Instrument Manual

Interface to Leica Geosystems Captivate







Contents

Introduction	3
Chapter 1	4
1.1 Install LSS & Testdata	4
1.2 Survey Instrument and Machine Control Support Files	5
1.3 Example Codelists	6
1.4 LSS String Coding and Reserved Codes	7
1.5 LSS Prototype and Feature Code Lists	8
1.6 Configuring Leica Captivate	10
1.6.1 Work Style Settings	12
1.6.2 Coding & Linework	14
1.6.3 User Defined Pages	16
1.6.4 Hot Keys & Favorites	18
1.6.5 The Function Button	19
Chapter 2	20
2.1 Instrument Data Capture on a Leica Captivate	20
2.1.1 Creating a New Captivate Job	20
2.1.2 Setup Procedure	21
2.1.3 Detail Procedure	22
2.1.4 The Free Code and Attributes Options	23
Chapter 3	25
3.1 Configuring the Leica Job (DBX) Reader in LSS	25
3.2 Configuring the New Survey Parameters in LSS	27
3.3 Creating a New Survey in LSS	29
3.4 Data Processing – Input Download / Convert	31
3.5 Data Processing – Input Load	35
3.5.1 Introduction	

Back to top

Page 1 **of** 48

Instrument Manual - Interface to Leica Geosystems Captivate

3.5.2 An Explanation of the LSS Load File Format	37
3.6 GPS Survey Instrument Issues	40
Chapter 4	41
4.1 Exporting Data to Leica Instruments	41
4.1.1 Export Leica DBX Database	42
4.2 Opening a DBX Job on Captivate	47
Conclusion	48

Back to top

Page 2 **of** 48

Instrument Manual - Interface to Leica Geosystems Captivate

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.

Back to top

Page 3 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

Version LSSv10.01.10

1.1 Install LSS & Testdata

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

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

Select 'Install LSS &

Test Data';



For a new install use

'Full LSS Install Incl

Dongle Drivers'



Also choose

'Install Enhanced

Test Data',

which includes examples of Point Cloud data and the files we use in our specialist training courses



Back to top

Page 4 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

1.2 Survey Instrument and Machine Control Support Files

Return to the Install Home Page;

Select

'Survey & Machine Control',

and access the files/documents for your instrument type-

For Leica instruments and loggers select

'Leica survey and machine control'





Choose '**1200/Viva/Nova/Captivate**' and the Vimeo;





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





1200 Viva Nova & Captivate

Back to top

Page 5 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

(iii) (iii)

Version LSSv10.01.10

1.3 Example Codelists

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

LSSv10Captivate - the standard LSS Prototype for Captivate instruments

LSSV980Road - includes LSS road markings

LSS1200Adv - an advanced version, which uses an alternative method to group features together in the code list. This is only intended as an additional facility and may be used to demonstrate ideas which can be added to the standard codelist in use.

👪 💽 🌆 = I	Code			- 🗆 ×
File Home Share View				~
	nt_files → Leica → JobDBX → Code →		♥ 🖒 Search Code	م
sales@dtmsoftware.com (ds)	Name	Date modified	Туре	Size
📔 Videos	cantivate code list zin	21/03/2017 12:21	Compressed (zinn	8 KB
🊢 Local Disk (C:)	and a list zin	01/02/2017 17:27	Compressed (zipp	37 KB
퉬 Intel	SS1200Adv x06	20/06/2011 12:20	V06 Eile	76 KB
PerfLogs	LSS1200Adv X23	20/06/2011 12:29	Y22 Eile	11 KB
🌗 Program Files	LSS1200Adv:XCE	20/06/2011 12:29	VCE File	1 // 0
Program Files (x86)		02/11/2011 12:29	V06 Eile	1 KD
🐌 rough_guides	L 155-0 90 X32	03/11/2011 13:05	V22 Eile	41 ND
support_files		03/11/2011 13:05	VCE File	1 1/1
🌗 Extras	LSSV9_60.XCF	03/11/2011 13:00	XCF File	1 ND
🌗 Geodimeter	LSSv10Captivate.x00	02/03/2017 18:08	X00 File	31 ND
🌗 Geomax		02/03/2017 18:08	X23 File	11 KB
🍌 Leica	LSSV10Captivate.XCF	02/03/2017 18:08	XCF File	I KB
Builder	LSSV980Road.x0b	09/03/2011 17:03	X0b File	51 KB
GPS500	LSSV980Road.X23	09/03/2011 17:03	X23 File	11 KB
JobDBX	LSSV980Road.XCF	09/03/2011 17:03	XCF File	1 KB
Dode Code	Readme1st.TXT	14/02/2012 12:38	Text Document	1 KB
aptivate code list.zip				
code list.zip				
Coding examples				
Format				
15 items 6 items selected 94.7 KB				

Back to top

Page 6 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

1.4 LSS String Coding and Reserved Codes



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

'Support_Files\LSS_Survey_Codes'

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

📕 🛃 📜 🗢 LSS_Survey_Codes				- 0	×
File Home Share View					~ ?
\leftarrow \rightarrow \checkmark \uparrow \blacksquare \rightarrow This PC \rightarrow LSSV10	00102 (D:) > support_files > LSS_Survey_Codes		ע ט Search LS	S_Survey_Codes	Ą
✓	Name	Date modified	Туре	Size	
> 📜 Extras	LSS_String_and_Reserved_codes.pdf	01/03/2017 17:13	PDF File	8	63 KB
> 📜 Geodimeter					
🦲 Geomax					
> 📜 Leica					
LSS_Survey_Codes					
> 📜 Prolec					
> 📜 Starnet					
> 📜 Topcon					
> 📜 Trimble 🗸 🗸					
1 item 1 item selected 862 KB					

Back to top

Page 7 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

1.5 LSS Prototype and Feature Code Lists

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

😂 LSS	v10.01.0	02 - Elite	+PC - DTM sur	vey: PROTOTYPE [*] - L	SS Version 10 Protot	type survey					- 0 ×
hile is	nput	heature	CAD-Pro Edi	t Control Transform	Output Keport	Plot Displa	sy Query	3-D View Li	irge Data 3D	/sion" Export Configure Help	
			ev 🟟 🖡	1 🖻 🕕 🍎 🖣	[າ 🛛 🔑	, س 🔍		5 🏓 ,	8	🔯 📰 🖤 T N C 🏊 🖻 🕾 % 🖾 🏧 🛸 📔 🗢 💩 🗉 🔍	
w	*	At -				-					
	•	•								A B	
2	*	⊕ [Query List -	Point features							
Q	хŀ	6		1							
74	ക		Code	Description	Usage	Removed	Plot	Height	Terrain ^	l	
		-	PASP	Asphalt	1		Yes		Yes		
10	•	11	PBL	Building line Rollard			Yes	1 200	Ver		
≢[׼	24	PC	Circle	1		Yes	1.200	Yes		
2	•	15	PC1	Circle 0.100 D	0		Yes		Yes		22
3	716		PC10	Circle 1.000 D	0		Yes		Yes		()) 24
	11"		PC11	Circle 1.100 D	0		Yes		Yes		
*	¥		PC12	Circle 1.200 D	0		Yes		Yes		$\langle \times \rangle$
×			PC13	Circle 1.300 D	0		Yes		Yes		2
	A		PC14	Circle 1.400 D	0		Yes		Yes Vor		20
	A.	-	<	Circle 1.500 D	v		165		>		- 20
1	*		,								A
	~A			Note: the ab	ive usage counts n	nay include E	dit / Remove	ed obs.			
X	2				See Help for I	ruitner details					37
14	12			Bac	< OK	Cancel	Help				
2	v										200
N	~		Query List	- Link features							
			,								🗮 🗮 🧖
X	A		Code	Description	Usage	Plot	Height	Smooth	Terrain ^		2
N .	<u>/</u>		P	Building Line	1	Vec	2 000	Shirooth	Vec		310
**	A		BB	Bottom of Bank	1	Vec	3.000		Vec		20
4	A		BF	Base of Face	1	Yes			Yes	a subscription of the second sec	· [4]
	2 😥	_	BHP	Base of Heap	1	Yes			Yes		_ 🖻
×	A		BO	Bld Open-sided	1	Yes			Yes		? <mark>``</mark>
	Α		BST	Base of Stock	1	Yes			Yes		? <u>.</u>
B			BT	British Telecom	1	Yes			Yes		-
8/			C	Contour	1	Yes		Yes	Yes	CODE D Rample Text wring "STRD" Style	
B			CFL	Cliff face left	1	Yes			Yes		
			CFR	Cliff face right	1	Yes			Yes		
"A			СН	Drainage Chanr	el 1	Yes			Yes 🗸		
			<						>		
				Bad	OK	Cancel	Help				E = 159.795
Select o	ommand	ł									N = 158.010

Prototype Survey File - PROTOTYPE.LSS ;

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

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

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

📙 🛃 📜 🗢 Code				_		×
File Home Share View						~ 🕐
\leftarrow \rightarrow \checkmark \uparrow \downarrow \rightarrow This PC \rightarrow LSSV	/100102 (D:) > support_files > Leica > JobDBX	(→ Code	✓ Ö Search Co	de		P
🗸 📙 Leica 🔷	Name	Date modified	Туре	Size		
> 📜 Builder	aptivate_code_list.zip	21/03/2017 11:21	Compressed (zipped) Folder		8 KI	в
> 📜 GPS500	👔 code_list.zip	29/10/2018 13:59	Compressed (zipped) Folder		21 KE	3
✓ 📙 JobDBX	LSSv9_80.x06	03/11/2011 12:05	X06 File		41 KE	3
✓ 📜 Code	LSSv9_80.X23	03/11/2011 12:05	X23 File		11 KE	3
Captivate code list.zip	LSSv9_80.XCF	03/11/2011 12:06	XCF File		1 KE	3
Code list zin	LSSv10Captivate.x06	02/03/2017 17:08	X06 File		31 KE	В
	LSSv10Captivate.X23	02/03/2017 17:08	X23 File		11 KE	в
Coding_examples	LSSv10Captivate.XCF	02/03/2017 17:08	XCF File		1 KE	3
> 📙 Format	LSSV980Road.x06	09/03/2011 16:03	X06 File		51 KE	3
> 📜 Leica_Geo_Office_Tools_en	LSSV980Road.X23	09/03/2011 16:03	X23 File		11 KE	3
> 📜 Machine_control	LSSV980Road.XCF	09/03/2011 16:03	XCF File		1 KE	8
> 📜 Mid-range 🗸	Readme1st.TXT	29/10/2018 13:59	Text Document		1 KE	в
12 items 3 items selected 42.3 KB						::: 🖿

Back to top

Page 8 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

LSSv9_80 – derived from the standard LSS Prototype for Leica 1200 and Viva.

LSSv10Captivate – derived from the standard LSS Prototype for Leica Captivate.

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

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

Prototype.LSS survey.



The LSS Export command is covered later on in this document.

Back to top		Page 9 of 48
Instrum	nent Manual - Interface to Leica Geosystems Captivate	
Version LSSv10.01.10	Copyright © McCarthy Taylor Systems Ltd, 2019	Dec 2019

1.6 Configuring Leica Captivate

The two requirements for using LSS coding on Captivate to the best advantage are

'Code List' - created by LSS

'Work Settings' – suitable configuration for LSS coding (identical for both EDM and GPS).

Code List – An example code list has been built from the LSS prototype legend (supplied with Testdata) and is available on the LSS media within the folder

'Support_files\Leica\JobDBX\Code\LSSv10Captivate.x06, x23, .xcf, .

The LSS point features translate as 'point codes' and the LSS link features as 'point codes with lines'.

Note: the use of 'line codes' appears unnecessary and has been avoided because of the incompatibility when processing the same code list from a Viva.

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

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

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

From the Main Menu

'Transfer user objects'

'Settings'

'Tools'







Set 'Object to transfer' as 'Codelist'

Set 'Codelist' to the relevant code list

Set '**From'** as either '**USB**' or '**SD Card**' depending on the data transfer media

Set 'To' as 'Internal memory'

OK [F1].

5 Transfer User Object	2D 0 1D	@ 14:52
Object to transfer	Codelist	\sim
Codelist	LSSv10Captivate	>
To device	Internal memory	\sim
Transfer all objects of the selected type		



Back to top

Page 10 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

Alternatively and for the latest LSS Captivate Code List we need to ensure the LSSV10_CAPTIVATE.XML is copied to the USB for transferring to the logger, but it will need to be in the Data folder of the USB flash drive.

📕 🕑 📜 🗢 Data				-		×	
File Home Share View							
🗧 🔶 🔹 🛧 📕 « Users > Public > Public > Decuments > Leica Captivate > TS > USB Memory Device > Data 🛛 🗸 👌 Search Data .							
✓	Name ^	Date modified	Туре	Size			
Code	E Geocom	28/08/2018 09:52	File folder				
> 📜 Config	📜 Gps	28/08/2018 09:52	File folder				
Convert	Map_Images	28/08/2018 09:52	File folder				
> 📙 Data	LSSV10_CAPTIVATE.XML	11/12/2018 12:13	XML Document	4	19 KB		
DBX							
Download							
📕 Gps							
📕 Gsi							
System	~						
4 items 1 item selected 48.6 KB							

We need to open a Job, for example 'Default', followed by 'Import data' and 'XML';



Page 11 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

1.6.1 Work Style Settings

Note: These screen captures refer to TPS and GPS or just TPS, depending on the instrument. These settings are to be set the same for each type of instrument and will need to be duplicated where both are present.

ID templates - To set the ID Templates.

From the Main menu

'Settings'

'Customisation'

'ID Templates'

'GS points' as <Manually enter>

'TS points' as <Manually enter>

'TS auto points' as 'TPS_Auto_0001'

🕤 Leica Captivat	e - Hor 😨	2D 1D	@ 15:51
			0,
	\mathcal{L}		
here Tap her			
to create he	Default		
	0	0	2
	0	0	8
Settings 3D view	er Measure	Stake points	Stake to line
Fn OK			Fn
5 Settings		2D	@ 16:41
	=	2	<u></u> 2
(P) .	T	-	┦
Connections	GS Sensor	TS	instrument
4	1441	5	6
Point storage			System
2 7	•	8	
lools	About Leica Captiv	ate	
Fn OK			Fn
Customisation	7 ×	2D	0 🗖
		1D	- 15:53
∕★ '	S	2	X_01 3
Working style wizard	User defined page	es ID	templates
		5	6
Hot keys & fayourites	Coding	An	visibility
	coung		p tisionty
Fn OK			Fn
 □ ID Templates 	T	2D	@
GS points	<mai< td=""><td>nually ente</td><td>er> ></td></mai<>	nually ente	er> >
TS points	<ma< td=""><td>nually ente</td><td>er> ></td></ma<>	nually ente	er> >
GS auto points	GS A	uto 0001	>
TS auto points	TS_A	uto_0001	>

Templates are used to define the point ID which is suggested within apps

OK

Note: These screen captures use TPS and GPS as the example.

Back to top

Page 12 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

Version LSSv10.01.10

Copyright © McCarthy Taylor Systems Ltd, 2019

Dec 2019

The settings for 'ID Templates' require the use of the second dialog 'ID Template Library'



Where relevant click 'Edit' after selecting your choice

🕤 ID Template Library 🥫 뚱

<Manually enter>

For example, highlight the TS0001

And 'Edit'

shown:

5 Edit ID Template		2D 1D	@ 16:15	
ID	0001			
Increment point ID Increment by	Only nu 1	merically	\vee	Set the ID to 0001
When point ID is edited, place cursor in position number	1		\checkmark	
OK				

2D -----

1D -----

@

ок Note: in LSS for detail observations, the equivalent Observation Number is numeric only, so it is best if all the set ID points are set numerical, for example, as

This will help ensure that the observations on the logger have unique numerical ID.

It will also result in all the observations being listed in the correct order

5 ID Templates	Hz 0°00'00" V 93°00'01" V	D D					
GS points	2001	>					
TS points	0001	>					
GS auto points	3001	>					
TS auto points	4001	>					
Auxiliary points	5001	>					
Templates are used to define the point ID which is suggested within apps							
OK							

Note: The 'New ID Template' dialog is not always available because some options are 'system ID templates' and cannot be edited e.g. <Manually enter> and 'Use code & string'.

Note: It may be necessary to go down one to Area001 first, to effect this change.

Back to top		Page 13 of 48
	Instrument Manual - Interface to Leica Geosystems Captivate	

1.6.2 Coding & Linework

Return to 'Settings' and 'Customisation', then select 'Coding';



5 Customisation	n 😨 🕺	2D @	16:43				
1	ž 2		3				
Working style wizard	User defined pages	ID templates					
₽ ₽ ₽3★ 4	5	y y y	6				
Hot keys & favourites	Coding	App visibility					
	<u>न् %</u>	2D	Fn				
Code & ettributes L		1D	17:02				
	mework						
Allow lines to be co independently of p	Allow lines to be coded independently of points						
Suggested attribute	Suggested attribute values Last used						
Prompt for mandatory attributes When code is chan V							
Coding allows measured objects to be easily visualised within Leica Captivate & CAD software							
ОК		Page					

'Create linework'

'Allow new codes to be created' and

'Show code description alongside code'.

'Suggested attribute values' to 'Last Used'

'Prompt for Mandatory Attributes' to 'When code is changed'

The '**Last Used**' which will recall the last attribute value for each individual feature e.g. for link features the last used string number for the selected feature will be offered.

The '**When code is changed**' where attribute input will not be requested unless the feature code is changed.

Back to top

Page 14 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

Note: a feature change can be triggered by toggling the feature list using the right and left arrow keys.

 └ Coding 	→ <u>1</u> Hz 1°00'00" V 90°00'01	. @ 11:24
Code & attributes Linework		
Begin line	BEG	
Begin 3 pt arc	ВС	
Continue line	C	
Begin spline	BC	
End spline	EC	
Cont spline	oc	
Close line	CLO	
OK		Page

Linework: The screenshot shows the suggested settings for Linework on the logger.

Please set the following;

Begin Line = BEG and Close Line = CLO

Quick coding Note: This can be enabled by setting the Coding functionality (shown above) to 'Only code pts - No linework'. Then on the Quick coding tab set to 'On' and the number of Digits to use and how they are stored.

Back to top

Page 15 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

1.6.3 User Defined Pages

These next settings configure the display screens on the Captivate logger seen during detailing. There are three page Tabs available to view on the screen.

Return to 'Customisation' select 'User defined pages'





'TS' tab to set the display for Total Station.

Each page is accessed via the down arrow

Click 'Edit' to view or make edits.

🕤 Page Settings 1	2D 0 1D	@ <u>11:08</u>
Name	Measure	
1st line	Point ID	
2nd line	Code	\vee
3rd line	Target height	\vee
4th line	Separator	\sim
5th line	Hz angle	\vee
6th line	V angle	\vee
Fn OK	Clear	Fn

2D -----📆 🕺 @ 11:11 **Dage Settings 1** 1D --6th line V angle 7th line Horizontal distance \sim 8th line Difference in height 9th line Separator \sim 10th line Easting 11th line Northing \sim 12th line Height ОК Clear Fn Fn

Page 1 is given the name '**Measure**'

by default, which we can accept.

We will accept these settings but they can be customised as required for the future.

Back to top

Page 16 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

Version LSSv10.01.10

	Next in 'User Defined P	ages' use the	
--	-------------------------	---------------	--

down arrow to change to Page 2;

User Defined Pages	📆 🕺	2D 1D	@ 11:34
TS GS			
Press 'Edit' to define the co pages	ontents of	the user det	fined
Define	Page 2		\sim
Name	Page 2		
	_		
OK Edit			Page

'Edit'

Page Settings 2	📆 🕺 2D	@ 11:37		
Name	Annotations			
1st line	Point ID			
2nd line	Target height	\sim		
3rd line	Separator	\checkmark		
4th line	Annotation 1			
5th line	Annotation 2	\checkmark		
6th line	Annotation 3	\sim		
Fn OK	Clear	Fn		

Change the tab name to '**Annotations**' Leave as displayed

Next use the

Dage Settings 3

Settings 3

Name

1st line

2nd line

3rd line

4th line

5th line

6th line

Fn OK

6th line

7th line

8th line

9th line

10th line

11th line

12th line

Fn OK

down arrow to change to Page 3;

Here we will 'Edit' the **'Code'** tab to help us see how the feature coding works with the attributes in the LSS code list. This will not affect the information displayed on the **'Survey'** screen

📆 🕺

Code

Code

Clear

7

Point ID

Separator

Target height

Code description

Attribute 01

Attribute 01

Attribute 02

Attribute 03

Attribute 04

Attribute 05

Separator

Unused line

1 2.0000 m

T 2.0000 m

3D --

3D ---

@ 11:45

 \vee

 \sim

 \vee

 \sim

(2) 11:47

 \sim

 \sim

 \sim

 \sim

 \sim

 \sim

Fn

Fn

User Defined Pages	T ×	2D 1D	@	11:39
TS GS				
Press 'Edit' to define the co pages	ontents of t	he user def	fined	
Define	Page 3			/
Name	Code			
OK Edit			Page	

If required we can rename this tab.

Scroll down to access the next lines.

The key here is to make use of the attributes through the LSS reserved codes which should be found in the code list.

Set each line for the display as indicated here.

Once complete, click 'OK' or 'F1'

Note: This screen	example is for	TS. The eq	uivalent settin	g for 'Ta	rget height'	on GS is '	Antenna
height'.							

Back to top

Page 17 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

1.6.4 Hot Keys & Favorites

Return to 'Settings' and 'Customisation'



select 'Hot keys & favorites'

5 Settings				2D @	1 6:41
(1	च 2	2		3
Connections		GS Sensor		TS instrument	
	4		5		6
Point storage		Customisation		System	
×	7	•	8		
Tools		About Leica Captivate	е		
Fn OK					Fn

Customisation	T ×	T 2.0000 m @	12:11
1	ž 2	×_01	3
Working style wizard	User defined pages	ID templates	
	5		6
Hot keys & favourites	Coding	App visibility	
Fn OK			Fn

Tab 'TS hot keys'

🕤 Hot Keys & Favourite	T 2.0000 m @ 12:16
GS hot keys GS Fn+hot keys G	S favourites TS hot keys TS F ∢ →
F7	Data - Enter free code >
F8	Data - View & edit $>$
F9	TS - Select target $>$
F10	TS - Toggle auto/m >
F11	TS - Measure & tar >
F12	TS - Toggle PowerS >
ОК	Page

The right arrow displays the list of options



Set '**F7**' to 'Enter free code'

Leave others or change as required by hitting



Back to top

Page 18 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

1.6.5 The Function Button



The Function buttons are located in the bottom corners of the main screen;

Once pressed the function opens Tabs for;

'Instrument'

'New job'

'Home'

'End'

'Exit'



For example, the 'Instrument' tab allows us to choose the instrument type;



In this manual we have set

'Use TS only'

Back to top

Page 19 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

Chapter 2

2.1 Instrument Data Capture on a Leica Captivate

2.1.1 Creating a New Captivate Job

Select option 'Tap here to create new job' from the Home screen

Type in the Name and other settings for General:

ົງ New Job	₩ 2D @ Ⅲ 0 1D @ 11:31					
General Coordinate system Codelist CAD files TS scale						
Name	LSS CAPTIVATE					
Description	Workshop Survey					
Creator	DJM					
Job stored to	SD card					
After storing job, capture an image to display in the						
Store	Page					



 New Job
 Image: Store
 Image:

Note: the default is set to 'capture an image to display'.

っ New Job	T ő	2D 1D	@	11:38
General Coordinate system	Codelist C	AD files TS sc	ale	
Coordinate system	<none< td=""><td>></td><td></td><td>></td></none<>	>		>
A coordinate system allow be used together in the sa	vs GS & TS ime job	measured p	points	to
Store			Page	

There is a tab to set the 'Coordinate System'

- more for GPS surveying.

Click the **Codelist** tab and use the right arrow to set to the required code list configured earlier:

つ New Job General Coordinate syste Codelist	m Codelist LSSv10	2D 1D D files TS scal Code list	@ <u>11:44</u> e >
A codelist allows pre-d measuring points	efined codes to	o be used w	hen
Store		F	Page

Note: If only one Codelist is in use on the Instrument then it will be the default. We can ignore the 'CAD files and TS scale tabs for now, and press '**Store'**.

Back to top

Page 20 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

2.1.2 Setup Procedure

The following example assumes an arbitrary co-ordinate system, from a starting point and bearing. If existing control coordinates are needed the stations can be uploaded from LSS to a **Fixpoint Job** (see exporting data to Leica DBX) and then copied to the current job before the first set-up



To set the set-on station name and details, click 'Point

ID' and the right arrow to key access the '**New Point - Coordinates**' screen and create a new point and specify a '**Point ID**' (i.e. Station name) and the relevant arbitrary coordinates for new station A;

└ Choose Setup Point	🕞 🚊 🌆 Hz 0'00'00"	(2) 12:03	っ New P	oint
Setup point from	Job	\sim	Coordinate	s Code Images
Job	LSS	>	Point ID	Α
Point ID	No items to display	>	Easting	1000.0000 m
Instrument height	1.5000 m		Northing	1000.0000 m
Easting			Height	100.0000 m
Northing				
Height				
Fn OK		Fn	Fn Store	Page
			Store	

Specify a 'Backsight ID', 'Target Height' and 'Direction', Sight the target, then press 'Distance' then 'Set'

[←] Choose Setup Point	1 ◎ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	@ <u>12:39</u>	Set Orientation	① 1 ● 1 ● Hz 0°00'00" ② 1 ● V 93°00'01" ③ 13:11	
Setup point from	Job	\sim	Orientation Backsight point	code Setup Camera 3D viewer	
Job	LSS CAPTIVATE (SD) >	Backsight ID	В	Vou ara now
Point ID	Α	>	Target height	1.6000 m	rou are now
Instrument height	1.5850 m		Direction	0°00'00"	ready to start
Easting	1000.0000 m		Horizontal distance	10.0362 m	detailing.
Northing	1000.0000 m		Difference in height	-0.5410 m	5
Height	100.0000 m				
Fn OK		Fn	Fn Set Distance	More Page Fn	

Back to top

Page 21 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

2.1.3 Detail Procedure

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



We will start by taking observations to Stations, e.g. B and C, for which the code CTLObsID is selected from the drop-down list - In the 'Code' option click the list icon;





Click on 'Page' to view the observation.

🏂 🐁

Point ID

Fasting

Ηz

Target height

Horizontal distance

Difference in height

Fn Measure Distance Store

Either 'Measure' or 'Distance' and 'Store'.

USS CAPTIVATE

We will use the same code for Station C;



Press 'Store'

Back to top

Page 22 of 48

→ <u>1</u>[®] Hz 291°22'08' V 89°36'15"

1.6000 m

291°22'08"

89°36'15"

18.2856 m

0.1113 m

982.9715 m

@

Page Fn

Instrument Manual - Interface to Leica Geosystems Captivate

2.1.4 The Free Code and Attributes Options

The **Free Code** commands, accessed with the F7 button, configured earlier, will list the LSS Reserved codes, which in turn have associated attributes.

└□ Last Used Free	e Codes 💮 💷 🖞	Hz 265°11'15" @ 13:44
Notes		
Type Free	Code desc General Text	Linework No
Freecode		Last used at 11.12.201
Type Free	Code desc Free code	Linework No
		Last used at 11.12.201
Type Free	Code desc Join to prev	Linework No
		Last used at 11.12.201
Type Free	Code desc Start string	Linework No
-RW		Last used at 11.12.201
T	C. I. J	Pharman Prikton
Fn Store	Attributes	Fn

Use the drop-down list to select the required Reserved Code, -SO;

🕤 Last Used	Free Codes 💮 1. K V 90°27'10" @ 🛄
-SI	Last used at 11.12.201
Type Free	Code desc String int + Linework No
-SOM	Last used at 11.12.201
Type Free	Code desc String off + Linework No
-SO	
Type Free	Code desc String off + Linework No
-INT	Last used at 11.12.201
Type Free	Code desc Intersection Linework No
-NPL	Last used at 11.12.201
Fn Store	Attributes

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

With -SO the choice is to type in

'Horizontal offset'

'Vertical offset'

'Offset feature'

Setting the offsets as here to 0.000 will assume the observation itself is on the offset feature,

່ງ Enter Mandatory Att	Hz 265°11'14" @ Hz 265°11'14" V 90°27'10" 14:03
Free Code	-SO
Code description	String off + dim
Horizontal offset	0.000
Vertical offset	0.000
Offset feature	KT1
Fn OK	Last Fn

KT1 – Kerb Top

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

Note: The current feature remains active on repeated measurements.

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

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

The F7 Hot key also is used to access the '**Notes**' and '**Freecode**' (to allow extra codes to be added) as well as the "." and ".."

Last Used F	ree Codes 💮 💷 🕼	Hz 265°11'15" @ 14:08
-SO		Last used at 17.12.201
Type Free	Code desc String off +	Linework No
Notes		Last used at 11.12.201
Type Free	Code desc General Text	Linework No
Freecode		
Type Free	Code desc Free code	Linework No
		Last used at 11.12.201
Type Free	Code desc Join to prev	Linework No
•		Last used at 11.12.201
The Free Prove		Characteristic Man
Fn Store	Attributes	Fn

5 Free Code & Attribut	Hz 276°43'46" @ Hz 276°43'46" V 90°24'58" @ 14:41
Free Code	DK
Attribute 1	
Attribute 2	
Attribute 3	
Attribute 4	
Attribute 5	
Attribute 6	
Attribute 7	
Store	Last

Back to top

Page 23 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

Version LSSv10.01.10

It is the LSS reserved codes for which attributes are generally used but some specific Point features also make use of the attributes on a logger;



There is a prompt for the attributes;

5 Enter Attributes	Hz 281°18'24" O Hz 281°18'4" Hz 281°18'4"		
Point code	PD		
Code description	Tree + dims		
Spread	5		
PS	PS		
Trunk dim(decm)	6		
Species	Apple		
Height	8m		
OK New attrb	Last Default		

Back to top

Page 24 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

Copyright © McCarthy Taylor Systems Ltd, 2019

Dec 2019

3.1 Configuring the Leica Job (DBX) Reader in LSS

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



To configure our logger of choice in LSS we select Configure Hardware & System, followed by 'Logger - New' (if there is already another logger configured then the option will be 'Logger / Change'). Now we need to choose the format of the data.

We will configure LSS as a Leica logger using the Job (DBX) Reader.

Configure H	ardware & System - New logger	×
Logger - Format :	Leica V Description : Captivat	
	Back Next Cancel Help	

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

Next we choose 'Job (DBX) reader';

Page 25 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

Configure Hardware & System		New logger - Leica
Settings Display Display colours General CAD-Pro directional arrows Default folders Default font File Editor Joystick settings Loaded text for Point features Maximum values New Survey parameters Plotting Popup menu Query / Sections Version 9 settings	Clicking ' OK ' will allow us to 'Finish' and 'Save' our logger settings to the registry.	Default data transfer/download Job (DBX) reader via Active Sync User invokes download via COM port Leica Survey Office Options Options COM port (RS232) : Settings Back OK Cancel Help
Back OK Finish Help		Configure Hardware & System × Configuration changes Save Use changes - save / discard on exiting LSS Discard - revert to last saved settings Back OK Cancel Help

Note: This must be repeated for all PCs that are to use the Job reader.

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

Back to top

Page 26 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

3.2 Configuring the New Survey Parameters in LSS

For each survey the following parameters are set during what is termed the "survey initialisation" process, which is the starting point for all surveys.

The command **Configure Hardware & System - New Survey Parameters** allows many of these options to be set for the PC in the following window:

Annotation of Levels –) Standard) Hydrographic - Admir) Hydrographic - Engir	alty Drying heigh leering	nt: 2 (m) above	Chart datum 0.0
Survey units	- Area report	- Settings	
Metres Feet Yards No default	Metres Hectares Feet Yards Acres	Default scale factor : Curvature / refrac Conditioning tolerance	1 tion adjustment e : 0.05 (m)
Annularumite	Valume meat	Smooth through d	ifferent link features
) Dec. degrees Deg Min Sec Grads	Metres Feet Yards	Obs format O VA / HD O VA / SD O LD / HD	VA collimation 90 270
Control tolerances		Target height	
Varning : 0.01	(m)	Maximum : 5	(m)
mor : 0.03	(m)	Minimum : 0	(m)
		J	

Set the Handling of 2-D data,

Alter standard Annotation of Levels for hydrographic surveys.

The Drying height is the height above Chart Datum to be considered as 'tidal'.

Set Survey units for length, area and volume in the survey,

And other survey parameters:

Angular units, Obs format, Vertical angle collimation.

Control tolerances set the Load values for Warnings and Errors, and also maximum and minimum Target heights,

'Copy Prototype from' - an LSS template survey from which the feature legend and display settings are copied.

'Default Scale factor' - this value is used to provide a default scale factor to newly loaded or edited stations to relate radial survey observations to their grid coordinates.

The value is normally be set to '1.0', but, **Note:** GPS data (including stations) based on the **OSGB36 TN15 transformation** should have the *local scale factor* applied here.

'Curvature / refraction adjustment' - will apply a fixed correction to radial survey data. The difference in level between adjusted and non-adjusted observations amounts to 7mm in the first **1km**, rising to 7m at 10km, so is rarely of concern for most surveys.

'Conditioning tolerance' - applies to arcs and circular steps - either surveyed or Co-Go generated - or when 'Output smoothed links' is used.

'Angles format' – all survey data is displayed in this format and can be changed.

'Obs format' – cannot be changed once radial survey data have been processed. It is possible to have different formats contained in loadfile(s), but after being processed all survey data is displayed / reported in this format.

'VA Collimation' - sets the default Vertical Angle at horizontal- either 90° or 270°. LSS is able to process combined Face Right and Face Left station observations.

Back to top

Page 27 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

'Control tolerances' – refer to the survey data processing of control observations. When a control (station) observation exceeds the warning or error values it is reported. However, when an error is issued the survey processing will be terminated as well.

It is the responsibility of the surveyor to be aware of these settings.

Note: It is possible to use negative target heights for when the detail pole is inverted, but exceeding the set values will also issue a warning.

Back to top

Page 28 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

Version LSSv10.01.10

3.3 Creating a New Survey in LSS

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

Select File New DTM from the main menu.

Click Browse against 'New survey' in the dialogue below.

We can create a new folder for the new survey to go in and call it *e.g.* C:\ Surveys\Leica System X Workshop\

Enter the survey name, *e.g.* LEICA SYSTEM X WORKSHOP SURVEY;

 File
 Input
 Feature
 CA

 System Manager
 System Manager

 Mew DTM
 Open DTM

 Open DTM
 New Elevation

 Save
 Save

 Save
 Save

 Save As
 Restore

 Close
 Cogy

 Rename / Moye
 Delete

 Delete
 Compress

 Sit
 Exit

Select it in the 'Save in' box

File New DTM - DTM survey	×							
New survey : Instrument Workshop Data\CAPTIVATE WORKSHOP SURVEY.LS	Browse	Click '	Save'.					
Survey title :								
		😂 Sele	ict new survey					×
- Copy Prototype from		← -		> Testdata	~	& Search Ter	stdata	p
		0	in a Newfelder				Rec	- 0
	Province	orga		A			0++	
	biowse	v	surveys	Name	Date modified	lype File folder	2426	
			Sci	Code Lists	20/11/2018 11:09	File folder		
		,	Clients	Engineers Data	20/11/2018 11:09	File folder		
Include stations from			cnv	Example DXF Data	27/11/2018 16:09	File folder		
			pdf	Example Genio Data	20/11/2018 11:09	File folder		
None		>	Prototype	Example Survey	20/11/2018 11:09	File folder		
0.5			sdf	Example Survey - Finished	20/11/2018 12:46	Filefolder		
OPrototype			tdf	Example Survey - Raw	20/11/2018 11:09	File folder		
		~	Testdata	Example Survey - Reduced Dig	20/11/2018 11:09	File folder		
O Survey :	Browse		3D View field of view calculator	Example XYZ Data	20/11/2018 11:09	File folder		
		· · · · · · · · · · · · · · · · · · ·	3D Vision Data	Floor Assessment Prototype	20/11/2018 11:09	File folder		
			add	Ground	20/11/2018 16:34	Filefolder		
			Advant	hydro	20/11/2018 11:09	File folder		_
- Handling 2-D data			Advanced	Instrument Workshop Data	23/11/2018 17:19	File folder		
			Aenal view Design Files	LSS coding	20/11/2018 11:09	File folder		
 Terrain is all 3-D - send 2-D data to Non-terrain 			Aenal View Elevation	LSS Reserved Codes	20/11/2018 11:09	Hiefolder		
Terrain may include 2-D data - NOTE: volumes, etc. not permitted			Aerial View Survey	LSS_logo	11/12/2018 11:12	Filefolder		
O renair may include 2-b data - No FE. Volumes, etc., not permitted			Attachment URL	Ordeness	20/11/2018 11:09	File folder		
			Birdlip Mapping	ordnance survey	20/11/2010 11:09	File folder		
Ontion			Birdlip Original Ground	Plot Rorder Surveys	20/11/2018 11:09	File folder		
Option			Birdlip Photo	Prototype	20/11/2018 11:09	File folder		
Configure Survey Parameters			Birdlip Road Design	sdf	20/11/2018 11:09	File folder		
C compare ourvey relationer		>	Birdlip Scan	 Section Plotting to Load File 	20/11/2018 11:09	File folder		
			Ele name: CAPTIVATE WORKSHOP SURVEY.	5				
Back OK Cancel Help			Save as type: Survey/data (*.LSS;*.SRV;*.0??;*.1??;	- 271)*-371;*-471;*-571;*-671;*-771;)				
		o Hid	e Folders			Oper	n Ce	ancel

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

If required we enter Survey title, or if left blank, LSS will use the survey name as the title.

Note: the LSS Prototype is found in Testdata and also in Prototype directory, and either can be used here. It is assumed that the surveyor will look to create their own prototype for their features in say C:\Surveys\Prototype and so will not be accessing the original LSS prototype in Testdata.

The 'Prototype' will be as per 'New Survey Parameters' (described earlier).

If we had stations already at the site we could bring them in here,

If we had stations already at		
Back to top		Page 29 of 48
Instrum	ent Manual - Interface to Leica Geosystems Captivate	
Version LSSv10.01.10	Copyright © McCarthy Taylor Systems Ltd, 2019	Dec 2019

(We will set the survey so any 2-D data will go to the survey's Non-terrain).

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

Ticking the 'Configure Survey Parameters' allows us to revisit the parameters set during the initialisation process and is worth checking through:

Configure Survey Parameters	×	
Survey title : CAPTIVATE WORKSHOP SURVEY	W	/e can alter the Survey Title,
 Handling 2-D data ● Terrain is all 3-D - send 2-D data to Non+terrain ○ Terrain may include 2-D data - NOTE: volumes, etc, n 	ot permitted	hange the handling of 2-D data,
Annotation of Levels Standard Hydrographic - Admiralty Drying height : 2 (m)	above Chart datum 0.0 A	djust other survey parameters.
Survey units Area report Settings ● Metres ● Metres Default scale f ● Metres ● Metres Default scale f ● Yards ● Metres □ Earth curve ● Yards ○ Yards □ Conditioning to ● Metres ○ Smooth thr ○ Smooth thr ● Deg Min Sec ● Metres ○ VA \ HD ● Deg Min Sec ○ Yards ○ VA \ SD	actor : 1 ture / refraction adjustment lerance : 0.05 (m) bugh different link features VA collimation • 90 • 270	or GPS data and the Ordnance urvey National Grid TN15 ansformation, the Default scale factor' can be set ere
Control tolerances Target height Warning : 0.01 (m) Error : 0.03 (m) Back OK Cancel	Edit additions File number : 799 Obs. number : 10000 Ca	Control tolerances' an be adjusted if necessary

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

If we continually have to reset a particular parameter, then it might be worth reconfiguring the

New Survey template values in Configure Hardware & System - New Survey Parameters.

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

3.4 Data Processing – Input Download / Convert

The first task is to transfer the survey Job DBX files from the logger to PC and on the earlier models this is carried out by removing the CF card from the instrument and inserting in the card reader in the PC.

On the Leica Captivate loggers, the recommendation is to use the USB flash drive that has been formatted for the Leica instrument.

Select **Settings** - **Tools** – **Transfer user objects** option and this time selecting to transfer Job from SD card to USB. This avoids the need to remove the card.





5 Transfer User Objects	→ <u>1</u> Hz 0°00'01" V 93°00'01"	@ <u>10:13</u>
Object to transfer	Job	\sim
Job	LSS CAPTIVATE	>
From	SD card	\vee
To device	USB	\sim
Transfer all objects of the selected type		
OK		



Once we have transferred the Job we require, a message requests whether we wish to transfer any other jobs across.

Once the transfer is, complete we can switch off the unit and we now remove the USB from the logger port to connect to the PC, bearing in mind the warning below;

Fn

Important Warning:

Leica Exchange

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





The Captivate should already have been configured on this PC.

'Change' allows us to make amendments to the logger.

nput Download / Convert - Download data	x
Logger Instrument type / data format Captivat Leica Job (DBX) reader Change	e
No DBX read (convert GSI data file)	
Back Next Cancel Help	

If 'Leica Job (DBX) reader' is not shown nor is it present on the logger list when

'Change' is selected then we have not already configured a logger.

To rectify click 'New' and follow the dialog boxes or refer to the 'Configure Logger' section above.

Note: If a Leica GSI file e.g. '.SVY', from reading a Job via Legacy mode, already exists on the C: drive, we can tick 'No DBX read (convert GSI data file)'.

This will skip straight to the conversion dialog where the file is selected as the 'Downloaded file'.

Click 'Next'	Input Download / Convert - Leica Job (DBX)
We need to define the Leica DBX Job;	Job folder: Browse Explorer
Select the DBX folder by either;	Datok UK Cancel help
Input Download / Convert - Leica Job (DBX)	Clicking Browse (particularly useful when the DBX folder is on a CF card) Instrument Workshop Data Instrument Workshop Data



Click 'Explorer' (particularly a) useful if the DBX folder is already on the PC).

This uses a Windows Explorer dialog from which the DBX files (or the folder itself) can be selected using 'drag and drop'.

The leb name should appear in the	Input Download / Convert - Leica Job (DBX)				
window.	Job folder:	C:\Surveys\Testdata\Instrument Workshop Data\LSS CAPTIVATE_0 Browse	Explorer		
		Back OK Cancel Help			

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

Input Download	/ Convert - Leica J	lob (DBX)	list					x	
Download									
Job name	Created	ł	Images	Scans	Geoid file	CSCS file	Job file name		Select the required Job and
LSS CAPTIV	ATE 13/12/2	2018	8	0			LSS CAPTIVATE_0001_1213_120936		$\operatorname{click}' \cap K'$
									CIER OR.
	Use legacy DBX method								
	Back OK Cancel Help								

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

Note: The 'Use Legacy DBX method' is present to allow a user to process a Job as per LSSv9.91. Please see the documentation from this version if this option is required.

Click 'OK'

If the LSS load file input box is empty and 'Next' is clicked then LSS will automatically provide the next available load file number for the current survey.

Input Download	I / Convert - Leica Job (DBX)	×	The se GPS C
LSS load file :	CAPTIVATE WORKSHOP SURVEY Included data Station coordinates GPS ref station EDM Corrections Atmospheric	GPS QA warning values Browse Edit Next 3D tolerance : 0.03 (m) GDOP : 5 PDOP : 5	The In
	Archive Job (D Back OK	BX) Cancel Help	ref sta the Jo statior

ettings for Included data and A warning values are nbered.

icluded data options relate to guirement for Control ns in the Load file. The GPS ition might be selected e.g. if b references an on-site base ٦.

'Archive DBX job database' will copy the database files to a sub-folder of the current survey.

Back to top

Page 33 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

Version LSSv10.01.10

Note: The job database files (DBX) are not 'archived' if browsed from within the current survey sub-folder tree (the option will be greyed).

Click 'OK' to process the Job, create the Load file, and automatically invoke Input Load.

Note: If the survey does not exist then File New will occur prior to Input Load.

Note: A report is written at the bottom of the Load file showing the QA information, as well as the number of converted stations, set-ups, observations, text etc.

Back to top

Page 34 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

Version LSSv10.01.10

3.5 Data Processing – Input Load

3.5.1 Introduction

The 'LSS Load Input file' is the format by which all external data is processed in LSS.

Loading data into a survey model

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

	Input Load	
A Load Report file will be generated – we will accept the default _nnn.TXT file type for this exercise.	Load Report Settings O Device : HPF8659E (HP Officejet Pro X576dw MFF on Ne05: O Adobe Acrobat : APTIVATE WORKSHOP SURVEY::A4:PT:Close Image: File : CAPTIVATE WORKSHOP SURVEY_nnn.TXT	Select
A conversion file can be invoked if, for example, the field codes on the logger require changing to the LSS feature codes in the survey's legend	Overwrite report file Lines per page : 67 (File) Bold text Feature conversion Conversion file : Do not check legend for feature codes Load file Options Denot cause and a leaded	krowse Edit
Leave the options as per default, but please note the layout changes in version 10 And the options to set up annotations	Number : 001 Edit Pepor pauses on Include Image: Second sec	Use Default Save as Default
for features, particularly for utilities surveys	Configure Survey Parameters	

'Next'.

Clicking the 'Edit' button next to the Load file 001 will open the Load file in the editor configured / reviewed earlier

Back Next Cancel Help

Page 35 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

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

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

HiEditor х File Edit View Tools Help 10, LSS load file using Leica Stylesheet v0.988 ~ 20, Created 2018/12/18 11:12:31 30, Job Name, LSS CAPTIVATE 40, Description, Workshop Survey 50, Date 2018-12-13, Time 12:29:06.31 60, Instrument Type TS16 I R1000, Ser. No. 1 71, METRES 81, DMS 101, VASD 1121, A, 1000.000, 1000.000, 100.000, -ST 120 130, Setup coords 140 150, Dt2018-12-13-13:14:16.37 16 172, A, 1000.000, 1000.000, 100.000 18 19 202, B, 1000.000, 1010.038, 99.459 210 220, Setup setOrientation 230, 240, Set-on station A, Instrument height 1.585 253, A,,, 1.585 260 270, Atmos (ppm/scale) = 0.00 / 1.00000000 280, EDM Target 1.6000m (0mm) Leica Circ Prism 290, Control obs 305, B, 0.00.000, 93.00.012, 10.050, 1.600, -ST 310, Control obs 325, B, 0.00.008, 93.00.029, 10.052, 1.600, -ST 330, Control obs 345, C, 291.22.082, 89.36.152, 18.286, 1.600, -ST 358, Image, Img_C_181218_092612.JPG 365, 1, 257.22.160, 90.16.231, 20.156, 1.600, K1 375, 2, 265.11.151, 90.27.101, 22.417, 1.600, K1 385, 3, 265.11.151, 90.12.515, 22.489, 1.600, -S00.000/0.000, KT1, K1 395, 4, 268.24.566, 90.42.199, 25.998, 1.600, CS1, K1 405, 5, 276.36.582, 90.37.380, 25.338, 1.600, CS1, K2 416, Start K2 425, 6, 276.43.461, 90.24.589, 25.340, 1.600, -S00.000/0.000, KT2, K2 435, 7, 276.43.465, 90.24.590, 25.340, 1.600, PGY, K2 445, 8, 286.28.022, 90.57.047, 18.196, 1.600, ..DK, K3 455, 9, 296.02.258, 91.19.203, 18.595, 1.600, K3 465, 10, 303.20.260, 91.30.390, 19.310, 1.600, K3 476, End K3 485, 11, 281.18.226, 90.17.061, 24.551, 1.600, PD5, PS6 496, Apple 506, 8m 518, Image, Img_0011_181218_092826.JPG 525, 12, 306.44.422, 91.27.492, 20.010, 1.600, B1 536, Start Bl 545, 13, 307.15.544, 91.29.551, 19.696, 1.600, B1 555, 14, 307.15.544, 91.29.551, 19.696, 1.600, B2 566, Start B2 575, 15, 310.24.240, 91.31.511, 18.794, 1.600, -RIN, B1 586, -RIN 595, 16, 319.01.130, 91.07.051, 14.586, 1.600, B2 605, 17, 324.15.356, 92.11.479, 13.700, 1.600, B2 615, 18, 327.56.217, 92.22.550, 12.899, 1.600, -NPL, B2 0D Ln 1 Col 0 Sel 0

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

Back to top

Page 36 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

3.5.2 An Explanation of the LSS Load File Format

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 an instrument 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.

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.

Back to top

Page 37 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

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.

Input Load - Initial Set-up	x	
Set-on Station A	-	
E: 1000 N: 1000 Z: 100		
Description : Default scale factor 1.00000000		Click 'OK'.
Backsight to Station B True bearing : 0 00 00 (dms) Mode		Otherwise the station coordinates from the Leica instrument are loaded along with the detail.
Back OK Cancel Help		

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 a CNV file.

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

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

Note: The load file header includes the following information as comments;

Coordinate system used (including the geoid and CSCS files used). Transformation name and type Projection Scale factor

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

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

Back to top

Page 38 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

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

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

If a station's xyz coordinates are all zero then it is ignored. If it is 1d it is reported but not used If it is 2d it is reported and used.

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

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. Some editor programs allow 'CTRL+G' to go to the line directly.



If available, Click 'Continue' at each pause / prompt

'OK' to complete the load.



Back to top Page 39 of 48 Instrument Manual - Interface to Leica Geosystems Captivate Version LSSv10.01.10 Copyright © McCarthy Taylor Systems Ltd, 2019 Dec 2019

3.6 GPS Survey Instrument Issues

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

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

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

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

Scale factor

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

For the 1200:

Select the 'Station Setup' dialog

Click 'Scale'

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

For the Viva:

Select 'Jobs and Data'

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

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

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

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

Instrument Manual - Interface to Leica Geosystems Captivate

Back to top

4.1 Exporting Data to Leica Instruments

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

Points Lines Triangles Alignments

LSS exports data to most types of survey instruments using the same logger configuration as **Input / Download / Convert**.

From the main menu the export commands are listed under Export;

For survey instruments the key exports are:

`LandXML'
`MX (MOSS)'
`Sections'
`Machine Control'
`Triangles'
`Survey Instrument' - Code List or Survey Data
`Leica DBX Database'
`Star Net'
`Esri ASCII Grid'
`XYZ (.CSV)'



Choose which is the most appropriate for your particular logger.

For Leica System X (DBX) loggers the most likely format would be Leica DBX Database.

The generated files are copied to the CF card or USB ready for transferring to the instrument.

Page 41 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

4.1.1 Export Leica DBX Database

The option **Export Leica DBX database** exports the LSS model as the three types of DBX job file direct to DBX based instruments.

Export Leica DBX database 🔹 🗴	Specify a
Create Job folder: LSS EXPORT TO CAPTIVATE Browse Explorer	exported Explorer.
Job name : LSS EXPORT TO CAPTIVATE Output Description : LSS EXPORT TO CAPTIVATE Description : SPF as corridor	does not Specify a
_ Job Type DTM : ☑ Triangles Data : ☑ Points and links	Descript the Job I instrume
SPF: Browse Edit	These wi name ar
Back OK Cancel Help	Select th

Specify a folder name for the exported files using Browse or Explorer. If the folder name does not exist LSS will create it

Specify a Job name and Description which will become the Job name on the nstrument.

These will default to the survey name and its Title

Select the type of data required

The user can choose from;

Standard survey DBX – all the observations are exported as Control points with the same point number as LSS and the linework has the same colours as the LSS legend

Stations (Standard survey DBX) – the stations are exported as Control points DTM DBX

Road alignment DBX - can be exported as an SPF of a design geometry file or an SPF with single or multiple reference strings.

Note: If multiple reference strings are selected via a combination of 'Links as alignments' and 'SPF' then it will be the longest string that is accepted by Leica as the Centre line.

Note: If DTM or Road are chosen then the name is extended to '*Job name* – DTM' or '*Job name* – Road' automatically (as long as the Job name is still the same as the LSS model name). In this way all the required DBX sets can be put into the same folder without the user needing to set different names.

If 'Road (alignment SPF)' is selected an SPF will be needed.

We use Configure SPF Create;

Note: An SPF can contain either;

A road design geometry imported via MX Genio or LandXML or

A normal SPF that can contain multiple reference lines.



Back to top

Page 42 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

4.1.2 Exporting Data as a Leica GSI File

Export Survey Instrument – Survey Data

Note: The logger parameters can be altered by clicking 'Change' or by using **Configure Hardware & System / Logger**, or by clicking 'Change' in dialogue box;

Specify a name for the exported file and

click 'Next'.

This dialog allows the selection of observation and station data;

Export Survey data Create file : C:\SURVEYS\TESTDATA\INSTRUMENT WORKSHOP DATA\POINTS FOR SET O Select / Data type Options Point ID: Point number only Stations Point number as per Observation Renumbered in sequence for unique values SPF chainage (rounded) : Request SPF Stat/End chainages Back Next Cancel Help	UT.GSI V UT.GSI V Browse Edit V	The defaults assume that the 'Observations' will be exported using the Selection filter. Note: The observations can have the code added to the point number, which can be elated to the SPF chainage. Stations' first Click 'Next'.
If chosen the Selection filter dialog will offe the opportunity of multiple observation selection criteria.	Export Survey da Upload file : C:\S	ta SURVEYS\TESTDATA\INSTRUMENT WORKSHOP DATA\POINTS FOR SET OUT.GS Add more data to file ? Back Yes No Help
Export Survey data Create file : C:\SURVEYS\TESTDATA\INSTRUMENT WORKSHOP DATA\POINTS FOR SET OUT A Select / Data type Individual observations(s) Observations by Selection Filter Stations Back Next Cancel Help	× SI	
Export Survey data - Selection Filter Data O Ad observations Individual obs selection Individual ink selection O Point features : PDS. PGY, PMO, PSS Select Locate O Link features : K. KT, MH, MHR, UE1C Select Locate Polygon Restrict by Polygon Restrict by Surface features : No features selected Locate Select Locate Select Locate Fiele Number : 001 Locate Select Max : (m) Back Apply Cancel Hep	× e cuded coverlay moverlay or terrain or terra	'Apply' to make selections on the screen – re can be many. soon as there are observations selected then ncel' button is replaced by 'Finish'. k 'Finish' once all required data is hlighted.

Export Survey data Logger Description Instrument type / data format Captivat Leica Job (DBX) reader Change Create file: POINTS FOR SET OUT GSI Browse Edit Back Next Cancel Help

Instrument Manual - Interface to Leica Geosystems Captivate

Back to top

Copyright © McCarthy Taylor Systems Ltd, 2019

Page 43 of 48

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.

Select -Upload when prompted.

Back to top

Page 44 **of** 48

Instrument Manual - Interface to Leica Geosystems Captivate

Version LSSv10.01.10

4.1.3 Exporting an LSS Code List to Leica Captivate

The LSS Export to Code List, now found in 'Export Survey Instrument – Code List' will produce a Leica code list.

However, we suggest that for new users the LSS prototype legend (supplied with Testdata on the LSS media) is used as a standard starting point for which there is a pre-built code list available in the 'Support_Files\Leica\JobDBX\Code_list' folder of the LSS media.

Please refer to the 'Transferring a code list...' in Session 1 above that explains how to copy these files onto the device.

As a consequence it is suggested that the Export code list option is best used for sending *new additional features* to the Leica code list as they are added to the LSS Prototype Survey.

Within a survey containing the prototype legend use Export Survey Instrument – Code List

Export Code lists ×	For Leica Captivate v	ve use
Instrument type Leica HeXML (Captivate) Leica HeXML (Viva) Leica IDX (1200) Leica XML (Icon) Topcon XML code library (recommended) Topcon TDD code library Trimble - FXL Library file (recommended) Trimble - Survey Controller (older version) Back OK	'Leica HeXML (Captiv	vate)
Export Code list - Leica HeXML	x	
Create file : LSS LEICA CAPTIVATE.XML Code List name : LSSv10 Code list	Browse Edit	Provide the filename for the code list and Use LSS to generate the IDX code list
Point feature(s)		'Select' the required point features.
Points : Jall	Select Locate	Tick the 'Use trailing digits as
Link feature(s) Links : all Select Locate Tree features Spread : PD1 Select Trunk : PS1 Select Other Stree features USS reserved codes + extras		dimension attributes' under Points if there are dimension items e.g. PT1, PT2,,PT20 etc. This will allow LSS to export these as a single feature with a Mandatory integer attribute for a more efficient code list.
Back OK Cancel	Help	

Note: It is important in this instance to have an extra feature without the numeric suffix e.g. PT, within the legend so that LSS can convert the items cleanly during the survey processing.

'Select' the required link features.

Back to top Page 45 of 48 Instrument Manual - Interface to Leica Geosystems Captivate Version LSSv10.01.10 Copyright © McCarthy Taylor Systems Ltd, 2019 Dec 2019

Tick the 'Include attributes for string numbers (links only)' under Links if required. This will add a Normal integer attribute, with a default of 0, so that each link feature can have a string number.

Leave the 'LSS reserved codes' box ticked to create all the Reserved codes as Free codes.

Note: This option will also export the 'String codes' and 'Code words' code groups that contain a mixture of free and point codes for extra functionality. OffsetLR, OffsetFB and OffsetUD are identical to the relevant reserved code offsets and SetupFr, SetupPt and CTLObsRO are for use when not using the instrument set-up and coordinate menus.

The primary String codes and Code words are;

CTLObsID' – for point coding a control observation for the instrument and LSS simultaneously.

'Notes' - for adding general text at an observation

'Freecode' – for adding multiple codes to one shot only

Start a new string from the previous point

The reserved codes as a group

The 'Tree feature' requires two Point features with digit suffixes for dimensions, the first feature represents the spread and the second the trunk e.g. PD1 and PS1. This also requires the features PD and PS to exist without the integer value as per Point features.

Note: The Tree feature has several attributes combined to make it a tree function including adding height and species information as well as the spread and trunk.

Back to top

Page 46 of 48

Instrument Manual - Interface to Leica Geosystems Captivate

4.2 Opening a DBX Job on Captivate

Once exported the DBX Job files are transferred to the Leica Captivate SD Card or USB stick as required.







Once we have transferred the Job we require, a message requests whether we wish to transfer any other jobs across.

ОК



Select the job on the Main screen;



Back to top

Page 47 of 48

Page Fn

Instrument Manual - Interface to Leica Geosystems Captivate

Copyright © McCarthy Taylor Systems Ltd, 2019

Fn OK

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.

McCarthy Taylor Systems Ltd Aerial View Acorn House Shab Hill Birdlip Gloucestershire GL4 8JX Tel 01452 864244 support@dtmsoftware.com www.dtmsoftware.com

December 2019

Back to top

Page 48 of 48

Instrument Manual - Interface to Leica Geosystems Captivate