

# Instrument Manual

Interface to Leica Viva

**LSS<sup>TM</sup>**

*Leica*  
**Geosystems**



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# Introduction

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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.

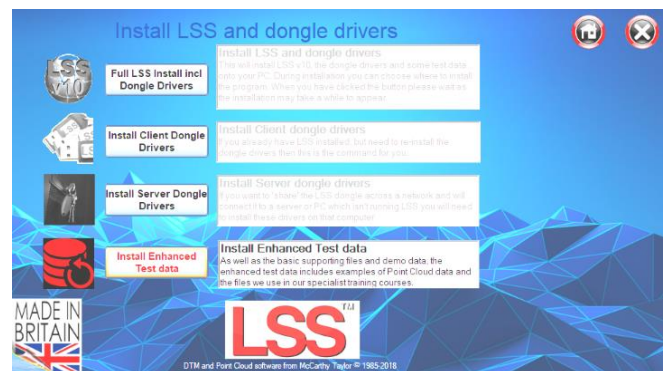
Select 'Install LSS & Test Data';



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

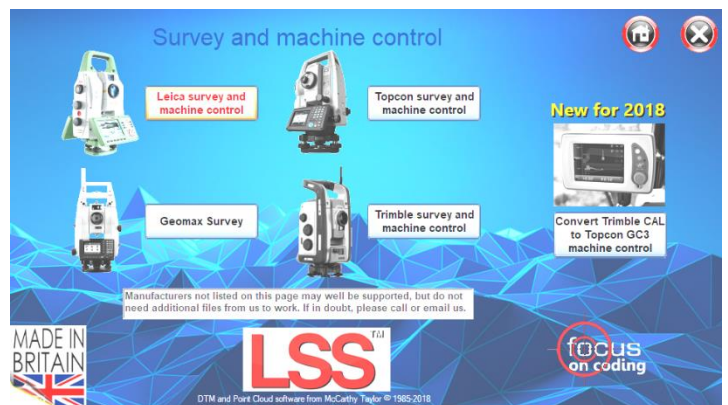
'Survey & Machine Control',



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;



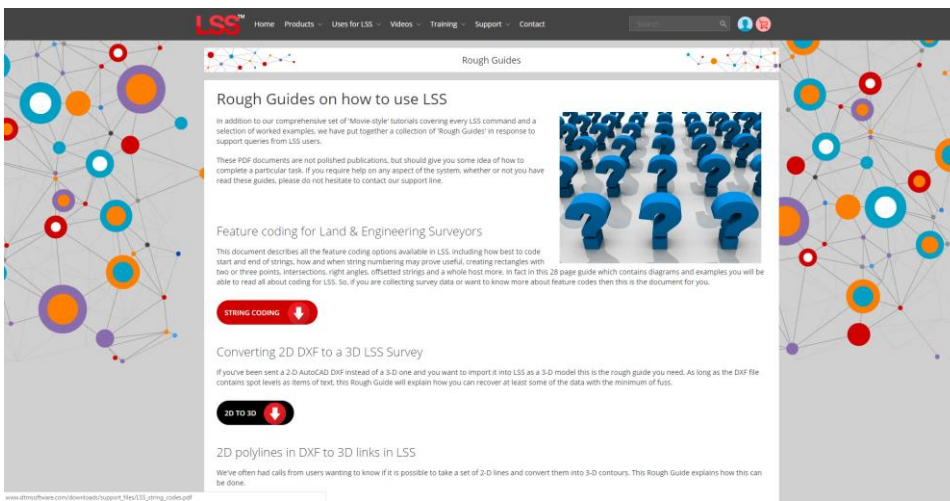
### 1.3 LSS Rough (How to) Guide

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

The 'How to Guides' are pdfs documents.



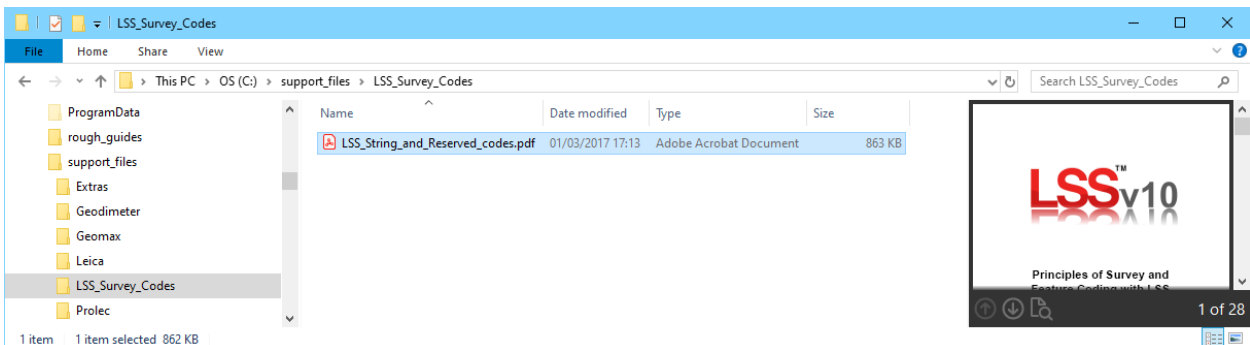
#### 1.3.1 LSS String coding and Reserved codes



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

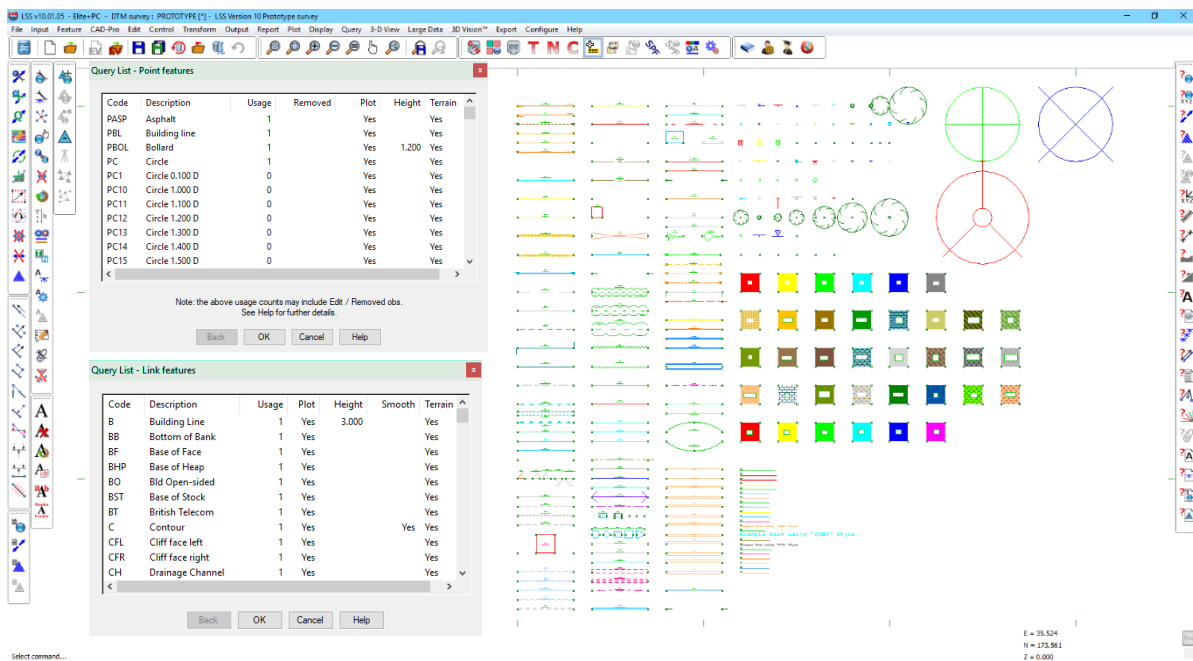
'Support\_Files\LSS\_Survey\_Codes'

The rough\_guides folder can also be accessed via the Windows Explorer window;



## 1.4 Example Codelists

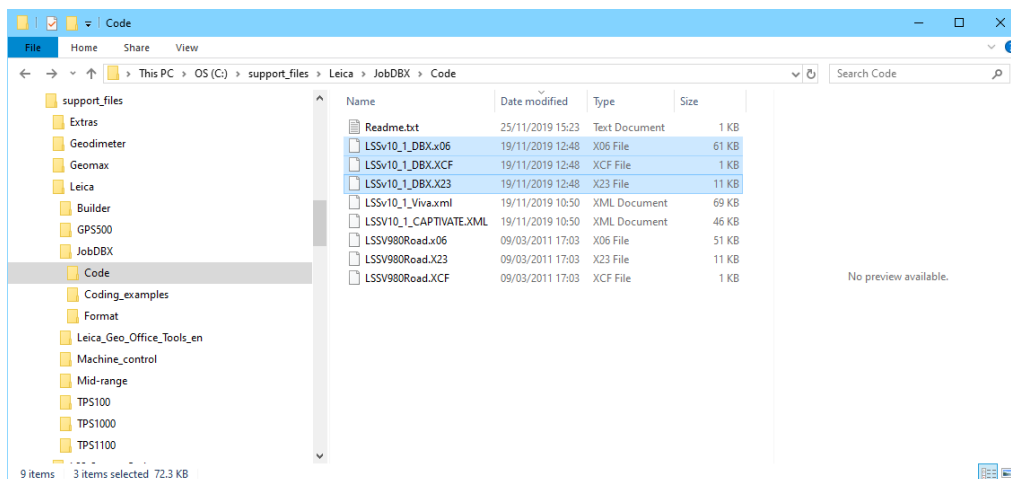
It is recommended that a feature library is copied to the instrument prior to carrying out any surveying tasks and code lists for many loggers have been created based on the standard LSS Prototype Survey File - **PROTOTYPE.LSS** ;



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.

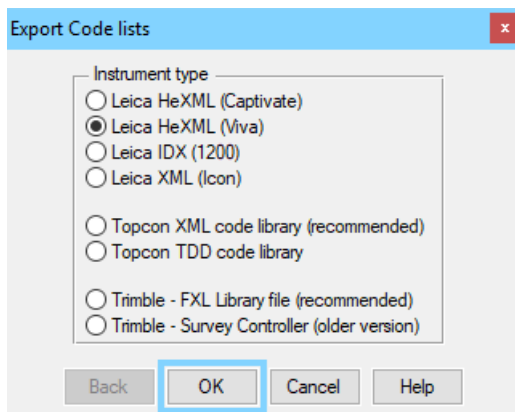
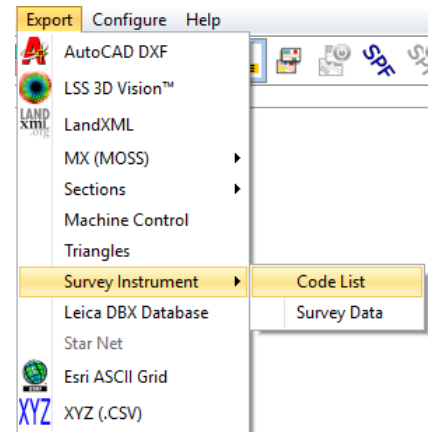
LSSv10\_1\_Viva.XML - Exported for Leica Viva as .XML file

LSSv10\_1\_Captivate.XML – Exported for Leica Captivate as XML file

However, with the demise of LGO Tools has gone the option of that program’s Code List Manager and hence an alternative is now available from within LSS Prototype.LSS survey.

The command

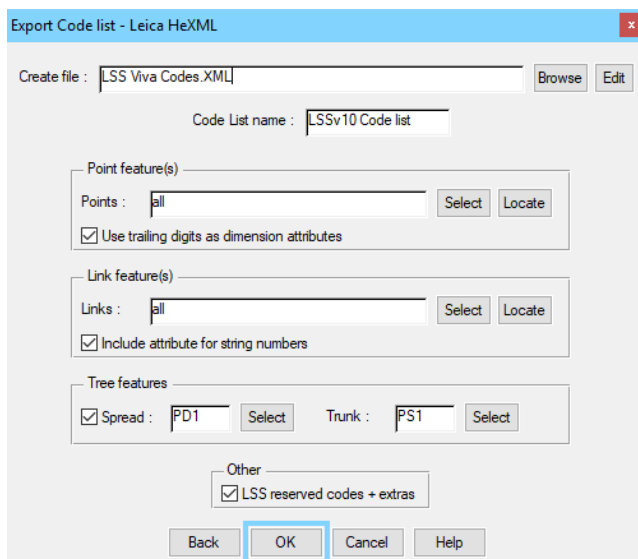
### Export Survey Instrument – Code List



Allows

'Leica HeXML (Viva)'

To be selected from the list.



This export method has been used to create a code list for the latest LSS v10 Prototype – LSSv10\_1\_Viva.XML.

When starting a new job on the logger, it can be configured to include this code list.

The **LSS Export** command is covered later on in this workshop.

## 1.5 Configuring Leica Viva

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 TPS and GPS.

**Code list** – An example code list has been built from the LSS prototype legend (supplied with Testdata) on the LSS DVD (in 'Support\_files\Leica\1200\Code\_list') and already copied to the C: drive folder earlier.

The following steps explain the method of transferring this code list to the Viva logger;

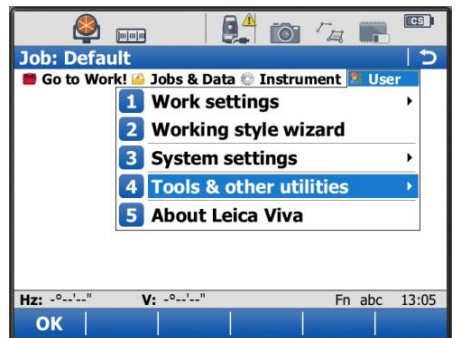
Copy the required Code list files **.XCF**, **.X06** and **.X23**, from the LSS DVD '**Code lists**' folder to the '**Code**' folder on the card or USB memory stick.

Transfer the Compact Flash card / USB memory stick from your computer to the Viva logger.

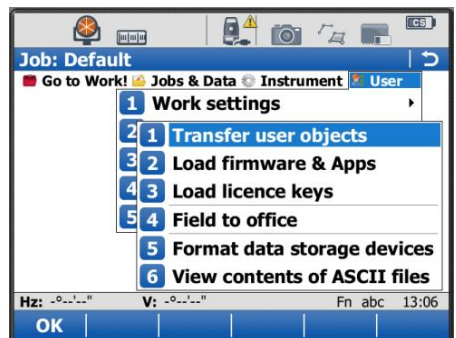
Select **User** from the Main Menu.



Select option **4 Tools & other utilities**.



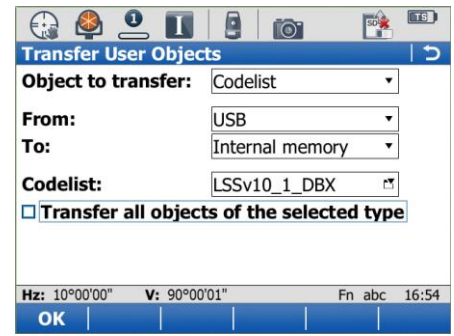
Select **1 Transfer user objects**.



In the 'Transfer User Objects' screen select "Codelist" as the Object to transfer from

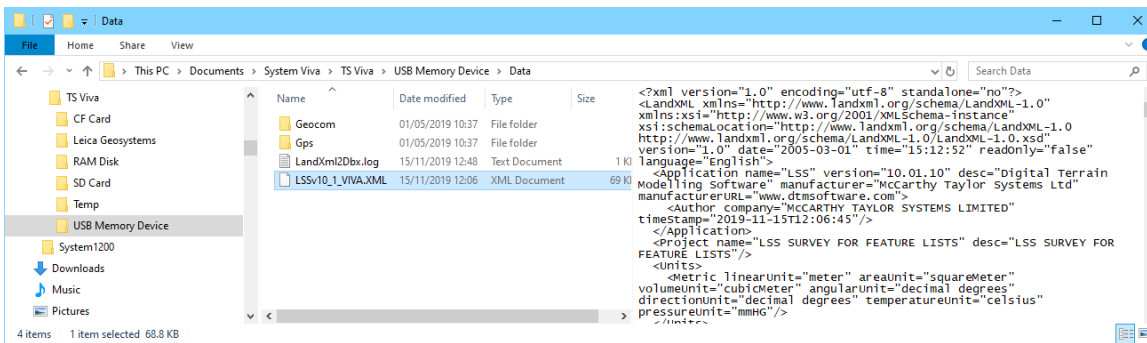
'From' CF Card or USB

'To' Internal memory, select the relevant code list and OK [F1].



Alternatively, and for the latest or a specific LSS Viva Code List we can make use of the LSSV10\_VIVA.XML exported from LSS and copy this to the USB for transferring to the logger.

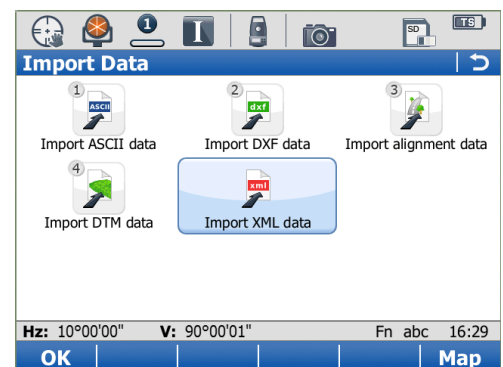
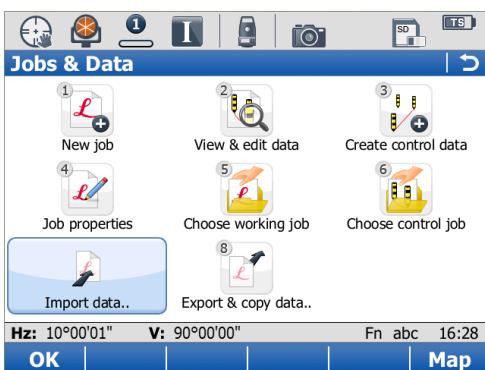
**Note:** We need to ensure the .XML code list is in the Data folder of the USB flash drive (NOT Code folder).



In Leica Viva we need to open a Job, for example 'Default' and 'Jobs & Data'



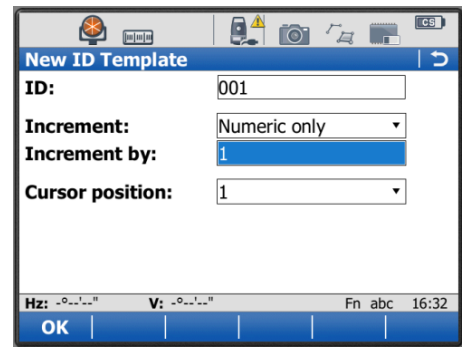
followed by 'Import data' and 'Import XML';





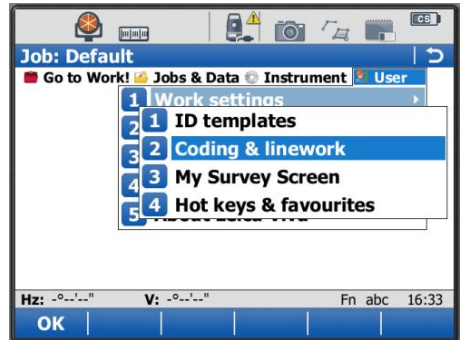
In LSS for detail observations, the equivalent Observation Number is numeric only, so set the ID to 001 or 0001.

This will result in all the observations being listed in the correct order.

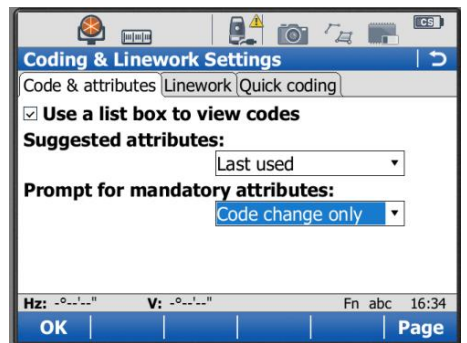


Go back to the 'User' menu and select

## Coding & Linework



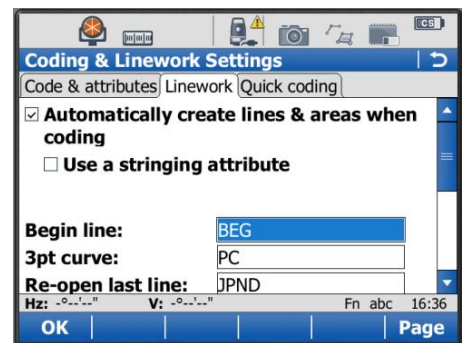
Under 'Code & attributes' tick the box to 'Use a list box to view codes', then set the 'Suggested attributes' to 'Last Used'. This means that values added for a feature / string number will be the next default input.



'Prompt for Mandatory Attributes' should be set to 'Code change Only' so that making a shot without changing the code will not request the attribute values again e.g. a row of trees all with the same dimension.

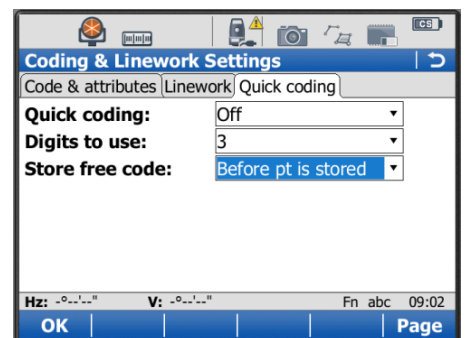
Under 'Linework' tick the option to 'Automatically create lines & areas when coding'.

LSS uses the 'Begin Line' setting in the 'Linework' tab to automatically recognise a start of string. It must be set to the default 'BEG'. Alternatively the LSS start string '.' character could also be used.



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

The 'Store free code' is set to 'Before pt is stored' which means all Free code [F7] additions made before a shot apply to that observation.

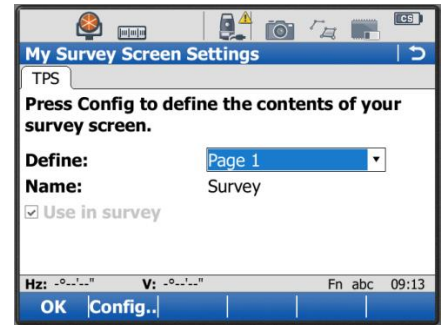


## 1.5.2 My Survey Screen Settings

The 'My Survey Screen Settings' 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 last attribute.

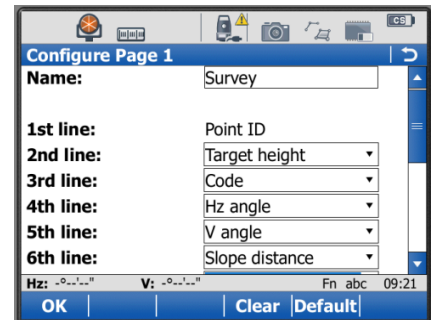
To create these settings, choose 'User' from the main menu and then 'Work Settings', then 'My Survey Screen'

Select to 'Define' 'Page 1' for 'Survey' then click 'Config'

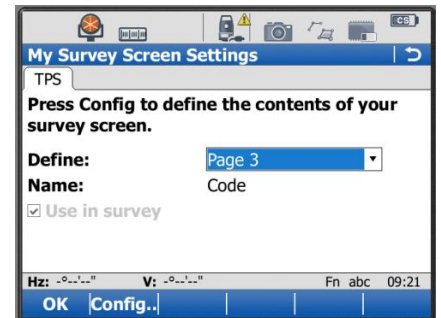


Set each line for the display as indicated here.

Once complete, click 'OK' or [F1]

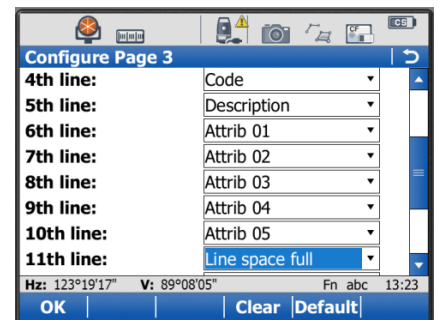
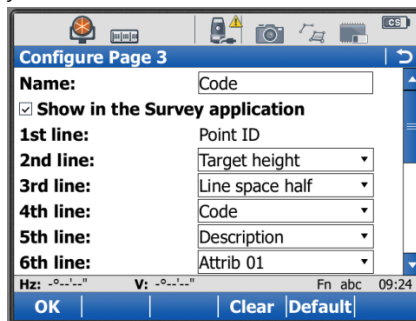


Select to 'Define' 'Page 3' for 'Code' then click 'Config'



Again, set each line for the display as indicated here:

Once complete, click 'OK' or [F1]





# Chapter 2

## 2.1 Instrument Data Capture on a Leica Viva

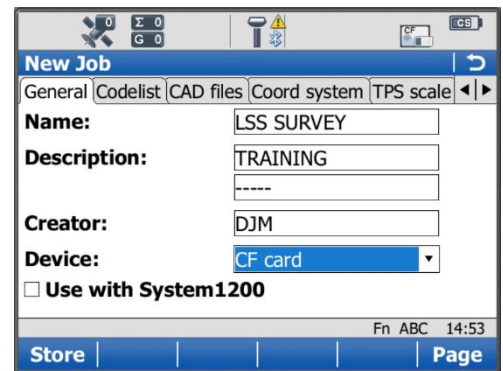
### 2.1.1 Creating a New Viva job

Select option 'Jobs & Data' from the Main Menu



Select the '1 New Job' list and 'OK'.

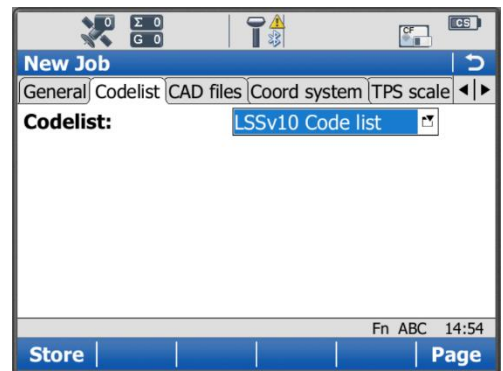
Type in the **Name** and other settings under the **General**. Tab.



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

**Note:** We should find the LSS Codelist that was copied and transferred over to the internal memory.

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



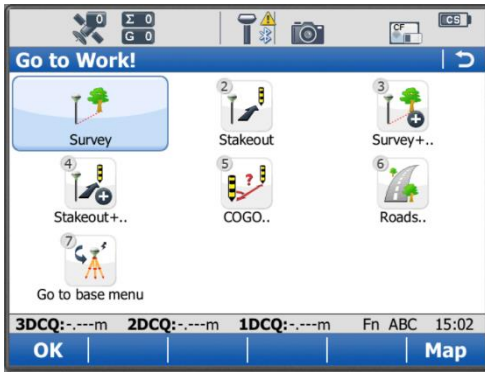
You are now ready to start detailing.



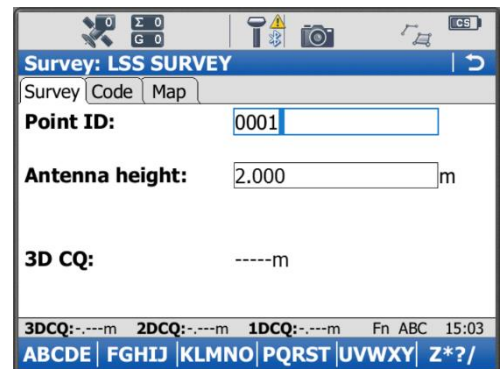
## 2.1.2 Detail Procedure

LSS uses Point, Point with Line and Free coding. The Codes are accessed via the display entry 'Code' and the Free Codes via the [F7] key. In each case the relevant Codelist is displayed as exported from LSS (see the LSS DVD 'support\_files' folder).

From the 'Go to work' menu select 'Survey'



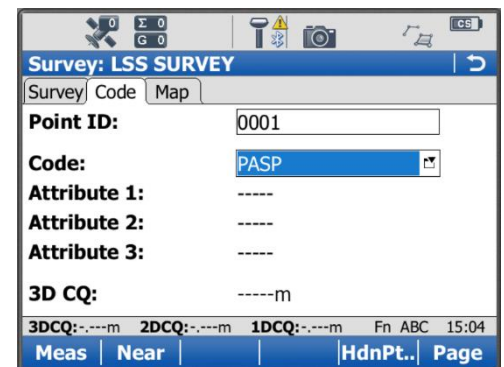
In the 'Survey' Tab set the Point ID to start at 0001



In the 'Code' option click the list icon

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.



'OK' will return to the display mask with the highlighted feature code.

**Attributes** - The display mask **LSScod** will show the required attributes (either integer, real, text or choice list) for the selected feature code.

**Note:** The LSS default for mandatory attributes is 'Only on code change'. The default values as set in the Codelist.

**Note:** The current feature remains active on repeated measurements.

**Note:** It is necessary to use the **ATTRIB** button on the code list to change an attribute that is not set to Mandatory as per reserved codes, -REC and -RIN.

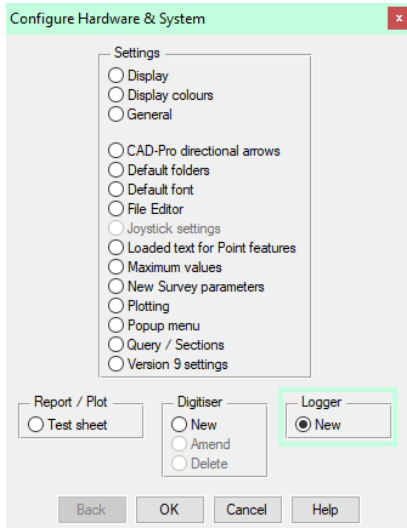
**Note:** The **LAST** button will show the last used codes in order.

# Chapter 3

## 3.1 Configuring LSS with the Leica Viva 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.

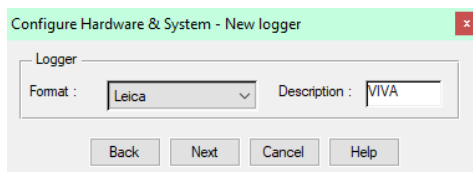
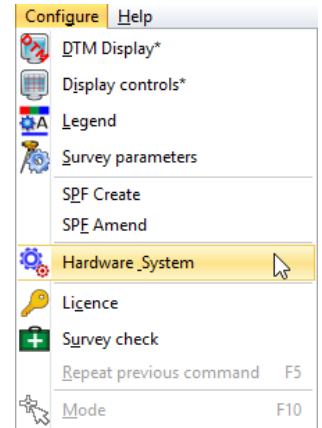
To configure our logger of choice in LSS we select **Configure Hardware & System**,



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.

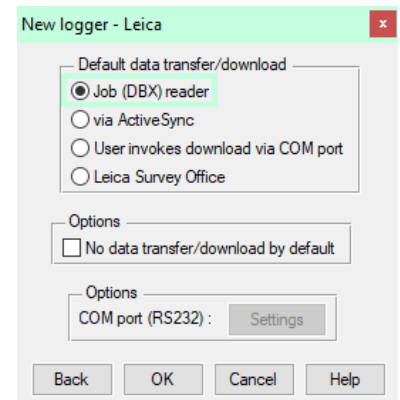
We will configure LSS for a Leica Viva;

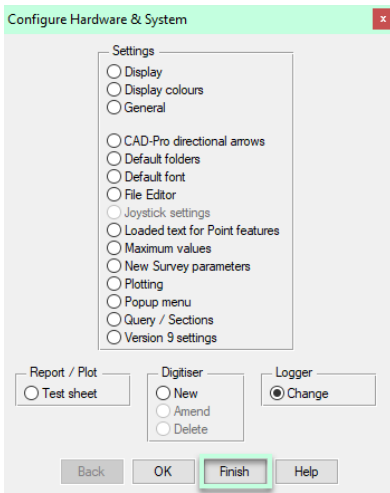
Select the logger format as 'Leica' and give the description as 'Viva'.

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.

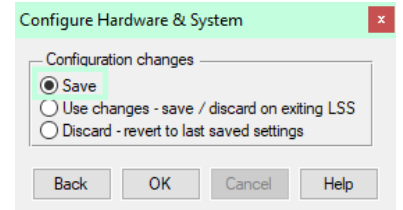
Next we choose the usual data transfer / download method.

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.

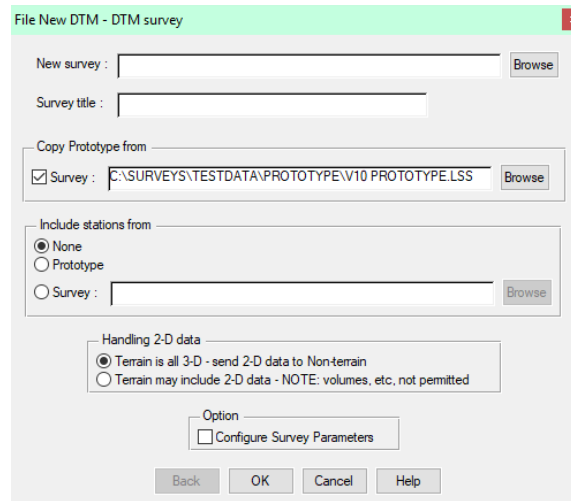
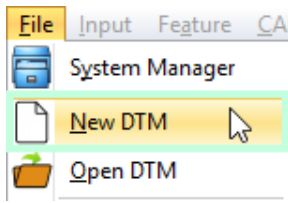


**Note:** This must be repeated for all PCs likely to be processing Leica System 1200 data. Once installed and configured, the Job reader will read the card and the list of jobs will appear in the next window. On selection of the Job to process LSS will directly create a Load file.

## 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.

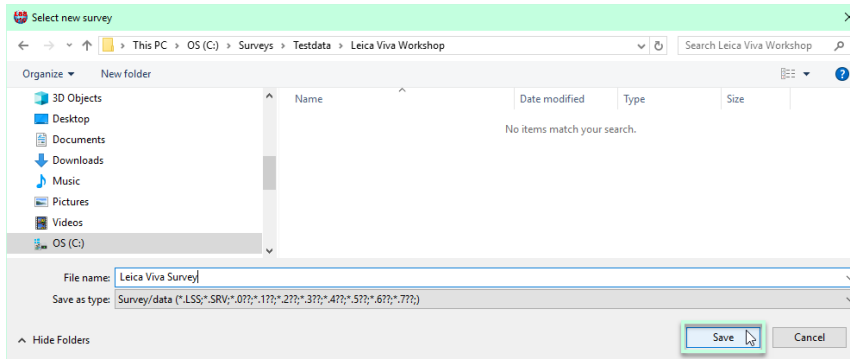
Select **File New DTM** from the main menu.



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'

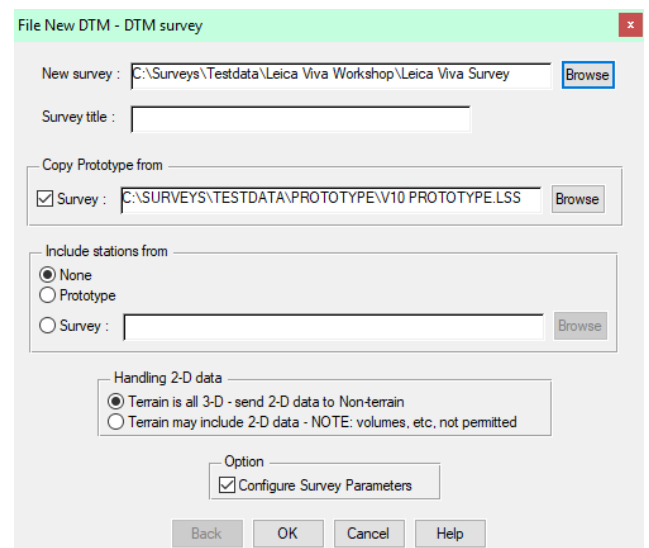
(if left blank LSS will use the survey name).

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.

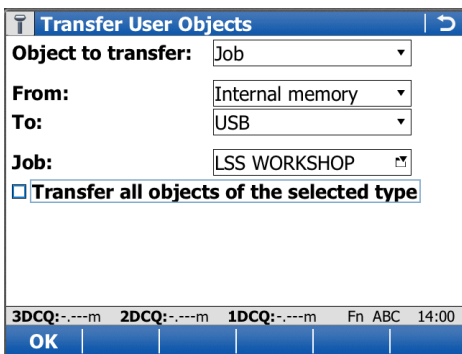
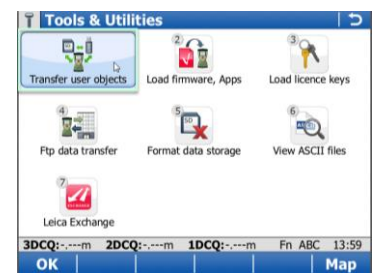
It is assumed that the surveyor will look to create a company specific prototype for their features in say C:\Surveys\Prototype and so will not be accessing the original LSS prototype in Testdata.

**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 and on the Leica Viva and Captivate loggers it is more convenient to use the USB stick once this has been formatted for the Leica instrument.

On the Leica main menu, we use 'User' – 'Tools & Utilities' – 'Transfer user objects';



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

'From' -Internal memory or memory Card

'To' USB

'Job' -Choose the name from the list.

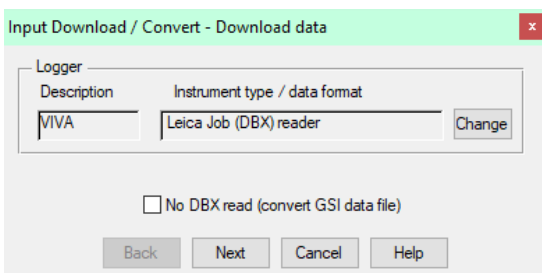
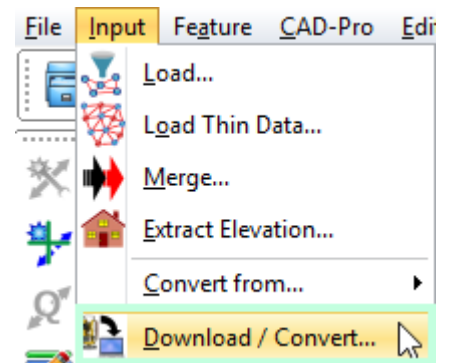
In this way the original job data is left safely on the logger and we avoid the need to remove the card. We have made a copy on the USB.

#### 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.

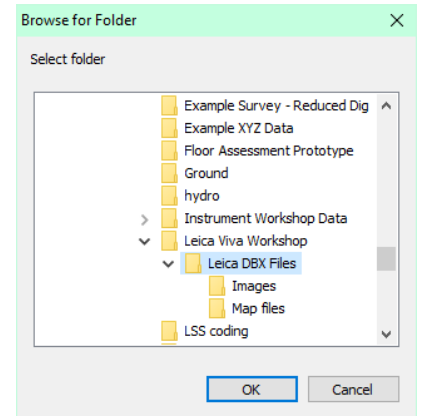
'Next'

Select the DBX folder by either;

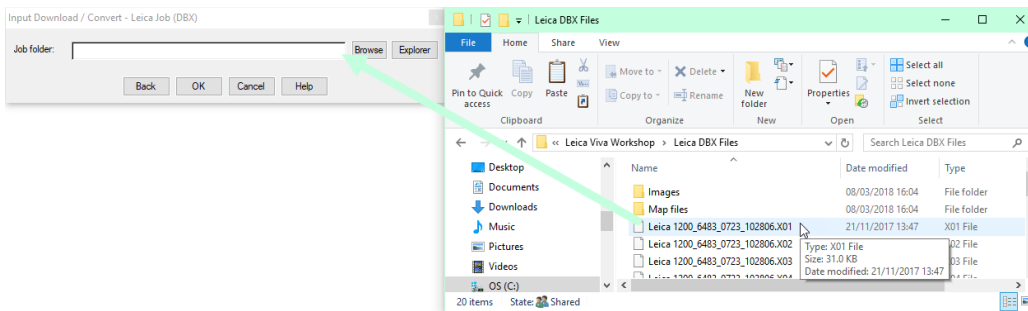
Clicking Browse (particularly useful when the DBX folder is on a CF card)  
and Click 'OK', or



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



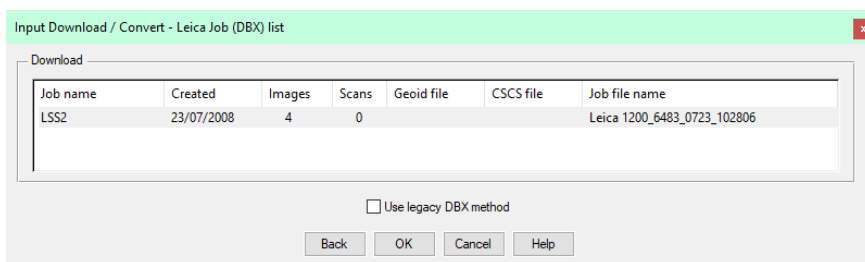
Click 'Explorer' (particularly useful if the DBX folder is already on the PC).  
This uses a Windows Explorer dialog from which the DBX files (or the folder itself) can be selected using 'drag and drop'.



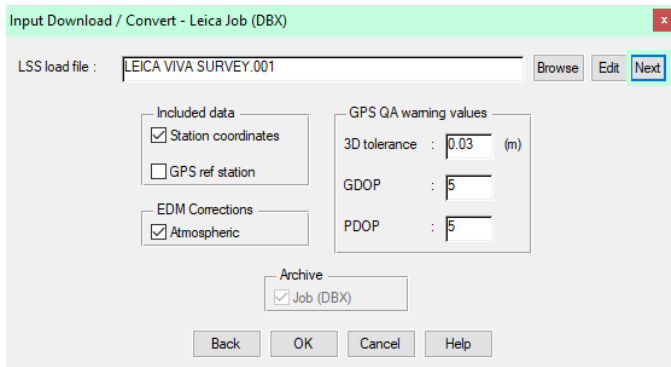
We can open the DBX folder and drag the .X01 file into the 'Job folder'.

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.



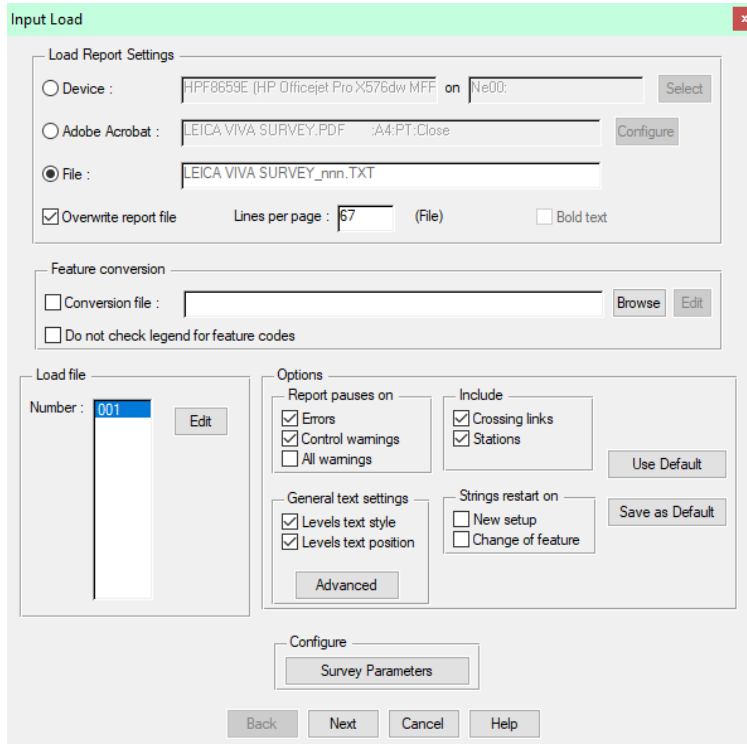
## 3.4 Data Processing in LSS – Inputting Data

### 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.



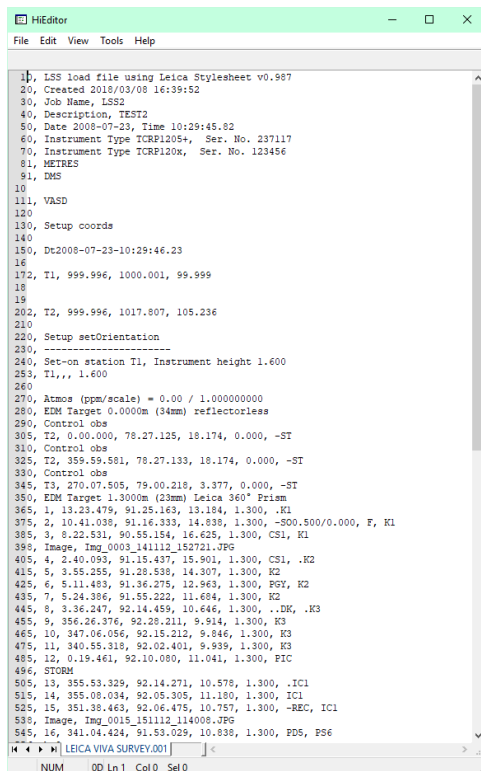
A Load Report file will be generated – we select the file type.

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'.



```
1 | LSS load file using Leica Stylesheet v0.987
2 | Created 2016/03/08 16:39:52
3 | Job Name, LSS2
4 | Description, TEST2
5 | Date 2008-07-23, Time 10:29:45.82
6 | Instrument Type TCR120S+, Ser. No. 237117
7 | Instrument Type TCR120X, Ser. No. 123456
8 | METRES
9 | DMS
10
11 | VASD
12
13 | Setup coords
14
15 | Dc2008-07-23-10:29:46.23
16
17 | T1, 999.996, 1000.001, 99.999
18
19
20 | T2, 999.996, 1017.807, 105.236
21
22 | Setup setOrientation
23 | -----
24 | Set-on station T1, Instrument height 1.600
25 | T1,, 1.600
26
27 | Azmos (ppm/scale) = 0.00 / 1.000000000
28 | EDM Target 0.0000m (34mm) reflectorless
29 | Control obs
30 | T2, 0.00.000, 78.27.125, 18.174, 0.000, -ST
31 | Control obs
32 | T2, 359.59.581, 78.27.133, 18.174, 0.000, -ST
33 | Control obs
34 | T3, 270.07.505, 79.00.218, 3.377, 0.000, -ST
35 | EDM Target 1.3000m (23mm) Leica 360° Prism
36 | T1, 13.23.479, 91.25.163, 13.184, 1.300, .R1
37 | T2, 10.41.039, 91.16.339, 14.839, 1.300, -500.500/0.000, F, K1
38 | T3, 8.22.531, 90.55.154, 16.625, 1.300, CS1, K1
39 | Image, Img_0003_141112_152721.JPG
40 | T4, 2.40.095, 91.15.437, 15.901, 1.300, CS1, .R2
41 | T5, 9.55.255, 91.28.539, 14.307, 1.300, K2
42 | T6, 5.11.493, 91.36.275, 12.963, 1.300, PGY, K2
43 | T7, 5.24.386, 91.55.222, 11.604, 1.300, K2
44 | T8, 3.36.247, 92.14.459, 10.646, 1.300, .DK, .K3
45 | T9, 356.28.376, 92.25.211, 9.914, 1.300, K3
46 | T10, 347.06.056, 92.15.212, 9.846, 1.300, K3
47 | T11, 340.55.318, 92.02.401, 9.939, 1.300, K3
48 | T12, 0.19.461, 92.10.080, 11.041, 1.300, FIC
49 | STORM
50 | T13, 355.53.329, 92.14.271, 10.578, 1.300, .IC1
51 | T14, 355.08.034, 92.05.305, 11.180, 1.300, IC1
52 | T15, 351.38.463, 92.06.475, 10.757, 1.300, -REC, IC1
53 | Image, Img_0015_151112_114008.JPG
54 | T16, 341.04.024, 91.53.029, 10.939, 1.300, PDS, P56
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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 T2      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 0.0000m (34mm) reflectorless
0076 : 0, Control obs
0077 : S, T2, 0.00.043, 78.27.231, 18.174, 0.000, -ST
To T2      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 T2      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 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.

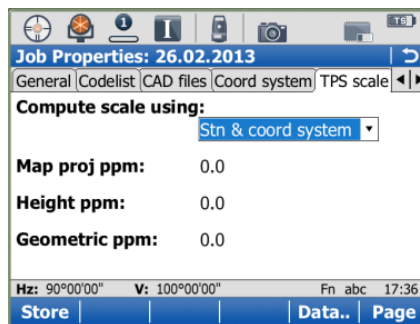
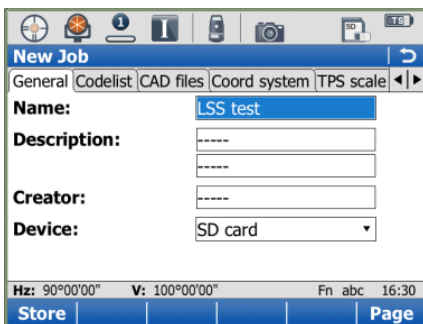
#### Scale factor

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

Select 'Jobs and Data'

Select 'New job' or 'Job properties' (if it is an existing job)

Set 'Compute scale using' to 'Stn & coord system'



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).

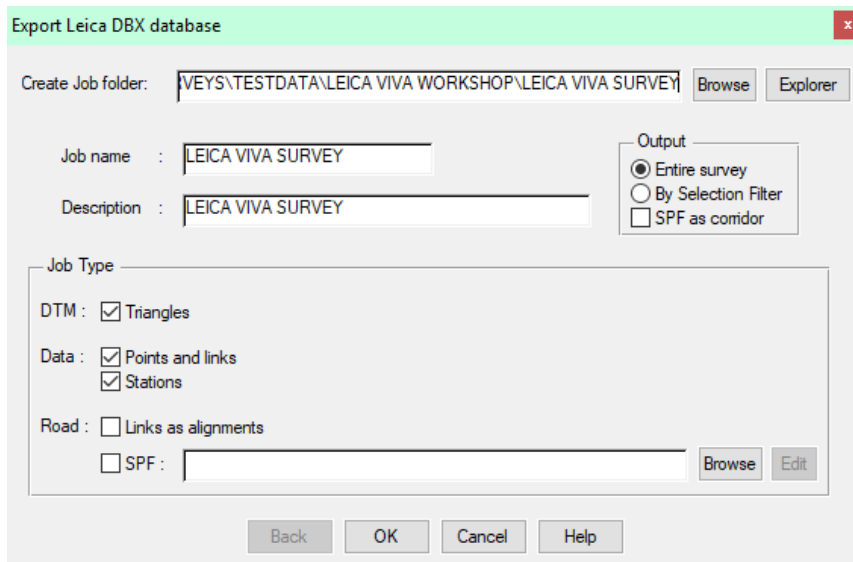
# Chapter 4

## 4.1 Exporting Data to the Leica Viva 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'

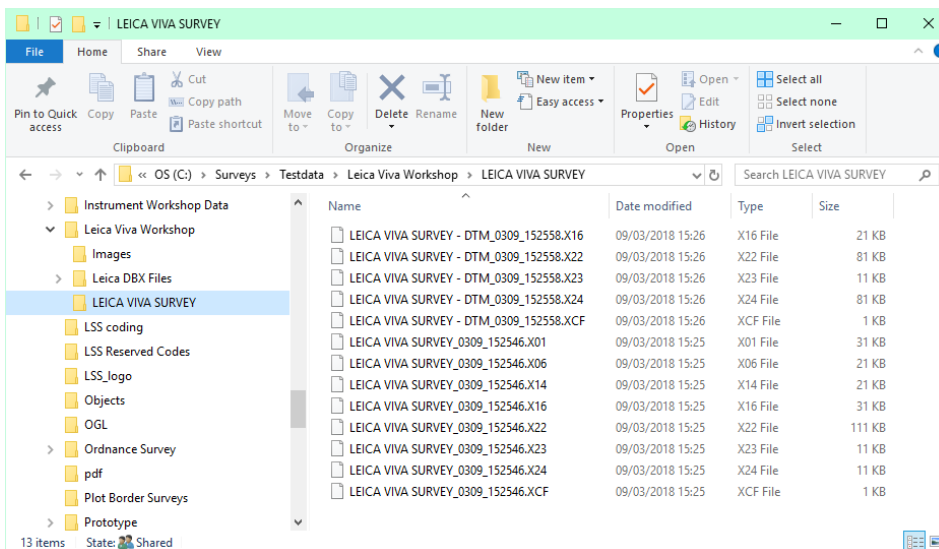
**Note:**

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.

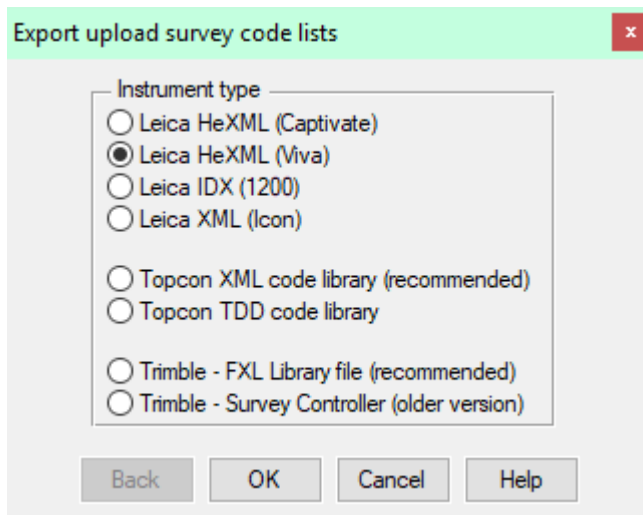
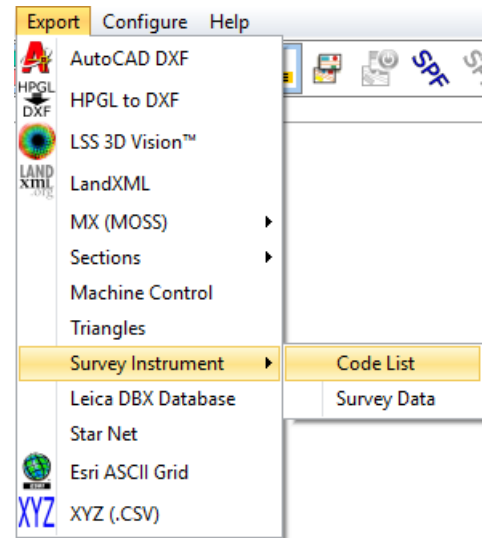
With DTM, the DBX files are placed in another subfolder.



## 4.2 Exporting Code List to the Leica Viva Datalogger

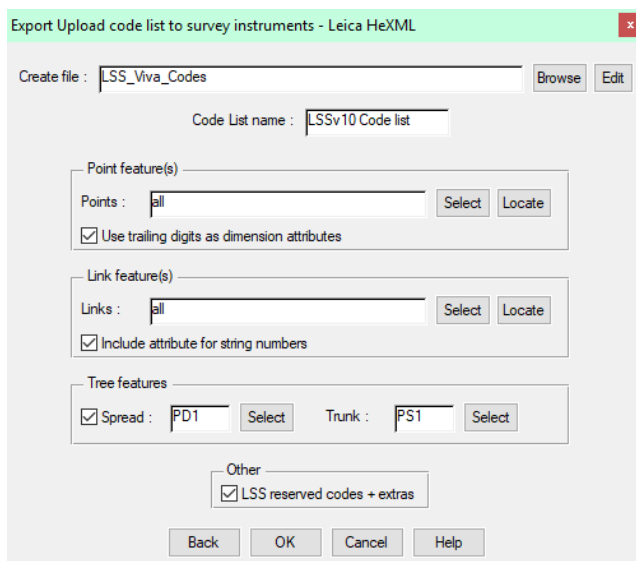
This option allows us to update the feature codes in the LSS Legend for any survey and once finalised to export them as a code list to the Datalogger we are using.

### Export Survey Instrument – Code List



'Leica HeXML (Viva) for the Viva loggers.

The various settings are displayed in the next export window;



Once the code list has been created, the file can be uploaded to the logger.

# Conclusion

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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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December 2019