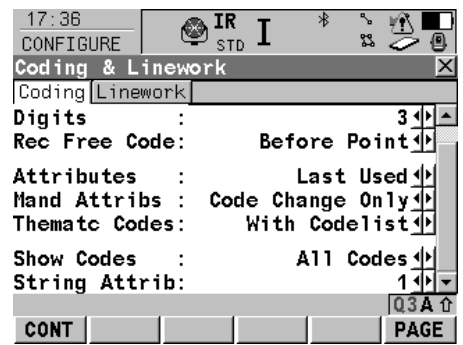
'Show codes' set to 'All Codes'.

'String Attrib' set to '1' will use the string number attribute as set in the LSS prototype codelist.

Then select the 'Linework' tab. Check that 'Begin Line' is set to 'BEG' to allow LSS to automatically recognise a System 1200 start of string.

Finally press CONT to confirm settings and

[F1] 'Store' to update the configuration set.



1.5.4 ID Templates

On the Wizard Mode screen again select 'ID Templates' / [F3] 'Edit'.

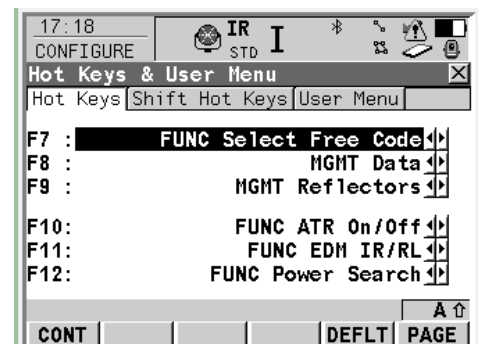
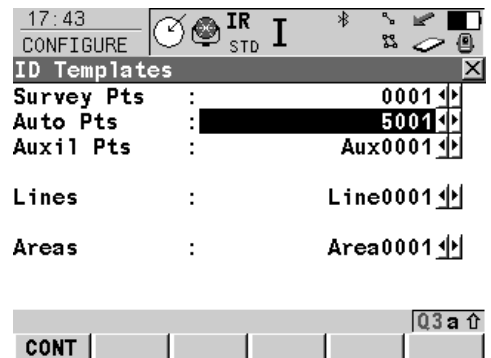
Note: The settings should be made according to those shown so that the instrument can increment the numbering systems efficiently.

If these settings are not available, then the firmware may need to be re-installed. Please contact Leica for advice.

Hot Keys and User Menu

On Wizard Mode again select 'Hot Keys and User Menu'. Set 'Hot Keys [F7]' to be

'Select Free Code'.



Chapter 2

2.1 Instrument Data Capture on a Leica 1200

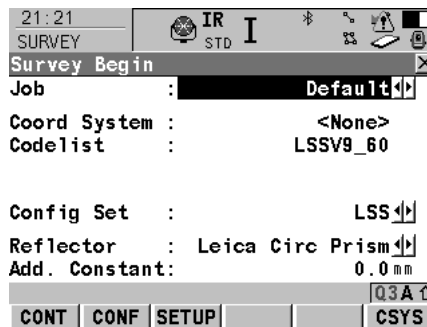
2.1.1 Creating a New 1200 Job

Select option **1 Survey** from the **Main Menu** to access the **Survey Begin** screen.

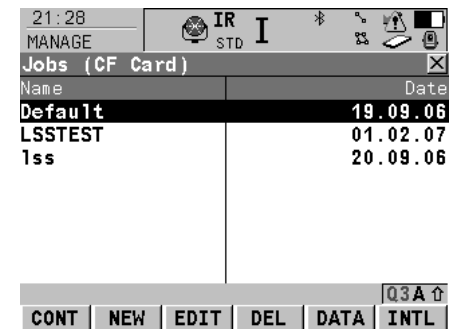
Note: Select by pressing the number 1 key, or by navigating to **1 Survey** and pressing the **Enter** key, or by touching the **Survey** icon when using an active touch screen.



Select the **Job** list and **Enter**.



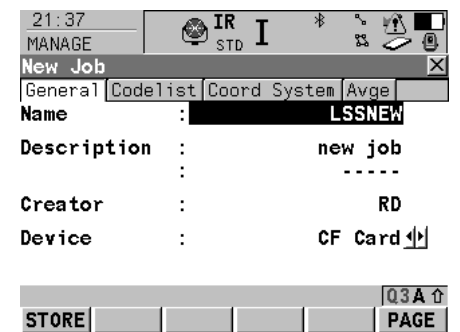
Select **New**



Type in the **Name** and other settings for **General**.

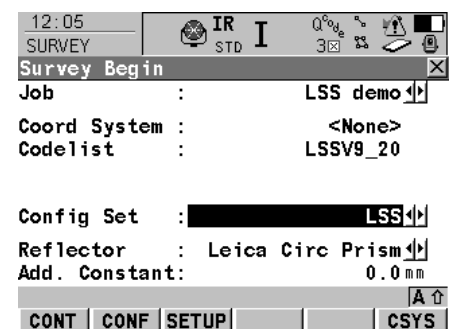
Also set the **Codelist**, **Coord System** and the **Averaging** settings. Then **Store**.

Note: If only one Codelist is in use on the Instrument then it will be the default.



Returning to the Survey Begin page, the **Coord System**, **Codelist** and **Config Set** should be set for the new survey e.g. as per the LSS media 'Support_files' folder.

Note: When using a TPS the **Setup** needs to be selected from this page unless no co-ordinate information is required during the survey. In which case use the Free Code 'Setup Fr', and the Point codes 'Setup Pt' and 'CTLObsRO' to store the Setup and control obs information for LSS purposes only.



Note: CTLObsRO may also be used following a CTLObsID when multiple control obs are required and recorded average is to be avoided.

2.1.2 Setup Procedure

The following example assumes an arbitrary co-ordinate system. If existing control coordinates are needed the stations can be uploaded from LSS to a **Fixpoint Job** (see exporting data from LSS to Leica 1200) and then copied to the current job before doing the first set-up using 'Convert' [4] then 'Copy Points Between Jobs' [3]

Press **SETUP** [F3] to input the details and observe the baseline stations.

For **Method** choose Set Azimuth to supply an arbitrary bearing.

For **Station Coord** use 'From Job' rather than 'Frm Fixpoint Job' (see first paragraph above).

Select the **Station ID** to select or enter a new station

(as shown) Enter the **Instrument Ht.**

If you have selected a new **Station ID** the **New Point** screen will be displayed for co-ordinate entry. Then press **STORE** [F1].

Press **CONT** [F1].

Select the **Backsight ID**

Enter the **Reflector Ht.**

Click **Az=0** to set the HA to 0

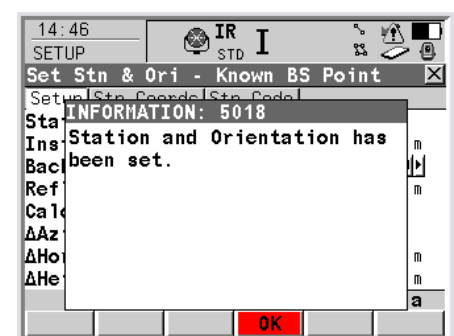
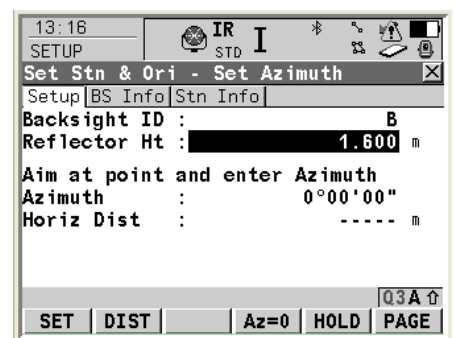
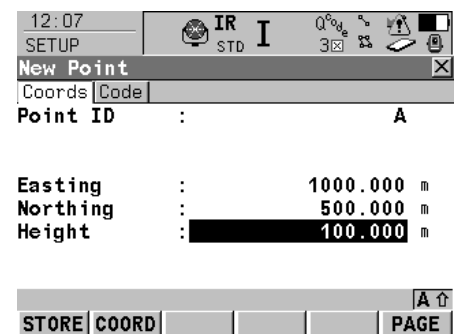
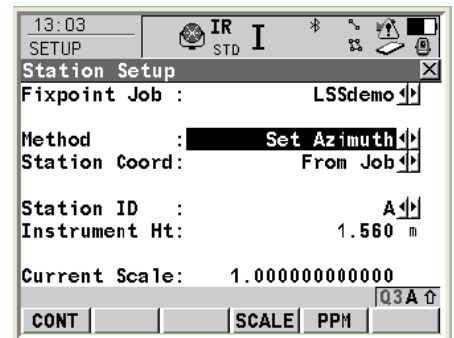
Press **DIST** [F2] to measure the distance to the RO.

Press **SET**

The Instrument confirms that the Station and Orientation has been set.

Press **OK** [F4].

You are now in the detail measurement screen.

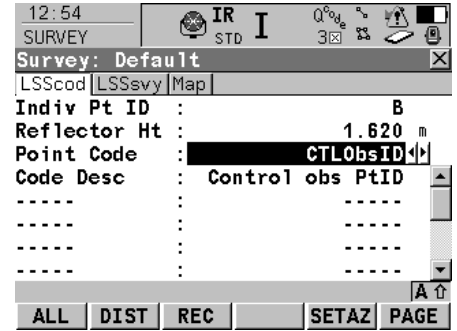


2.1.3 Control Observations

For a control observation highlight the **Point ID** and

press **Shift INDIVID** (avoids the incrementing Point IDs), then enter the station ID

For **Code** select **CTLObsID** and take the shot - do NOT use the -ST Reserved code.



2.1.4 Detail Procedure

For basic measurements centre the **TPS1200** accurately on the prism at your detail point, set the **Point ID** (e.g. to 1) and press **ALL [F1]**.

If the ATR is being used the Total Station needs only to be aimed approximately at the prism.

If LOCK is being used the Total Station will "follow" the prism as it is moved from point to point.

The **DIST [F2]** and **REC [F3]** keys can be used instead of the **ALL [F1]** to measure an object that the prism cannot occupy the centre of (e.g. a pole).

The prism is placed next to the object and **DIST** pressed to measure the distance and place it in a "buffer".

The instrument is then turned so that the centre of the object is bisected and **REC** pressed.

Note: that **LOCK** must be disengaged to use this function.

2.1.5 Detail Coding

LSS uses Point coding and Free coding. The Codes are accessed via the display entry 'Code' and the Free Codes via the 'Select Free Code' [F7] key.

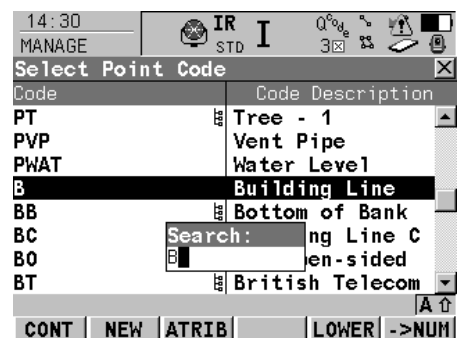
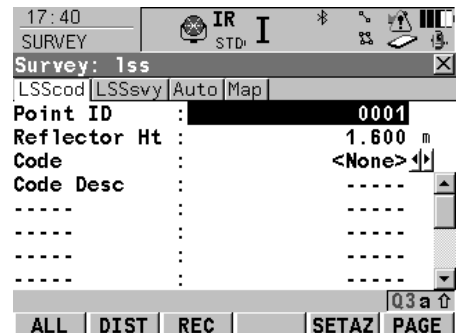
In each case the relevant part of the Code list is displayed as exported from LSS

(see the LSS media 'Support_files' folder).

Using the arrow keys highlight the 'Code' entry and type the required code or 'Enter'.

The codelist will appear defaulting to the closest entry to the typed characters. The arrow keys can further be used to manually select the required code.

CONT or **ENTER** will return to the display mask with the highlighted feature code.



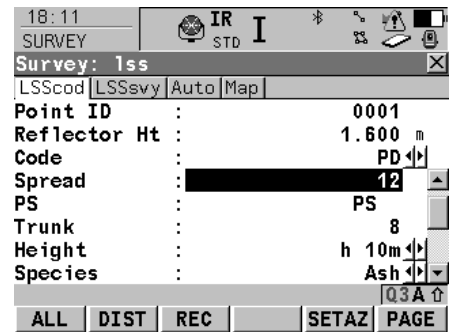
2.1.6 Attributes

Attributes are integer, real, text or choice-list values used in certain features in the code list and behave in the following way:

The **Code Display mask** will show the required attributes for the selected Point feature code.

It is necessary to use the **ATTRIB** button on the code list to change an attribute that is not set to mandatory.

For the Reserved codes this applies to -REC and -RIN.



Where Attribute 1 is the string number it can be left blank and a new string is started each time the code is 'toggled'. This is true even when the code remains the same.

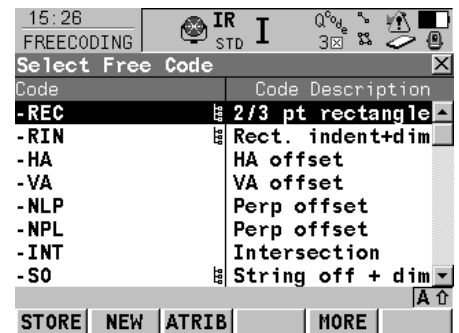
2.1.7 Free-codes

The Reserved codes, e.g. -REC, are all referenced as Free-codes via the **[F7]** button and behave in the following way:

A Free-code is additive to the Point code currently in use, *i.e.* 'As well as', NOT replace.

Free-codes can be stacked, *e.g.* Notes and -REC can be added on a single shot.

Note: Not all combinations work.



A Free-code applies to 'One shot' only as it only applies to the current observation and does not appear on subsequent measurements.

The **LAST** button will show the last used codes in order.

2.1.8 Subsequent Set-Up Procedure

When it is time to move to a new Survey Station;

Press **ESC** to leave the **Survey:** screen

Press **ESC** to leave the **Survey Begin** screen and return to the **Main Menu**.

The **TPS1200** can now be turned off.

At the new Setup, switch on the instrument and use the **SETUP [F3]** option in the **Survey Begin** screen to enter the **Station Setup** screen where subsequent set-ups on a job assume a coordinate system using the existing Station coordinates.

For **Method** you can now choose *Known BS Point*.

For **Station Coord** choose *From Job~*

For **Station ID** select or enter an existing station

Enter the Height of the Instrument.

Press **CONT [F1]** to go to the Set Stn & Ori – Known BS Point.

Select the Backsight ID and enter the Reflector Ht.

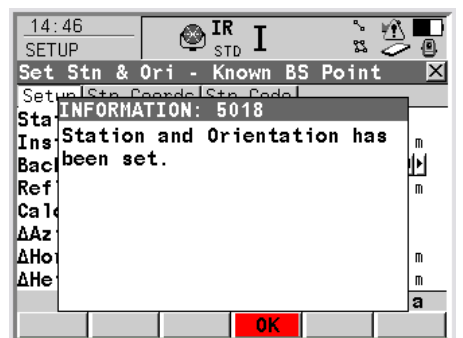
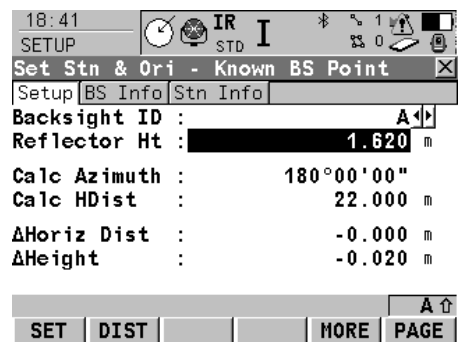
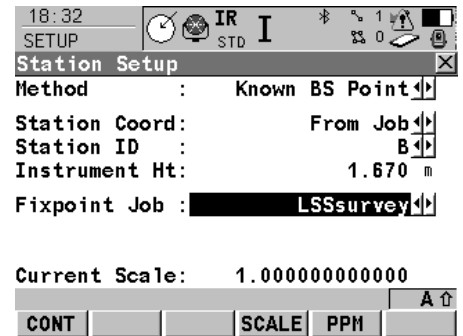
The instrument will report the calculated azimuth and horz dist.

Press **DIST [F2]** to measure the distance to the RO.

Press **SET**

The Instrument confirms that the Station and Orientation has been set.

Press **OK [F4]**.



Important Note:

Never insert or remove the Compact Flash [CF] card unless the System 1200 sensor is switched off. If there is data access to the CF card when removing or inserting it, your files may become damaged.

2.1.9 Smart Coding

To turn on Smart coding at this stage click the CONF and set the values as listed;

Use SCodes – Yes

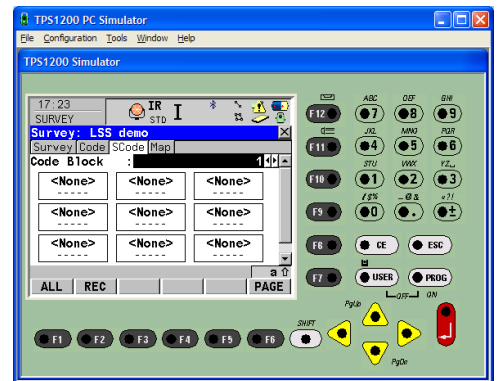
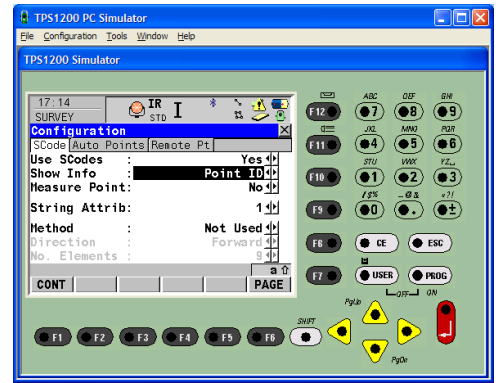
Measure point - No (this can be set to Yes during the survey to automate the data collection by selecting Shift CONF)

String Attrib - 1 (this is linked to the Coding and Linework config set values and should at this stage already be 1). **Note:** 1 must be used.

Method - Not Used (Zig-Zag and Same direction can be used if required)

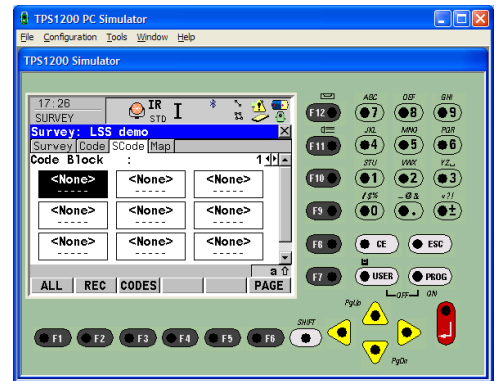
Note: The following details follows after the Setup during the detailing procedure:

When you arrive in Survey mode the SCode tab should now be available as shown.



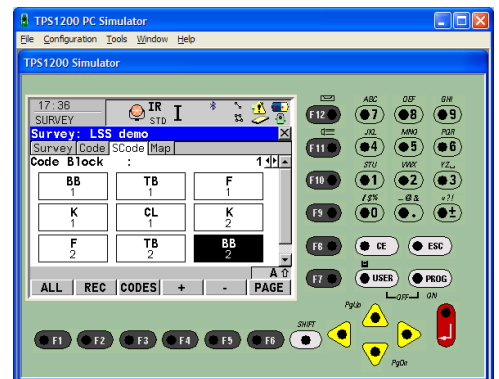
Highlight the first Code box by selecting it and press the Codes button [F3] and select your first code from the codelist.

Note: String numbers need to be used and can be added to the entry point directly below each feature.



Repeat for each box until a complete set of codes are listed.

Additional code blocks can be created by highlighting the existing code block name e.g. 1, press Enter and choose a New [F2] name and Store. Then repeat to add codes for the new block. In this way additional code blocks can be created until all required code block templates have been defined.



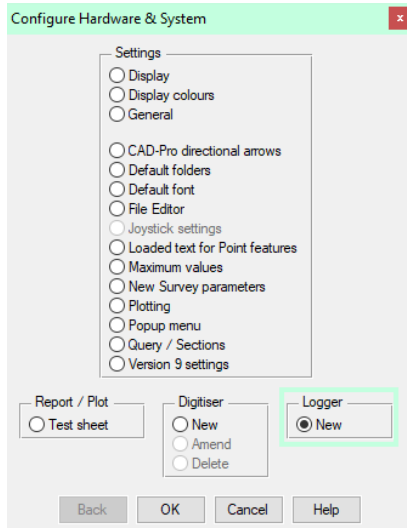
The + or – buttons can be used to increase or decrease the string numbers.

Chapter 3

3.1 Configuring LSS with the Leica 1200 Datalogger

This is a once-only operation, for each type of instrument to be used, on every computer into which data is to be downloaded.

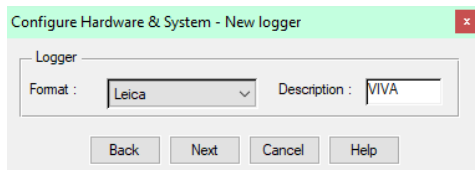
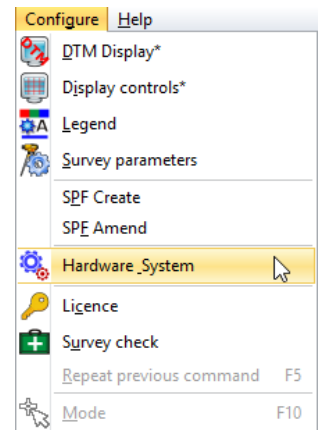
To configure our logger of choice in LSS we select **Configure Hardware & System**,



Followed by

'Logger - New'

(if there is already another logger configured then the option will be 'Logger / Change').



Now we need to choose the format of the data.

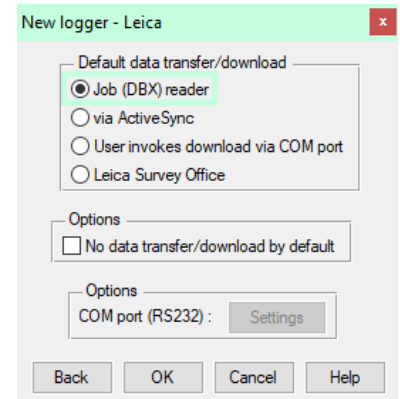
We will configure LSS for a Leica Viva;

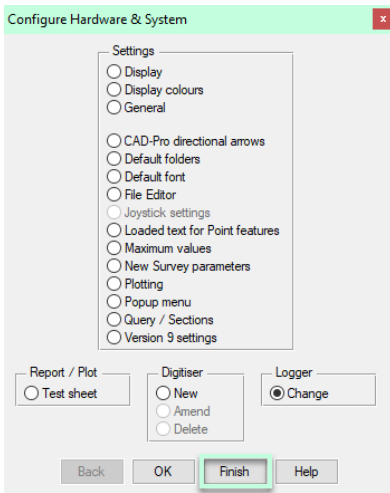
Select the logger format as 'Leica' and give the description as 'Viva'.

The recommended method is to use Leica's 1200 DBX Database Reader to access the list of jobs on the instrument's memory card and which should have been installed in Chapter 1.

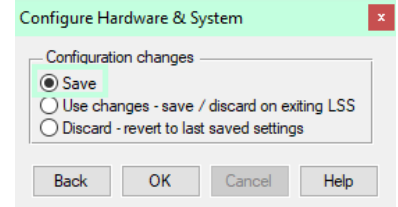
Next we choose the usual data transfer / download method.

The option 'System 1200 DBX database reader' allows direct access from the instrument job files on a drive e.g. Compact Flash card.





Hitting 'OK' will allow us to 'Finish' and 'Save' our logger settings.



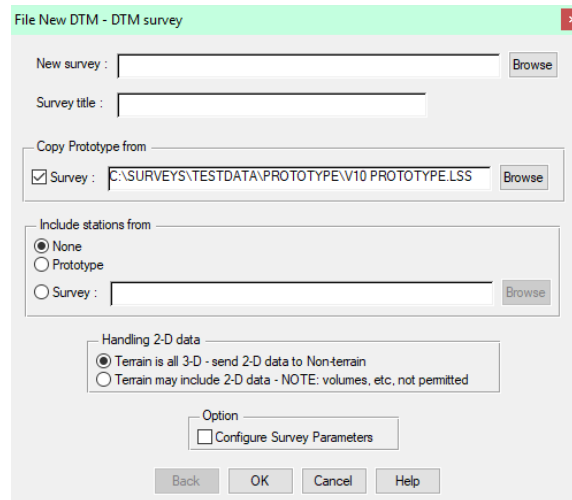
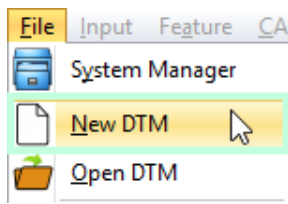
Note: This must be repeated for all PCs likely to be processing Leica System 1200 data.

Once installed and configured, the Job reader will read the card and the list of jobs will appear in the next window. On selection of the Job to process LSS will directly create a Load file.

3.2 Creating a New Survey in LSS

A survey must be open to process data into LSS and we will do this exercise in a new survey.

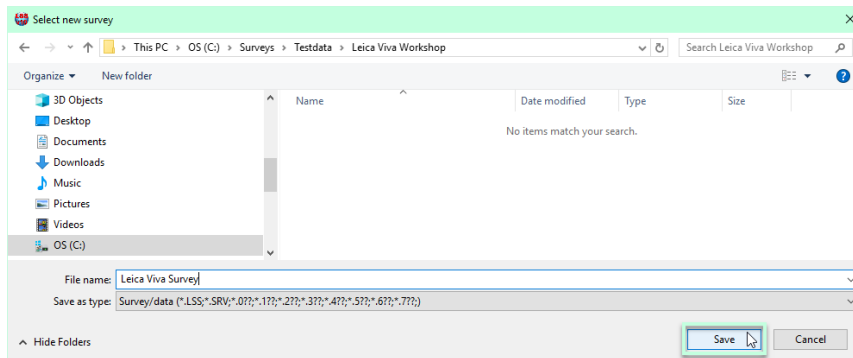
Select **File New DTM** from the main menu.



Click Browse against 'New survey'.

Create a new folder for the new survey to go in and call it *e.g.*

C:\Surveys\Testdata\Leica Viva Workshop;



Select it in the 'Save in' box
Enter the survey name, *e.g.* 'Leica Viva Survey' in 'File name'.
Click 'Save'.

This will return to the 'File New DTM' dialog with the path and name of the intended LSS survey.

If required, enter 'Survey title'

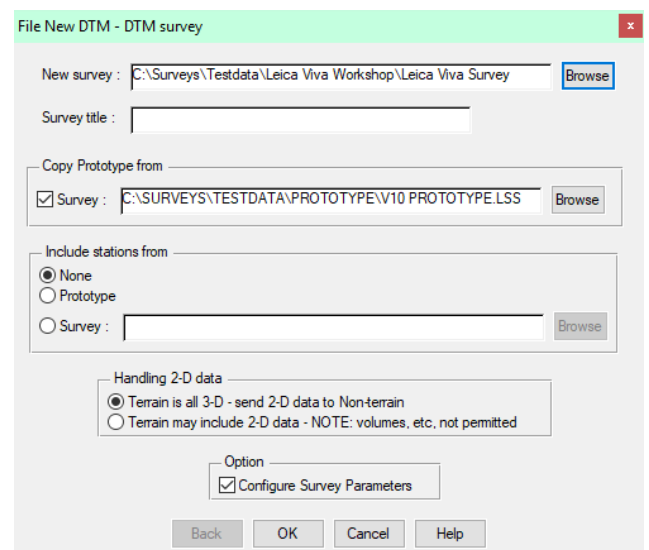
(if left blank LSS will use the survey name).

The 'Prototype' will be as per 'New Survey Parameters' (see above).

If we had stations already at the site we could bring them in here,
We will set the survey so any 2-D data will go to the survey's Non-terrain.

Note: the LSS Prototype is found in Testdata and also in Prototype directory, and either can be used here. Testdata is set here simply because this is where all the training datasets are held.

Tick 'Configure Survey Parameters', then Click 'OK'



Ticking the 'Configure Survey Parameters' allows us to revisit the parameters set during the initialisation process, and we would not normally require this:

Configure Survey Parameters

Survey title : LEICA VIVA SURVEY

Handling 2-D data

Terrain is all 3-D - send 2-D data to Non-terrain
 Terrain may include 2-D data - NOTE: volumes, etc, not permitted

Annotation of Levels

Standard
 Hydrographic - Admiralty Drying height : 2 (m) above Chart datum 0.0
 Hydrographic - Engineering

Survey units

Metres
 Feet
 Yards

Area report

Metres
 Hectares
 Feet
 Yards
 Acres

Settings

Default scale factor : 1
 Earth curvature / refraction adjustment
Conditioning tolerance : 0.05 (m)
 Smooth through different link features

Angular units

Dec. degrees
 Deg Min Sec
 Grads

Volume report

Metres
 Feet
 Yards

Obs format

VA \ HD
 VA \ SD
 LD \ HD

VA collimation

90
 270

Control tolerances

Warning : 0.01 (m)
Error : 0.03 (m)

Target height

Maximum : 5 (m)
Minimum : 0 (m)

Edit additions

File number : 799
Obs. number : 10000

Back OK Cancel Help

The parameters in the above window are set within **Configure Hardware & System - New Survey Parameters** and were looked at previously.

This window can also be invoked by the command **Configure Survey Parameters**.

But if we continually have to reset a particular parameter, then it might be worth reconfiguring the New Survey template values.

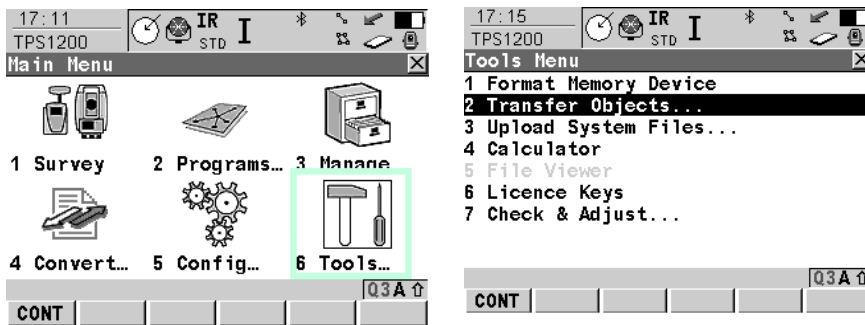
It is assumed that the surveyor will look to create a company specific prototype for their features in say C:\Surveys\Prototype and so will not be accessing the original LSS prototype in Testdata.

Note: It is worth saving the survey immediately after initialisation, provided all the parameters are correct of course. This will also set a "Restore point" prior to loading the survey data, and this will help with addressing **Input Load** issues when processing the survey.

3.3 Data Processing in LSS – Converting Data

On the Leica data logger, the first task is to transfer the survey Job DBX files from the logger to PC. On the Leica 1200 loggers it may be necessary to transfer from internal memory to the CF Card which has been formatted for the Leica instrument.

On the Leica main menu, we use 'Tools' – 'Transfer Objects';



'Object to transfer' – we select Job from the list.



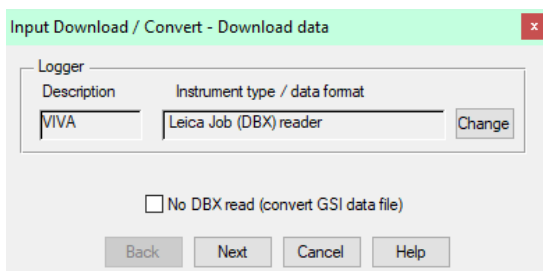
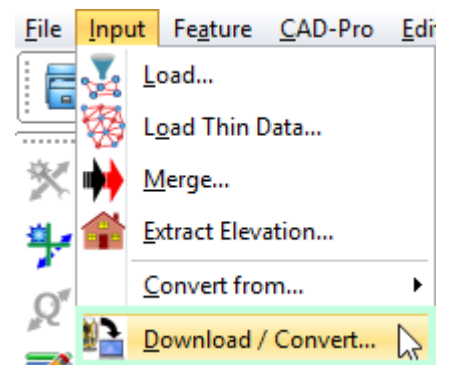
'From' - Internal memory
 'To' CF Card
 'Job' - Choose the name from the list.

Important Note:

Never insert or remove the Compact Flash [CF] card unless the System 1200 sensor is switched off. If there is data access to the CF card when removing or inserting it, your files may become damaged.

Once it is safe to do so, we remove the USB from the logger and place in port in the PC.

In LSS we select **Input Download / Convert** to invoke the Download data window.



If 'Leica Job (DBX) reader' is not shown nor is it present on the logger list when 'Change' is selected then we have not already configured a logger.

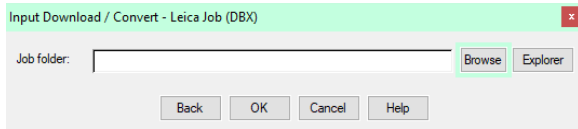
To rectify this click 'New' and following the dialog boxes or refer to the 'Configure Logger' described earlier.

Either way we will need to save the logger configuration settings in the system registry.

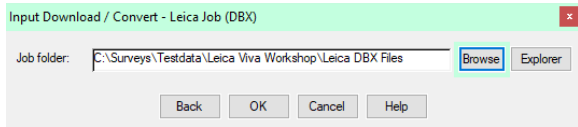
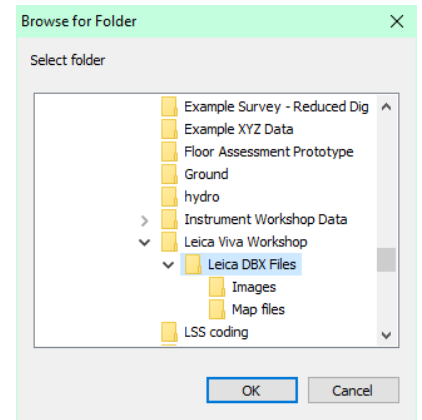
'Next'

Select the DBX folder by either;

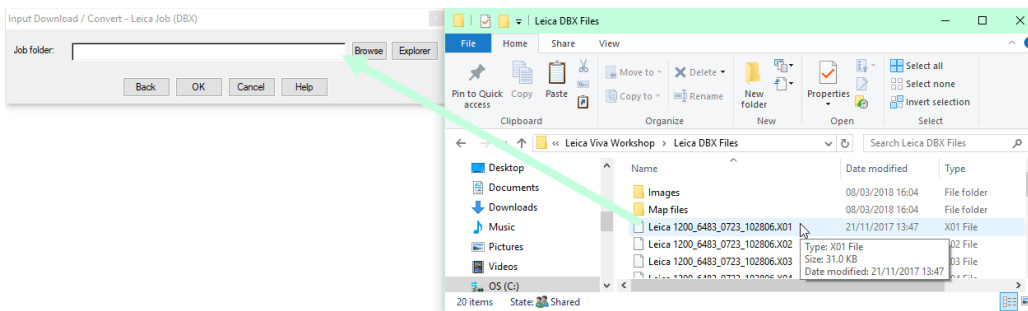
Clicking Browse (particularly useful when the DBX folder is on a CF card)
and Click 'OK', or



'Browse' opens an explorer window
And starts in the root directory.



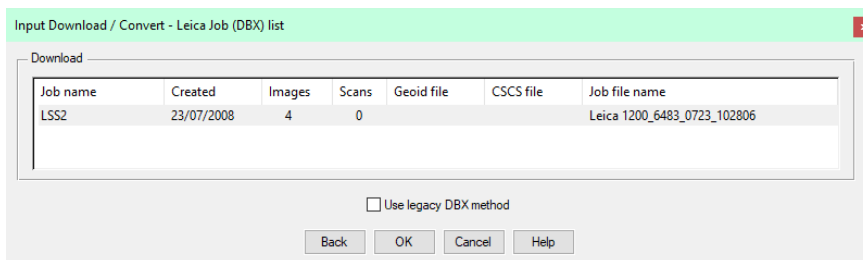
Click 'Explorer' (particularly useful if the DBX folder is already on the PC).
This uses a Windows Explorer dialog from which the DBX files (or the folder itself) can be selected using 'drag and drop'.



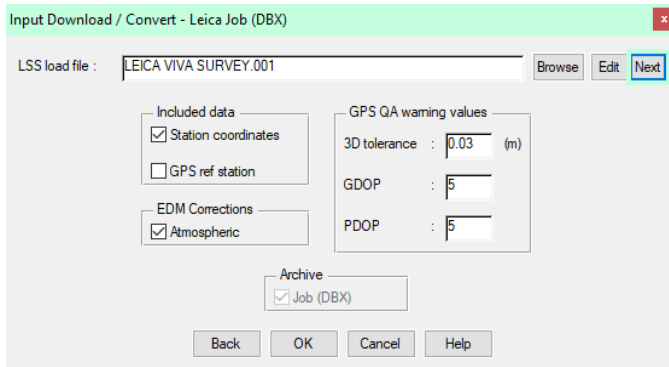
We can open the DBX folder and drag the .X01 file into the 'Job folder'.

Clicking 'OK' to the selected Job folder will provide a list of the Jobs in that folder.
Select the required Job and click 'OK'.

Note: For Viva (or later) instruments each Job is located in its own folder



The LSS Load file is prompted in the next window invoked by 'OK' in the previous



Leave the other settings as per default

'Archive DBX job database' will copy the database files to a sub-folder of the current survey. The job database files (DBX) are not expected to be 'archived' if they are already in a folder under the current LSS survey folder tree and the option will be greyed.

Click 'OK' and LSS will attempt to convert the data.

3.4 Data Processing in LSS – Inputting Data

3.4.1 Introduction

The 'LSS Load Input file' is the format by which all external data is processed into LSS e.g. data from a survey instrument has to first be converted to a load file via the **Input Download & Convert** option.

Loading data into a survey model

The **Input Load** command will invoke the following window, highlighting the correct load file i.e. '.001' if 'Save and Load' has been chosen at the end of the conversion process.

A Load Report file will be generated – we select the file type.

A conversion file can be invoked if, for example, the field codes on the logger require changing to the LSS feature codes in the survey's legend

Leave the options as per default, but please note the layout changes in version 10

And the options to set up annotations for features, particularly for utilities surveys

'Next'.

```
HiEditor
File Edit View Tools Help
|LSS load file using Leica Stylesheet v0.987
20, Created 2018/03/08 16:39:52
30, Job Name, LSS2
40, Description, TEST2
50, Date 2008-07-23, Time 10:29:45.82
60, Instrument Type TCR1204, Ser. No. 237117
70, Instrument Type TCR1204, Ser. No. 123456
81, METRES
91, DMS
10
111, VASD
120
130, Setup coords
140
150, Dt2008-07-23-10:29:46.23
16
172, T1, 999.996, 1000.001, 99.999
18
19
202, T2, 999.996, 1017.807, 105.236
210
220, Setup setOrientation
230, -----
240, Set-on station T1, Instrument height 1.600
253, T1,, 1.600
260
270, Azmos (ppm/scale) = 0.00 / 1.000000000
280, EDM Target 0.0000m (34mm) reflectorless
290, Control obs
305, T2, 0.00.000, 78.27.125, 18.174, 0.000, -ST
310, Control obs
325, T2, 359.59.581, 78.27.133, 18.174, 0.000, -ST
330, Control obs
345, T3, 270.07.505, 79.00.218, 3.377, 0.000, -ST
350, EDM Target 1.3000m (23mm) Leica 360° Prism
365, T1, 13.23.479, 91.25.163, 13.184, 1.300, .R1
375, T2, 10.41.039, 91.16.339, 14.839, 1.300, -500.500/0.000, F, K1
385, T3, 8.22.531, 90.55.154, 16.625, 1.300, CS1, K1
395, Image, Img_0003_141112_152721.JPG
405, T4, 2.40.095, 91.15.437, 15.901, 1.300, CS1, .R2
415, T5, 9.55.255, 91.28.539, 14.307, 1.300, K2
425, T6, 5.11.493, 91.36.275, 12.963, 1.300, PGV, K2
435, T7, 5.24.386, 91.55.222, 11.604, 1.300, K2
445, T8, 3.36.247, 92.14.459, 10.646, 1.300, .DK, .K3
455, T9, 356.28.376, 92.25.211, 9.914, 1.300, K3
465, T10, 347.06.056, 92.15.212, 9.846, 1.300, K3
475, T11, 340.55.318, 92.02.401, 9.939, 1.300, K3
485, T12, 0.19.461, 92.10.080, 11.041, 1.300, FIC
490, STORM
505, T13, 355.53.329, 92.14.271, 10.578, 1.300, .IC1
515, T14, 355.08.034, 92.05.305, 11.180, 1.300, IC1
525, T15, 351.38.463, 92.06.475, 10.757, 1.300, -REC, IC1
535, Image, Img_0015_151112_114008.JPG
545, T16, 341.04.424, 91.53.029, 10.939, 1.300, PDS, P56
M | LEICA VIVA SURVEY.001 |
NUM 00 Ln1 Col0 Sel0
```

Clicking the 'Edit' button next to the Load file 001 will open the Load file in the editor configured / reviewed earlier (see next page for an explanation of the load format command lines).

The Load file can be viewed and edited to address any issues raised during **Input Load**.

'Next' will start the **Input Load** survey process but usually we will want to open the load file first to check through all the set ups, target heights and feature coding.

A load file can contain either radial observations, coordinate observations or both, which can be opened in HiEditor;

3.4.2 An Explanation of the LSS Load File Format

A load file can contain either radial observations, coordinate observations or both, which can be opened in Programmer's Notepad;

Radial and coordinate record types

0 = Comment line containing information that will not be processed by LSS, such as the surveyors name, date and time of the survey.

1 = Parameters record containing e.g. survey units and angular settings.

2 = Station coordinate record.

20 = Station coordinate control observation used as a check and commonly encountered with GPS survey equipment to verify a survey station position.

6 = An item of general annotation (normally text entered on a survey instrument or logger as a comment or note). Such annotation will be shown in the LSS survey centred on the previously surveyed point.

9 = End of file marker. It is not necessary to have one of these at the end of the file.

Radial only record types

3 = An instrument setup record with set-on station, followed by backsight station, backsight angle, instrument height, vertical angle collimation and station scale factor. Some of the fields may be blank as in this load file as LSS will be getting information from lines which follow.

4 = A control observation where the final field is the station name. If there is a 4 record following a setup record, this will provide any missing information in the setup record. This is identical to a '5,' record with a '-ST' code.

5 = A 'detail' record which contains an observation to a surveyed point with the feature code appearing in the last field. Multiple features may be specified and separated by either a comma or a forward slash.

This record type may also be a control observation, where '-ST' is the code, with the station name either following this or being taken from the observation number field.

We may also use the special or Reserved codes, described in detail in the next session.

Coordinate only record types (not shown in this example)

21 = A coordinate record. Instead of collecting radial data it is possible to collect and convert coordinates, e.g. for GPS survey data. These survey data can also use Reserved codes.

Note: The load file header includes the following information as comments;
Coordinate system used (including the geoid and CSCS files used).

Transformation name and type

Projection Scale factor

Note: The processing will also include comments on;
Which detail observations have zero values and have been removed
Whether a station observation is being used as 1d, 2d or 3d.

1d stations observations are commented out and not used, unless it is the only one in the set-up, in which case the load file set-up record uses its values as the backsight name and

horizontal angle.

2d station observations have their target heights removed so that height differences are not attempted to be

Whether a station coordinate is 1d, 2d or 3d.

If a station's xyz coordinates are all zero then it is ignored.

If it is 1d it is reported but not used

If it is 2d it is reported and used.

Note: The set-ups in the load file are annotated with the Set-up type.

As the load file is processed so a report is produced showing all relevant information e.g. comments, setups and control observations. Any warnings or errors found in the data set will cause the processing to pause. An error will not allow **Input Load** to complete.

```
Input Load
Difference (slope distance) 0.001
0079 : 0, Control obs
0080 : S, T2, 0.00.047, 78.27.225, 18.173, 0.000, -ST
To T3      HA      VA      SD      TH      Easting  Northing  Level  ObsNo
Expected  0 00 00    78 27 21  18.174          999.996  1017.807  105.236
Observed   0 00 05    78 27 23  18.173          999.996  1017.806  105.236
Differences 0 00 05    0 00 02  -0.001          0.000      -0.001    0.000
Difference (slope distance) 0.001
0082 : 0, Conversion Report
0084 : 0, Stations 2
0086 : 0, Setups 1
0088 : 0, Converted radial obs. 36
0090 : 0, Converted images items 4
0092 : 0, Converted textual items 3
0094 : 9

File verified successfully.
Press : Continue to update DTM or
       Cancel to terminate Load...
```

```
Input Load
0067 : 0, EDM Target 0.5000m (23mm) Leica 360° Prism
0071 : 0, EDM Target 1.3000m (23mm) Leica 360° Prism
0075 : 0, EDM Target 0.9000m (34mm) reflectorless
0076 : 0, Control obs
0077 : S, T2, 0.00.043, 78.27.231, 18.174, 0.000, -ST
To T3      HA      VA      SD      TH      Easting  Northing  Level  ObsNo
Expected  0 00 00    78 27 21  18.174          999.996  1017.807  105.236
Observed   0 00 04    78 27 23  18.174          999.996  1017.807  105.236
Differences 0 00 04    0 00 02    0.000          0.000      0.000    0.000
Difference (slope distance) 0.001
0079 : 0, Control obs
0080 : S, T2, 0.00.047, 78.27.225, 18.173, 0.000, -ST
To T3      HA      VA      SD      TH      Easting  Northing  Level  ObsNo
Expected  0 00 00    78 27 21  18.174          999.996  1017.807  105.236
Observed   0 00 05    78 27 23  18.173          999.996  1017.806  105.236
Differences 0 00 05    0 00 02  -0.001          0.000      -0.001    0.000
Difference (slope distance) 0.001
0082 : 0, Conversion Report
0084 : 0, Stations 2
0086 : 0, Setups 1
0088 : 0, Converted radial obs. 36
0090 : 0, Converted images items 4
0092 : 0, Converted textual items 3
0094 : 9

File verified successfully.
Press : Continue to update DTM or
       Cancel to terminate Load...

File loaded successfully.
Press : "OK" to close this window
```

The end of the Input Load Report should appear, with a note

***** Warning(s) issued ***** recognising that some warnings had been issued.

Any misclosures that exceed the 'warning' parameter are labelled Large differences, and Load will pause. Likewise for any that exceed the 'error' parameter except that here Load will not complete.

If we scroll back up the following report file, we might find 'Warning : Feature does not exist.' and 'Warning : Large Difference.' Warnings have been generated during the **Input Load** process. Otherwise, click 'Continue' to update DTM and 'OK' to close window.

If a loaded feature is not found in the Legend, then the 'Warning : Feature does not exist.' is created. We will also be prompted to save new feature selections to a CNV file.

For each control observation, the combined 3D measured 'slope distance' is compared with any stored values and tested against the 'Control Tolerance' warning and error values set in 'Survey Parameters'.

Those control observations with 'Warning : Large Difference.' next to them, are where the warning tolerance (0.01m) was exceeded (but not the error tolerance).

Note: if an observed station does not exist in the survey, then the **first** observation is used to compute its coordinates – they are not meant here. Subsequent station 'shots' become 'check' observations'.

Note: if any **errors** are encountered the load will not be permitted. It will be necessary to review these errors and maybe respecify the error tolerance to allow the load.

Often errors occur simply because the stations have been incorrectly labelled during the set-ups, or there is one poor observation.

To correct these, click 'Back' and then 'Edit' to open up the load file. If you have set 'PFE' as your editor program then use 'CTRL+G' to go to the line directly.

If available, Click 'OK' to continue and 'Continue' to complete the load and display the data. This includes updating the triangulation to create the DTM.

3.5 Leica 1200 Format File

In normal circumstances the format file is not required for the Leica 1200 when using LSS because the DBX Reader replaces the need for its presence on the instrument. However, if it does become necessary to use a format file it is important that the right one is used. The correct one can be found on the LSS DVD in "`\\support_files\Leica\1200\format\lss1200.frt`".

This will allow the user to export a file from the instrument that is identical to that created in the Job reader (Legacy mode).

You will need the LSS format file if;

There is not a working version of the DBX reader available

In this case copy the format file to the CF Card and then Transfer it from the CF-card to System RAM using the similar procedure to transferring the code list shown earlier.

Then from the main menu choose 4 Convert then 1 Export Ascii and then select the LSS format file.

This will create a file identical to the SVY file created by the DBX Reader and can be copied to the PC.

Following the processing sequence shown earlier just tick the box 'No data transfer/download' which will skip the DBX reader and then Browse the exported file as 'Downloaded file' in the conversion dialog.

There is a need to post-process the DBX data in Leica Geo Office.

When using conventional GPS it may be necessary to post-process the observations with Rinex data in Leica Geo Office. In this case use the option 'Export / Ascii' with the following settings;

File type Custom Ascii

Right click on New Settings – Add name

Settings button

Coord class – Current

Sort by – time i.e. not Point ID

Format template: use LSS1200.frt from the "`\\support_files\Leica\1200\format`" folder on the LSS media.

Deactivated points – 'turn off'

Note: This will not include the free codes.

Processing in LSS

Following the processing sequence in 'Input / Download and Convert' shown earlier just tick the box 'No DBX read (convert GSI data file)' which will skip the Job reader and then Browse the exported file as the 'Downloaded file' in the conversion dialog.

3.6 GPS Survey Instrument Issues

GPS data can be read directly from the DBX Job when CSC and/or GEM projection files are in use as long as the GPS coordinate system is OSTN02 or OSTN15, or similarly for Northern Ireland and the Republic of Ireland.

Note: During the **Input Download / Convert** process LSS will report if a job is using CSCS or GEM files on the job list.

Or as a local grid via a coordinate transformation or a fixed base station and the levels relate to Orthoheights.

Combined GPS (coordinates) data and TPS (radials) data will be processed simultaneously during the same DBX read.

Scale factor

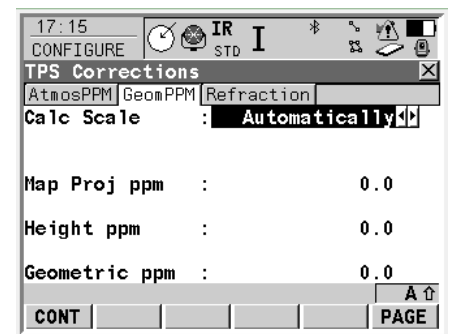
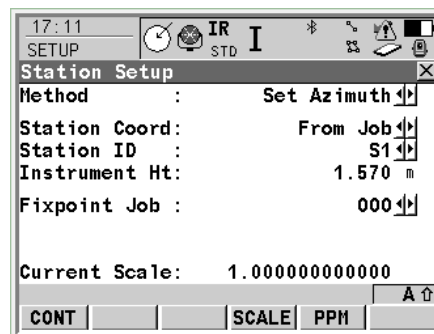
If the Job coordinate system contains a scale factor then LSS can also apply this and therefore correctly maintain the radial (TPS) data with the GPS data in the same LSS model as long as the Geometric scale factor is automatically set on the instrument

For the 1200:

Select the 'Station Setup' dialog

Click 'Scale'

Set "TPS corrections /
GeomPPM / Calc Scale" to
Automatically.



This enables LSS to set the relevant scale factor for each individual station and apply this to each shot in the set-up and also to seamlessly process Smartpole data.

The grid scale factor in an LSS model can be changed to a local grid using File\Transform\Scale. This requires the use of File Transform to first Transform Obs as XYZ (which converts all radial observations to XYZ).

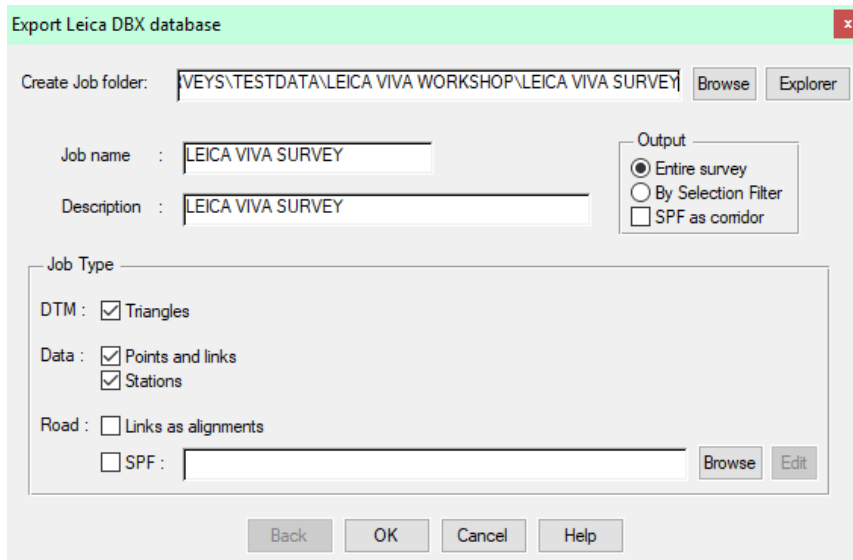
Chapter 4

4.1 Exporting Data to the Leica 1200 Datalogger

LSS has the option to export direct in DBX Database format, which is the most convenient option for the Leica System 1200 platform instruments;

From the main menu, select

Export Leica DBX database.



Specify a name for the exported file and click

Standard survey'

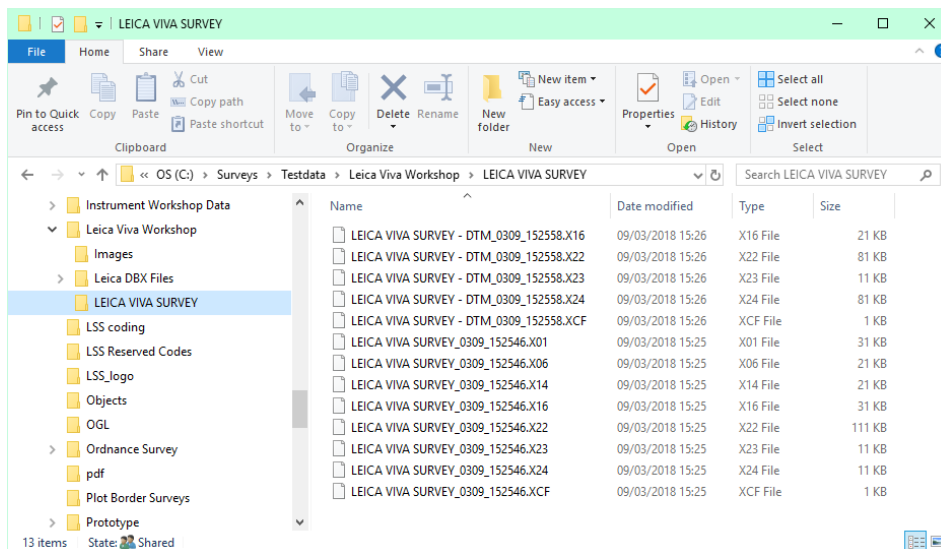
Note:

DTM and Road (alignment SPF) are also available.

'OK'

LSS will export the *entire survey* into the necessary DBX files which are copied onto the instrument card job folder via the card reader.

With DTM, the DBX files are placed in another subfolder.



Conclusion

Using this manual, we hope that you will be in a position to start making the most of the survey instrument.

We strive to cover and support as much of the capabilities as possible but there are always new methods and developments, so do keep in contact by visiting the LSS Help and other on-line resources or call our support line.

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