

Leica GS09 Quick Guide

Version 1.0 English

- when it has to be **right**



To use the product in a permitted manner, please refer to the detailed safety instructions in the User Manual.

Hardware

Real-time reference setup



- a) GNSS antenna (GS09)
- b) Height hook
- c) Transport container
- d) CS09 field controller
- e) Battery (GEB211/GEB212)
- f) CompactFlash card
- g) External battery (GEB171)
- h) Y-cable (GEV205)
- i) GFU device
- j) GHT58 tripod bracket

Real-time rover setup



Rover setup

- a) GS09 GNSS antenna with LED indicators
- b) Battery (GEB211/GEB212)
- c) Telescopic pole
- d) Clamp (GHT63) to attach the GHT56 holder to the pole
- e) GFU device
- Holder (GHT56) for attaching CS09 field controller and RTK device to the pole
- g) CompactFlash card
- h) CS09 field controller

CS09 field controller

- a) Function keys F1-F6
- b) QWERTY keyboard
- c) User-definable keys F7-F12
- d) Arrow keys
- e) Control keys
- f) Numeric keys

Screen Display & Main Menu

Icons

a) Position status







10m

- 0.01-0.02m
- b) Visible satellites
- c) Contributing satellites

<1m

- d) Real-time status
- e) Position mode
- f) Bluetooth
- g) Data management
- h) Battery & Memory

Main Menu



Screen Display

- a) Title
- b) Screen area / Main Menu
- c) Message line
- d) ESC 🗵
- e) CAPS
- f) SHIFT icon
- g) Softkeys

1 Survey	Survey application.	G 4 Convert	Data conversion (import/export ASCII, GSI or DXF data, copy points between jobs).
2 Programs	Programs menu (menu of all loaded applications).	Ö 5 Config	To configure parameters related to a survey, CS09 field controller and the radio.
3 Manage	Data management (jobs, data, codelists, coordinate systems, etc.).	6 Tools	Tools (format the memory device, upload firmware and language files, manually type in or upload a licence key, etc.).

Data Transfer

To transfer data to or from the office computer, connect the CS09 field controller with cable to the office computer using Microsoft ActiveSync (Windows XP) or Windows Mobile Device Center (Windows Vista). The CompactFlash card can also directly be used in an OMNI drive as supplied by Leica Geosystems. As example for the data transfer procedure the transfer of DXF data is shown following.



- 1. Turn on the CS09 field controller.
- 2. Connect it with the GEV234 USB cable to the office computer.
- The Microsoft ActiveSync program will start automatically and connect with the CS09 field controller.
- Microsoft ActiveSync must first be installed on the office computer.
- 4. Click the Explore icon in ActiveSync. The Windows Explorer opens.
- 5. Copy the DXF file and paste it into the folder Mobile Device/StorageCard/Data.
- 6. Close the Explorer window, the ActiveSync and disconnect the CS09 field controller from the office computer. Connect the CS09 field controller to the GS09 GNSS antenna.

Importing Data to a Job

Description

It is possible to import ASCII, GSI or DXF data from a file stored on the CF card to a job on the CS09 field controller. As example for the importing procedure the import of DXF data is shown following.

Import DXF data step-by-step

17:20 CS09	- % ^{2:9} ``}_∮ 9 [*] 6:9 `]∮	່ 💽 ສີ
Main Menu		×
		-
1 Survey	2 Programs 3	Manage
1	Ö	Ĩ
4 Convert	5 Config 6	Tools
CONT		a û
17:29	Ĕ\$\$\$\$ € 8 € 8 € 8	2
Import DAF L		
From File To Job	: Tennis : Tennis	Court Court
Progress	•	
	·L	

- Ensure that at least one file in DXF format with the file extension *.dxf is stored in the \DATA directory of the CF card.
- 1. Starting the DXF Importer
 - Select Main Menu...Convert.
 - Select Convert Data...Imp Data and access the Import Data to Job screen.
 - Select Import DXF and access the Import DXF Data to Job screen.
- 2. Accessing the Configuration.
 - Enter the Configuration screen (CONF (F2)).

17:27 IMPORT	ŝ	.* ` 💽 ¤ 📮
Configuration		×
Block Prefix	:	B1k_
Point Prefix	:	Pt_
Line Prefix	:	Line_
File Units Create Vertex Points	:	Metre 🔶 No 🕩
Convrt White Elements	:	Yes 🕩
Exclude Height	: -	9999.999 a û
CONT		DEFLT

12:12 Import DXF Data to Job Import DXF Data to Job From File Import DXF To Job To Job Progress Do not remove CF Cardi

3. Configuring the DXF Importer.

- Ensure that the File Units are correct.
- DXF files have no defined units and therefore the units must be defined within the DXF importer.
 - Confirm the configuration settings and return to the **Import DXF Data to Job** screen.

4. Importing the DXF data.

- Import the DXF data to the active job (CONT (F1)).
- After importing the **DXF** data to the active job, complete the import or import another **DXF** data.

Real-time Reference Setup

Description

Setup Reference is a program to configure GS09 as a real-time reference station. After completing the program, the reference station is operating and CS09 field controller switches to rover mode and can be used for all rover applications.

Configuring a GS09 real-time reference step-by-step

13:22 SETUP REF	101		2 🚰
Reference Beg	y i n		×
Jop	:	job	name
Coord System	:	coord sys	name
Codelist	:	codelist	name 🐠
CONT		DA	aî TA CSYS
13:23 SETUP REF	<i>1</i> 8y	Å] *	a ∎ ∎
13:23 SETUP REF Reference: So Antenna ID Address Device	% ≱ et An : : :	ی ایک tenna GS09 T 12f30 #157196	nipod∳ 3452a GS09

- 1. Starting the Program
 - Select Main Menu...Programs.
 - Select Setup Reference and access the Reference Begin screen.
 - Select a Job.

Press **DATA (F5)** to check all of the points in the selected job.

2. Selecting the Antenna

- Select the antenna.
- Start searching for the antenna via Bluetooth (SRCH (F4)) and continue (CONT (F1)).

12:50 CONFIGURE Radio Channel X	3. S
Radio Type : Satelline 3AS	
Channel : 7 Actual Freq : 433.7000 MHz	() J
CONT SCAN	
13:28 ★ *# > Image: Setup Reference Station X Setup Reference Station X Point ID : 0001(4. S •
Antenna Ht : 1.5850 ₪	_
WGS84 Lat : 47°24'31.16466" N WGS84 Long : 9°37'06.08772" E WGS84 E11 Ht : 482.9057 m ∎aî)	(j)
CONT COORD HERE	
13:32 一個 第二人 第二人 </td <td>5. C</td>	5. C
Antenna Ht : 1.5850 n	(P
Time at Point: 00:00:24	

3. Setting the Radio Channel

- Enter the radio channel for the radio at the reference and continue (CONT (F1)).
- Ensure that the radio at the reference and the radio at the rover are set to the same frequency. If an incorrect radio type is displayed, exit the program, connect the radio to the GHT56 holder and the CS09 field controller and configure the radio.

4. Selecting the Reference Point

- Select the **Point ID** of the known point and enter the antenna height.
- Press **HERE (F4)** to use the current navigated position for the setup and continue (**CONT (F1)**).
- When setting the reference point for the setup, the selected point must be able to be viewed as WGS1984 coordinates.

5. Completing the Setup

- Finish (FNSH (F1)) the setup and return to the Main Menu screen.
 - The CS09 field controller disconnects itself from the reference antenna. The BT connection to the reference antenna will be broken.

GPS Resection

Description

GPS Resection is used to orientate and calibrate the active job. The program is designed to provide an orientation to a GPS job in a similar method to a TPS resection.

Starting up with GPS Resection step-by-step

GPS RESEC	`{````````` ````	°``	2 🖕	1
GPS Resecti Name Job	on Beg :	in GPS Rese De	× ection efault <u>√</u>	
CONT			a û CSYS	
12:06	4.5	. s N *	<	1 2
GPS RESEC	≁ ∛ õ	8 🗐 🔊	- 🖬 🏹	-
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GPS RESEC Step 1: Nea Point ID Antenna Ht	transferrer Herrer Co Sure Co Sure Co Sure Co Sure Co	ontrol Pt loca	1_001	5
GPS RESEC Stop 1: Hoa Point ID Antenna Ht Easting Northing Ortho Ht	transforment sure Co : :	8 10 Pt 10 Ct 50 (50 (10 (ss →1_001[] 2.0000 n 0.0000 n 0.0000 n 0.0000 n	5
GPS RESEC Stop 1: Nos Point ID Antenna Ht Easting Northing Ortho Ht Match Type	transforment sure Co : : :	ontrol Pt loca 50(50(10(Pos & I	x 1_0014 2.0000 n 0.0000 n 0.0000 n 0.0000 n Height∳	5
GPS RESEC Step 1: Nea Point ID Antenna Ht Easting Northing Ortho Ht Match Type 3D CQ	tanta tantanta tanta tanta tanta tanta tanta tanta tanta tanta	ontrol Pt loca 500 500 100 Pos & H	± 10001 () 2.0000 m 0.0000 m 0.0000 m 0.0000 m Height () 0.0091 m	5
GPS RESEC Stop 1: Hos Point ID Antenna Ht Easting Northing Ortho Ht Match Type 3D CQ	tanta anti anti anti anti anti anti anti	ontrol Pt loct 50(50(10(Pos & H	1001 4 2.0000 m 0.0000 m 0.0000 m 0.0000 m deight 4 0.0091 m a 0	4

- 1. Starting the Program
 - Select Main Menu...Programs.
 - Select GPS Resection and access the GPS Resection Begin screen.
 - Type in a Name for the resection, select a Job and continue (CONT (F1)).

2. Measuring the local points

- Select Point ID of the known local point and occupy it.
- Hold the GPS real-time rover steady.
 - Start measuring the point (OCUPY (F1)).
 - End measuring the point (STOP (F1)).
 - Store the measured point (STORE (F1)).

	4 Σ= 8 Σ= 8 Σ= 8 G= 8	2 * 1	
Step 2: Hatch	Points		×
Points			Match
local 001		Pos &	Height
loca1_002		Pos &	Height
loca1_003		Pos &	Height
loca1_004		Pos &	Height
CALC ADD	DEL	MATCH	aû
13:14	43y Σ= 8 1	* * `	
13:14 GPS RESEC	4 3μΣ=8 8 6 8 1 ∮	1 ° °	P
13:14 GPS RESEC Step 3: Check	Residuals	1 2	
13:14 GPS RESEC Step 3: Check Points	Residuals East	(m) N	lorth[n]
13:14 GPS RESEC Step 3: Check Points local_001	% Σ= 8 8 G= 8 Residuals East -0	[* * * [* * [m] N 007	Corth[n] -0.007
13:14 GPS RESEC Step 3: Check Points loca 1_001 loca 1_002 loca 1_003	% 2= 8 8 6-8 Residuals 0 0.00	[m] N 007 15 7	<pre></pre>
13:14 GPS RESEC Step 3: Check Points local_001 local_003 local_004	≥=8 8 6-8 12 Residuals = 0.0 0.0 0.0	[m] N 007 15 7 012	Conth[n] -0.007 0.012 0.0239
13:14 GPS RESEC GPS RESEC Check Points Check loca 1_001 Check loca 1_002 Check loca 1_003 Check	≥=8 8 6-8 Residuals =0. -0.0 0. -0.0	[m] h 007 15 ? 012 008	erth[n] -0.007 0.012 0.023? -0.015
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13:14 → GPS RESEC → Stop 3: Check → Points → loca1_001 → loca1_002 → loca1_003 → loca1_004 →	Residuals 6-8 -0.0 -0.0 0.	(m) N 007 15 7 012 008	<pre> enth[n] -0.007 0.012 0.023 -0.015 a û </pre>

3. Matching the local points to WGS84 coordinates for position and/or height

- Select the type of match between the measured WGS84 and the known local point (MATCH (F5)).
- Survey another WGS84 point (ADD (F2)).
- Confirm the selections and compute the transformation (CALC (F1)).

4. Checking the calculated residuals

- Check the calculated residuals.
- Press MORE (F5) to display information about height residuals.
- If the residuals are unacceptable, return to **Step 2** (**ESC**) where you can edit or temporarily delete points from the list and recalculate the transformation.
- Save the coordinate system and attach it to the active job (**STORE** (F1)).

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Leica Geosystems AG, Heerbrugg, Switzerland, has been certified as being equipped with a quality system which meets the International Standards of Quality Management and Quality Systems (ISO standard 9001) and Environmental Management Systems (ISO standard 14001).

Ask your local Leica Geosystems dealer for more information about our TQM program.

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