

# Instrument Manual

Interface to Topcon Magnet Field

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

 **TOPCON**

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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:** The LSS v10 install procedure provides most of the necessary installation files for the Topcon, but some Installs may be required on the PC in order to connect LSS to Topcon Magnet Field.

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

LSS will automatically initialise the registry when any of the Trimble options are invoked for the first time.

Select 'Install LSS &  
Test Data';



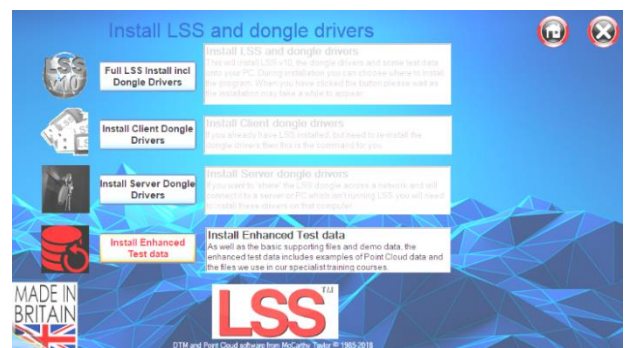
For a new install use 'Full LSS Install Incl Dongle Drivers'



Also choose

'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;

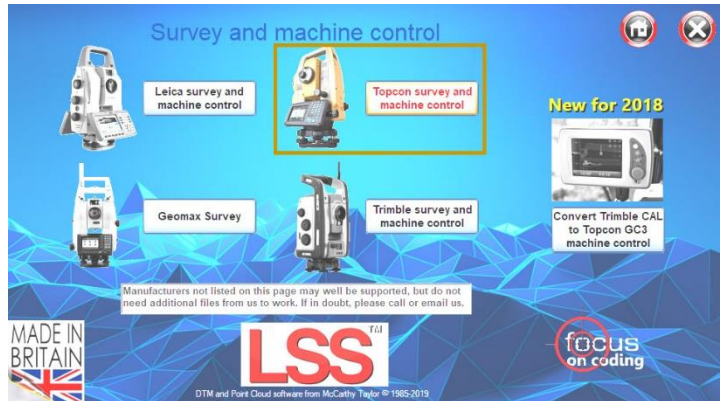
Select

'Survey & Machine Control',

and access the files/documents for your instrument type-

For Topcon instruments and loggers select

'Topcon survey and machine control'



The various Topcon Documents can be accessed.

'The Code Library'

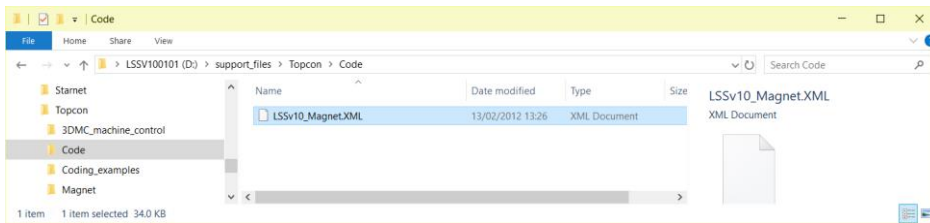
'Browse the Topcon

Support files folder'

(on the installation flash drive):

**Note:** All the LSS media files shown here are also available for downloading from the LSS website '[www.dtmssoftware.com /Support-Home/Download/Survey-Equipment-Machine-Control-Support-Files](http://www.dtmssoftware.com/Support-Home/Download/Survey-Equipment-Machine-Control-Support-Files)'

## 1.2.1 Example Feature Library

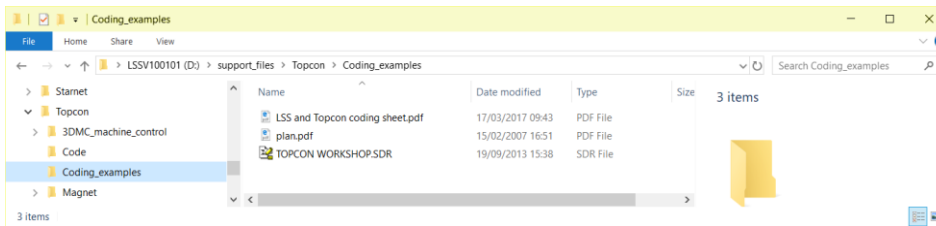


The example code library was created from the LSS Testdata Prototype survey.

It can be found on the LSS media (and also on the website) at;

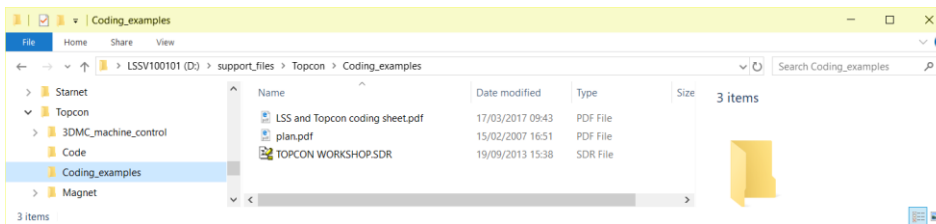
"\Support\_Files\Topcon\Code\LSSv10\_Magnet.XML"

## 1.2.2 Example Survey Coding Sheets



These are available in the LSS media folder.

'Support\_Files\Topcon\Coding\_examples' as 'LSS and Topcon coding sheet.pdf' and 'plan.pdf'  
They are included later on in this manual.



## 1.2.3 Machine Control

For those requiring guidance, information can be found in the 'Support\_Files\Topcon\Coding\_examples\3DMC\_machine\_control' folder.



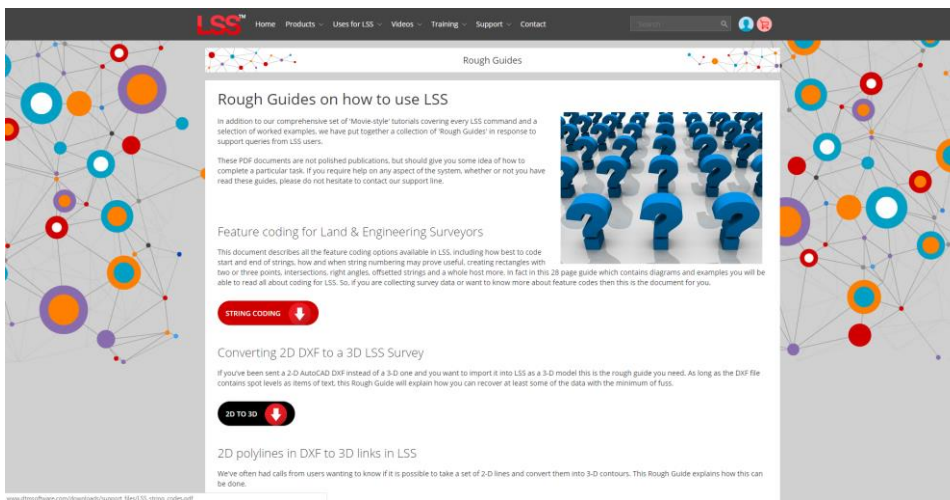
## 1.3 LSS Rough (How to) Guides

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](#)'

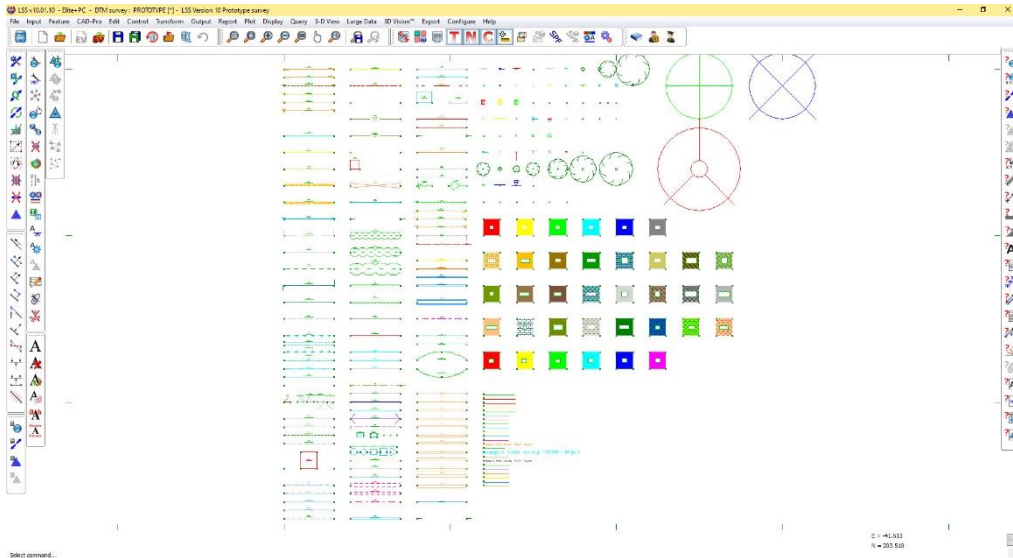


## 1.4 Configuring Topcon Magnet

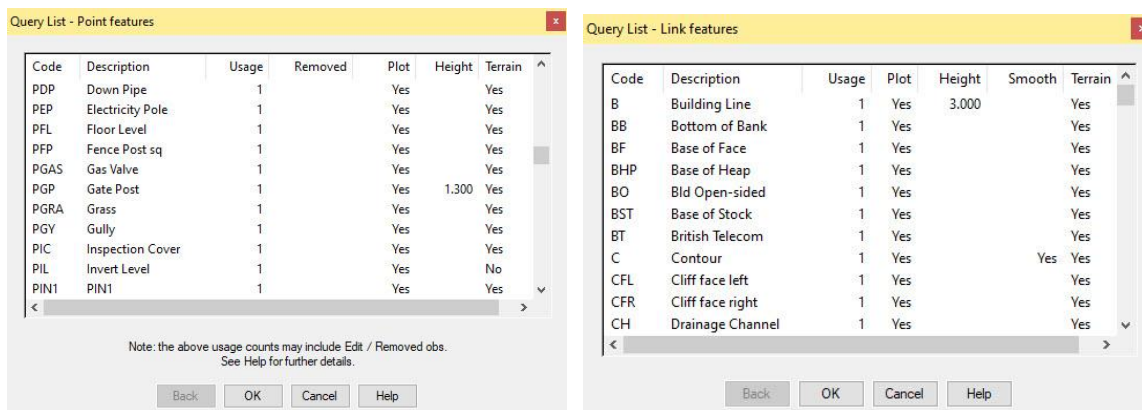
### 1.4.1 Copying the Feature Code Library

It is recommended that a feature library is copied to the instrument using the option 'Export / Survey Instrument / Codelist'.

The format to use for Topcon Magnet is .XML and there is available a pre-prepared code list that has been exported from the standard LSS Prototype Survey File - **PROTOTYPE.LSS** ;



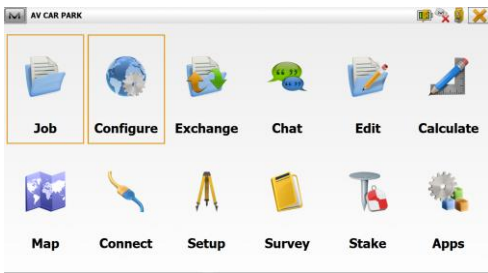
The command Query List will list the features in the Prototype Legend;



The command **Export Survey Instrument – Code List** has been used and the resultant file, LSSv10\_Magnet.XML, found on the LSS media under **Support\_Files\Topcon\Code\LSSv10\_Magnet.XML** initially should be copied onto the Topcon - Magnet Logger's IFiles folder;

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

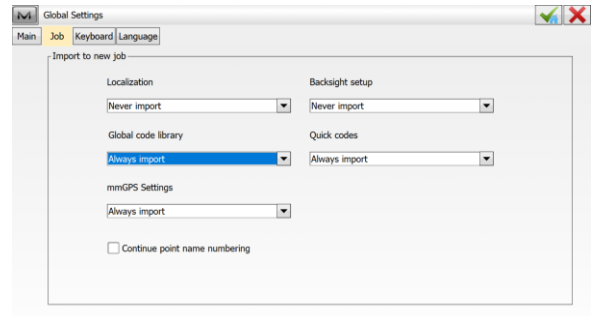
On the Topcon Magnet Field Main menu, Set 'Configure'



'Global'



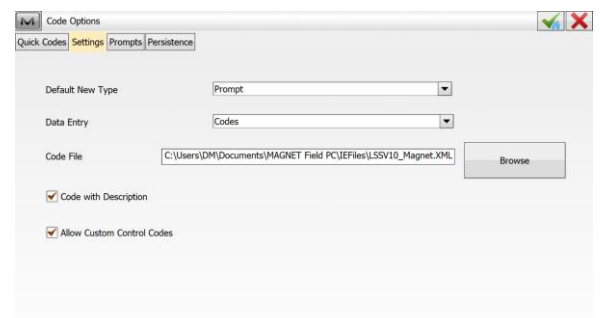
Select the 'Job' tab and in here set the 'Global code library to 'Always import';



Then select 'Configure – Codes'

In the 'Settings' tab  
'Browse' to the IFiles folder and the  
LSSv10\_Magnet.XML code file.

Once set this becomes the default code library used every  
time a Job is created.



Set 'Code with Description' on.

The 'Allow Custom Control Codes' option allows non-Magnet control codes to be entered in the 'Ctrl Code' input box.

Otherwise the control code may not be stored when the entry is completed.

**LSS custom Control codes** (Not interpreted graphically by Topcon Magnet Map function);

'A' - start string,

'J' or 'JP' - join to previous point,

'T' - end string and

'P' or 'CLOSE' - closed loop.

The 'Prompts' Tab will allow the 'Prompt for Code in:' 'Optical Survey', 'GPS Survey', 'Stakeout' and 'COGO' operations.

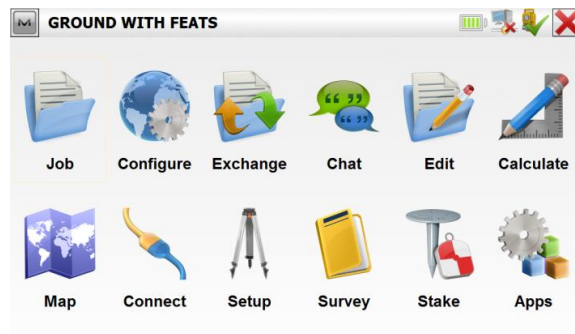
The 'Persistence tab' will allow Multi-Codes, Attributes, Custom Control Codes to be set.

# Chapter 2

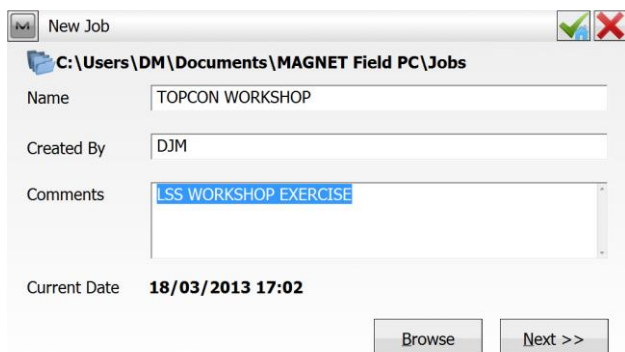
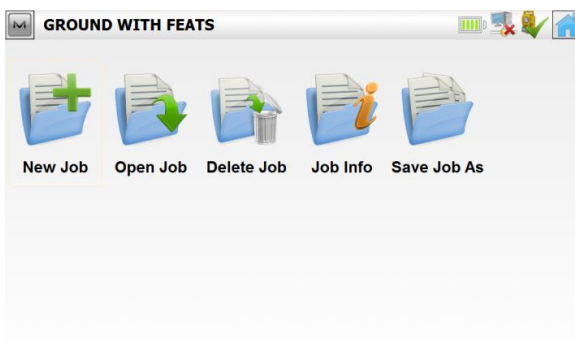
## 2.1 Instrument Data Capture

### 2.1.1 Creating a New Job

Having started up Magnet, select the Job Icon and then



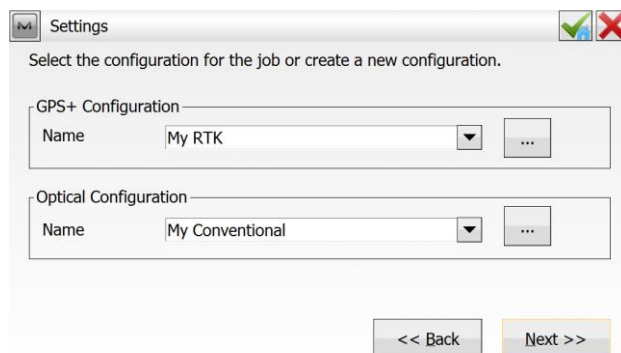
New Job' from the next menu to invoke the New Job Window



Enter an appropriate name and details ...

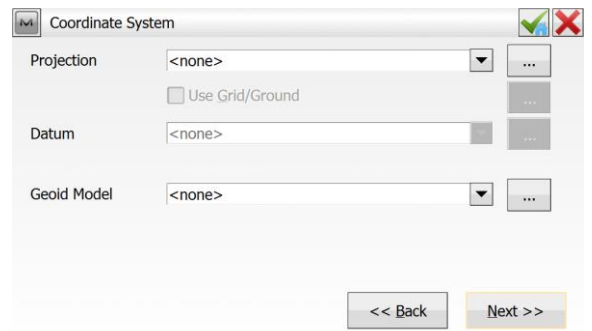
Press 'Next >>'.

Select the appropriate survey configuration, e.g.: 'My Conventional'



Press 'Next>>'

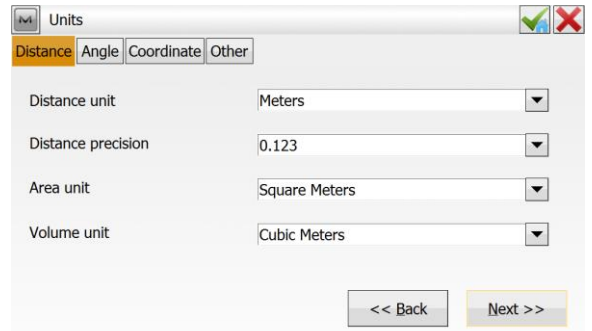
Review the Coordinate System settings.



For total station based jobs, these can be left as shown, or various options are available for GPS jobs.

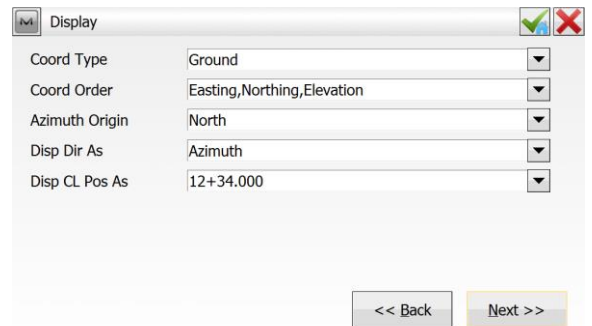
Press 'Next>>'

Check that you have the appropriate units set for the job



Press 'Next>>'

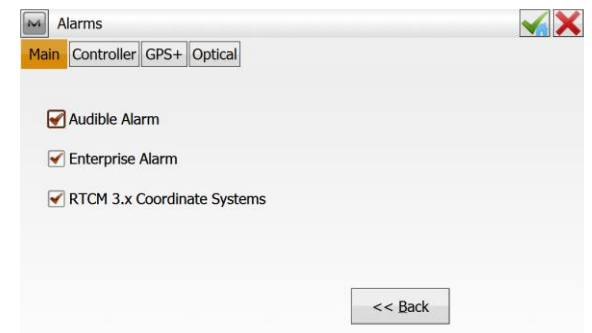
Ensure that in the Display, the Coord Order is as shown.



Press 'Next >>'

The last dialog shows the notification alarms which can be left as they are.

Finally, press 'Green Tick'



To return to the main Magnet screen within the newly created job.

Press "Connect" to access the General tab and select the instrument details that the logger is connected to.

The icon next to the "home" icon (top right) confirms the logger has created the connection to the instrument.

Press the "home" key to continue.

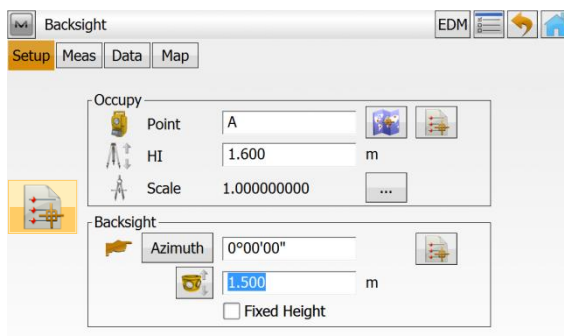
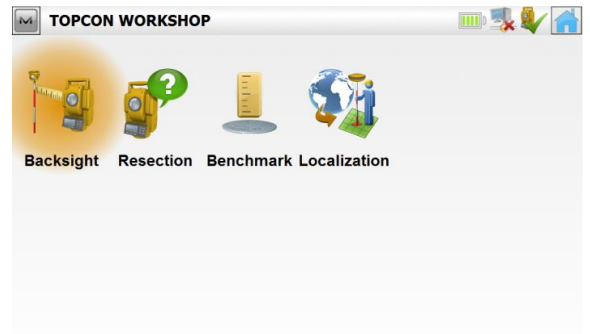
## 2.1.2 Station Set-Up on Topcon - Magnet for Total Station

Once in the newly created job, we will need to choose the Setup Icon



Followed by Backsight;

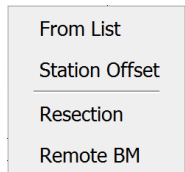
Other options are Resection and Remote BM



Enter the Occ Point (Set on station) – icons on the side allow the user to search both the list or map to choose the points.

Icon allows choosing a known station.

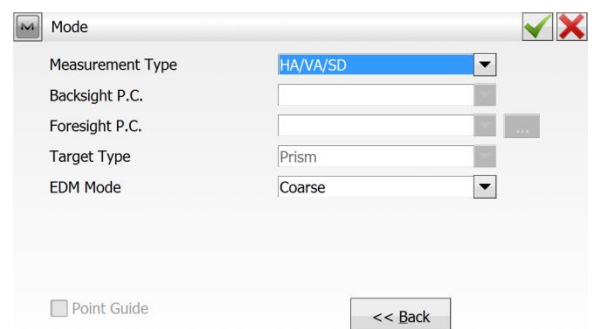
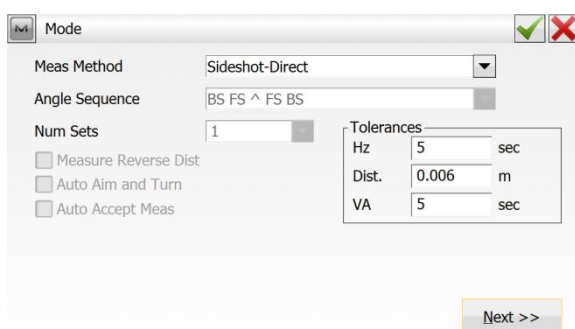
The 'Backsight' can be toggled to 'Azimuth'.



The icons on the top right allow EDM settings to be changed or



the icon accesses the Mode of measurements;



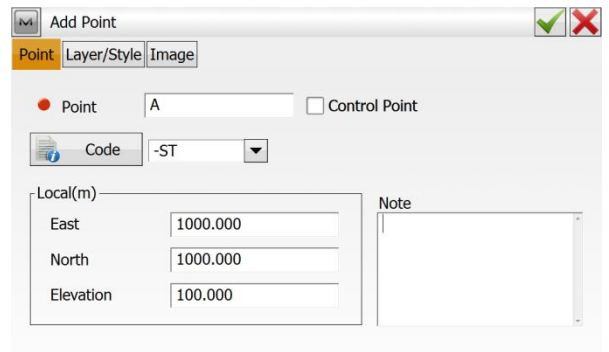
If the check box 'Measure distance to BS' is not ticked then the Backsight station in LSS will be created 500m away unless a control obs to the backsight is taken immediately after the setup.

If this is not the first set-up for an arbitrary coordinate system then use 'BS Point' for the backsight as there should now be other known stations.

If the station coordinates are not known, when the 'Meas' tab is accessed, Magnet will prompt for the coordinates.

Add the coordinate values and '-ST' for the code so that LSS will know this is a station value.

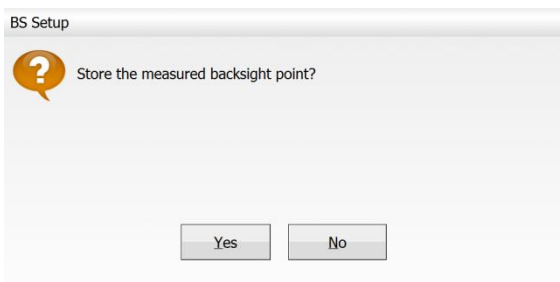
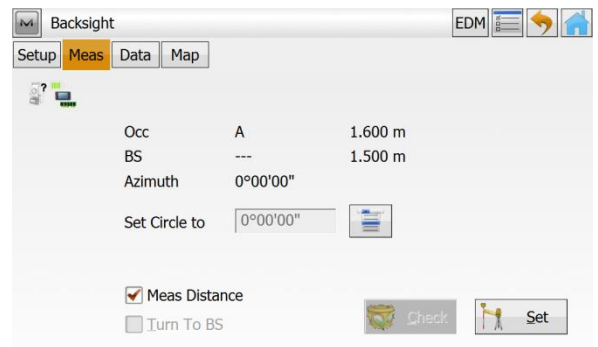
Press 



or Click the 'Meas BS' button or 'the 'Set' button.

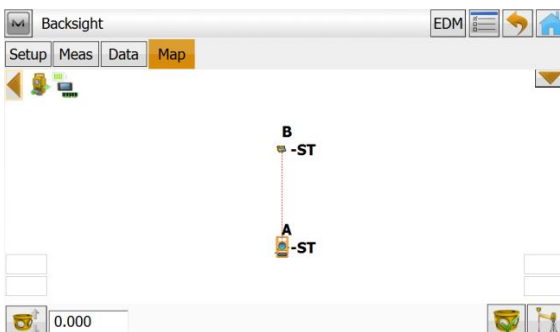
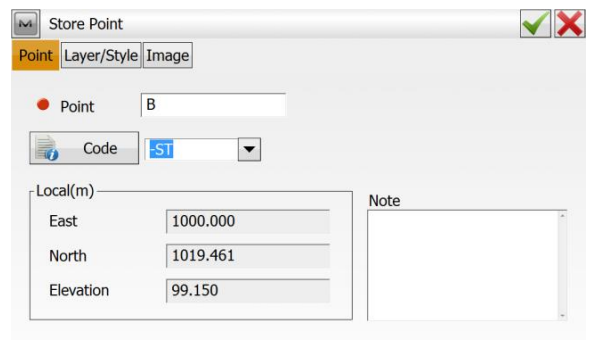
This will prompt for the RO and the backsight to be observed for the orientation through the following dialogues;

If the coordinates of the set on station have been manually entered, then set the Backsight orientation to be Azimuth.



Press 

Click Close to end the set-up recording.

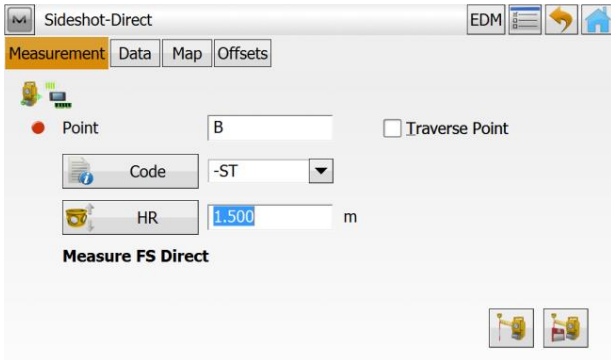
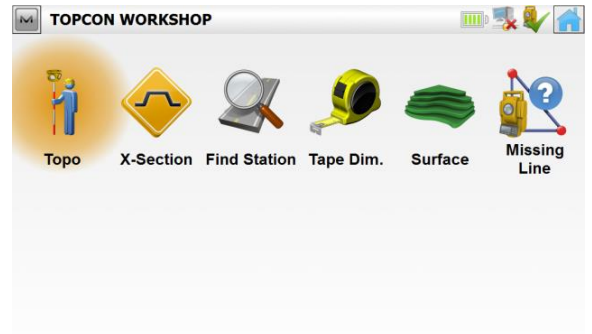


We can click on the 'Map' tab to view the stations following the set up.



## 2.1.3 Feature Coding for LSS on Topcon - Magnet

Select **Survey / Topo** to enter the detailing section.

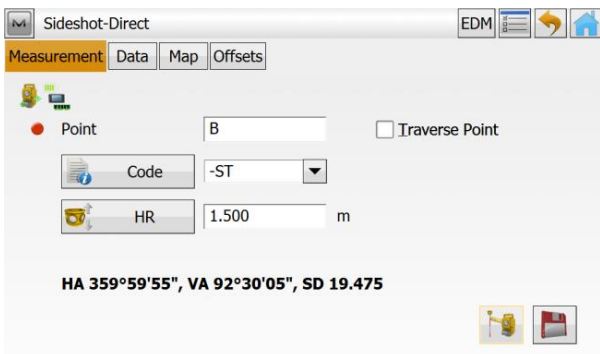


The Sideshot-Direct window will be invoked;


For a Control observation - set the

Point to be the station name, and the

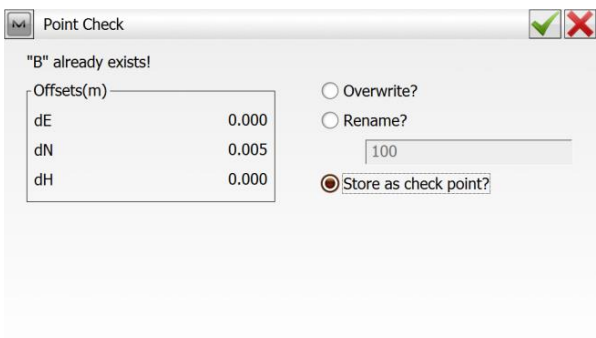
Code to '-ST', to make this a control observation when this is processed in LSS.



Press  to take a shot

Press  to record a shot.

If the Point already exists in the survey, for example, when a second observation is taken as a backsight, the Point Check window gives the following options:



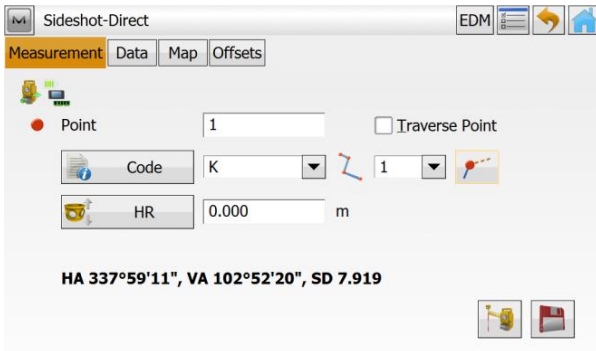
'Overwrite?'

'Rename?'

'Store As Check Point'


Press 

For detail (Topo) surveying we would normally set the first observation to be 1 and choose a feature code e.g. 'K' followed by the string number.

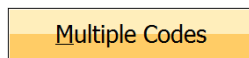


Press  to take a shot

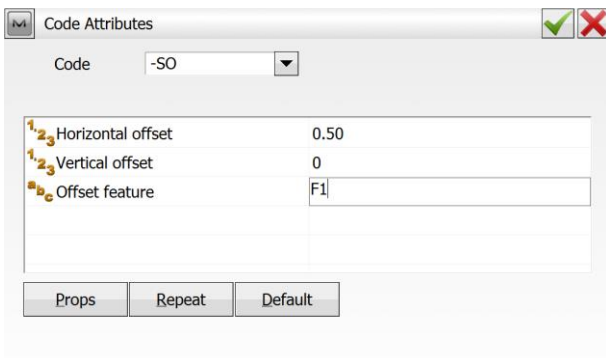
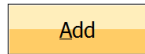
Press  to record a shot.

To create multiple coding click on the  icon to the left of the Code field.

followed by 'Multiple Codes',



'Add' and select the Code and String.



For example here adding the -SO code will

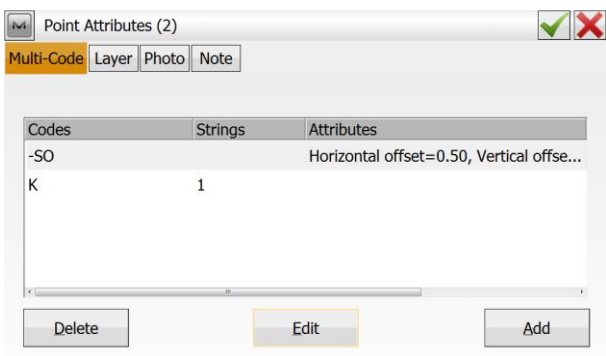
Prompt us for;

The Horizontal offset

The Vertical offset

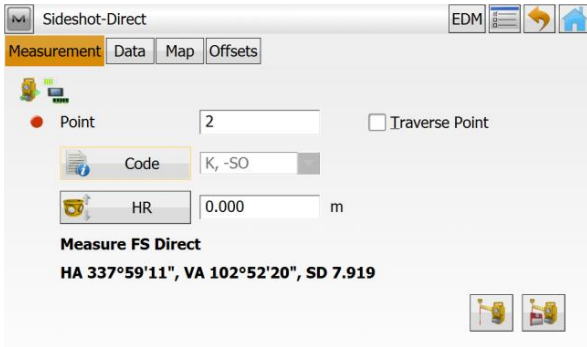
The Offset feature

Press 



In the Point Attributes window, Other Tabs are 'Layer', 'Photo' and 'Note'.

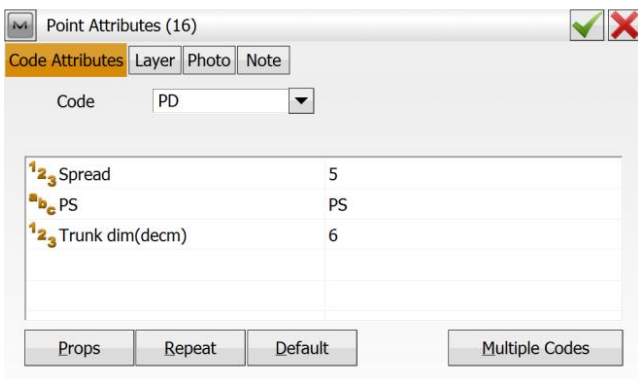
Press 



To return to the sideshot window to observe the shot.

**Note:** Multi codes apply for one shot only. Once it has been taken the Code reverts to its main value.

For Trees the Code PD sets up automatically the Point Attributes as below;



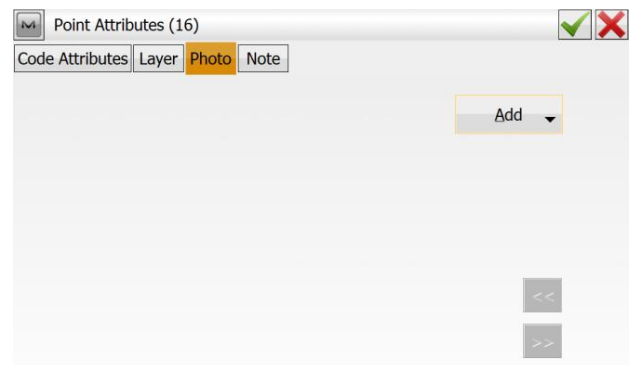
The values for the diameter of the Spread and PS for Trunk Dimension can be added (in Decimetres)

Press 

For Photos select the 'Photo Note' Tab

To 'Add' the photo to the observation.

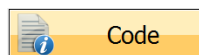
Press 



**Note:** At present the Export format used on the Topcon loggers does not recognise the Photos attributed to the observations.

It should be possible to transfer any photos using Active Sync and appended to the survey observations within LSS.

To add a field note or annotation click on the icon followed by;

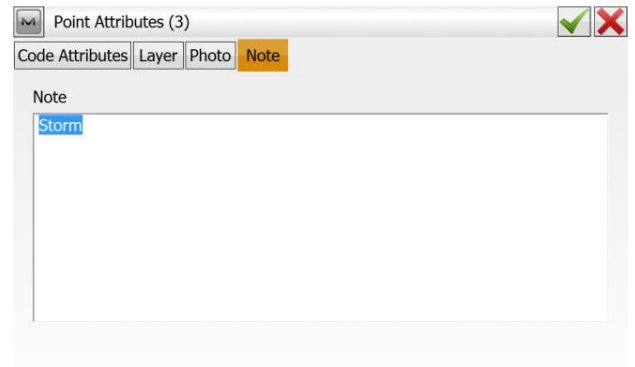


to the left of the Code field,

The 'Note' Tab which allows the field note or annotation to be added;

Press 

**Note:** a Note will disappear once the shot has been measured.

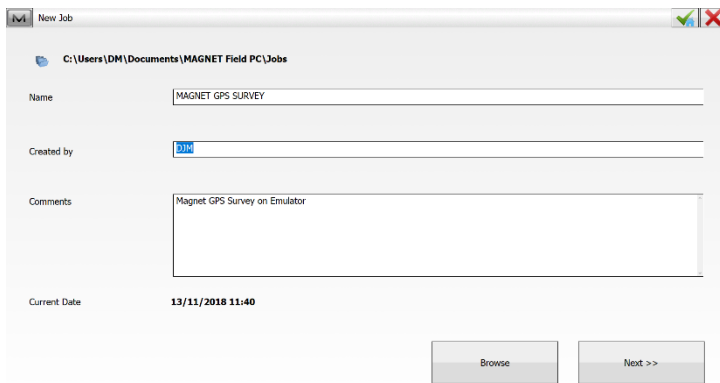


This is an example where a Note is required on 2 lines for the height and species so we use ',@' for each new text line.

Press 

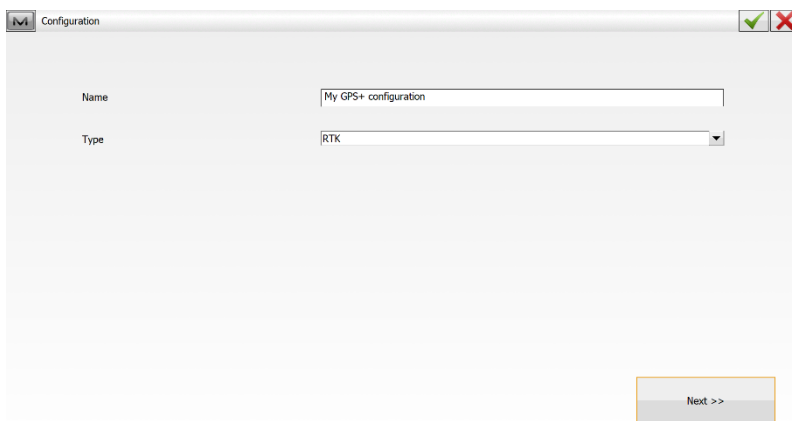
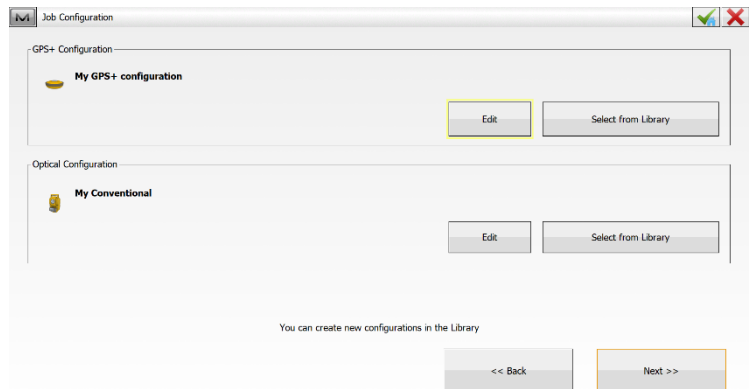


## 2.2 Setting a New Job for GPS Surveying

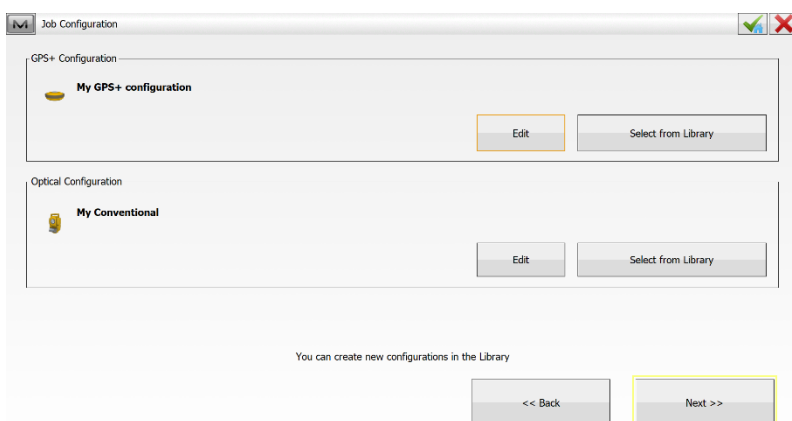


After selecting 'New Job' on the Magnet,  
Type in the Job Name,  
'Created by'  
And any comments.  
Press 'Next >>'.

In the next 'Settings' window,  
Use the drop down list to choose the  
'My GPS + Configuration' setting;



Pressing 'Edit' above will take us through  
a number of pages to view and if  
necessary, amend the GPS Settings,  
although most we can leave as default



Press 'Next>>'

[Back to top](#)

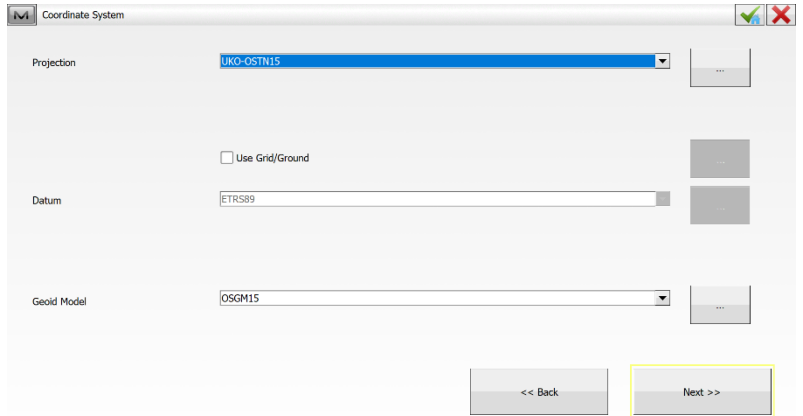
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Instrument Manual - Interface to Topcon Magnet Field

The Coordinate System Window allows the Site Transformation to be specified.

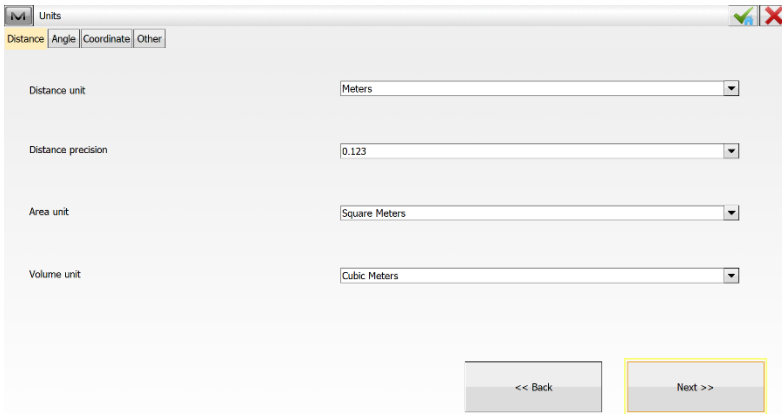
For example, we might set to the OSGB36 and OSTN15 / OSGM15 projections for working in true Ordnance Survey National Grid.

Click on the icon to access the files.



Press 'Next>>'

**Note:** For Site specific grid coordinate systems



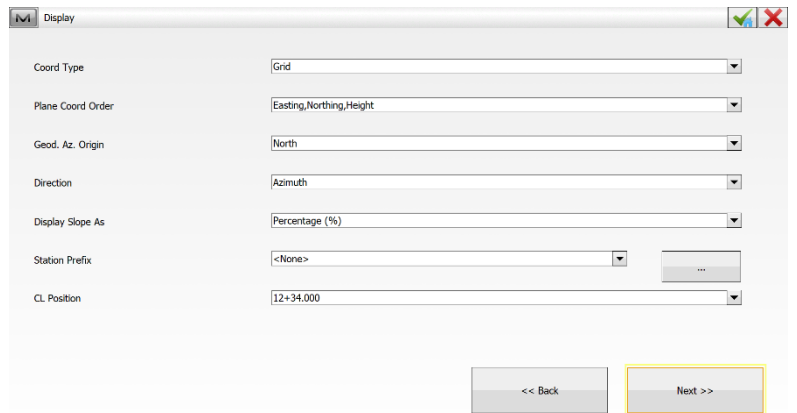
At the 'Units' window, accept or change the defaults,

To view the other units click on the Tabs - 'Angle', 'Coordinate', 'Other'

Press 'Next>>'


At the 'Display' Window;

Check the order of the Coordinates.



Press 'Next>>'

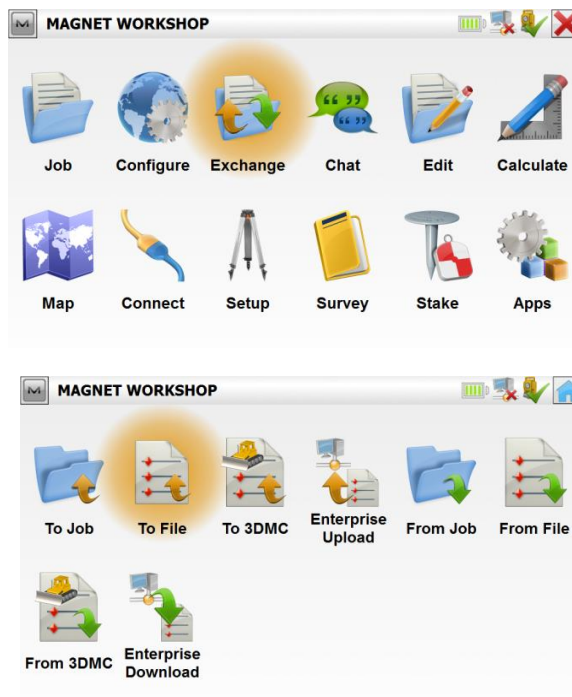


The 'Finish' button  can be selected at any of the stages above, which accepts the standard settings without altering any of the following ones.

# Chapter 3

## 3.1 Exporting EDM and GPS Data

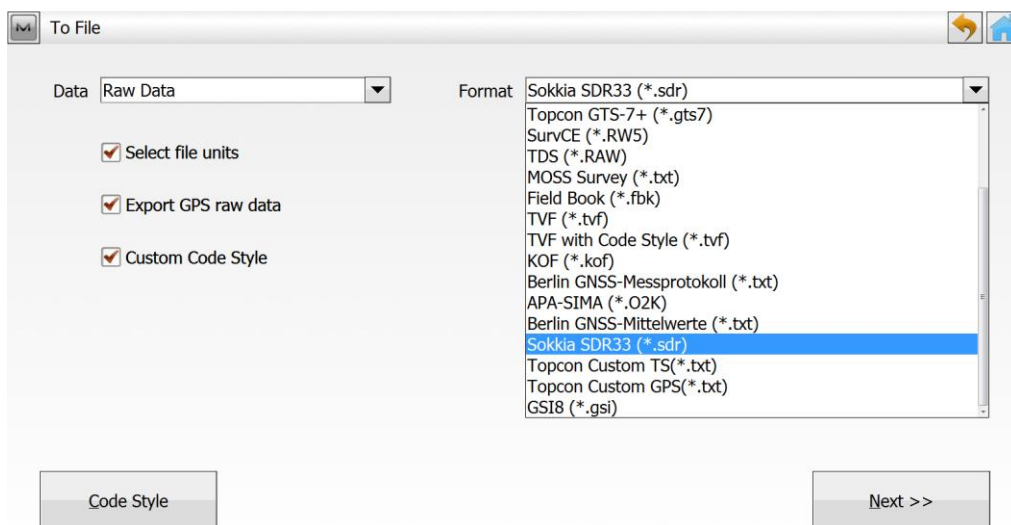
On the Magnet logger home window, the Exchange command is used to access the Import and Export functions.



To Export our survey data we choose the 'To File' option in the next window.

On the Magnet logger Select **Exchange / To File / Raw Data / Sokkia SDR33**.

The drop - down list shows the formats that can be used in the export for the survey raw data;



Choose Sokkia SDR33.

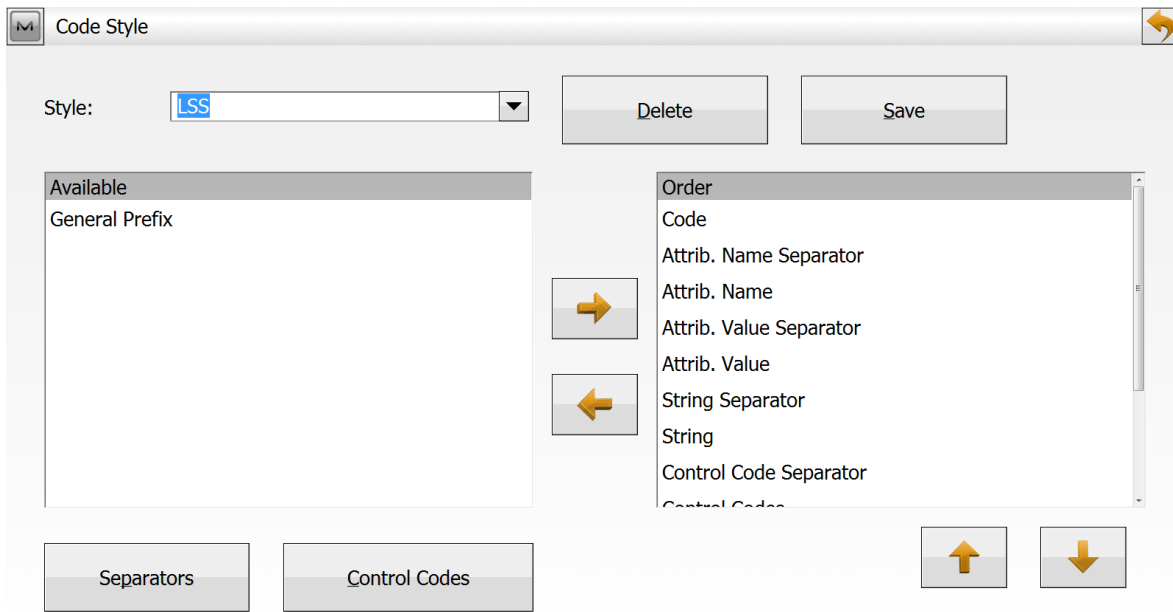
This format allows both EDM and GPS data to be exported and includes the attributable data as well as the LSS Reserved codes and field notes.

The following configuration of the Export option needs to be set once and from then on it is possible to skip to the **Export** paragraph.



### 3.1.1 Configure the Export SDR33 Format

The first time this option is used on the logger we will need to click the 'Code Style' Tab to configure the export and give Code Style a name, e.g. 'LSS';



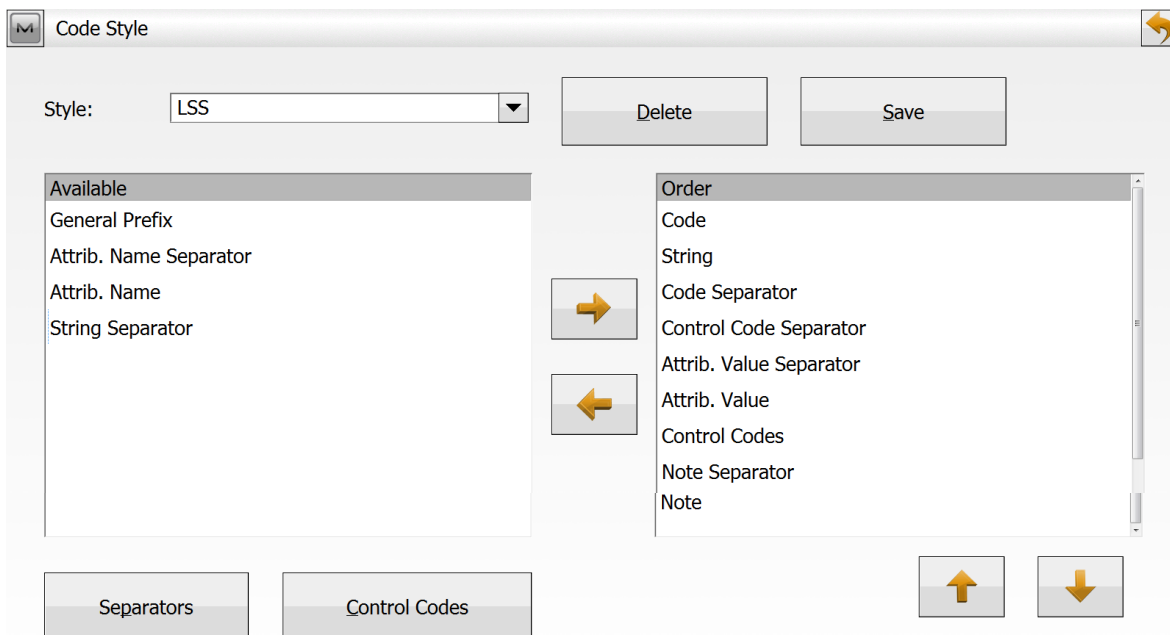
Populate the right-hand list in the Code Style as per the dialogs below by highlighting the Available item and clicking the Up and Down arrows to adjust the Order of the data to be exported.



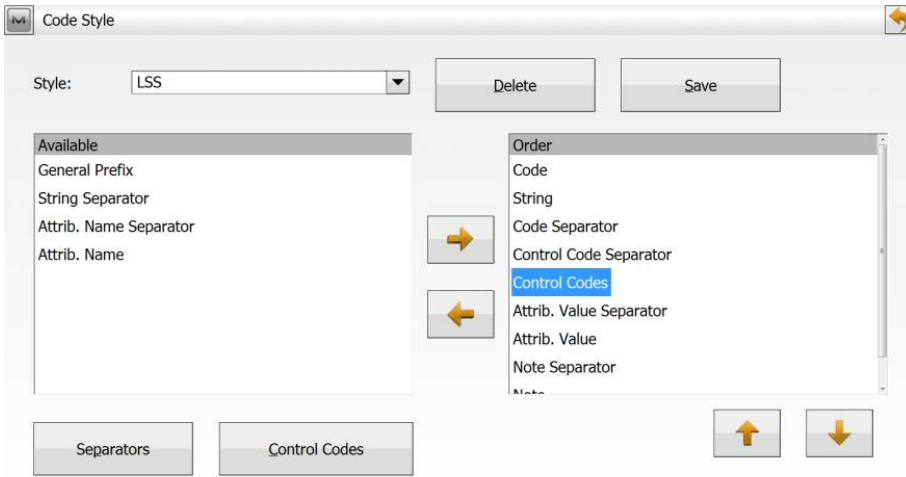
Use the Right and Left arrows to transfer to the left/right hand side.



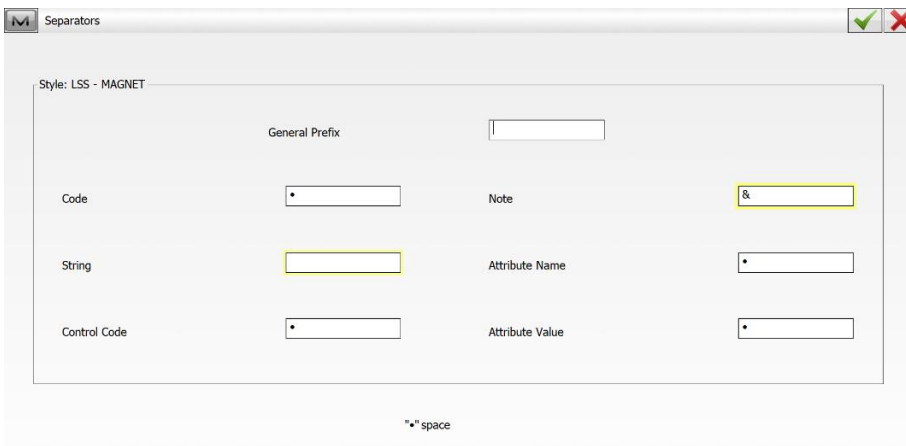
The screenshot below is a composite to show the full list of items required in the Order.



We will need to click on the 'Separators' and 'Control Codes' Tabs to access these two settings:



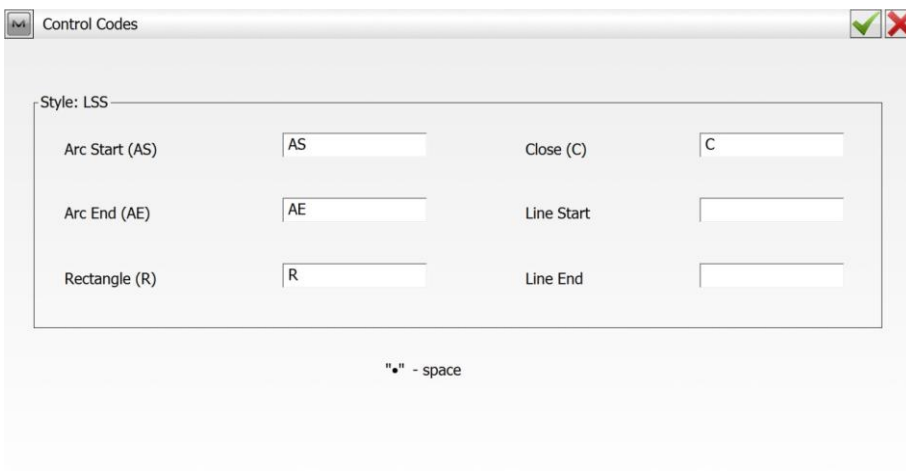
Click the 'Separators' tab to set the Separators as in the screenshot below; generally use the space bar to create the dot symbol in the input boxes as shown, but we will need to use 'Blank' – no character for the 'String' and hit the 'Shift' key to set the Note Separator as '&'.



Press



Click the 'Control Codes' tab;



The LSS custom control codes ('.A' start string, '.J' join to previous point, '.T' end string and '.P' closed loop) do not need to be set here.

Make sure the 'Line Start' and 'Line End' settings are blank.

Press



To get Magnet to remember these values type 'LSS' as the Style and click the 'Save' button.



The image shows a horizontal control bar with a light gray background. On the left, the text 'Style:' is followed by a dropdown menu containing the text 'LSS' and a small downward-pointing arrow. To the right of the dropdown is a gray button labeled 'Delete'. Further right is a yellow button labeled 'Save'.

If this is already in place the option to Overwrite is simply responded to with 'Yes' to overwrite.

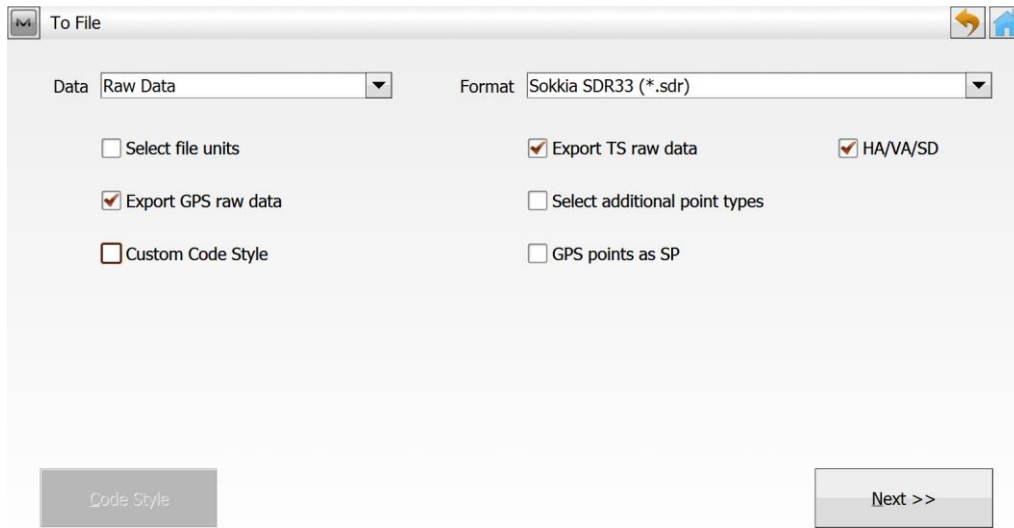
### 3.1.2 Export Survey Data to a File

This sequence can be used repeatedly once the Code Styles have initially been configured as above.

Set the 'Data' to be 'Raw data' from the drop - down list and choose 'Sokkia SDR33 (\*.sdr)'. Accept the settings as shown;

The Export GPS raw data button needs to be set to include GPS coordinates e.g. Hybrid kit. Otherwise only the EDM data is exported.

Tick the 'Custom Code Style' button.

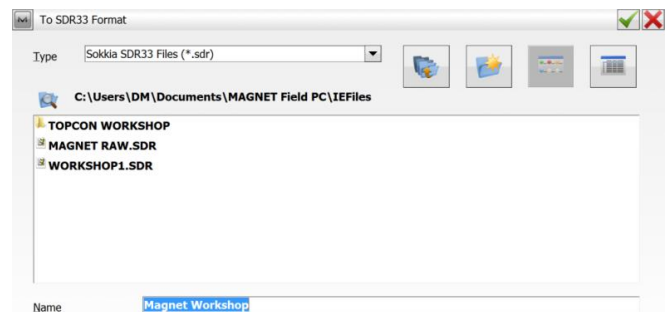


Clicking the 'Code Style' button allows the settings to be checked e.g. that the Style is still set to LSS correctly

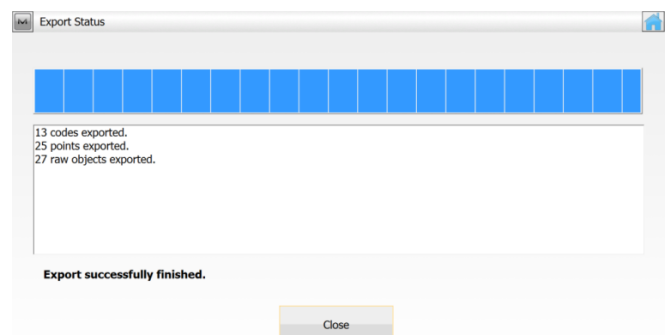
At the To File dialog click 'Next>>'

Enter a file name

Press 



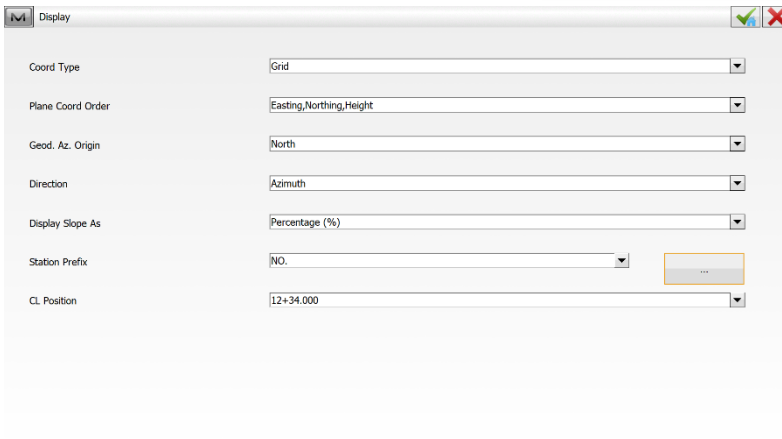
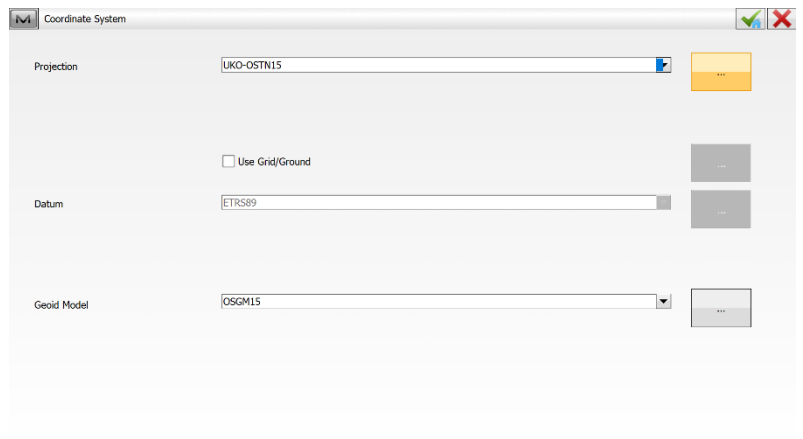
The Export Status will show a summary of the exported data.



Click 'Close' to complete the export to the file.

### 3.1.3 Export GPS Data to a File

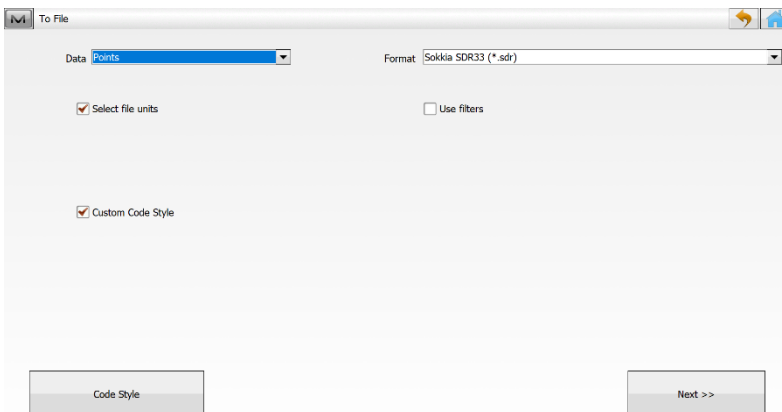
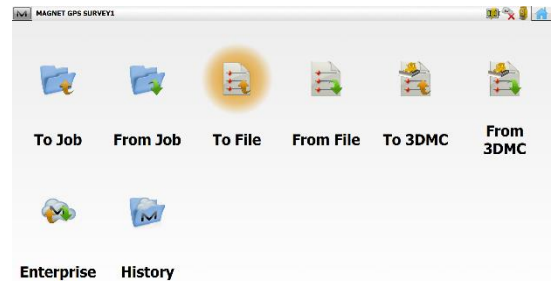
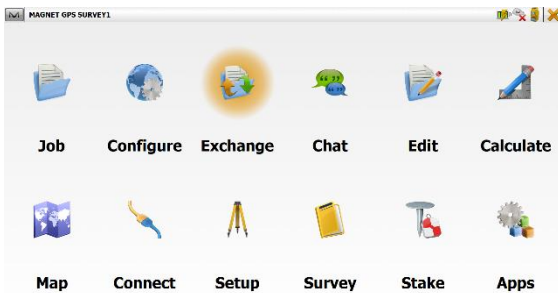
Use the Configure Coordinate System and



Configure Display options to confirm the settings for the current job;

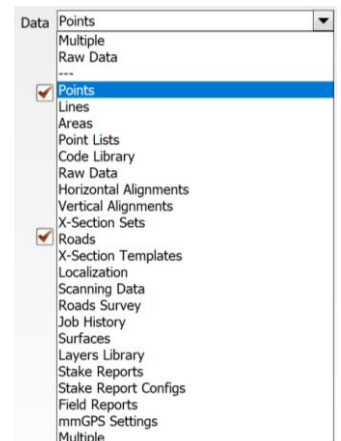
'Plane Coord Order' should be 'Easting', 'Northing', 'Height'

Then select Exchange to File

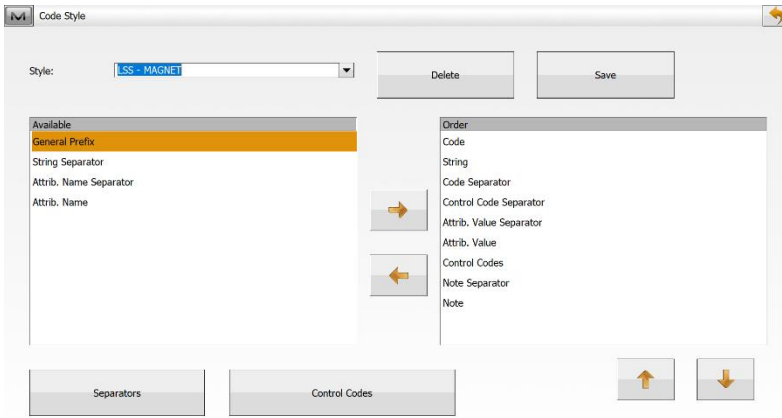


Click on the down arrow to select

'Points' from the drop-down list.



Click on 'Code Style' in the previous window to confirm the following settings required for the Right hand pane;



If necessary, we use the Left / Right arrows to move items between the panes.

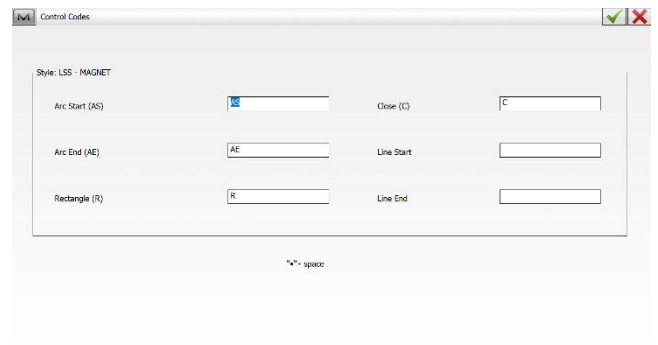
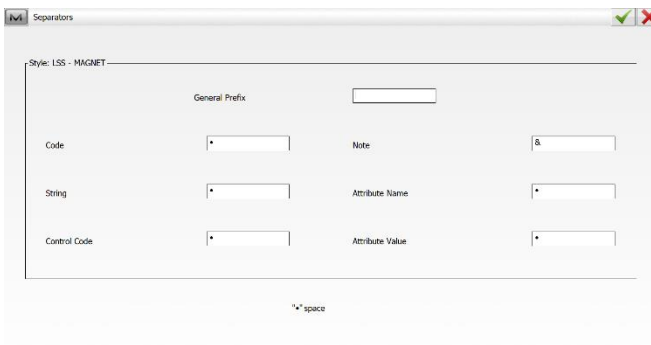


Use the Up down arrows to reorder to that shown.

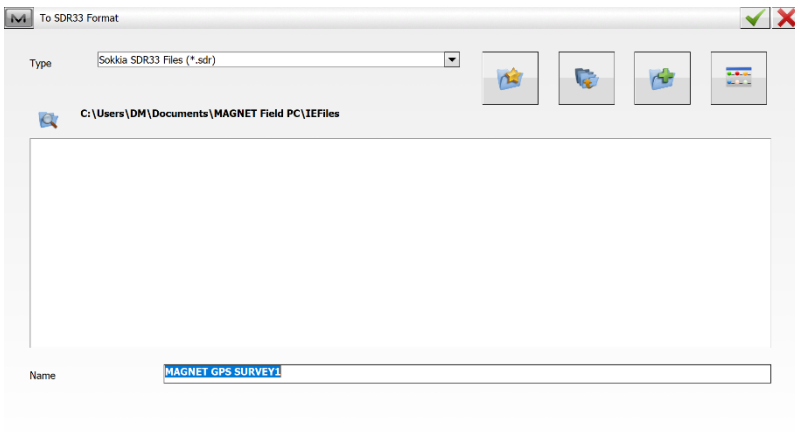


Click on 'Separators' as spaces and

'Control Codes' to set as follows;



Accept the final confirmation dialogues for the 'Units' and 'Coordinate System' to complete the export of the GPS points to the .SDR file;

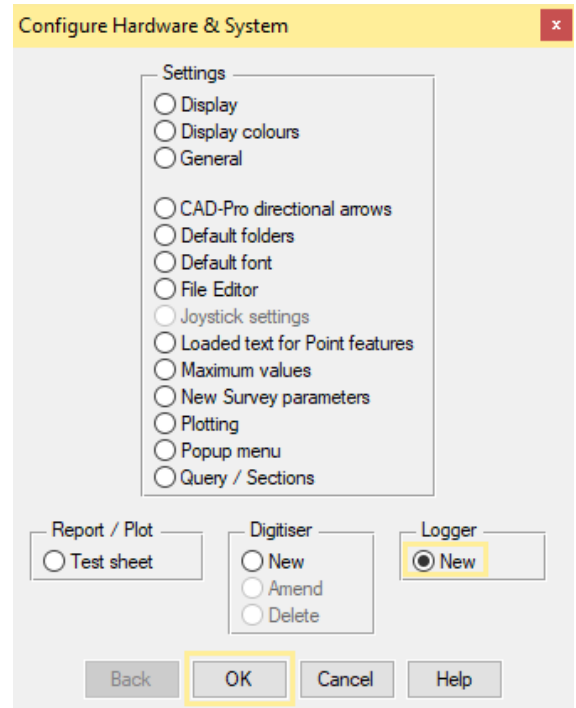


### 3.2 Configuring LSS for Topcon Magnet

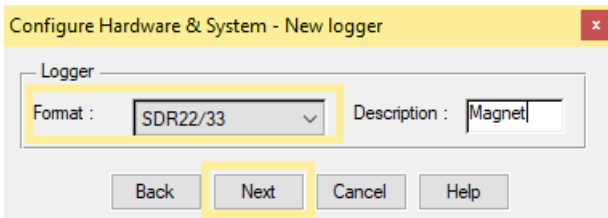
This is a once-only operation, for each type of instrument to be used, on every computer into which data is to be downloaded.

Because the same data format (SDR22/33) has been exported from both the Topcon - TopSurv and Magnet loggers, we can use the same logger configuration in LSS as described below.

To configure our logger 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').



We need to choose the format of the data, here SDR22/33 for the Topcon loggers from the drop down-list and the 'Description', as appropriate;



'Next'.

Next we choose the usual data transfer / download method.

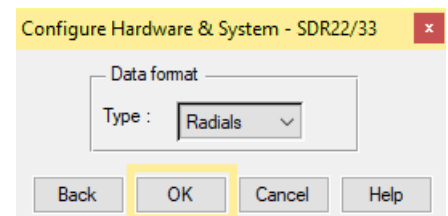
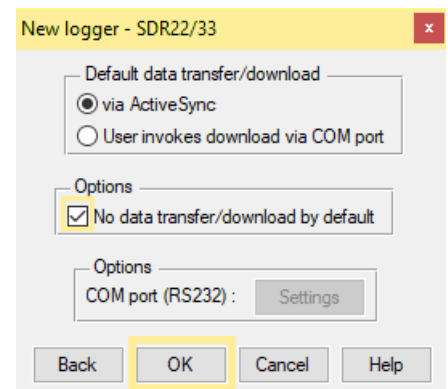
Select 'Active Sync'. Click 'OK'

**Note:** If the file already has been copied to the C: drive, we can tick the option

'No transfer/download by default'.

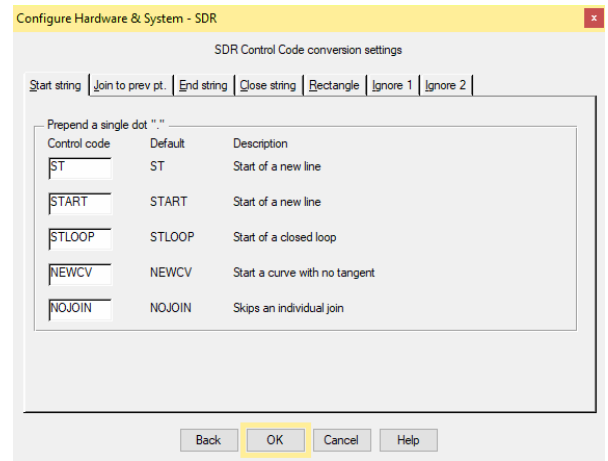
Followed by Select Type 'Radials'.

Click 'OK'

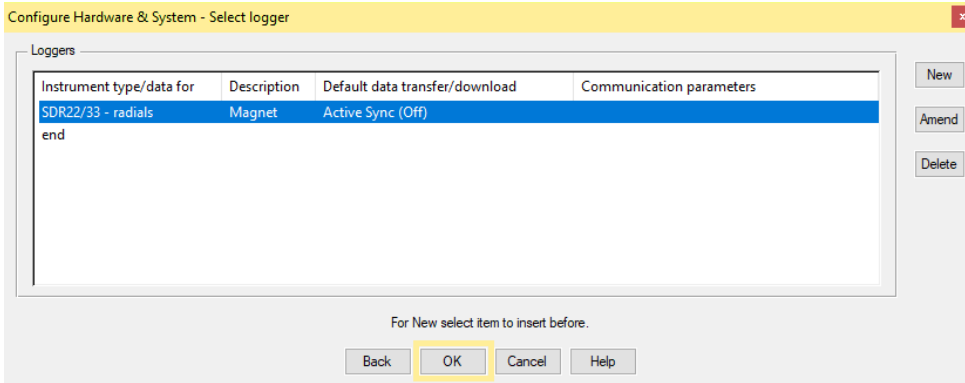




Leave the SDR Control Codes as they are and



Click 'OK'

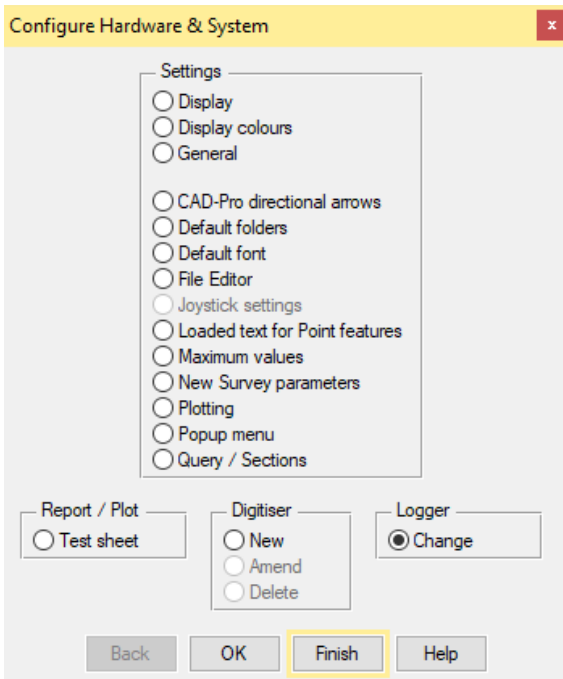


In this window it is possible to add

'New'  
'Amend'  
'Delete'

The logger(s) we will be using.

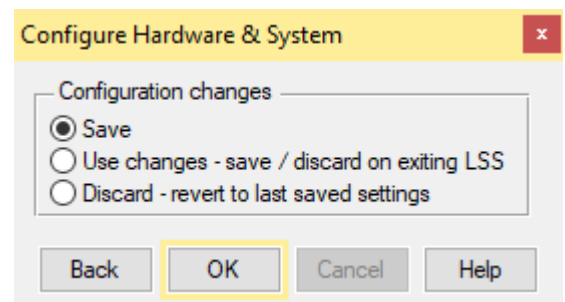
Hitting 'OK' here



will allow us to 'Finish' and

'Save' our logger settings in the next dialogues

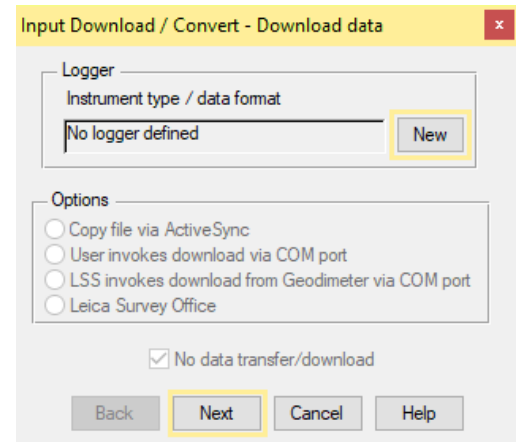
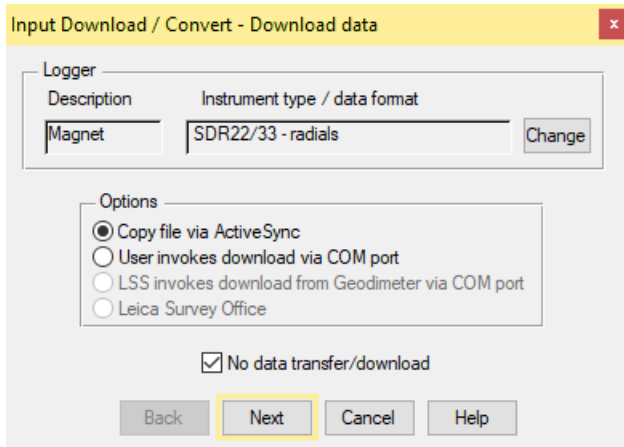
This must be repeated for all PCs likely to be processing Topcon - Magnet data.



### 3.3 Data Processing in LSS– Converting Data

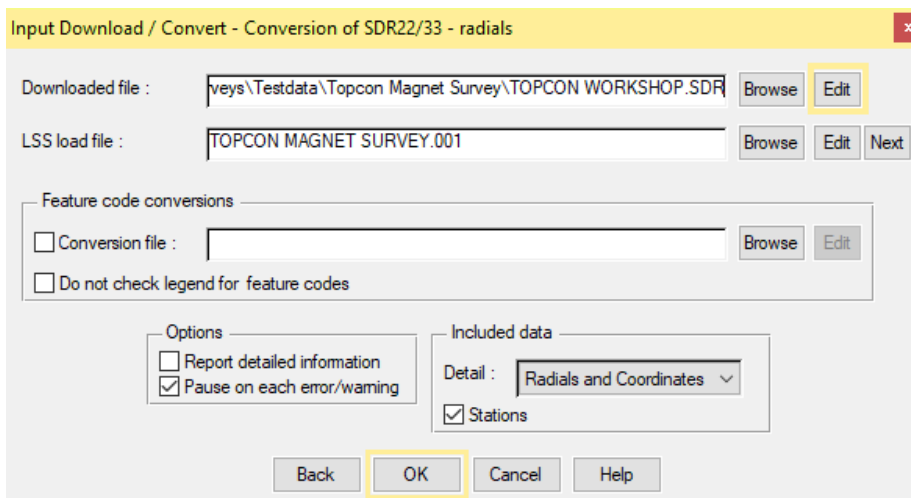
This option will download and convert survey data from TopSurv / Magnet logger.

Selecting **Input Download / Convert** will invoke the Download data window, the variant shown on the right being displayed if we have not already configured a logger which prompts us to do so by clicking 'New' and following the dialog boxes:



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

**Note:** The 'No data transfer/download' tick box can be selected if the survey data has already been copied from the TopSurv OR Magnet \ IEFiles e.g. via memory card, to the hard drive of the computer.



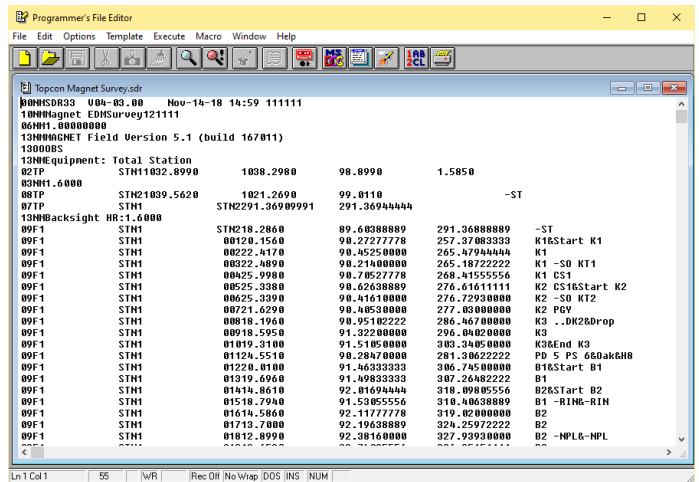
If the tick box is not selected then the download method e.g. ActiveSync, allows direct access to the TopSurv OR Magnet \ IEFiles

On the conversion dialog we Browse for the Topcon Workshop data file

Click 'Next' when the load file box is empty for the next available load file for the current survey

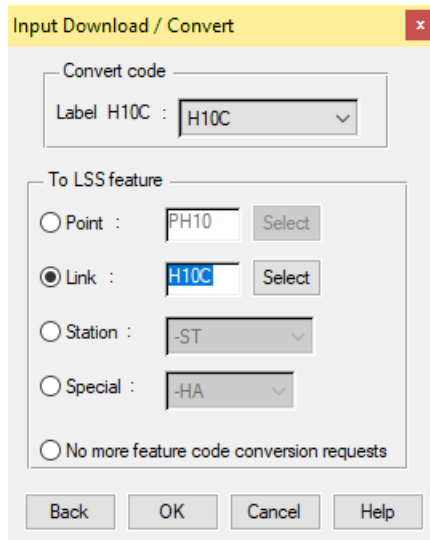
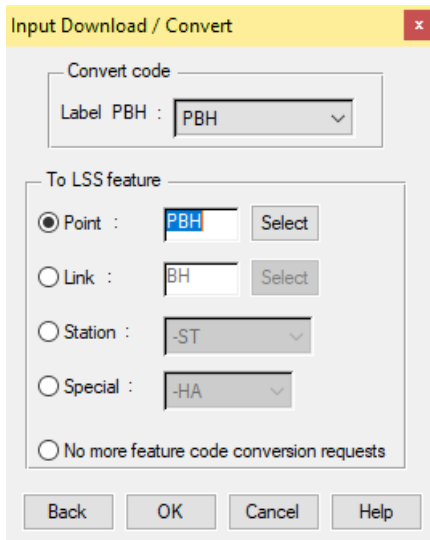
Leave the other settings as per default. Click 'OK' for LSS to convert the SDR33 file into a new LSS 'Load file',

The .SDR file can be opened using the 'Edit' button (see screenshot below):



**Note:** For GPS surveys, the HRMS and VRMS are reported as min/max values or individually if they exceed the error tolerance. The Lat/Longs are converted as comments in the load file.

If during the conversion LSS detects a feature code that it does not recognise in the legend of the current survey a 'Feature conversion' dialog will be displayed, to allow the feature to be converted;



'Select' will open up the lists for point or link features accordingly to allow a conversion.

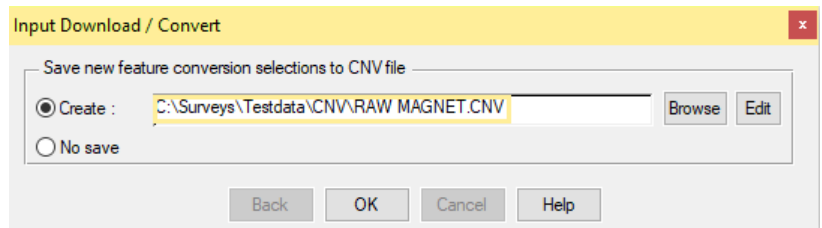
Unless we can see a feature code in the

'Select' list to replace, we can simply set

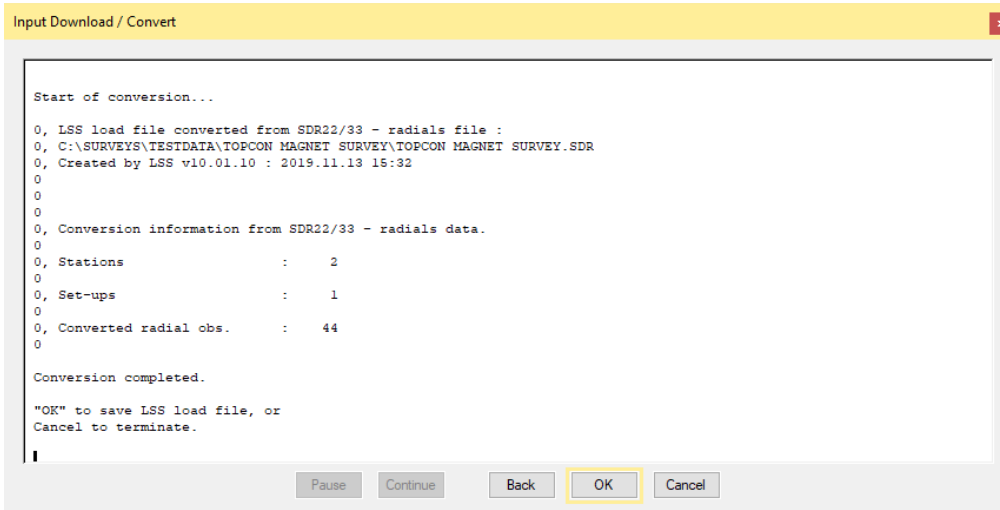
'OK' to maintain the current code and

'No more feature code conversion requests will ignore all future unrecognised codes.

If conversion requests have been reacted to, then LSS will prompt the creation of a code conversion file .CNV. Or we can hit 'No Save'.



Once all the requests have been responded to or 'No more feature conversion requests' the conversion will complete with LSS displaying the relevant information.



Click 'OK'  
and we will be given the options for the newly created load file;

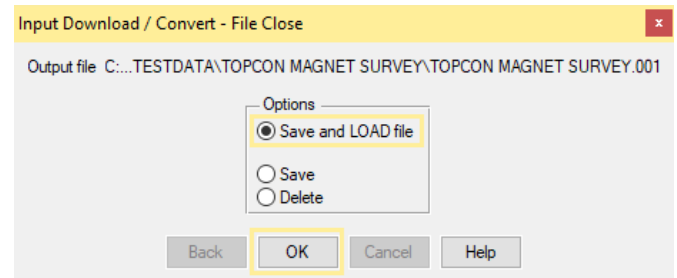
'Save and LOAD file'

'Save'

'Delete'

Choose the first item – 'OK' -

The **Input Load** command will automatically be invoked.



**Note:** If the Load file name is for a survey that does not exist then the 'Save and LOAD file' will prompt **File New** to create a new survey prior to loading 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.

### 3.4.2 Loading Data into a Survey Model

The **Input Load** Window appears where there is a load file available to load into the current survey:

The first radial buttons are for choosing where to send a load report - to a printer, to Adobe Acrobat file or (more usually)

A text report file.

A load report file is generated for each load.

We can choose a Conversion file here,

Normally we would 'Report pauses on' 'Errors' and 'Control tolerance warnings'.

We could also select 'All warnings'.

Other options are described below.

We can normally accept the default settings, but if we do need to change any of the settings on a regular basis we can 'Save as Default' as required.

The Defaults [which we will leave the options as per default and click 'Next'] are:

For the 'Pause' options, we will need to select 'Continue' during the processing when any of the **errors** or **warnings** are triggered. This will become clearer as LSS processes the survey data.

'Include' 'Crossing Links' or 'Stations' – conversely unticking will exclude,

which, for crossing links is an automatic way of removing crossing links where the majority should simply not be there.

'General text settings' will allow field notes and annotations to take the Font and the position of the text from that set in the level text of feature's legend entry.

'Strings restart on' 'New setup' and 'Change of feature' will stop links from joining up across survey instrument set-ups and when a change of link feature is identified

This could reduce the number of 'crossing links' in the survey.

Clicking the 'Advanced' button will give the user access to 'Advanced settings' for redefining the 'Conditioning tolerance' for inputting arcs and circles.

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### 3.4.3 An Explanation of the LSS Load File Format

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

A Load File can contain either radial observations, coordinate observations or both:

Each record is assigned a number for LSS to process as described below;

#### **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.

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.

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 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'.

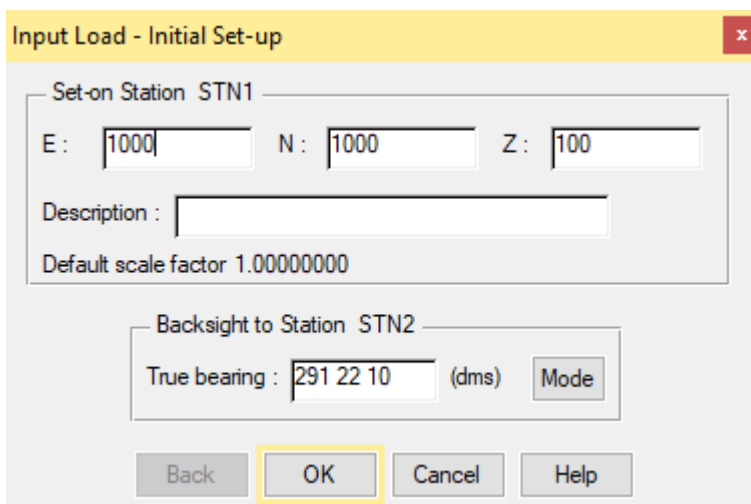
Those control observations with 'Warning : Large Difference.' next to them, are where the warning tolerance (0.01m) was exceeded (but not the error tolerance).

**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.

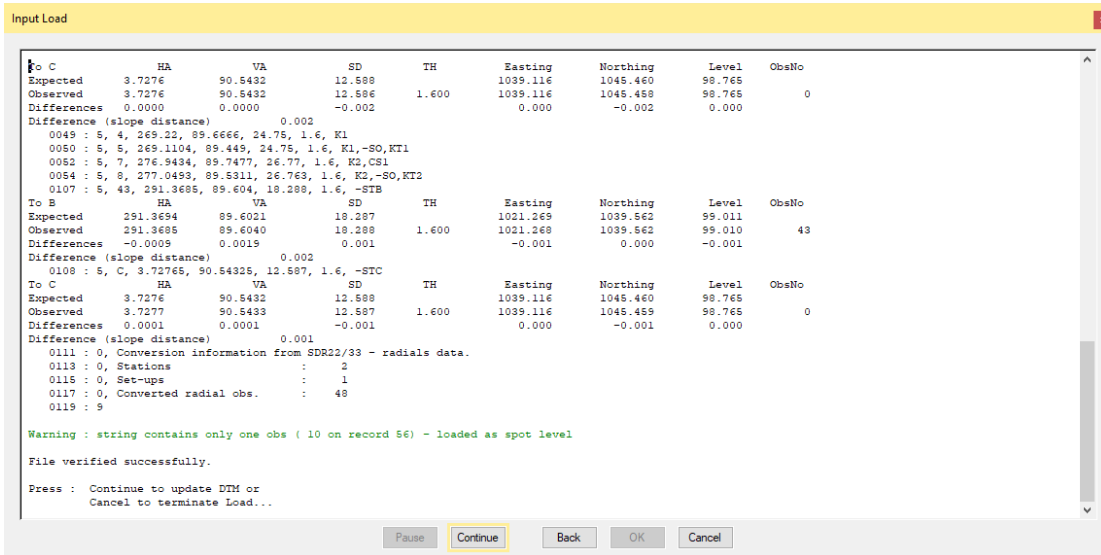
To correct these, click 'Back' and then 'Edit' to open up the load file. If you have set 'PFE' as your editor program then use 'CTRL+G' to go to the line directly.



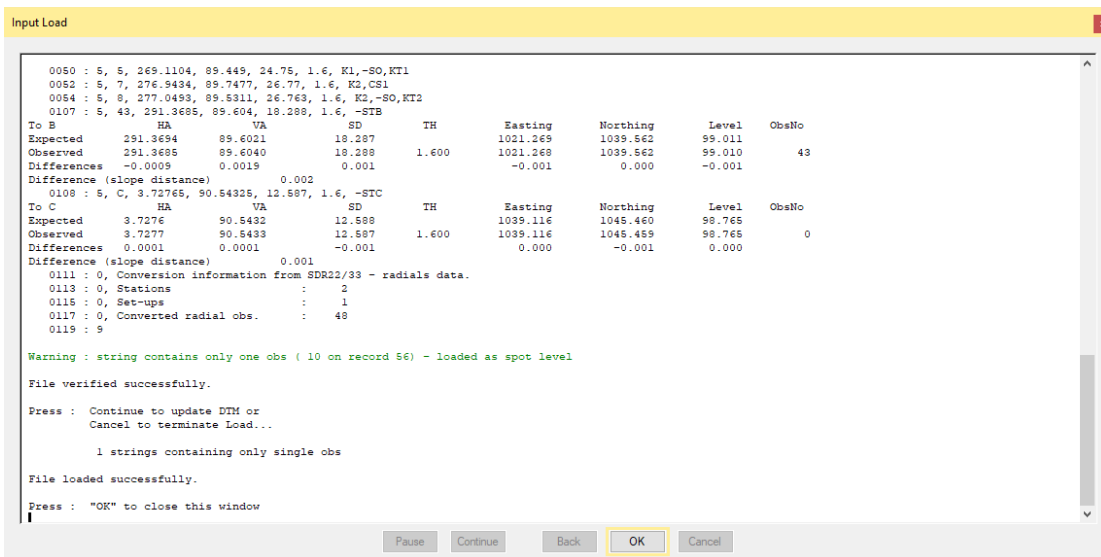
If the survey is empty and no station coordinates are provided prior to the first instrument set-up in the Load file, then an Initial Set-up dialog will be presented to verify the station coordinates and orientation.

Otherwise the station coordinates from the Topcon logger are loaded along with the detail.

Click 'OK'.



When available,  
Click 'Continue'



and 'OK'

to complete the load and display the data. This includes updating the triangulation to create the DTM.



# Chapter 4

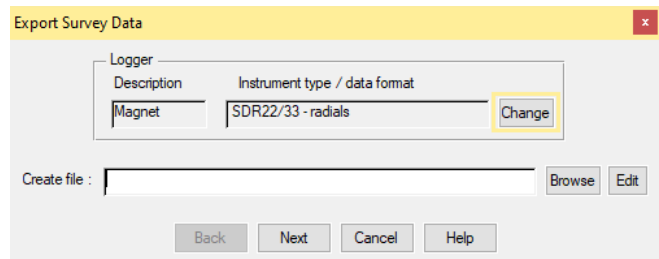
## 4.1 Exporting Data to Topcon Magnet Loggers

The Export of data to survey instruments and loggers falls broadly into four categories:

- Points
- Lines
- Triangles
- Alignments

The LSS Export commands are used to export data to most types of survey instruments using the same logger configuration as used during **Input - Download / Convert**.

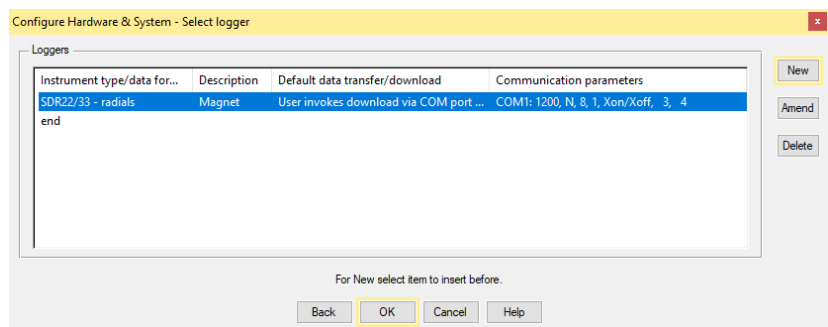
From the main menu, select **Export Survey Instrument – Survey Data**.



We will be prompted to create an export file whose format matches the default logger

**Note:** For Topcon - Magnet better results are obtained with the **GTS7** format.

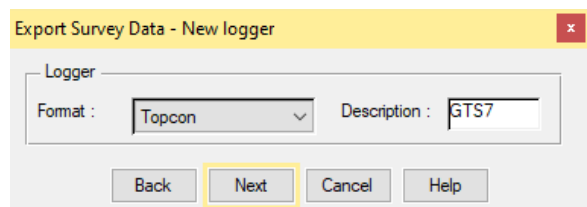
To Export to this format the logger parameters can be altered by clicking 'Change' in the above window or by using **Configure Hardware & System / Logger**.



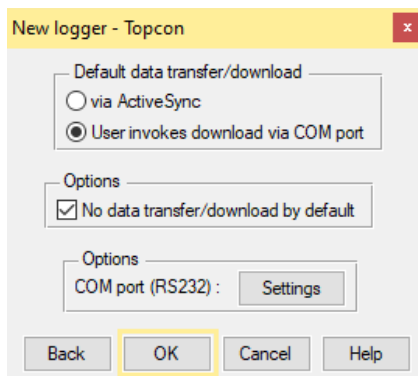
Select 'New' in the list of loggers.

'OK'

Leave the default option 'Topcon' selected and type in the 'Description' GTS7

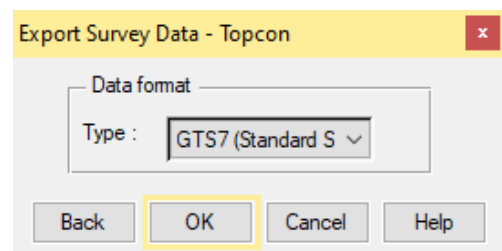


click 'Next'.



Leave as 'User invokes download via COM port' but choose 'No data transfer/download by default' as this will 'OK'

Choose GTS7 (Standard svy)

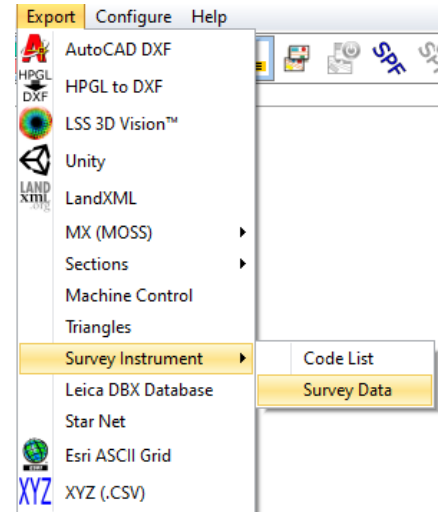


'OK' to save the new logger through the prompts.

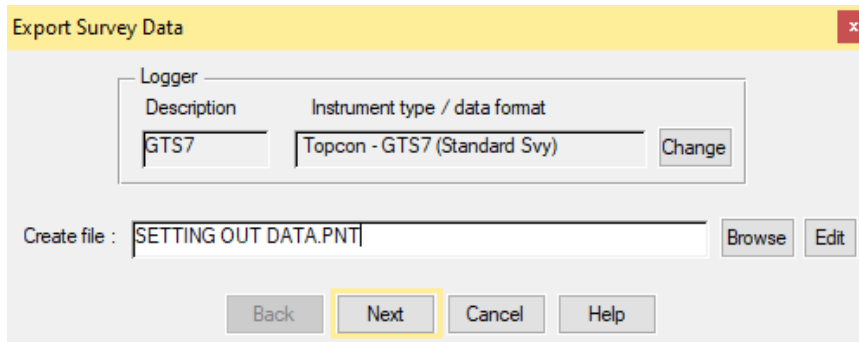
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## 4.2 Exporting Stations from LSS to Topcon Magnet

From the main menu, select Export/Upload data to survey instruments as above.



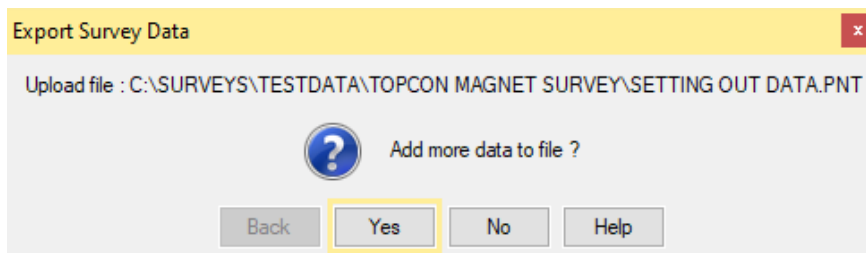
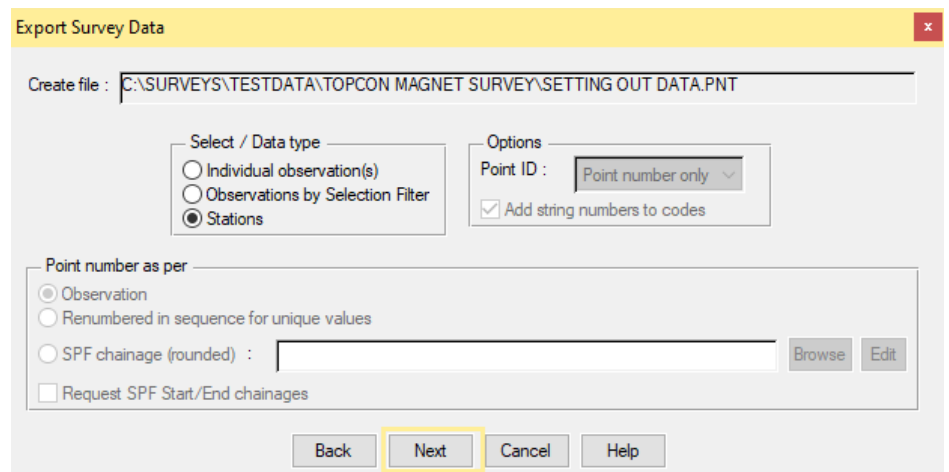
**Note:** the stations can be exported within the same file as the survey data but if done separately they can be imported as Control points into Topcon Magnet.



We type in a file name for the exported data.

The Export Survey Instrument – Survey Data next dialog allows the selection of:  
‘Individual observations’,  
‘Observations by Selection filter’,  
‘Station data’.

We will start with Stations, which will export all the stations in the current LSS survey.



We will be prompted with ‘Add more data to file?’

Select ‘Yes’ for now.

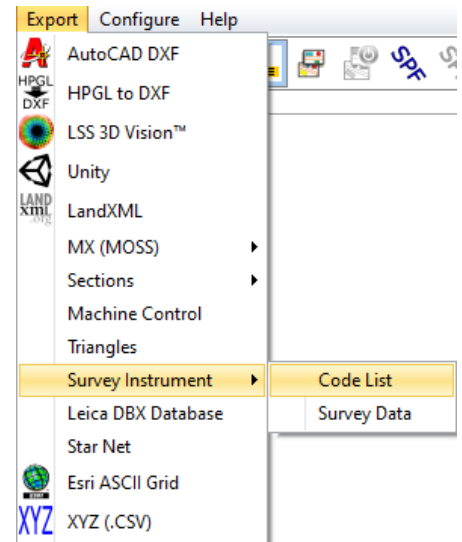
### 4.3 Exporting a Code Library LSS to Topcon Magnet

An LSS legend can be exported to Topcon Magnet as a new code library using the command

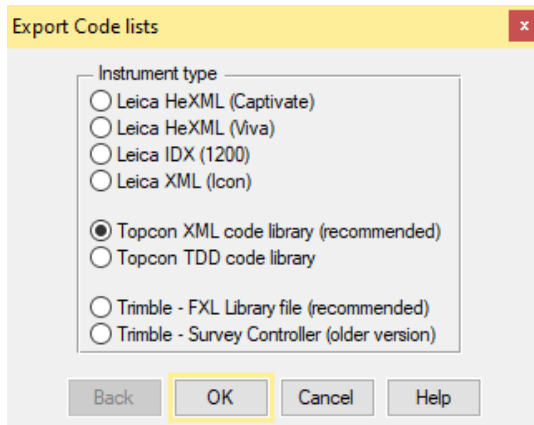
#### Export Survey Instrument – Code List.

**Note:** This option is only needed once you have built an alternative LSS legend to the prototype supplied at LSS install.

If you are using the LSS prototype legend then the equivalent Magnet Global code library has already been created and is supplied on the LSS media.



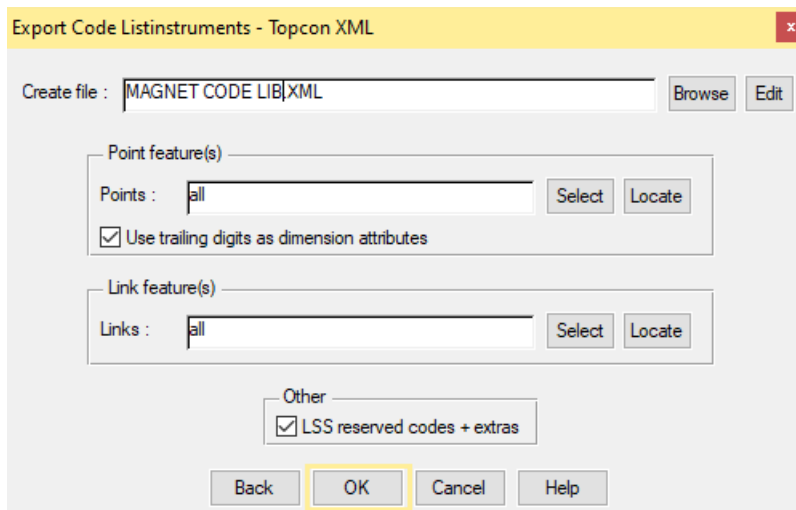
Open a survey containing the prototype legend to be exported as a code library.



The Export command opens the Export upload survey code lists window; Select 'Topcon XML code library (recommended).

'OK'

Provide the feature code library name.



'Select' the required 'Point features'.

**Note:** with dimension features e.g. the trees PT1, PT2 etc, LSS requires that the legend also contains the stub such as PT. Although LSS will still produce only one feature PT with a dimension attribute the PT legend feature will aid the processing.

'Select' the required link features.

Tick the 'Use trailing digits as dimension attributes' option to allow the special point feature codes such as for trees that

has several attributes. The LSS prototype uses PD1 and PS1 as the spread and the trunk respectively. Leave the 'Extra LSS codes' box ticked to include all the Reserved codes etc. Click 'OK'.

The created file is copied via USB to the IEFiles folder.

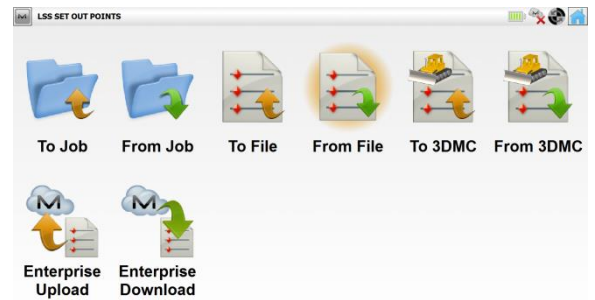
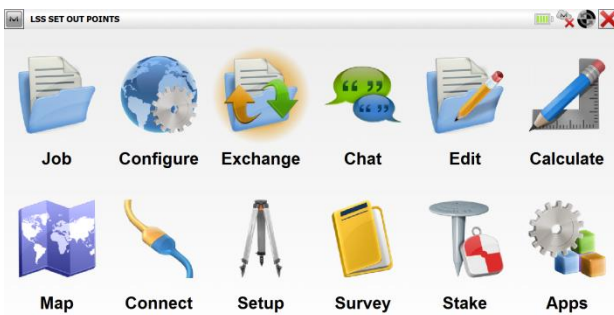
## 4.4 Importing Data on the Topcon Magnet

As can be seen in the previous section, LSS can export data from the LSS survey or design in a number of different formats that can be imported on the Magnet logger.

The logger itself will consider the data in separate entities which can be listed in the Import function. We will consider Points, Lines and Surfaces in the next examples, but other items are available.

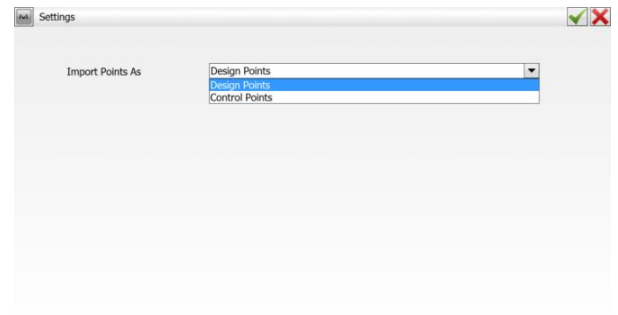
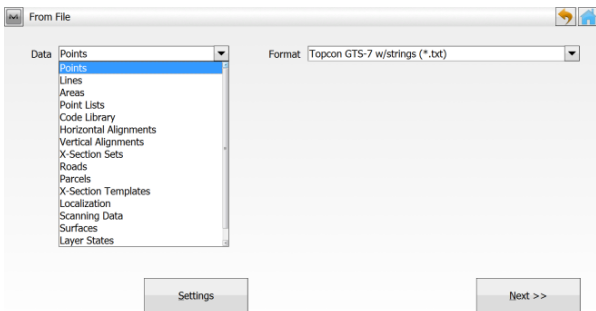
In each case, it is usual to set up a new job on the Topcon - Magnet logger as described in Session 1. It is also possible to import from another job on the logger.

Select 'Exchange / From File';



### 4.4.1 Points

Select 'Points' from the drop down list and the 'Topcon GTS-7 w/strings (\*.txt)' Format.



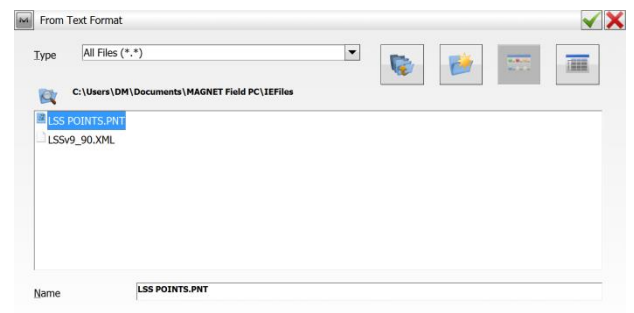
Clicking on 'Settings' will allow the choice of 'Design Points' or 'Control Points', 'Next>>'

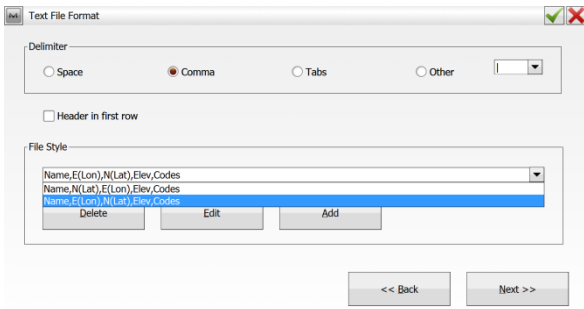
Will open a Browse explorer;

Browse to the relevant folder and select the file, here LSS POINTS.PNT.

The GTS7 (.PNT) file exported from LSS can be opened in an editor – here Programmer's File Editor.

**Note:** the stations were exported and are held within the same data format as the design data with the code being -ST. The only required difference required between the two is to select Point Type as Control Points.



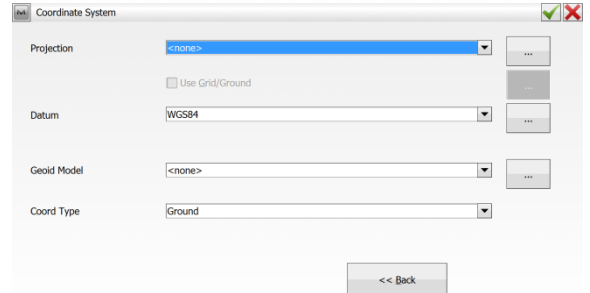
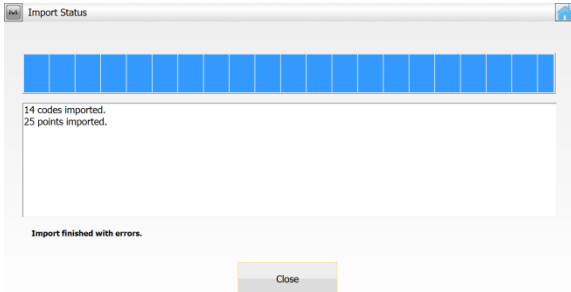


In the Text File Format Window, set 'Comma' as the Delimiter.

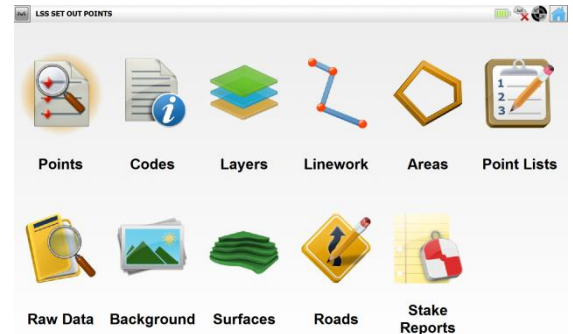
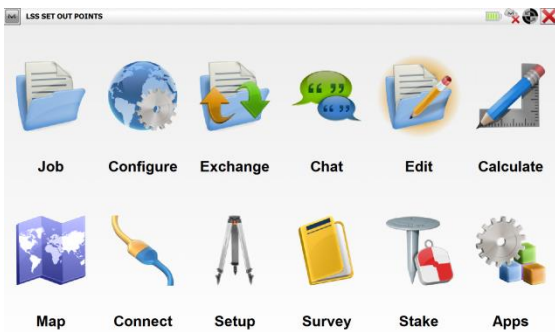
'Header in First Row' as appropriate,

And the File Style should be set to 'Name, E(Lon), N(Lat),Elev,Codes' using the drop down arrow.

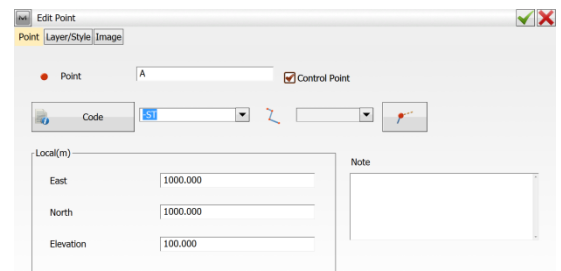
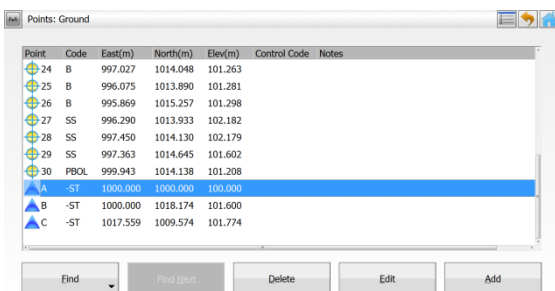
'Next >>' followed by 'Close';



Once imported from the file, 'Edit' followed by 'Points'



Will open the list of points in the exported file;



In the screenshots, the points were imported from the LSS POINTS.PNT file as Design Points, but highlighting a point and clicking 'Edit' has allowed the stations A, B, C to be set as 'Control Point' in the other window. **Note:** the stations were assigned the feature code '-ST' during the LSS Export.

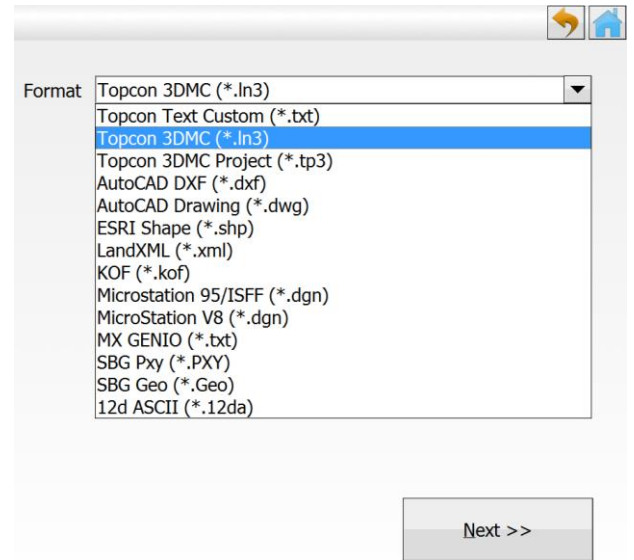
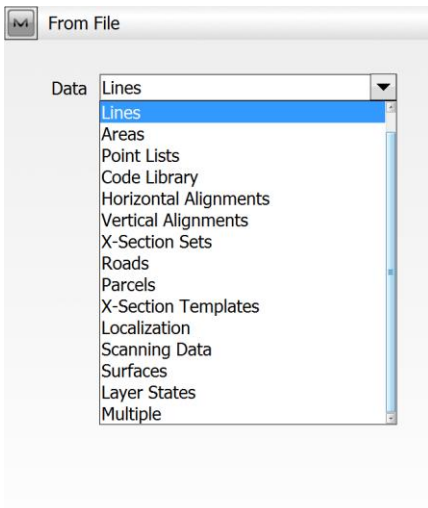
## 4.4.2 Lines

In LSS, the best option is to select **Export Onboard Instrument DTM – Topcon Surfaces (TINs) TN3/LN3** and import onto the Magnet logger as below.

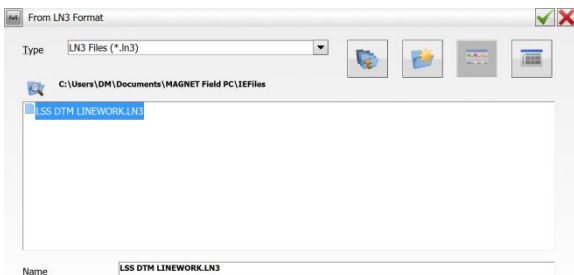
Lines can also be put out from LSS in **Export LandXML-Linework**, but with this method the data is not in 3D as it is with the described procedure.

On the Magnet use Job New to set up a new job, followed by Exchange / From File as for Points, described above.

In the 'From File' window, select 'Lines' from the drop down list and 'Topcon 3DMC(\*.LN3)' in the Format list (Other formats are available);

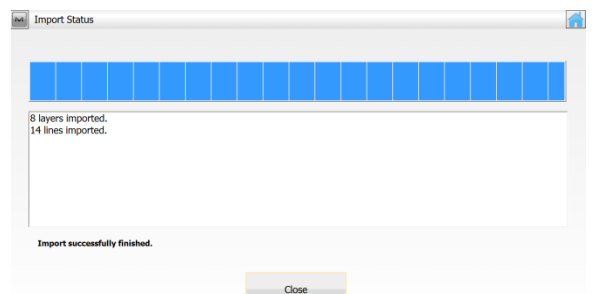
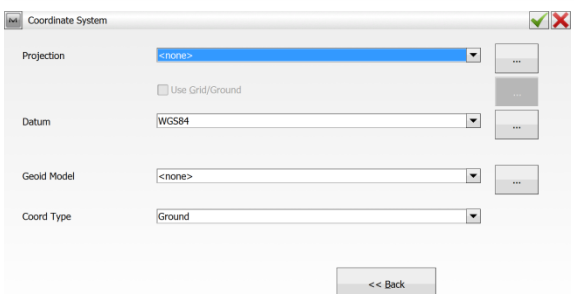


'Next>>' Will open a Browse window, which allows us to find the .LN3 file exported from LSS.



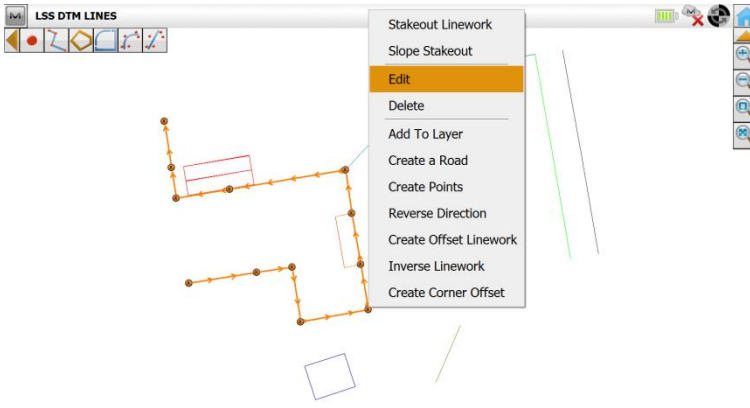
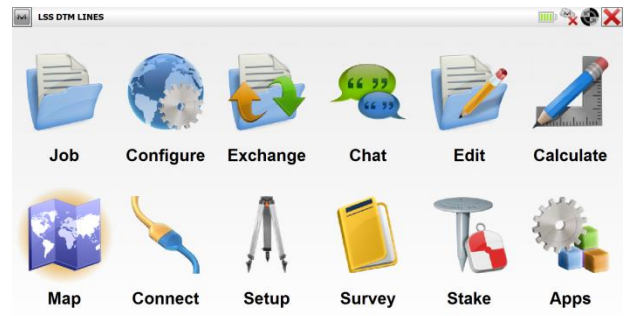
Highlight and click 

To go through the import...



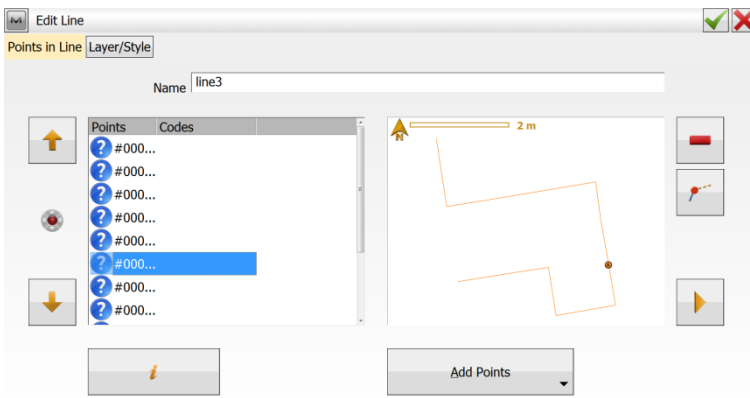
'Close' to complete the import.

In the Topcon - Magnet main menu, click on the Map icon to Display the imported lines in the job;

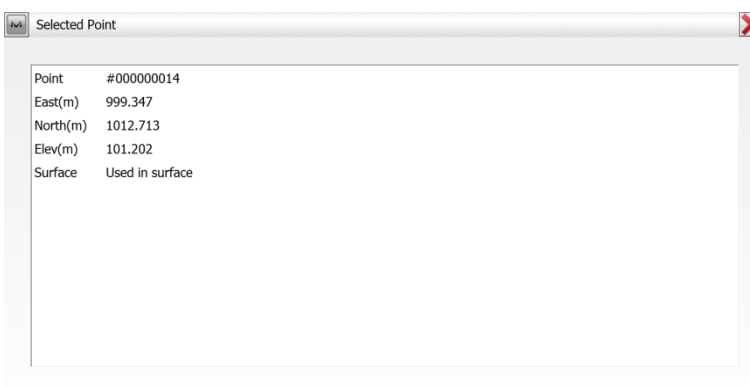


On the map a line can be selected by clicking with the left mouse button, then a right click will open the dialogue as shown in the screen shot.

For example, the Edit function will open a list of Points on the line, giving access to the Point coordinates.



Various commands are available. Clicking on the icon will open the Selected Point window;



The Selected Point details can be accessed via these clicks.

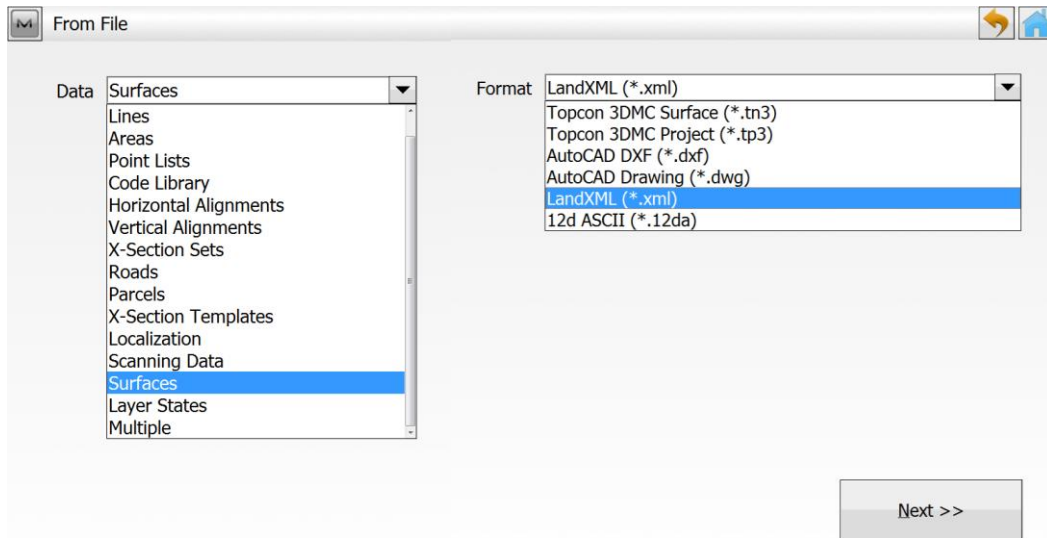


### 4.4.3 Surfaces

Other formats are available for transferring design data using the LSS Export function and one format that is currently being developed at McCarthy Taylor Systems is the LandXML format, which is able to export a range of data types.

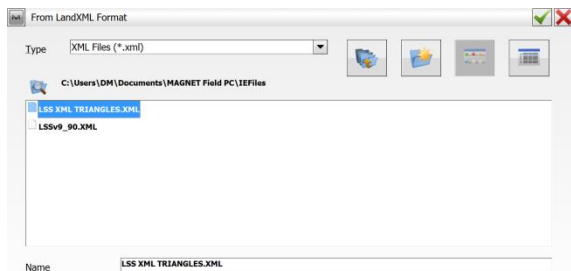
For surfaces the LSS **Export LandXML-Triangles** command is the best format to export the triangulation from the LSS Survey or Design into the Topcon - Magnet.

On the Magnet set up a new job followed by logger and choose the 'Exchange' and 'From File' options again, but then 'Surfaces' and 'LandXML (\*.xml)', from the drop down menus, but **Note**, Topcon - Magnet does recognise Topcon 3DMC Surface TN3 (TIN)files.



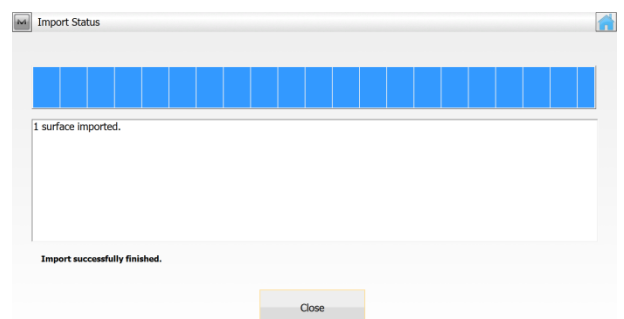
'Next>>'

Will open a Browse window, which allows us to find the .XML file exported from LSS.



Highlight and click

To go through the import...

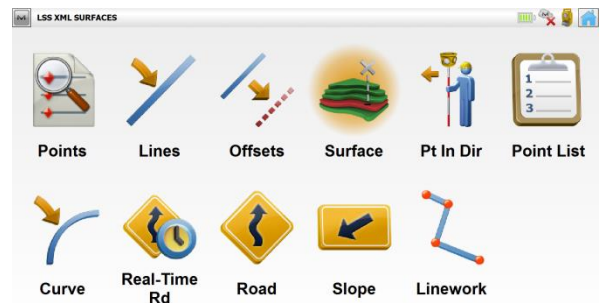
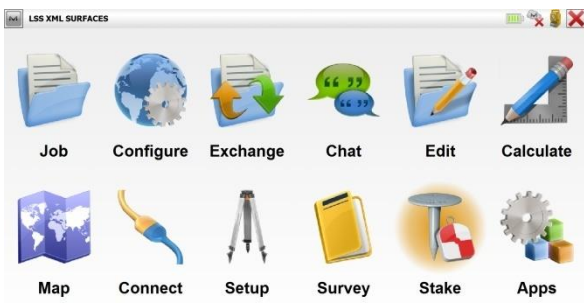


'Close' to complete the import.

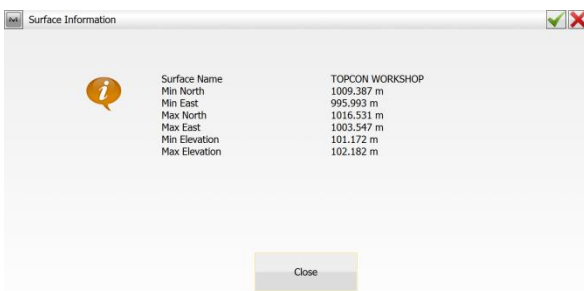
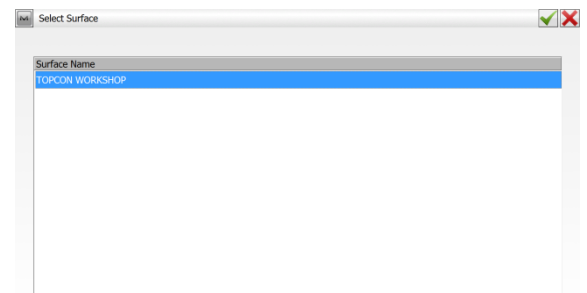
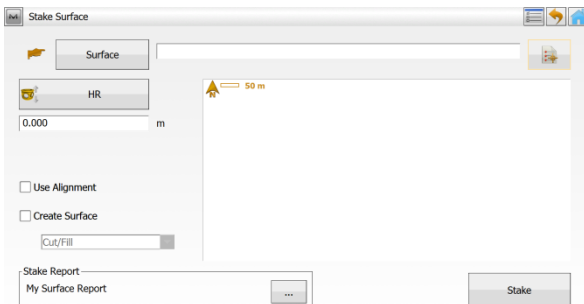


On the Magnet, the Map function, can only display Points and Lines, as described in the previous two examples.

To view the triangles or surfaces, we need to choose Stake – Surface;



Select the model name by clicking the icon to the right of 'Surface'.

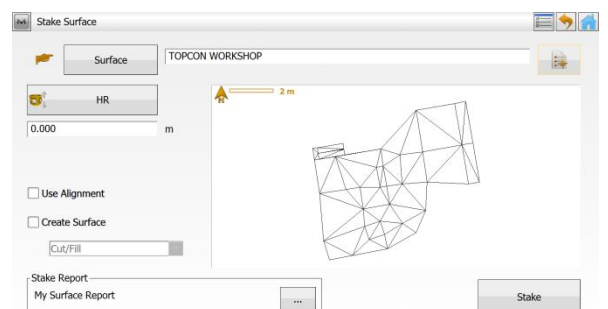


'Close'

The DTM triangulation should be visible.

Once a setup with backsight has been established, open the exported DTM and then click Stakeout.

See Topcon documentation for further stakeout information.



# 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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