# Instrument Manual Interface to Topcon TopSurv





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## Instrument Manual - Interface to Topcon TopSURV

# Introduction

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

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

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# 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



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# 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.dtmsoftware.com /Support-Home/Download/Survey-Equipment-Machine-Control-Support-Files'

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# 1.3 Configuring Topcon TopSURV with an LSS Code Library

### 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;

Code	Description	Usage	Removed	Plot	Height	Terrain	^								
PDP	Down Pipe	1		Yes		Yes		Code	Description	Usage	Plot	Height	Smooth	lerran	n
PEP	Electricity Pole	1		Yes		Yes		В	Building Line	1	Yes	3.000		Yes	-
PFL	Floor Level	1		Yes		Yes		BB	Bottom of Bank	1	Yes			Yes	
PFP	Fence Post sq	1		Yes		Yes	100	BF	Base of Face	1	Yes			Yes	
PGAS	Gas Valve	1		Yes		Yes	-	BHP	Base of Heap	1	Yes			Yes	
PGP	Gate Post	1		Yes	1.300	Yes		BO	Bld Open-sided	1	Yes			Yes	
PGRA	Grass	1		Yes		Yes		BST	Base of Stock	1	Yes			Yes	
PGY	Gully	1		Yes		Yes		BT	British Telecom	1	Yes			Yes	
PIC	Inspection Cover	1		Yes		Yes		C	Contour	1	Yes		Yes	Yes	
PIL	Invert Level	1		Yes		No		CEL	Cliff face left	1	Ves			Ves	
PIN1	PIN1	া		Yes		Yes	× .	CER	Cliff face right	1	Ves			Ves	
<						,	*	СН	Drainage Channel	1	Yes			Yes	~
	Note: the above	e usage counts See Help fo	may include Edit r further details.	/ Removed	l obs.			<						1	>

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.XML initially should be copied onto the Topcon - Magnet Logger's IEFiles folder;

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



Copy the LSS example XML file from the LSS media 'Support\_Files\Topcon\TopSurv\Code' folder to the 'TopSurv\IEFiles' folder on the TopSURV logger via Active Sync.

Select 'Configure / Codes' or 'Job Config Global'

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

Set 'Code with Description' on.

In Control Codes set 'Allow Custom' on.

Global Code	Options	ОК	Cancel
Codes Settings	Code Prompts		
Codes Default New Ty Data Entry Code File	pe Prompt Codes les\LSSV9-90.XML escription	▼ ▼ <u>B</u> rowse	
Control Codes-	n Delimiter ent Space	•	

Note: The 'Allow Custom' option allows non-

TopSurv control codes to be entered in the 'Ctrl Code' input box during detailing. The LSS ones are described below.

#### LSS preset control codes;

- '.A' start string,
- '.J' or 'JP' join to previous point,
- '.T' end string and
- '.P' or 'CLOSE' closed loop.

Although LSS supports the use of the control codes in general TopSurv does not use these graphically. Therefore, although it allows more choice of coding options you will not see the affects of these control codes on the TopSurv Map.

# Chapter 2

# 2.1 Instrument Data Capture

# 2.1.1 Creating a New TopSURV Job

Having started up TopSURV select New from the Open Job screen, or select Job New from the menu...

Job List	Created: 07/01/2011 12:55 Modified: 02/07/2012 11:24
or C:\\Documents\TopSURV	PC\Jobs
E <u>x</u> it <u>N</u> ew <u>B</u> rov	wse Open

🛹 Open Job

enter appropriate name and details ...

Press Next

and select the appropriate total station configuration set, for instance: 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

🗲 New Job	-	•	$\checkmark$	×
词 C:\\Docı	uments\T	opSURV PC\J	obs	
Name	LSS Demo	)		
Created By	DP			
Comments	LSS Demo	onstration		*
				-
Current Date	07/02	/2012 11:25		
		Browse	Next	:>>
	onfiguration			
Select the Con	figuration f	for the Job or	create a	
New Configura	tion.			
GPS+ Config	5. Ju		1	
Name   <de< th=""><td>aurc&gt;</td><td></td><th>J [</th><th></th></de<>	aurc>		J [	
Optical Config				
Name My C	onventiona	al 🗸 🔻	] [	
		< < Back	Next	
		a a <u>D</u> uck		· · · ·
			_	
Coordinate	e System	_	$\checkmark$	×
Projection	<none></none>		-	
🔲 Use <u>G</u> rid/Gro	ound			
Datum	WGS84		-	
Casid Madel				
Geola Model	<none></none>		<u> </u>	
			<b>_</b>	
		<< <u>B</u> ack	Next	>>

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check that you have the appropriate units set for the job Press Next

ensure that your Coord Order is as shown below ...

Press Next

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

Finally, pressing Finish to get back to the main TopSURV screen within the newly created job.

### 2.1.2 Station Set-Up

Select Survey / Backsight from the menu...

Enter the Occ Point (Set on station).

Enter the BS Azimuth value (Backsight station azimuth). If the button reads 'BS Point' then clicking on this will toggle to BS Azimuth.

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.



Junits	
Distance	Meters
Angle	DMS 👤
	<< <u>Back</u> <u>N</u> ext >>
🧀 Display	🖌 🔪
Coord Type	Ground
Coord Order	Easting,Northing,Elevation
Azimuth Origin	North
Disp Dir As	Azimuth
Disp CL Pos As	Station
Full Station	100.000 m
	<< Back Next >>
Alarms	🖌 🔀
Main Controller	GPS+ Optical
🗆 Audible Alarm	

<< <u>B</u>ack

EDM

E 🖉 📑

🛹 Backsight

Occupy 🗿 Point 🛛 🔼

Setup Meas Data Map

🛝 HI 1.536 m

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If the Occ Point does not exist click the down arrow icon to the right and select Properties, then Yes to 'No Point to display! Create One?'

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

Click OK

Click the 'Meas BS' button or 'HC set'.

**Note:** If this is the first set-up and the coordinates are typed in for the Backsight station then add a code '-ST'. This allows LSS to recognise the coordinate as a station in SDR33 format.

**Note:** 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.

Click Close to end the set-up recording.

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Add Point Lave	pint r/Style Photo Note	× ×
Point	A	
Local(m)	500.000	Note
North	1000.000	<b>A</b>
Elev	100.000	~

# 2.2 LSS and TopSURV Feature Coding

Select Survey / Topo to enter the detailing section.

Control observation - set the Code to '-ST' to 'tell' LSS that it is a control obs.

Note: The PointID is set to the station name.

Select Note to add General Text.

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



**∃**▼

Code Ctrl Codes

String

To create multiple coding click on the icon to the right of the Code field. Click 'Multiple Codes' then Add and select the Code and String.

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

If a Note is required on 2 lines use ',@' for each new text line.

oodevattii			JK	1,
Code	CS			
Ctrl Codes		•		
String	1			
a		_		_

📷 🕶 Sidesh	ot-Direc	t		Settings	Close
Measurement	nt Data	Map (	Offset	\$	
Point 3	3	6			
Code 🛛	C CS	~	C D	11-	
🖺 HR 🛛 1	.560	m	f) (	088	
HA 0.0000,V	A 90.00	00,SD 0.	.000	(dms,n	
Measure F	oresight	Direct			
Traverse Poi	int				
BS Setup				Meas	
			_		

Strings Attributes

Delete Edit

Sideshot-Direct

Code -ST

Measure Foresight Direct Traverse Point BS Setup

Point 1

Note Not

Storm

OK Cancel

Multiple Codes

1.560 HR

Heasurement Data Map Offsets

**B** 

- 20 1-

1 🙂 🕿

Meas

OK Cancel

OK Cance

Add

Settings Close



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# Chapter 3

# 3.1 Exporting EDM and GPS Data from TopSURV for LSS

Select Export / To File / Raw Data / Sokkia SDR33.

The configuration of the export option (below) only needs to be set once and from then on skip to the **Export** paragraph.



# 3.1.1 Configure the Export SDR33 Format

The first time this option is used on the logger you will need to click the *Code Style* button to configure the export.

Code Style		Close
Style: LSS	▼ <u>D</u> ele	te <u>S</u> ave
Available General Prefix String Separator Attrib. Name Se Attrib. Name	Order Code String Code Sej Control ( Attrib. V Attrib. V Control ( Note Sep	oarator Code Se alue Se alue Codes oarator
Separators Cont	rol Codes	♠ ₽

Code Style	Close
Style: LSS	▼ <u>D</u> elete <u>S</u> ave
Available General Prefix String Separator Attrib. Name Se Attrib. Name	Order String Code Separator Control Code Se Attrib. Value Se Attrib. Value Se Attrib. Value Control Codes Note Separator Note Separator
Separators <u>C</u> on	trol Codes 🔹 🕈 🖶

Populate the right hand list as per the dialogs above (they are the same one with the second picture showing the RHS scrolled to the bottom of the list).

Then click the Separators button

Use the space bar to create the dot symbol in the input boxes as shown.

Add an ampersand '&' to the Notes input box.

Click OK

Separators	OK Cancel
Style: LSS	
General Prefix	
Code	•
String	•
Control Code	•
Note	8.
Attribute Name	•
Attribute Value	•
	'•" - space

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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.

Click OK.

Control Codes	OK Cancel
Style: LSS	
Arc Start (AS)	AS
Arc End (AE)	AE
Rectangle (R)	R
Close (C)	C
Line Start	
Line End	
L	"•" - space

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



The LSS code styles will only need to be reselected if another Code style is used at any point.

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### 3.1.2 Export

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

Click the Code Style button to

Check that the Style is still set to LSS

Click Close

At the previous dialog click Next

Enter a file name

Click OK

The file will be created.

Click 'Close'

👉 To File		Cancel
Data	Raw Data	•
Format	Sokkia SDR33 (*.sdr)	-
Select File Units  Export TS and DL Raw Data  Export GPS Raw Data  Select Additional Point Types		
<u>C</u> ode Style		<u>N</u> ext >>

Code Style	Close
Style: LSS	▼ <u>D</u> elete <u>S</u> ave
Available General Prefix String Separator Attrib. Name Se Attrib. Name	Order       ▲         Code       String         Code Separator       Control Code Se         ▲ Attrib. Value Se       ▲         Attrib. Value       Control Codes         Note Separator       ▼
Separators <u>C</u> on	trol Codes 📄 🗲

Organize 🔻 New folder		85	• 0
Documents library IEFiles		Arrange by: Fol	der 🔻
Name A	Date modified 13/07/2010 12:46	Type File folder	Size
File same	11		
Save as type: Sokkia SDR33 Files(*.sdr)			

<b>Export Status</b>		
7 codes exported. 29 raw objects exported.		
Export Successfully Finished.		

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# 3.2 Data Processing in LSS- Converting Data

This option will download and convert survey data from TopSurv / TopSURV 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:

Input Download / Convert - Download data 🔹	Input Download / Convert - Download data
Logger       Description     Instrument type / data format       Magnet     SDR22/33 - radials	Logger Instrument type / data format No logger defined
Options Copy file via ActiveSync User invokes download via COM port LSS invokes download from Geodimeter via COM port Leica Survey Office	Options Copy file via ActiveSync User invokes download via COM port LSS invokes download from Geodimeter via COM port Leica Survey Office
No data transfer/download	☑ No data transfer/download
Back Next Cancel Help	Back Next Cancel Help

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.

Input Download / Convert - Conversion of SDR22/33 - radials	×
Downloaded file : veys\Testdata\Topcon Magnet Survey\TOPCON WORKSHOP.SDR	Browse Edit
Feature code conversions     Conversion file :     Browse     Edit     Nex	
Do not check legend for feature codes	
Options Included data Report detailed information Pause on each error/warning Stations Included data Detail : Radials and Coordinates ~	]
Back OK Cancel Help	

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

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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.

Programmer's F	ile Editor				-	×
File Edit Options	Template Execute Ma	scro Window Help				
						 _
1 <b>2</b>   <b>2</b>   E	à 🖆 🖉 🔍	ا 🚟 ا 🖓 ا 🖓 ا	🚾 📇 🖌 🔤			
🔄 Topcon Magne	t Survey.sdr					×
00NHSDR33 V	04-03.00 Nov-14-	-18 14:59 111111				^
10NMMagnet E	DMSurvey121111					
06NH1.000000	88					
13NMMAGNET F	ield Version 5.1 (t	build 167011)				
13000BS						
13MHEQUIPHEN	CTM44000 0000	4000 0000	00 0000	4 5050		
021F 02NH1 6000	21411025.0330	1036.2960	90.0990	1.5658		
88TP	STN21839.5628	1821.2698	99.8118	-51		
97TP	STN1	STN2291-36989991	291.36944444	51		
13NHBacksigh	t HR:1.6000					
89F1	STN1	STN218.2860	89.68388889	291.36888889	-ST	
89F1	STN1	00120.1560	90.2727778	257.37083333	K1&Start K1	
89F1	STN1	00222.4170	90.45250000	265.47944444	K1	
89F1	STN1	00322.4890	90.21400000	265.18722222	K1 -S0 KT1	
89F1	STN1	00425.9980	90.70527778	268.41555556	K1 CS1	
89F1	STN1	00525.3380	98.62638889	276.61611111	K2 CS1&Start K2	
09F1	STN1	00625.3390	90.41610000	276.72930000	K2 -S0 KT2	
89F1	STN1	88721.6298	90.40530000	277.03000000	K2 PGY	
09F1	STN1	00818.1960	90.95102222	286.46700000	K3DK2&Drop	
89F1	SIN1	00918.5950	91.32200000	296.04020000	K3	
09F1	SINT	01019.3100	91.51050000	303.34050000	K3&End K3	
89F1	SINI	01124.5510	90.28470000	281.30622222	PU 5 PS 660ak6H8	
0911	STM	01220.0100	91.403333333	300.74500000	BIGSLAFL BI	
8951	STN1	01319.0900	91.498333333 02.8160kkkk	307.20402222	B18STart B2	
89F1	STILL	81518 7948	01 53055556	318 48638889	B1 -RINE-RIN	
89F1	STN1	01614 5860	92 11777778	319 82888888	R2	
89F1	STN1	01713.7000	92.19638889	324.25972222	82	
89F1	STN1	01812.8990	92.38160000	327.93930000	B2 -NPL&-NPL	
2000	AT					× .
						 <ul> <li></li></ul>
In1Col1	55 WB Bec	Off No.Wrap DOS INS INUN	4			 
ALC: NOTE: T		an his map pool into into				11

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 is displayed, to allow the feature to be converted;

Input Download / Convert Input	ut Download / Convert Select
Convert codeLabel PBH :	Convert code     point of to allo       Label H10C : H10C      H10C
To LSS feature ● Point : PBH Select (	To LSS feature Unless O Point : PH10 Select in the
O Link : BH Select (	Link : H10C Select 'Select simply
O Special : HA	O Special : HA OK' to
O No more feature code conversion requests     (       Back     OK     Cancel     Help	No more feature code conversion requests       Back       OK       Cancel       Help

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

Jnless we can see a feature code n 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'.

nput Download	/ Convert	×
- Save new fea	ture conversion selections to CNV file	
Create :	C:\Surveys\Testdata\CNV\RAW MAGNET.CNV	Browse Edit
◯ No save		
	Back OK Cancel Help	

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



Input Download / Convert	×
Start of conversion 0, LSS load file converted from SDR22/33 - radials file : 0, C:\SURVEYS\TESTDATA\TOPCON MAGNET SURVEY\TOPCON MAGNET SURVEY.SDR 0, Created by LSS v10.01.10 : 2019.11.13 15:32	
0 0 0, Conversion information from SDR22/33 - radials data. 0 0, Stations : 2 0 0 Stations - 1	
0, Converted radial obs. : 44 0	Click 'OK'
Conversion completed. "OK" to save LSS load file, or Cancel to terminate. Pause Continue Back OP	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 <b>Input Load</b> command will automatically be invoked.	Input Download / Convert - File Close     X       Output file C:TESTDATA\TOPCON MAGNET SURVEY\TOPCON MAGNET SURVEY.001       Options       Save       Delete       Back     OK       Cancel

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.

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# 3.3 Data Processing in LSS- Inputting Data

### 3.3.1 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.

## 3.3.2 Loading Data into a Survey Model

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

Input Load X	The first radial buttons are for choosing
Load Report Settings	where to send a load report - to a
O Device : HPF8659E (HP Officejet Pro X576dw MFF on Ne05: Select	printer, to Adobe Acrobat file or (more
O Adobe Acrobat : TOPCON MAGNET SURVEY.PDF :A4:PT:Close Configure	usually)
File : TOPCON MAGNET SURVEY_nnn.TXT	A text report file.
✓ Overwrite report file         Lines per page :         67         (File)         Bold text	
- Feature conversion	A load report file is generated for each
Conversion file : Browse Edit	load.
Do not check legend for feature codes	We can choose a Conversion file here,
Load file     Options       Number :     OD1       Edit     Errors       Control warnings     Stations       Use Default	Normally we would 'Report pauses on' 'Errors' and 'Control tolerance warnings'.
General text settings Strings restart on Levels text style New setup Save as Default Change of feature	We could also select 'All warnings'.
Advanced	Other options are described below.
	We can normally accept the default
Survey Parameters	settings, but if we do need to change any
	of the settings on a regular basis we can
Back Next Cancel Help	'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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#### 3.3.3 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.

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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 meaned 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.

Input Load - Initial Set-up ×	
Set-on Station STN1	
E: 1000 N: 1000 Z: 100	
Description :	
Default scale factor 1.00000000	
Backsight to Station STN2	
True bearing : 291 22 10 (dms) Mode	
Back OK Cancel Help	

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'.



Input Load	💌 When
to C HA VA SD TH Easting Northing Level ObsNo Exmerted 3.7276 90.5432 12.588 1035.116 1045.460 98.755	^ available, Click
Observed 3.7276 90.5432 12.586 1.600 1039.116 1045.458 98.765 0 Differences 0.0000 0.0000 -0.002 0.000 -0.002 0.000	'Continue'
Difference (slope distance) 0.002 0049 : 5, 4, 255 2, 93.6666, 24.75, 1.6, K1 0050 : 5, 5, 255.1104, 93,445, 24.75, 1.6, K1, -S0,KT1 0055 : 5, 7, 256.434, 83.747, 26.77, 1.6, K2, C51	Continue
0054 : 5, 8, 277.0493, 89.5311, 26.763, 1.6, K2, S0, KT2	
To B HA VA SD TH Easting Northing Level ObsNo	
Apperted 291.3694 05.6021 10.207 1031.269 1033.562 95.011 Observed 291.3655 85.6040 10.2808 1.600 1021.268 1039.562 95.010 43	
Differences -0.0009 0.0019 0.001 -0.001 0.000 -0.001 Difference (slope distance) 0.002	
0108 : 5, C, 3.72765, 90.54325, 12.587, 1.6, -STC To C HA VA SD TH Easting Northing Level ObsNo	
Expected 3.7276 90.5432 12.588 1039.116 1045.460 98.765	
Observed         5.12.0         5.0001         1.000         1.001.100         1.001         0.001           Differences         0.0001         -0.0001         0.000         -0.001         0.000	
Difference (slope distance) 0.001 0111: 0, Conversion information from SDR22/33 - radials data.	
0113 : 0, Stations : 2 0115 : 0, Set-ups : 1	
0117 : 0, Converted radial obs. : 48	
Warning : string contains only one obs ( 10 on record 56) - loaded as spot level	
File verified successfully.	
Press : Continue to update DTM or Cancel to terminate Load	
	~
Pause Continue Back OK Cancel	
nput Load	x
0050 : 5, 5, 269.1104, 09.449, 24.75, 1.6, K1,-50, KTI 0052 : 5, 7, 276.9434, 89.4477, 26.77, 1.6, K2, CSI	6
0054 5, 8, 277.0493, 89.5311, 36.763, 1.6, K2,-S0,KT2	
0107 : 5, 43, 251.3685, 89.604, 18.288, 1.6, -STB To B HA VA SD TH Easting Northing Level ObsNo	
Expected         291.3654         09.6021         10.207         1021.265         1039.562         99.011           Observed         251.3654         69.6021         18.287         1.600         1021.275         1039.562         99.010	
Differences -0.0009 0.0019 0.001 -0.001 -0.001 -0.001	
Difference (slope distance) 0.002 0108 : 5, C, 3.72765, 90.54325, 12.587, 1.6, -STC	
TO C HA VA SD TH Easting Northing Level ObsNo Superced 3 7275 90 5432 12 588 1039 115 1045.460 98 765	
Alperten 3.7277 50.5433 12.587 1.600 1035.116 1045.459 58.765 0	
Differences 0.0001 0.0001 -0.001 0.000 -0.001 0.000 -0.001 0.000 -0.001 0.000	
0111 : 0, Conversion information from SDR22/33 - radials data.	
0115 : 0, Set-ups : 1	
0117 : 0, Converted radial obs. : 40 0119 : 9	
Warning - string contains only one obs ( 10 on record 56) - loaded as snot level	
File verified sussesfully	
File Verified Successfully. Press : Continue to update DTM or	
Cancel to terminate Load	
File loaded successfully.	
Press : "OK" to close this window	*
Pause Continue Back OK Carval	and 'OK'
Contraction Contraction Contraction	

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

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# 4.1 Setting-Out with LSS and TopSURV

### 4.1.1 Export / Survey Instruments - Survey Data

From the main menu, select 'Export/Upload data to survey instruments'. The selected logger uses the

parameters as per Input/Download & convert. Note: The logger parameters can be set by clicking the 'Change' button or by using Configure/Hardware & System / logger.

Leave the default option Topcon GTS7 selected and click 'Next'.

This dialog allows the selection of observation	
and station data.	

The defaults assume that the 'Observations' will be exported using the Selection filter. Click 'Next'.

**Note:** The observations can have the code added to the point number, which can be related to the SPF chainage.

If chosen the Selection filter dialog will offer the opportunity of multiple observation selection criteria. As soon as there are observations selected using 'Apply' then the 'Cancel' button is replaced by 'Finish'.

Note: The data selected by the Selection filter is grouped in the export set first as complete strings and then as individual points related to their loaded order. To export the observations in the order they were located use 'Individual observations' from the previous dialog.

Data		To be
All observations     Individual obs selection     Individual link selection		Included     Excluded
O Point features : No features sel	ected Select L	ocate From overlay
O Link features : No features sel	ected Select L	ocate Crossing links
Restrict by		Туре
Polygon Rectangle	Current screen	✓ 3-D ✓ 2-D
Surface features : No features s	elected Select	Locate
Load File Number : 799 🗸	Locate	Any     Calculated
		Amended
Height range	User obs range	Obs from
Maximum : 99999 (m)	Locate Maximum : 0	Within boundary
Minimum : 99999 (m)	Locate Minimum : 0	Rectangle/Polygon

Export / Upload data to survey instr 🔀					
Do you wish to add more data to the file?					
Options Add more data No more data					
Back Next Cancel Help					

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	55	
Export / Upload	data to survey instruments	
	Logger Instrument type / data format Topcon - GTS7 (Standard Svy) Change	
Export file : DEM	OSURVEY.PNT	Browse Edit
	Back Next Cancel Help	

- Point number a	Select / Data type Individual observations Observations by Selection Filter Stations s per	Options       Point ID :       Point number only       Image: Add string numbers to codes
<ul> <li>SPF chainage</li> </ul>	in sequence for unique values e (rounded) :	Browse

There is the possibility of repeating several selection criteria / method to the same data set. If required click 'Add more data' and then choose to add more observations/stations. When 'No more data' is chosen see below for the data transfer.



Export / Upload data to survey instruments - File u 🔀				
File exported successfully				
C:\SURVEYS\TESTDATA\EXAMPLE SURVEY - FINISHED\DEMOS				
← File options ──				
Upload data to instrument				
Ensure instrument ready to receive				
Back OK Cancel Help				

Select 'Active Sync' and click 'OK'.

Active Sync via LSS will now automatically select the last accessed folder (if uploading for the first time to this logger then browse to the 'Topsurv\IEFiles' folder on the TopSURV logger).

Click 'OK' to transfer the data file.



If required select Job New (as procedure described above).

Select 'Import / From File / Points / GTS7 w/strings / Design points'...

Select the uploaded data file

Job Edit	⊻jew	Survey	Stake	Cogo	Нþ
Open	-		_		
New					
Delete					
Config	•				
Import	•	From J	lob		
Export	•	From F	ile		
Info		From (	Controller		
Mode	1				
Exit	_				

Select file 🔀
TOPCON
😑 🛅 TopSURV
🛁 antennas 📃
- 🗂 Beacons
- 🗂 Camera
CustomDevices
DTM
🗖 Geo
👛 Geoids
🗅 Help
🖃 💼 IEFiles
📥 DI3000
DEMOSURVEY.gt7
- M TEST3D.DXF
I I I I Jobs
\CF Card\TopSURV\IEFiles\\UPLOAD.PNT
OK Cancel

Trom File	e	Cancel
Data	Points	•
Format	GTS-7 w/strings	•
Point Type	Design Points	-
		<u>N</u> ext >>



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Select the Coordinate System and Finish...

TopSURV will now attempt to bring the data file into the job.

Please refer to the TopSURV documentation for the Stakeout procedure.

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Coordinat	e System	Finish	Cancel
Projection	<none></none>	-	
🗆 Use Grid to	Ground		
Datum	<none></none>	•	
Geoid Model	<none></none>	•	
Coord Type	Ground	•	
Dist Units	Meters	•	
	<< <u>B</u> ac	:k	



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# 4.2 Export a Code Library to TopSURV

An LSS legend can be exported to TopSURV as a new code library using the option 'Export / Upload code list to survey instruments'.

**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 TopSURV Global code library has already been created and is supplied on the LSS media (see above).

Open a survey containing the prototype legend to be exported	The Export upload survey code lists
as a code library.	Instrument type     Leica IDX     Topcon TopSurv XML code library (recommended)     Topcon TopSurv TDD code library
Select ' Export/Code list to survey instruments/Topcon TopSurv XML code library	Trimble - FXL Library file (recommended)     Trimble - Survey Controller (older version)      Back     OK     Cancel     Help

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.

🐉 Export Upload code list to survey instruments - Topcon Topsurv XML 🛛 🗾	
Create file : LSS EXAMPLE Browse Ed	t
Point feature(s)	
Pointe : Multi colorition 20 of 122	
Points . Induit-selection - 36 of 123	
Use trailing digits as dimension attributes	
Link feature(s)	
Links : All features selected Select Locate	
Tree features	
VSpread 3 PD1 Select Trunk : PS1 Select	
Other	
LSS reserved codes + extras	
Back OK Cancel Help	

'Select' the required link features.

Tick the 'Spread' option to allow the special Tree feature code 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'.

Once the file has been created, either copy the XML file onto a memory stick, or upload it via Active Sync onto the instrument and follow the same procedure as above to Configure the Global code library.

**Note:** Certain early versions of Topsurv v8 will not handle the minus character "-" in the code input field. We have been informed that this bug has been corrected and therefore your TopSurv firmware may need to be updated.



# 4.3 Export to Machine Control

Provides onboard determination of the height difference to the model calculated from the current survey position

Select DTM file format (as shown) from the Export to Onboard Instrument DTM option.

Export to Machine Control	x
File type LandXML DTM Leica Job (DBX) Leica D45 Leica DTM Stakeout (DXF) Leica DTM Stakeout (GSI8) Topcon Surfaces (TINs) TN3/LN3 (recommended) Topcon Surfaces (TINs) DXF Trimble SiteVision (DTX)	
O Trimble TIN model (TTM)	
Back Next Cancel Help	

This option produces a DXF file which can be copied directly to the 'Topsurv\IEFiles' folder on the TopSURV logger via Active Sync.

Export to Machine Control		×
Topcon Surfaces (TINs) DXF		
Create file : EXAMPLE SURVEY	Browse	Edit
Current Survey Area		

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# 4.4 Import DTM data to TopSURV

Create a job as described above.

Then 'Job / Import / From file / Surface (TINs) / DXF' and click Next.

Select the exported DXF file and click OK.

Click Close when the import has completed.



Format	DXF	•
		<u>N</u> ext >>
	aport Status	

Surfaces (TINs)

**च −** Fr

Data

1 surface imported.
Import Successfully Finished.
Close

Select 'Stake / DTM' once a setup with backsight has been established.

Open the exported DTM and then click Stakeout.

See Topcon documentation for further stakeout information.

🖥 🔽 Open DTM		OK	Cancel
Current File:			
DTM List			
LSSEXAMPLE		Created:	
TRIANGLE		02/28/	2007
🔁 DTM		16:21	
	1	Modified: 02/28/ 16:28	: 2007
🔍 C:\\My Documen	ts\TopSUF	RV PC\D1	M
	Browse		pen

<b>□</b> ▼ DTM Sta	<b>□</b> ▼ DTM Stakeout		
🚁 DTM	LSSEXAMPLE	1	
HR	0.000 n	n	
🗆 Use Alig	nment		
Create T	N Cut/Fill	- <u>S</u> takeou	ıt
			_

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# 4.5 Export/Upload Stations from LSS to TopSURV

From the main menu, select 'Export / Survey Instruments – Survey Data ' as above.

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

The only difference required to exporting the survey data is to select Stations which will export all the stations in the current LSS survey.

Export 7 Option	IRVEYS\TESTDATA\EXAMPLE SURVEY - FINISHED	STATION.PNT
	Select / Data type         Options           O Individual observations         Point ID :           Observations by Selection Filter         ✓ Add string r	Point number only
Point number as Observation Renumbered in SPF chainage	per	Browse) Edit
Request SPF S	Start/End chainages Back Next Cancel	Help

Within the relevant Job in TopSURV select 'Import / From File / Points / GTS7 w/strings / Control points'

**Note:** the stations are held within the same data format as the survey data and the only required difference between the two is to select Point Type as Control Points.

**Note:** the stations are shown as triangles because of the feature code '-ST' in the LSS code library.

From File	e	Cancel
Data	Points	•
Format	GTS-7 w/strings	-
Point Type	Control Points	-
		<u>N</u> ext >>



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# 4.6 Export Stations from TopSURV to LSS

Select 'Export / To file / Points / GTS-7 w/strings' and tick the box 'Select Types of the Points' and click Next.

Set 'Control Points' only and click Next

Follow the usual dialogs to create the file.

To File	Cancel	Select Point Type(s) to Export	Cancel
Data Points Format GTS-7 wistrings ✓ <u>Select Types Of The Points</u> ✓ Use Filters	- -	Point Types       Design Points       Ø Control Points       © Cogo Points       Base Station       Offset Topo Points       Auto Topo Points       Sideshot       Offreet	
	<u>N</u> ext >>	<u>Check</u> <u>Uncheck</u> <u>Check</u>	lext >>

Within the LSS 'Input / Download and convert' option choose 'Coordinates' rather that 'Radials'

**Note:** For this to operate the stations must be set to Control points and the code to '-ST', which would be normally done during the definition of the station coordinates.

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# Conclusion

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

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

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