

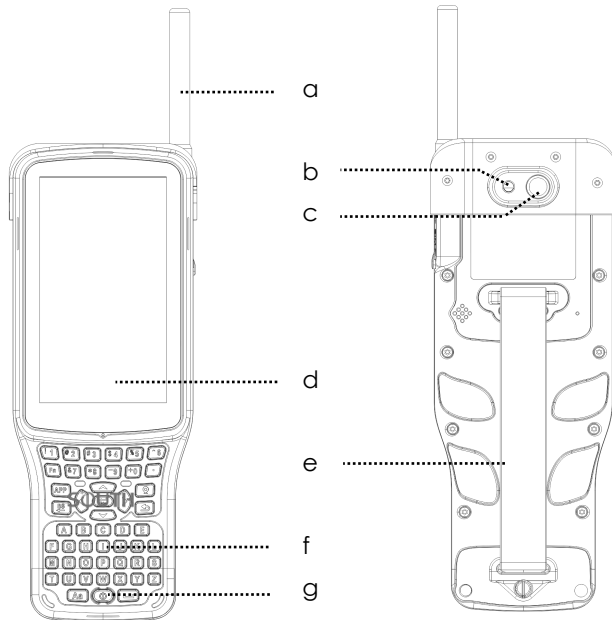
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1. GET START

1.1 HARDWARE



- a) Antenna
- b) Flash Light
- c) Camera
- d) Screen
- e) Strap
- f) Keypad
- g) Power Key

Note: Please install the antenna correctly on **H6 Plus controller** and **NS30 Robotic Total Station** in the same time to ensure the effective long-range remote control.

1.2 INTRODUCTION

Survey Star Pilot was designed for One-man Solution on South **H6 Plus** Controller, work with **NS30** Robotic Total Station. It provides a simplified and map-driven workflow.

Map-driven workflow allows you to set up the station, collect points and stake out faster and easier than ever. The graphic display on **Survey Star Pilot** provides a instant visual operation with high efficiency.

Benefit by Zigbee Technology on **H6 Plus** and **NS30**, it is easier to control the Robotic Total Station in any place in any time.

1.3 PREPARATION

Before get started... **TServer** is successfully installed on NS30 Robotic Total Station.

Survey Star Pilot is successfully installed on **H6 plus** controller.

How to Install?

- 1) Copy the install package (e.g. SurveyStarPilot-V1.0.230606.apk) into controller.
 - 2) Click the package.
 - 3) Select **[Install]** and waiting until the installing process is done.
-

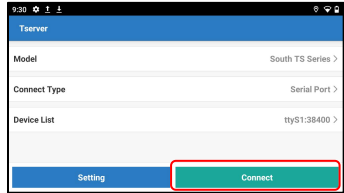
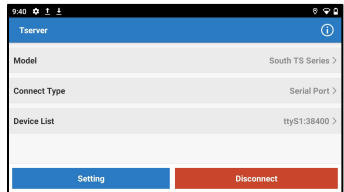
1.4 CONNECT WITH NS30

1.4.1 Connect by Bluetooth

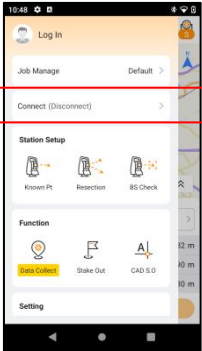
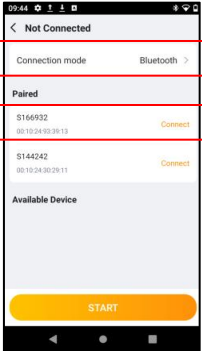

Description

When connect by Bluetooth, you can control the robotic total station (NS30) by your controller (H6 Plus) in a short range.

1) Steps on NS30

Step	Description	Pics as Reference
1	Keep the Bluetooth opened. <i>Check it by:</i> [Settings]\[Connected Devices]\[Connection Preference]\[Bluetooth]\[On]	 A screenshot of the TServer application interface. The top bar is blue with the text 'TServer'. Below it, there are three rows of settings: 'Model' with the value 'South TS Series', 'Connect Type' with the value 'Serial Port', and 'Device List' with the value 'ttyS1:38400'. At the bottom, there are two buttons: a blue 'Setting' button and a green 'Connect' button. The 'Connect' button is highlighted with a red rectangular box.
2	Open [TServer] on NS30.	 A screenshot of the TServer application interface, similar to the first one. The top bar is blue with the text 'TServer'. Below it, there are three rows of settings: 'Model' with the value 'South TS Series', 'Connect Type' with the value 'Serial Port', and 'Device List' with the value 'ttyS1:38400'. At the bottom, there are two buttons: a blue 'Setting' button and a red 'Disconnect' button.
3	Press [Connect] .	

2) Steps on H6

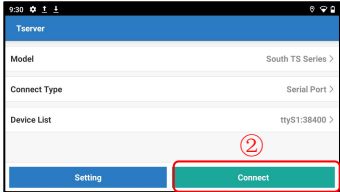
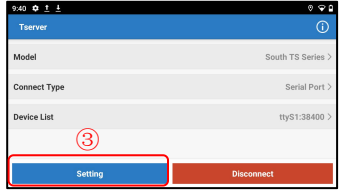
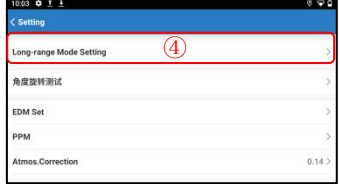
Step	Description	Pics as Reference
1	<p>Open [Survey Star Pilot].</p> <p>Press [≡ Default] or slide from the left to access the main menu.</p>	
2	<p>Select [Connect].</p>	
<p>3</p> <p>4</p> <p></p>	<p>Select [Connection Mode]: Bluetooth</p> <p>Press [Start]: Start to search the available device.</p> <p>Or Click the paired device, e.g [S166932], waiting for connection.</p> <p>When [Connected]/[Success] shown on the screen, Bluetooth connection is succeed.</p>	

1.4.2 Connect by Zigbee Long-range Mode

Description

Benefit from Zigbee technology, you can control NS30 by your controller with higher efficiency and lower consumption in maximum 600m.

Steps

Step	Description	Pics as Reference
1	Open [TServer] on NS30.	
2	The configure should be: Model: South TS Series Connect Type: Serial Port Device List: ttyS1:38400 Press [Connect] .	
3	Press [Setting] .	
4	Select [Long-range Mode Setting] .	

5	Open [Survey Star Pilot] on H6.	
6	Press [≡ Default] or slide from the left to access the main menu.	
7	Select [Connect] \ [Connection Mode]: Long Distance Mode.	
8	Confirm the information (PANID, Channel, etc) on both Controller and Total station, it should be paired.	
9	Press [Connect] on controller at first.	
10	Then press [Connect] on TServer.	
	When [Connected] shown on the screen, the long-range remote control is connected.	

When using Long-range Remote Control, please install the Zigbee antennas correctly on both **NS30** and **H6 Plus** Controller :)

Please stay at TServer page for stable connection.

1.4.3 Demo Mode

Description

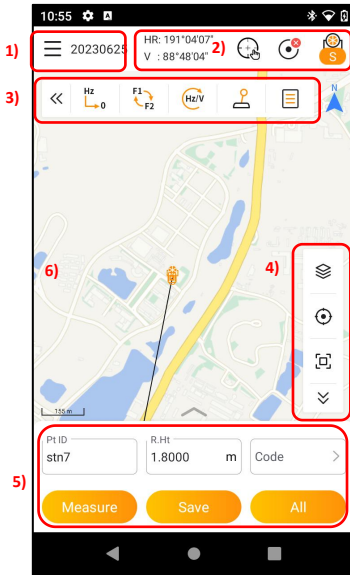
Not necessary to connect with NS30 under Demo Mode, Survey Star Pilot will provide simulated measurement data.

Steps

Step	Description	Pics as Reference
1	Open [Survey Star Pilot].	
2	Press [☰ Default] or slide from the left to access the main menu.	
3	Select [Connect]\ [Connection Mode]: Demo Mode.	
4	Press [Connect].	

2. INTERFACE

2.1 MAIN INTERFACE



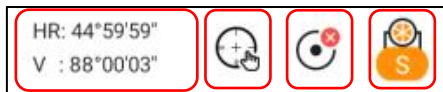
The interface on Survey Star Pilot is separated into various parts which contain common functions or tools that the user will use most often.

- 1) Main Menu
- 2) Instrument Toolbar
- 3) Operation Toolbar
- 4) Display Toolbar
- 5) Measure Toolbar
- 6) Map View

2.2 TOOLBARS

2.2.1 Instrument Toolbar

The instrument toolbar includes the total station status (H/V), motorization mode (Manual, APR, LocknTrack, Prism Search), instrument status, and measure modes.



















(1)

(2)

(3)

(4)

Items		Descriptions	
1	Horizontal angle	HR/HL	E.g. 252° 10'09"
	Vertical angle	V	E.g. 38° 06'18"
2	Motorization Mode		Manual Aiming
			APR
			LocknTrack (unlocked)
			LocknTrack (locked)
			Prism Search
3	Instrument Status	Ins.Status	STN: Point ID of station; Ins.Ht: Instrument height

	Compensation Status		Compensator over range
			Compensator closed
			Instrument in Face 1 (HL)
			Instrument in Face 2 (HR)
4	Target	  	Prism, Non-prism and Reflective Sheet
	Measure Mode	   	Single, Continuous, Tracking and N Times
	Laser Pointer	On/Off	Open or close the laser pointer






2.2.2 Operation Toolbar

The operation toolbar includes the total station status (H/V), motorization mode (Manual, APR, LocknTrack, Prism Search), instrument status, and measure modes.



(1) (2) (3) (4) (5) (6)


	Items	Description
1		Click to hide or expand the toolbar

2		H0 Set	HA: Set the horizontal angle. If it is reset, please orient to the backsight again.
3		Face 1/2	Change the face between Face 1 and Face 2.
4		Horizontal / Vertical Rotation	Absolute: Rotate the horizontal or vertical angle based on H0/V0 direction.
			Relative: Rotate the horizontal or vertical angle based on current direction.
5		Joystick	Manual - Click or long-press the navigation key to control the motorization.
			Auto - Click the navigation key to control the motorization continuously. Click the stop button to stop rotation.
			Speed: L (Low), M (Middle), H (High).
6		Data	Check the points and codes. Refers to Chapter 6 DATA .

2.2.3 Display Toolbar

The display toolbar located at the right of the screen, is used to layer manage, locate and full image.




	Icon	Description	
1		Layer Setting	Click [] to open or close the selected layer and map. Press [Import] to import layers and maps. Refers to Chapter 6.3
2		Locate	Click to locate the map to the instrument location.
3		Full image	Click to change the map scale to a fixed size and locate it at the instrument location.
4		Click to hide or expand the display toolbar.	

2.2.4 Measure Toolbar





The measure toolbar located at the bottom of the map, is used to display the point number, reflector




height, code for current point, N/E/Z, HD/VD/SD with **[Measure]**, **[Save]** and **[All]** keys.

	Icon	Description
1		Slide or click to hide or expand the full display of points
2	Measure	Measure only
3	Save	Save only
4	All	Measure and save

2.3 MAP VIEW

In map view, it mainly displays information such as the location of points and station, telescope direction, scales, north direction, etc.

Icons	Description
	Station
	Measured Points
	Selected Measured Points
	Selected Stake Out Points

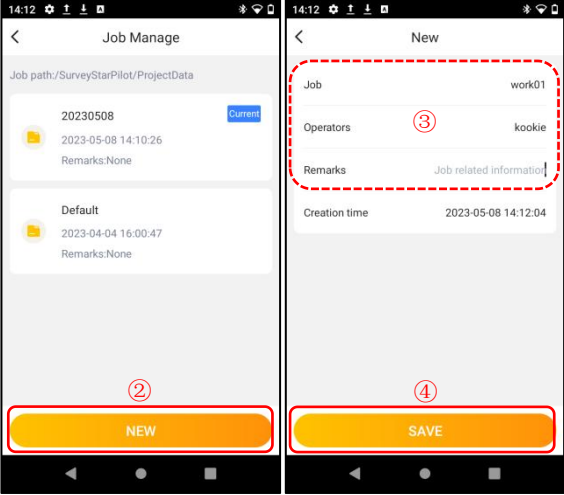
Lines	Description
	Direction of Telescope
	Direction of Measured Point
	Direction of Stake Out Point

Clicking the selected points in the map, to automatic turning, stake out, view, edit, and delete point.

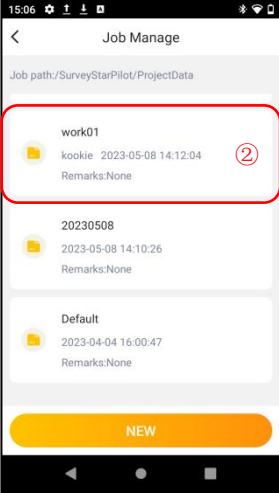
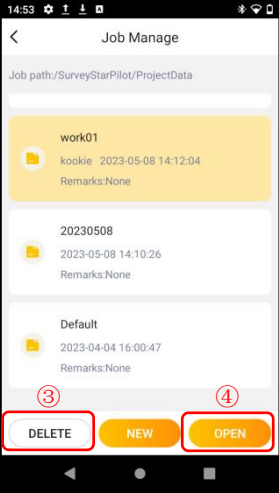
	Item	Description	Pics
1	Auto	Rotate the equipment to the direction of selected point	
2	Stake Out	Stake out the selected point. (Refers to Chapter 5.5)	
3	View	Check the detail information	
4	Edit	Edit the selected point	
5	Delete	Delete the selected point	

3. JOB MANAGE

3.1 CREATING A NEW JOB

Step	Description	Pics
1	Press [☰ Default] or slide from the left to access the main menu.	
2	Press [Job Manage]\[New]	
3	Input the job name, operators and remarks.	
4	Press [Save] to save and open the new job.	

3.2 EDITING A JOB

Step	Description	Pics
1	Press [≡ Default] or slide from the left to access the main menu.	
2	Press [Job Manage]. Select an existed job	 <p>The screenshot shows the 'Job Manage' screen with a list of jobs. The first job, 'work01', is highlighted with a yellow background and a red box. A circled '2' is next to it. The other jobs are '20230508' and 'Default'.</p>
3	Press [Delete] to delete it.	
4	Press [Open] to open it.	 <p>The screenshot shows the 'Job Manage' screen with the same list of jobs. At the bottom, there are three buttons: 'DELETE', 'NEW', and 'OPEN'. The 'DELETE' button is circled with a '3' and the 'OPEN' button is circled with a '4'.</p>

4. STATION SETUP

4.1 KNOWN POINT

The coordinates of station point are required for setup. The instrument can be oriented by a known point, or an unknown point with assumed azimuth.

Step	Description	Pics
1	Select Main Menu: [Station Setup] \ [Known Pt] .	
2	[Ins.Ht] :Enter the instrument height. [R.Ht] : Enter the reflector height.	
3	[Station] : Select or input a known point as station.	
4	Select orientation method: 1) [BS Pt] : Select or input the other known point. 2) [Azimuth] : Enter the azimuth.	
5	Aim at the backsight point or assumed azimuth. Press [Set] .	

4.2 RESECTION

Resection is used for determine the instrument position from measurements of maximum 7 points. The calculation requires at least three angle data or two distance data.

Step	Description	Pics
1	Main Menu: [Ins.Station] \ [Resection] .	
2	[Ins.Ht] :Enter the instrument height.	
3	[+] : Add the known points as backsight.	
4	Press [Pt ID] to select a point.	
5	Press [Measure] to measure the distance; Press [Angle] to measure the angle.	
6	Press [OK] to confirm. Repeat the steps to add the 2 nd , 3 rd ... points for resection.	
7	When all the measurement is finished, press [Calculation] to check the result.	
8	Press [Set] to set the station.	

☞ The intersect angle of known point shouldn't less than 15 degrees or larger than 165 degrees, and the points can be on a same line (Error Code: Source Error) or on dangerous circle.

4.3 BACKSIGHT CHECK

Check the azimuth and coordinates of backsight after station setup.

Step	Description	Pics
1	Main Menu: [Ins.Station] \ [BS Check] .	
2	Station Pt: Current station ID; BS Pt: Backsight point, if the backsight is oriented by angle, it will be empty.	
3	Azimuth: Azimuth of backsight. HA: Current horizontal angle. dHA: difference between azimuth and current horizontal angle.	
4	Press [Measure] to measure and check the backsight point.	
5	Residual: Differences between backsight point and measured point.	
6	Press [Set] to re-set the backsight.	

☞ Please set up the station before backsight checking.

5. MEASUREMENT

5.1 DATA COLLECT

Step	Description	Pics
1	Select Main Menu: [Function]\[Data Collect]	
2	Enter the point ID, reflector height and code.	
3	Check the settings of instrument: 1) Motorization Mode. 2) Compensator. 3) Target, Measure Mode and Laser Pointer.	
4	[Measure]: Measure only. [Save]: Save only. [All]: Measure and save.	



5.2 APR

APR (Auto Prism Recognition) is used to recognize and measure the prism automatically in the sight of view (± 1.5 degrees), in maximum 1200m. If the prism is founded, the crosshair will automatically positioned to the prism center.

Step	Description	Pics
1	Select Main Menu: [Function]\[Data Collect]	
2	Enter the point ID, reflector height and code.	
3	Select [APR] mode.	
4	Press [Measure] or [All] to measure and save the data.	

5.3 LOCKNTRACK

LocknTRack enables an automatic prism recognition and lock to a moving prism.

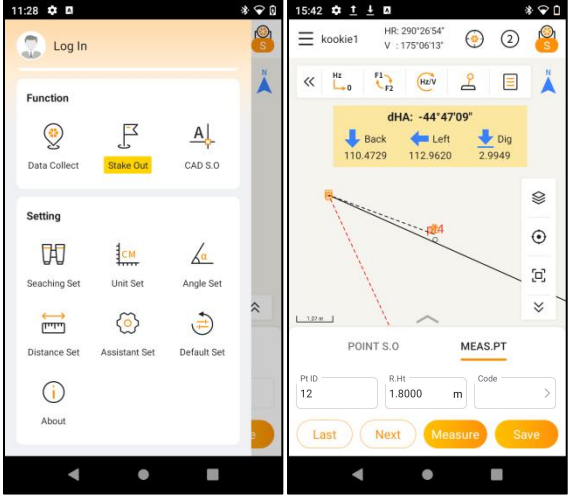
Step	Description	Pics
1	Select Main Menu: [Function]\ [Data Collect]	
2	Enter the point ID, reflector height and code.	
3	Select [LocknTRack] mode.	
4	Press [Measure] to measure the prism in sight of view.	
5	When prism locked, the icon will be:  . When prism is lost, the icon will be:  .	
6	Select the measure mode and move the prism. NS30 will follow the prism automatically.	
7	Press [Measure] or [All] to measure and save the data.	

5.4 PRISM SEARCH

When Prism Search is activated, the station starts to rotate 360 degrees around the vertical axis in anti-clockwise direction. Then, the automatic prism search in the vertical direction ($\pm 18^\circ$) is performed. If prism is detected, the rotation will stop immediately. Otherwise, it will stop after a 360° rotation.

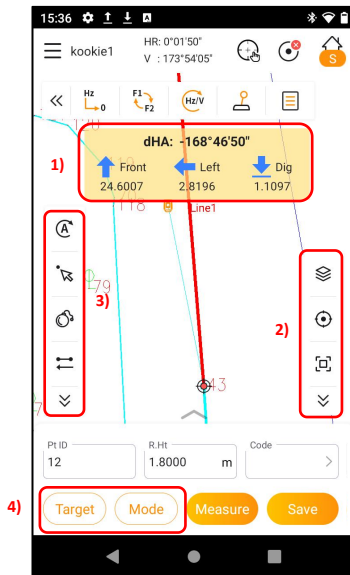
Step	Description	Pics
1	Select Main Menu: [Function] \ [Data Collect]	
2	Enter the point ID, reflector height and code.	
3	Select [Prism Search] mode.	
4	Press [Measure] or [All] to start searching the prism in 360 degrees, then, measure and save the data.	

5.5 STAKE OUT

Step	Description	Pics
1	Select Main Menu: [Function] \ [Stake Out]	
2	[Pt ID]: Select a point to stake out.	
3	Select motorization mode, aim at the prism by Manual, APR, LocknTrack or Prism Search. (Please refers to Chapter 5.2/5.3/5.4)	
4	Press [Measure] to measure the prism.	
5	Rotate the telescope until the dHA	
6	<div style="display: flex; align-items: center; gap: 10px;"> <input style="width: 80px;" type="text" value="12"/> <input style="width: 80px;" type="text" value="1.8000"/> <input style="width: 80px;" type="text" value="m"/> <input style="width: 80px;" type="text" value="Code"/> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> prism until all </div> <div style="display: flex; justify-content: center; gap: 10px; margin-top: 5px;"> Target Mode Measure Save </div>	
7	Press [Save] to save and record it into memory.	







5.6 CAD STAKE OUT

5.6.1 BRIEF INTRODUCTION



In this function, the points to be staked can be uploaded and selected from DXF/DWG files.





1) Guide for stake out

Item	Description	
dHA	Difference of horizontal angle.	
	Front	Move the prism to the farther position.
	Back	Move the prism to the nearer position.
	Left	Move the prism to the left.
	Right	Move the prism to the right.
	Dig	Move the prism to the lower position.
	Fill	Move the prism to the upper position.

2) Display Toolbar (Refers to Chapter 2.2.3)

In display toolbar, you can change the background color, import the layers, locate the equipment for stake out.

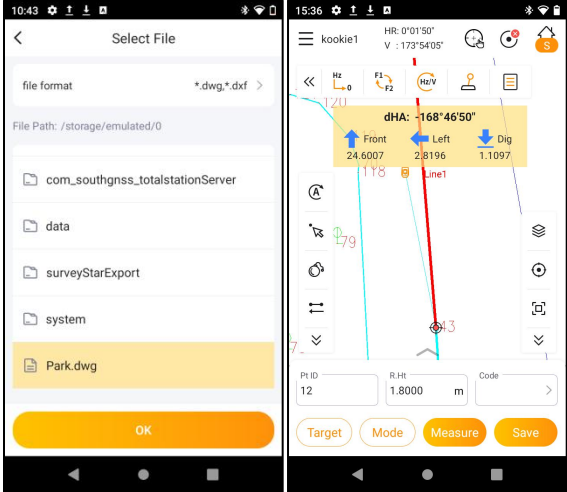


3) CAD Toolbar

Icon	Description	
	Auto Pointing	Rotate the telescope to the stake out point by motorization.
	Pointer	Select the features by cursor.
	Explore	Explore the features into sections.
	Change Direction	In the pile stake out or interval stake out function, click this button to change the direction of last or next point.

4) Setting

Item	Description	
[Target]	Select a feature on the map, to check the coordinates of points to be stake out.	
[Mode]	Line Stake Out	Staking out a point with offsets based on the selected line. [Left]/[Right] : Enter the left or right offset. [Front]/[Back] : Enter the front or back offset. [Up]/[Down] : Enter the up or down offset.
	Pile Stake Out	Select a feature on the map, enter the starting mile to stake out.
	Interval Stake Out	Select a feature on the map, enter the starting mile and interval to be stake out.

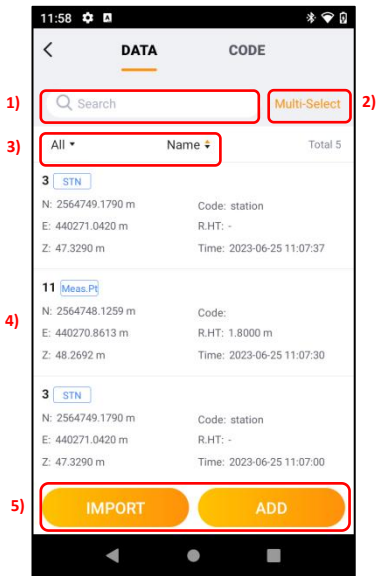
5.6.2 HOW TO STAKE OUT A POINT FROM CAD FILES

Step	Description	Pics
1	Select Main Menu: [Function] \ [CAD S.O]	
2	Press [] \ [Import] to select files in dwg or dxf format. Press [OK] .	
3	Select the motorization mode: Manual, APR, LocknTRack, Prism Search	
4	Press [Measure] to measure the prism.	
5	Rotate the telescope until the dHA becomes 0.	
6	Then move the prism based on the guidance on the map when all the value becomes 0.	
7	Press [Save] to save and record it into memory.	
	If you use LocknTRack mode, please fix the prism to finish the first aim. Otherwise, the prism will not be locked.	

6. DATA MANAGE

6.1 POINTS

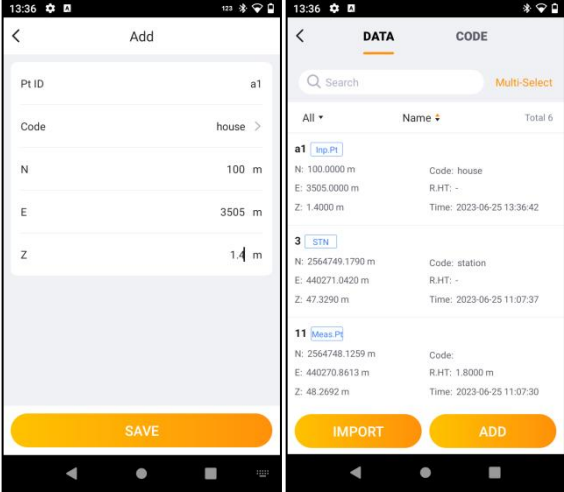
6.1.1 OVERVIEW



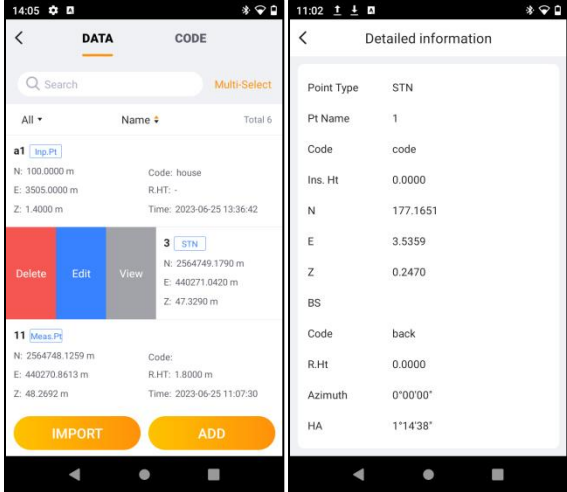

Select: Toolbar\ [] \DATA to check the point list.

Item		Description
1	Searching Window	Enter the point ID to search it.
2	Multi-Select	Export or delete multiple points in once.
3	Filter	Filter the points by types or re-order the points.
4	Points	Only imported point, inputted point and calculated point can be edited.
5	Function Key	Import or add points.

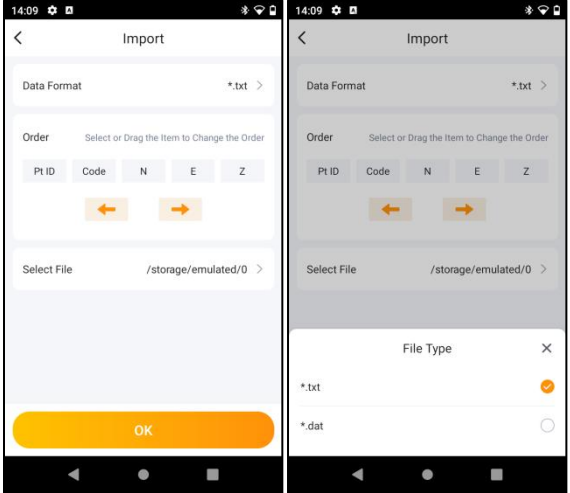
6.1.2 CREATING A NEW POINT

Step	Description	Pics
1	Press [ADD] to add a new point	
2	[Pt ID]: Enter the Point ID [Code]: Select or enter a code [N/E/Z]: Enter the coordinates of point	
3	Press [Save] to record it.	

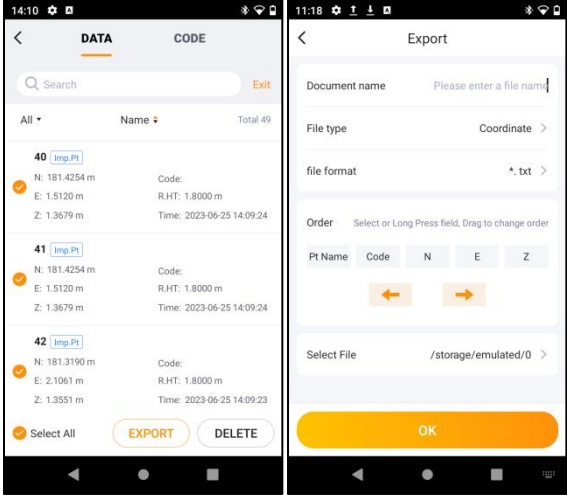
6.1.3 POINT MANAGEMENT

Step	Description	Pics
1	Slide the screen from the left to right to delete, edit or view a point.	
2	Press [Delete] to delete the selected point	
3	Press [Edit] to edit the selected point	
4	Press [View] to view the selected point for details.	
	Select [Multi-Select] to delete or export multiple points in once.	

6.1.4 IMPORTING POINTS

Step	Description	Pics
1	Press [Import] to import points from internal memory.	
2	Select [File Format]: *.dat or *.txt optional.	
3	Select or drag the item to change the order of imported files. The order should be matched.	
4	Click [Select File] to select a file from internal memory.	
5	Press [OK] , then the points will be imported to the data list.	

6.1.5 EXPORTING POINTS

Step	Description	Pics										
1	Press [Multiple] , click the checkbox to select points. Press [Export] .											
2	[Document Name]: Enter a file name, the data will be saved under this name.											
3	[File Type]: Select the data type. Optional: coordinate data, raw data and side & angle data.											
4	[File Format]: Select the data format											
	<table border="1"> <thead> <tr> <th>File Type</th> <th>File Format</th> </tr> </thead> <tbody> <tr> <td>Coordinate</td> <td>*.txt, *.dxf, *.dat, *.csv,</td> </tr> <tr> <td>Data</td> <td>*.txt (FC-6/ GTS-7)</td> </tr> <tr> <td>Raw Data</td> <td>*.txt, *.txt (FC-6/GTS-7)</td> </tr> <tr> <td>SA Data</td> <td>*.txt</td> </tr> </tbody> </table>		File Type	File Format	Coordinate	*.txt, *.dxf, *.dat, *.csv,	Data	*.txt (FC-6/ GTS-7)	Raw Data	*.txt, *.txt (FC-6/GTS-7)	SA Data	*.txt
	File Type		File Format									
Coordinate	*.txt, *.dxf, *.dat, *.csv,											
Data	*.txt (FC-6/ GTS-7)											
Raw Data	*.txt, *.txt (FC-6/GTS-7)											
SA Data	*.txt											
5	Click [Select File] to select the path to be saved.											
6	Press [OK] to export.											

6.2 CODES

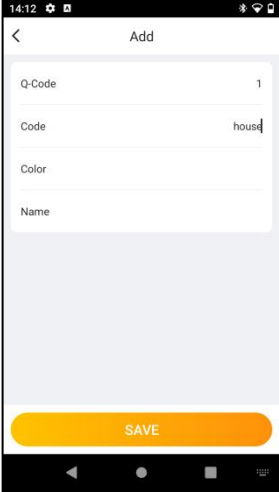
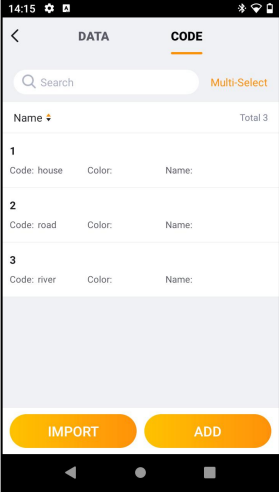


6.2.1 OVERVIEW



Select: Toolbar\ [] \CODE to check the list.

Item		Description
1	Searching Window	Enter a code to search it.
2	Multi-select	Export or delete multiple codes in once.
3	Filter	Reorder the codes
4	Code	Check, delete or edit the code.
5	Function Key	Import or add codes

6.2.2 CREATING A NEW CODE

Step	Description	Pics	
1	Press [ADD] to add a new code		
2	<p>[Q-Code]: Q-code marks for Southmap or CAD.</p> <p>[Code]: Select or enter a code</p> <p>[Color]: Marks for Southmap or CAD.</p> <p>[Name]: Marks for Southmap or CAD.</p>		
3	Press [Save] to record it.		
	Color and name are not required in basic measurement.		
	Select [Multiple] to delete or export several codes in once.		

6.2.3 CODE MANAGEMENT

Step	Description
1	Slide the screen from the left to right to delete or edit a code
2	Press [Delete] to delete the selected code.
3	Press [Edit] to edit the selected code.

6.2.4 IMPORTING CODES


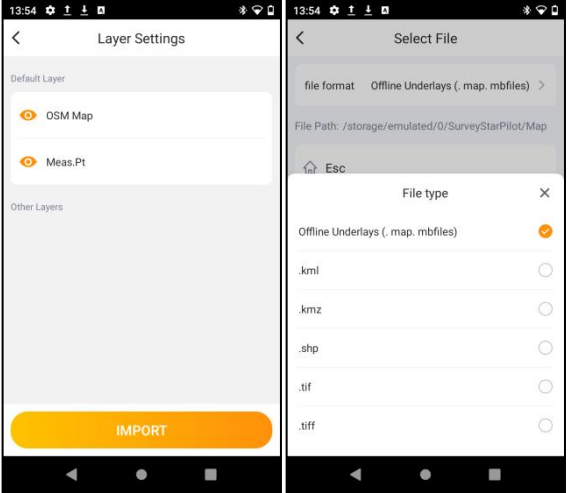



Step	Description
1	Press [Import] to import codes from internal memory.
2	Select [File Format]: *.xls, *xlsx
3	Select or drag the item to change the order of imported files. The order should be matched.
4	Click [Select File] to select a file.
5	Press [OK] , then the codes will be imported to the data list.

6.2.5 EXPORTING POINTS

Step	Description
1	Press [Multi-Select] , click the checkbox to select points. Press [Export] .

2	Select [File Name] : Enter a file name, the data will be saved under this name.
3	[Data Format] , it can only be *.xls.
4	Click [Select File] to select the path to be saved.
5	Press [OK] to export.

6.3 MAPS AND LAYERS

Step	Description	Pics
1	Press [] from the toolbar to enter the layer setting page.	
2	Press [Import] to import the other layers or maps.	
3	Select [File Format] to select the format. E.g. *.map, *.mbfiles, *.kml, *.kmz, *.shp, *.tif, *.tiff.	
4	Select the file path.	
5	Press [OK] to import the base map or layers.	
	[]: Visible layers. []: Invisible layers.	

7. SETTINGS

Item		Option	
Searching Set	Prism Prediction	Waiting Time	1s/3s/5s
		Operation after Prism Lost	Stop Searching/APR/Prism Search/Turn to Last Point
	APR Searching Range	Horizontal Searching Range	0-180 degree
		Vertical Searching Range	0-90 degree
Unit Set	Angle Unit		Degree/DMS
	Distance Unit		M/U.S Feet/Int.Feet
	Temperature Unit		°C/°F
	Pressure Unit		HPa/mmHg/inHg
Angle Set	Minimum Angle Reading		5s/1s/0.1s
	V0/H0		Vertical 0/Horizontal 0
Distance Set	Minimum Distance Reading		0.001/0.0001
	Coefficient (k)		0.14/0.2/Off

	Grid Factor	Scale Factor	1.0 in default. Entered from 0.99 to 1.01
		Average Elevation	To be entered
		Grid Factor	1.0
	Atmospheric Correction	Temperature	Entered by manual.
		Pressure	Entered by manual.
		PPM	It will be calculated automatically
Assistant Set	Soft keypad		On or off
	Point ID Existed		On or off. When the same point ID existed, turn on or off the tips.
Default Set			Reset to default settings
About	Version		Software version
	Version Update		Software update when available