



SL600 GNSS Receiver User's Manual



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1. Introduction

1. Introduction

Thank you very much for choosing Satlab SL600, state of the art, ultimate on the pole GNSS System with 6G tracking.

Within this user guide, you will be given the physical and operational considerations as well as step by step field operations in detail.

SatLab SL600 is built on a LINUX based operating system which controls all hardware and communications for an error free and easy to support solution.

Just listen to SatLab SL600, its voice prompts will advise you of any issues together with a solution. It always remembers what it has performed before. Once you set up its operating parameters, forget about setting them up again, just power up the receiver and it is ready to measure.

SL600 utilizes the latest in GNSS technology; 6G!

The unit is capable of tracking 6 different satellite constellations, namely GPS, GLONASS, BeiDou, GALILEO, QZSS and SBAS.

Static, VRS RTK, UHF RTK, all surveying modes are available to meet any type of surveying application. A multiband 3G modem covers all types of data services available in the world, making sure that SatLab SL600 can connect to any NTRIP Network. Moreover, the 2 W internal UHF modem is compatible to work with any standardized radio protocol, ensuring your SatLab SL600 will work with any available base or rover station. Equipped with two high capacity hot-swappable Li-Ion battery packs, that together provide up to 24 hours of uninterrupted operation.

In addition to its 1GB of internal memory, SL600 is equipped with a Micro SD card slot for storing large files like long static observations in high precision applications.

NOTICE:

1. SATLAB SL600 HAS DIFFERENT CONFIGURATIONS WITH DIFFERENT PART NUMBERS. FOR THE BEST CONFIGURATION, PLEASE REFER TO YOUR LOCAL REPRESENTATIVE.
2. BEFORE THE FIRST USAGE, WE SUGGEST CHECKING THE PACKAGE IS NOT DAMAGED. OPEN THE BOX CAREFULLY AND CHECK WHETHER INNER ITEMS MATCH UP WITH THE SUPPLIED ORDER LIST. IN CASE OF ANY MISSING ITEM OR ANY DAMAGE ON ANY ITEMS, PLEASE CONTACT YOUR LOCAL DISTRIBUTOR OR SATLAB GEOSOLUTIONS AB IMMEDIATELY.
3. PLEASE READ THIS INSTRUCTION MANUAL CAREFULLY BEFORE USING THE SYSTEM!





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2. Receiver Physical Appearance

2.1. Introduction

In the default configuration, Satlab SL600 is available as a complete kit including Satlab SL600 receiver, its transport case and corresponding accessories which are given in the following section

Note: Items in the standard configuration may differ depending on the application or geographical conditions.



Figure2.1 Transport Case

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2.2. Transport Case

Satlab SL600 is stored in a protective transport case which is durable against harsh environmental conditions.

It has a specially cut rubber insert to accommodate Satlab SL600 and its accessories.



2. Receiver Physical Appearance

2.2.1. Items of Transport Case

Satlab SL600 standard kit consists of following items inside the transport case

Item	Description	Picture	Quantity
SL600	GNSS Receiver		1 pc
SL55	Field Controller		1 pc
Pole Holder			1 pc
Tape Measure			1 pc
Battery	for SL600		2 pcs
Battery	for SL55		2 pcs
Y Cable			1 pc
Charger	for SL600		1 pc
Charger	for SL55		1 pc
Extension Pole*			1 pc
UHF Antenna *			1 pc

* Available only with UHF configuration (P/N 0201010269)

Table. 2.1



2. Receiver Physical Appearance

2.3. Housing

Satlab SL600 housing is made of General Electric Xenoy 5220U polymer resin to withstand severe and harsh environment conditions.

Housing consists of two main parts, namely top part, covering the GNSS antenna and bottom part, accomodating electronics, ports and compartments.

A rubber band around top and bottom parts protects housing and inner electronics from impacts. Following figures show how housing looks from front and back side.



Figure 2.1 Satlab SL600 housing front view



Figure 2.2 Satlab SL600 housing back view

2. Receiver Physical Appearance

2.3.1. Bottom Housing

The bottom part of the housing accommodates all the inside electronics, I/O ports, battery compartments, SIM/Memory card slots. This section gives information about the bottom part with its components.



Figure 2.3 shows the components of bottom part.

In two sides, there are two covers with watertight locking mechanism to host two hot swappable batteries as well as SIM and Memory cards.

Three connectors for communication and UHF radio are also available in the bottom part in the above figure. Please refer to communication section for detailed information.

IF YOU ARE NOT USING THE 5-PIN PORT, 8-PIN PORT OR RADIO ANTENNA PORT, PLEASE PUT THE PLASTIC PROTECTIVE PLUGS ON TO PROTECT CONNECTORS FROM BEING DAMAGED.
COMMUNICATION MODULE

According to different requirements, SL600 receiver can be equipped with UHF radio options with different parameters. Consult your local dealer to define the correct UHF Radio Modem Options.



2. Receiver Physical Appearance

2.3.1.1. Battery

Satlab SL600 uses two hot swappable Li-Ion batteries 7.4V, 5000 mAh. When the receiver is powered on, it activates one of the batteries. It activates to second one in case of any power loss in the first battery without interrupting the operation.

In the standard package, there are two batteries included in the kit. Two batteries would provide a continuous operation of 16 to 24 hours depending on the operation mode.

On each battery, there are four recesses, making sure that battery is placed correctly in the compartment and also providing a locking mechanism so battery does not drop even if the battery cover is open.



Figure 2.4 Satlab SL600 battery.

Placing battery in the receiver is depicted in the figure 2.5. Recesses on the battery guide to place and lock the battery in the compartment.

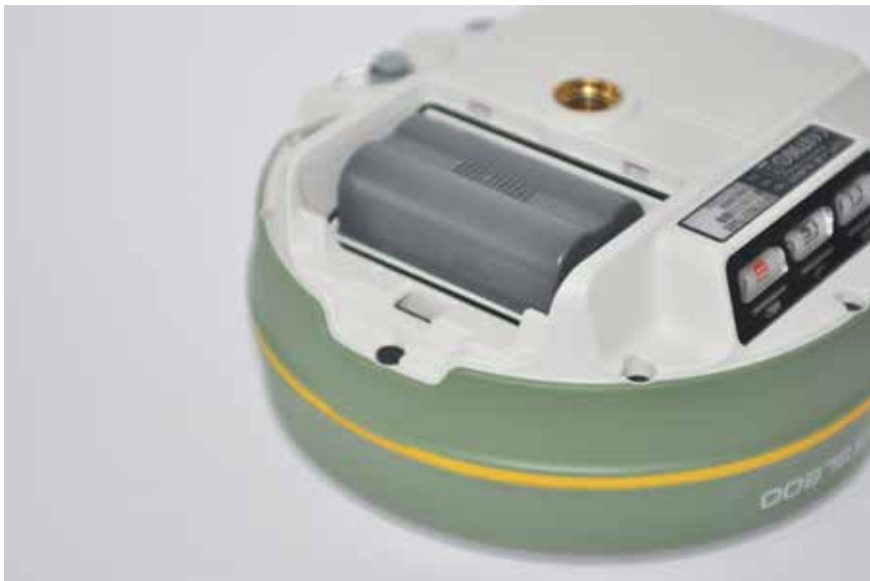


Figure 2.5 Placing battery in Satlab SL600

2. Receiver Physical Appearance

After placing and locking the battery, it is necessary to make sure that battery cover is closed and locked properly for water tightness by moving latch from Unlock symbol to Lock symbol.

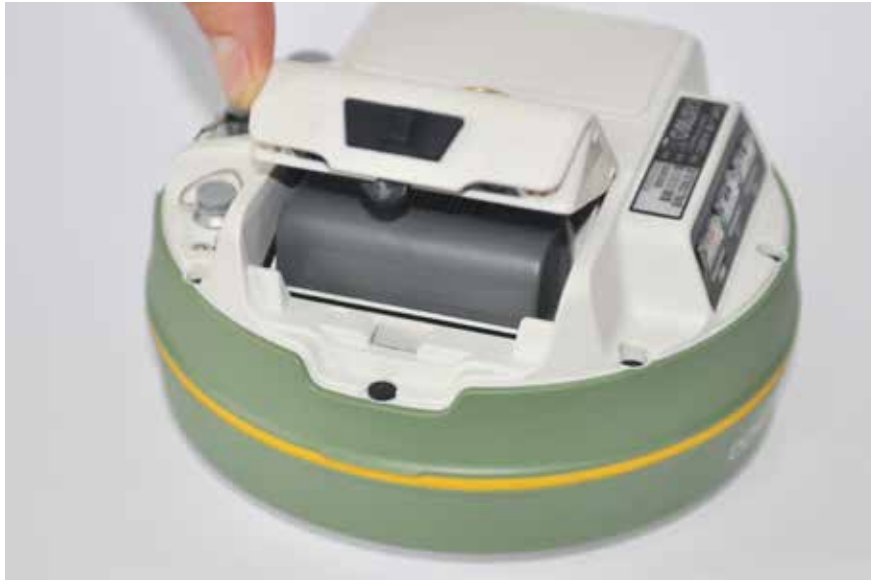


Figure 2.6 Battery cover

Batteries are partially charged before being shipped. Depending on the storage period, they can be fully discharged. Therefore, batteries need to be fully charged before being used in Satlab SL600.



Figure 2.7 Battery Charger.



2. Receiver Physical Appearance

Battery charger consists of three parts. Charging station, power adapter and power cord. Charging station has two slots to place batteries with quite advanced electronics for a safe and quick charging. Power adapter is a switching mode power converter which fits any local electricity network ranging from 100 V AC to 240 V AC @ 50 or 60 Hz. Power cord has options for regional requirement on electric outlets. Please consult to your local dealer for suitable power cords.

Battery charger has LED indicators. The LED in the middle glows RED showing the system is ON and ready to charge. The LEDs on the sides have dual color.

- Off: No battery or battery has not been identified.
- Red: Charging is in progress.
- Green: Charging has been completed.

2.3.1.2. SIM Card

SatLab SL600 is equipped with a 3.5G multi band cellular modem providing mobile data connection to perform internet based RTK. In order to operate the internal modem, a SIM card with internet access is necessary.

SIM Slot is located in one of the battery compartment.



Figure 2.8 SIM slot.



2. Receiver Physical Appearance

To insert/remove SIM card:

1. Turn off the device.
2. Remove battery cover by pushing the slide button towards the “open lock” symbol. The cover will partially eject.
3. Remove the battery by pushing it towards the “open” direction if there is any.
4. Insert the SIM card into the SIM card slot with the contacts facing down. In order to remove the SIM card, gently slide the SIM card out of the slot.

TIPS:

Before using SIM card,

- disable PIN code
- make sure that internet is available in the subscription.
- GPS corrections require very small bandwidth due to very small amount of data per second (<20kbs) but continuous connection. Consequently, it is advisable to try to find a stable internet connection instead of fast connection
- There are four SIM card size namely, full size, mini, micro and nano as it is seen in the following figure. Mini SIM which has been standard size for any industrial systems. Mini is the correct size. Avoid using micro or nano with adapters to fit into Mini SIM slot.

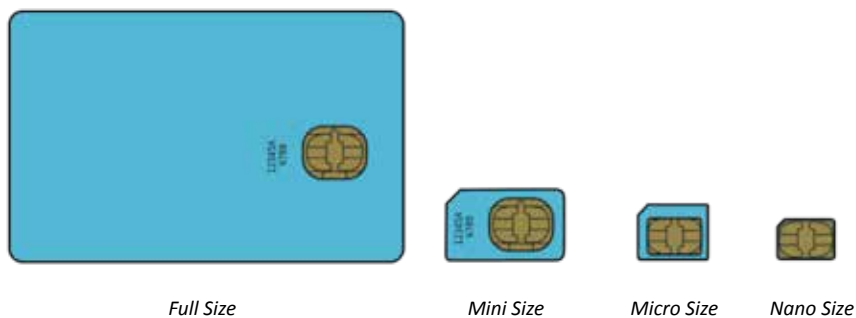


Figure 2.9 SIM Size



2. Receiver Physical Appearance

2.3.1.3. Memory Card

In addition to its 1GB internal storage SL600 is equipped with a microSD card slot. SatLab SL600 supports all microSD cards with up to 64 GB capacity which provides months of data storage for static observations.

To insert MicroSD card:

1. Turn off the device.
2. Remove battery cover by pushing the slide button towards the “open lock” symbol. The cover will partially eject.
3. Remove the battery by pushing it towards the “open” direction if there is any.
4. Push the lid in the “OPEN” direction and then gently pull it up.
5. Insert microSD card with contacts down as shown in following figure
6. Fold the lid down and push it in the “CLOSE” direction

To remove MicroSD card:

1. Follow steps 1 to 4 above.
2. Gently slide the card out of the slot.
3. Fold the lid down and push it in the “CLOSE” direction

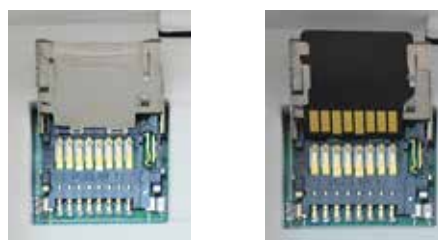


Figure 2.10 Steps to place/remove memory card.



2. Receiver Physical Appearance

2.3.2. Control Panel

Satlab SL600 receiver can be controlled by front panel buttons, SurvCE or Satlab Field Tools software. For the operation by SurvCE or Satlab Filed Tools software, please refer to corresponding chapters. Here, operation by front panel will be explained.

Control panel is in the middle part of the receiver. It contains the F1 key (function key 1), F2 key (function key 2) and the power button, 3 indicator LED's which are respectively Satellite LED, Status LED and the Power LED. The three function buttons allows setting up different SL600 receiver modes and functions.

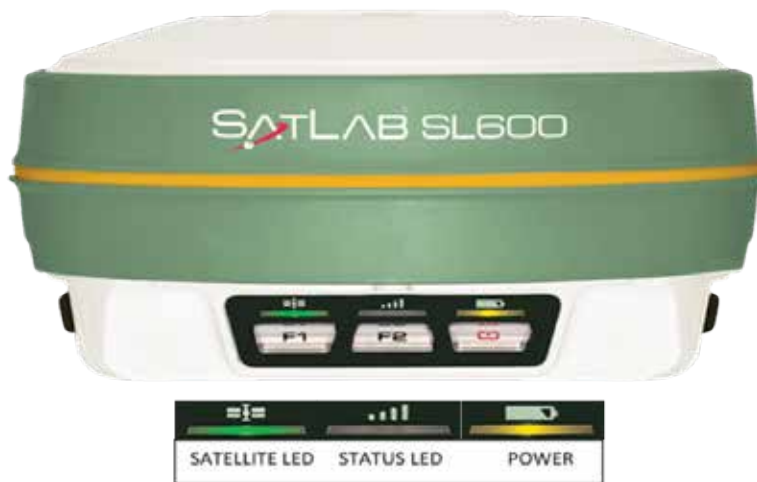


Figure 2.11 Satlab SL600 front panel.

SL600 has three function, test and control keys in the GNSS receiver. These are often used to reset the measure without using any GNSS control unit.



F1

Allows settings of working mode, UHF radio transmitting power, satellite elevation angle, settings for automatic base station, resetting receiver and also features a self-test.



F2

Allows setting of data link, UHF radio channels, collection interval and the option to restore the unit to factory settings.



ON/OFF Power Key:

Allows setting confirmation, voice switches and other help functions.

Table 2.2 Buttons



2. Receiver Physical Appearance

The buttons in the front panel are assigned to perform predefined tasks by the firmware. These tasks are listed and explained here. Should you have a task which is not explained in the guide, you probably have application specific task which would be explained in an application note. Please for more information, get in contact with your local dealer.

Operation Mode:

Satlab SL600 receiver can be set to Static mode to record raw data, RTK base station to stream corrections to a UHF Radio or an internet RTK Server, or RTK Rover station by UHF or Internet. In order to change the mode, double click on F1 so Voice help responds the active mode among Base, Rover or Static. Please use push F1 once again to change. Finally press Power button to confirm the change. Confirmation needs to be done in 10 seconds or it returns back to previous setting.

Telemetry Mode:

In order to deliver corrections from/to Satlab SL600 in corresponding Operation Mode of Base or Rover, there are three options, namely External, GSM and UHF.

In external mode, for delivery of corrections, COM2 serial port @ 19200 bps rate is used. For cable options of COM2, please consult to your local dealer.

GSM option is used for corrections over internet by using internal modem in the receiver in either base or rover mode.

UHF option has the similar way as GSM option but corrections over UHF radio if the device is equipped with radio.

In order to change the mode, double click on F2 so Voice help responds the active mode among External, GSM or UHF. Please use push F2 once again to change. Finally press Power button to confirm the change. Confirmation needs to be done in 10 seconds or it returns back to previous setting.

Reset:

In order to reset the receiver F1 and F2 buttons can be used depending on the desired level of reset.

Pressing F1 for more than 6 seconds will activate the options of resetting GNSS board and Self Test.

After these options are activated, pressing F1 will start Self Test and F2 will reset the GNSS receiver.

In the same way, pressing F2 for more than 6 seconds will activate the option of getting back to the original settings. After option is activated, pressing F2 will perform the operation of Getting Back to the Original Settings.



2. Receiver Physical Appearance

LED	Status	Meaning
Power LED Yellow	On	Power level = Good
Power LED Red	On	Power level = Medium
Power LED Red	Flashing	Power Level = Low
Status LED Green	Off	In external data link, UHF mode, and static mode
Status LED Green	On	Ntrip/Server connection successful
Status LED Green	Flashing	Internet connection is successful
Status LED Orange	Flashing	1. getting correction stream
		2. collection static data in static mode
Satellite LED Green	On	Tracking enough number of satellites and position has been calculated
Satellite LED Green	Flashing	Not enough number of satellites being tracked to calculate position

Table 2.3 LED Indicators

2.4. Communication

2.4.1. Communication Ports

Satlab SL600 is equipped with Bluetooth and two sealed ports called COM1 and COM2 for external power supply and communications with external computer terminals.



Figure 2.x Communication ports

2. Receiver Physical Appearance

2.4.1.1. COM1

COM1 or communication port number 1 is an industry level sealed push-pull 8 pin connector providing RS232 serial, USB communications as well as power supply.

COM1
1 RXD Data input
2 USB D-
3 USB D+
4 USB V+
5 Vin Power input
6 Cable Detection
7 TXD data output
8 GND earth

Table 2.x COM1 pinouts

In the standard package, set includes a Y cable to communicate with COM1. For other cable configurations, please consult to your local dealer.



Figure 2.x COM1 Y cable

2. Receiver Physical Appearance



Figure 2.x Inserting COM1 Y cable to receiver.

2.4.1.2. COM2

COM2 or communication port number 2 is an industry level sealed push-pull 5 pin connector providing RS232 serial and power supply.

COM2

- | |
|-------------------|
| 1 GND earth |
| 2 GND earth |
| 3 Vin Power Input |
| 4 RXD Data input |
| 5 TXD Data output |

Table 2.x COM2 pinouts



2. Receiver Physical Appearance

2.4.1.3. Bluetooth

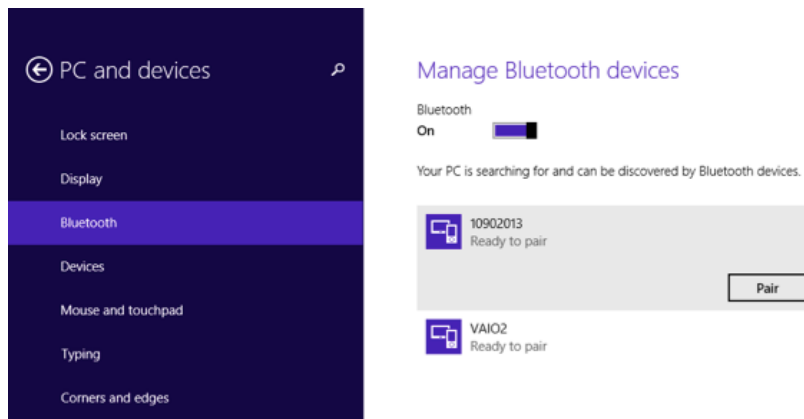
The main communication medium in SL600 is Bluetooth which is being used to communicate with handheld computer in the daily usage.

Bluetooth connection uses RS232 communication port in COM1. In other words, RS232 communication port in COM1 is assigned to be communicated by Bluetooth once it is bonded. However Bluetooth communication stops when COM1 Y cable is inserted.

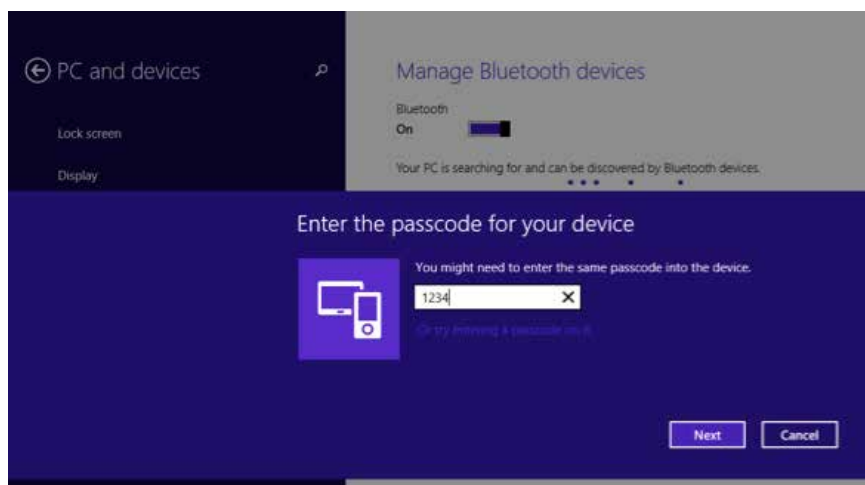
Bonding procedure differs based on operating systems. However in any Bluetooth connections, PIN Code of 1234 is needed.

General Bluetooth connection procedure shall be as follows:

- 1- Search for Bluetooth devices:

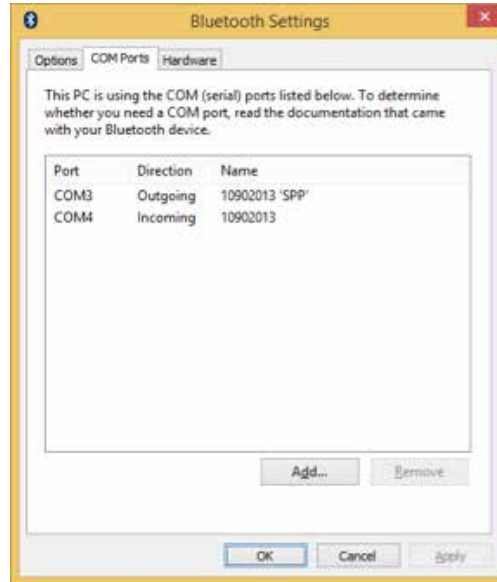


- 2- Pair and enter the PIN code of 1234:

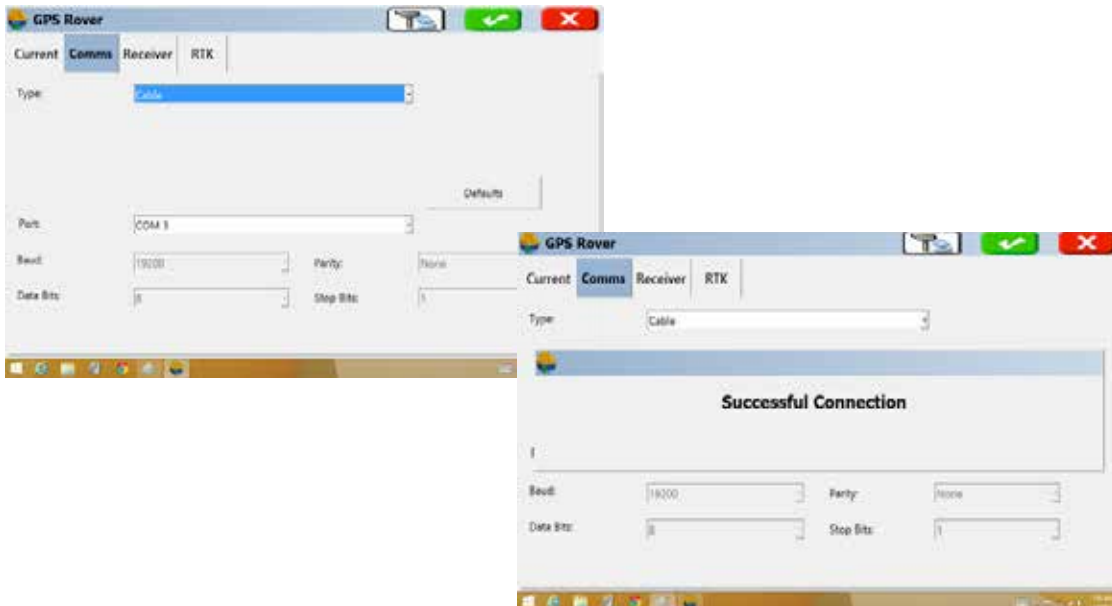


2. Receiver Physical Appearance

3- If necessary, set COM ports to paired connection under Bluetooth Settings:



4- Then Satlab SL600 can be communicated as if it was connected through serial cable.



3. Operation

3.1. Introduction

In this chapter, getting Satlab SL600 ready for the field operations is being explained in two sections. First section is about software tools to make changes in operational parameters as well as performing diagnostics. Second section explains the field work considerations and also operational steps.

3.2. Software Tools

Satlab SL600 can be accessed and set up by three different software tools in addition to field software called Satlab SurvCE. For Satlab SurvCE operations, please refer to chapter 4.

In order to communicate with Satlab SL600 by using software tools, there must be a RS232 serial connection, COM XX. This connection can be established by using either RS232 serial (9 pin Female) port in the Y cable or Bluetooth connection. After Bluetooth bonding, SPP (serial port profile) service will be available. Consequently, serial port needs to be assigned to Bluetooth connection. Please refer to Section 2.4 for more information in communication.

3.2.1. Satlab GNSS Management Software

Satlab GNSS Management Software is the most comprehensive PC tool to manage all of the operational parameters of Satlab SL600.

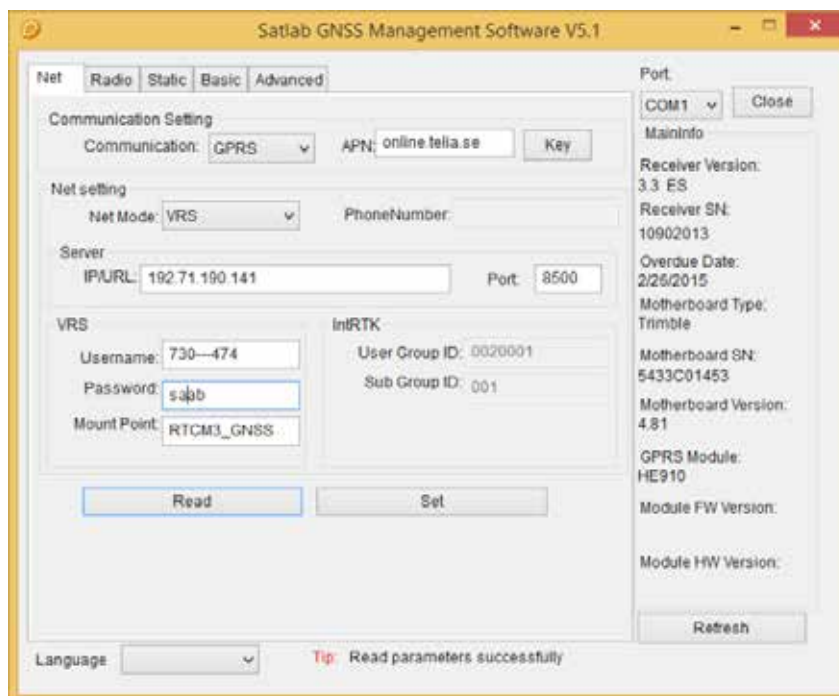


Figure 3.1 Satlab GNSS Management Software interface.

3. Operation

Tool contains five selectable tabs to classify operations and one main info about modules and serial numbers.

Tabs are explained below:

Net: Performing RTK over internet by internal 3G modem is set in this tab. From 3G connection parameters to login information for NTRIP can be entered here. For the parameters please refer to your local NTRIP and GSM provider.

The screenshot shows a software interface for configuring network settings. At the top, there are five tabs: 'Net', 'Radio', 'Static', 'Basic', and 'Advanced'. The 'Net' tab is currently selected. Below the tabs, there are several sections for configuration:

- Communication Setting:** Includes a dropdown for 'Communication' set to 'GPRS', a text field for 'APN' containing 'online.telia.se', and a 'Key' button.
- Net setting:** Includes a dropdown for 'Net Mode' set to 'VRS' and a 'PhoneNumber' text field.
- Server:** Includes a text field for 'IP/URL' containing '192.71.190.141' and a text field for 'Port' containing '8500'.
- VRS:** Includes a text field for 'Username' containing '730-474', a text field for 'Password' containing 'saab', and a text field for 'Mount Point' containing 'RTCM3_GNSS'.
- IntRTK:** Includes a text field for 'User Group ID' containing '0020001' and a text field for 'Sub Group ID' containing '001'.

At the bottom of the form, there are two buttons: 'Read' and 'Set'.

Figure 3.2 Net tab

Radio: Radio tab in the tool is for advanced diagnostics. For changing radio parameters, please refer to Satlab UHF Radio Management Software explained in the next section.

3. Operation

Static: In the static tab, raw data collection parameters can be set. Moreover, raw data files can also be listed. Downloading raw data files can be done by connecting to PC via USB and copying from the unit in file explorer.

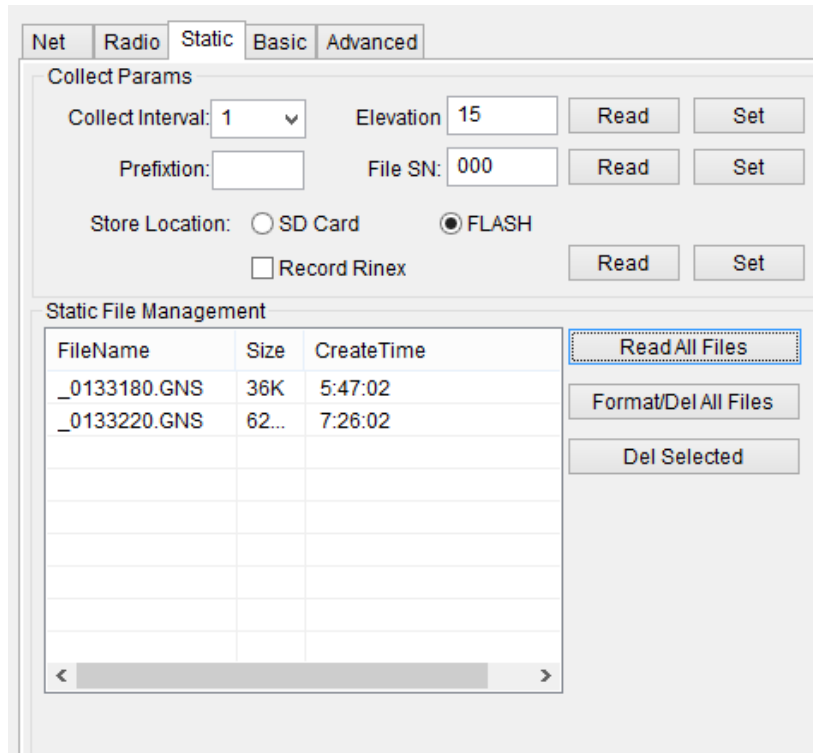


Figure3.3 Static Tab

Basic: Here in the basic tab, system registration code can be entered and remote access login can be set. For system registration, please refer to your local dealer.

3. Operation

The screenshot shows a configuration window with five tabs: Net, Radio, Static, Basic, and Advanced. The 'Basic' tab is selected. It contains three sections: 'FW Update' with instructions to connect via USB, copy firmware, and restart; a 'Register' section with seven empty input boxes and a 'Register' button; and a 'Remote Connection Password' section with 'Password:' and 'Confirm Password:' labels, two input boxes, and a 'Set' button.

Figure 3.4 Basic Tab

Advanced: In this section, Voice can be enabled or disabled, GSM band can be set, GSM signal can be diagnosed and NMEA data can be output.

The screenshot shows the 'Advanced' tab selected in the configuration window. It features three main sections: 'Voice' with a dropdown menu set to 'English' and 'Read'/'Set' buttons; 'Net Module Band' with a dropdown menu set to 'GSM 900MHz + DCS 1800MHz' and 'Read'/'Set' buttons; and 'Other Setting' with 'Data Output' and 'Test GPRS SNR' buttons. A large text area is present below these sections, with 'Clear Display' and 'Pause Display' buttons at the bottom.

Figure 3.5 Advanced Tab



3. Operation

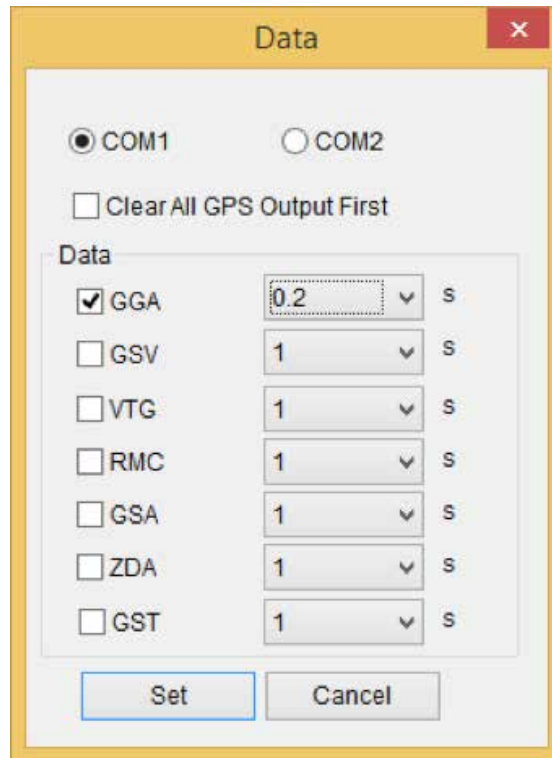


Figure 3.6 Data Output

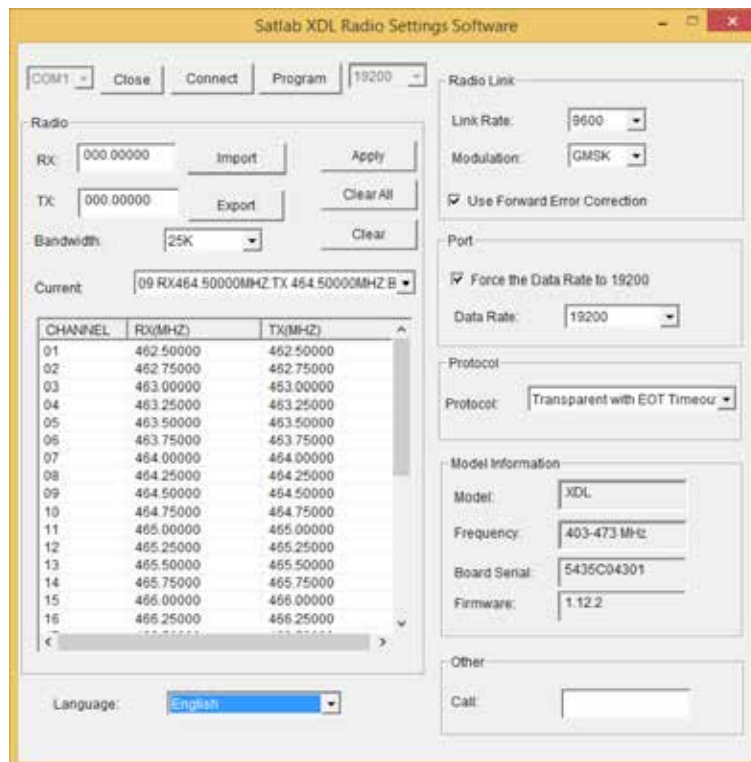
3.2.2. Satlab UHF Radio Management Software

Satlab SL600 with P/N of 0201020269 is equipped with 2 watts transceiver UHF radio. Usage of UHF radio is regulated by local authorities in most of the countries in the world. Due to regulations, using licensed frequency and bandwidth is important not to violate the rules.

Communication with Satlab SL600 can be done by using RS232 Y cable with serial connection to a PC. Software requires a simple RS232 connection without any flow control. Any Windows operating system from Windows XP should work as long as there is a RS232 serial driver.

Note: In order to start communicating with Radio modem, Telemetry mode needs to be set to UHF by using either buttons (double Click F2 and Press Power to set) or Field Software.

3. Operation



Satlab SL600 consists of

- System Board/Computer, controlling the whole operation by setting traffic rules among communication ports, GNSS Receiver and Telemetry Medium.
 - GNSS Receiver, tracking satellites, outputting raw observation data and running RTK algorithm
 - Telemetry Medium, UHF Radio or 3G modem, transferring corrections from/to GNSS Receiver
- Telemetry Medium is set to either UHF Radio or 3G modem by Telemetry Mode. In order to access to either of telemetry medium and make changes is only possible by activating them. Consequently UHF mode shall be activated in order to make any changes. Please refer to local authorities for the UHF Radio parameters.



3. Operation

3.3. Field Operations

Satlab SL600 is, in default, equipped with full tracking and operational options. There is no need to activate, RTK Rover or Base or L1/L2 etc. It can perform Real Time Kinematic Operations or Static Sessions. In this section, considerations to perform such operations are explained

3.3.1. Network Rover

Satlab SL600 with any part number is equipped with a 3G modem and capable of performing Network Rover operations. Login parameters to NTRIP Caster can be set by using either Satlab GNSS Management Software under NET tab or Satlab SurvCE Field Software. Once all the parameters are set, next time powering the receiver up, Login to NTRIP server shall be done automatically by the receiver. In Network Rover operation, correction data stream is being provided by Internet from NTRIP servers. The amount of data is relatively low compare to any other internet based services. Consequently, any internet generation from 2.5G (EDGE) to 4G should be fine to meet the bandwidth requirements. However it requires a continuous connection to provide corrections at 1Hz. It is advisable to use both internal modem in SL600 and modem in SL55 controller with different GSM operators in case of any coverage problems. As another option, internet can be provided to controller from mobile hot spot boxes or smart phones.

3.3.2. UHF Base/Rover

Satlab SL600 with P/N of 0201010269 is equipped with a transceiver UHF radio with adjustable 2 watts output. The unit can work in both Base and Rover mode during the field operation by using either front panel buttons or field software. In most of the countries, usage of UHF radio is restricted and licensed. Please refer to your local dealer for more information on regulations. You might be limited to use certain frequency and bandwidth. The coverage of signal coming from the base station to reach to the rover station is based on topographical conditions and artificial obstructions such as buildings. In order to maximize the coverage, place base station on visible spots such as high hills or top of high buildings. In order to meet the requirement of being mobile, a half wave omni directional antenna is being used in both base and rover stations. In case of long range requirements, a high gained full wave base station antenna could be used.

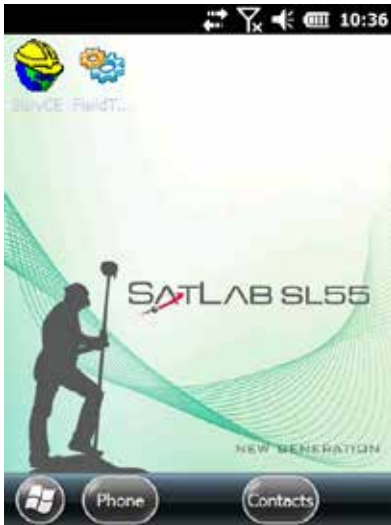
3.3.3. Static Data Collection

Raw data collection for static observations can be done in the field either by using either front panel or field software. SL600 is equipped with an antenna with NGS calibration parameters. Consequently, raw data from SL600 can be processed by any commercial or scientific post processing software suits.

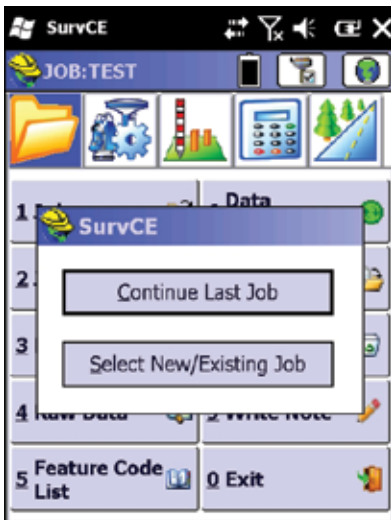


4. Satlab SurvCE Guide

4.1. Creating A Job



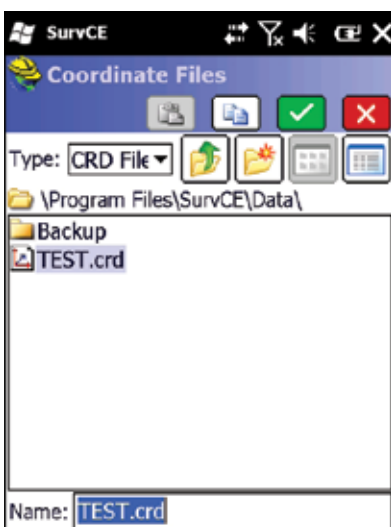
Double click on the **SATLAB SurvCE** icon on the controller unit and execute the program.



The program helps you by opening the business manager.

There are two options:

- **Continue Last Job**
- **Select New / Existing Job**

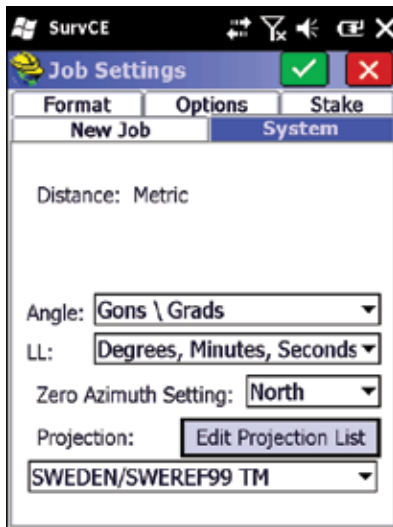


Write the name of the Job in the Name line in the page that is opened. Virtual keyboard pops up automatically when you click on the line to write the name.

Write Job name without any punctuation marks and click on Okay.

Attention: Job files are created under NandFlash/SurvCE/ Data folder. You can use  Parent Directory and  New Folder functions for a different directory.

4. Satlab SurvCE Guide



After giving a name to the job, the software will automatically be redirected to the **Job Settings** menu. Choose the coordinate system from the **System** tab in the Job Settings menu, which is composed of **Format**, **Options**, **Stake**, **New Job** and **System** tabs.

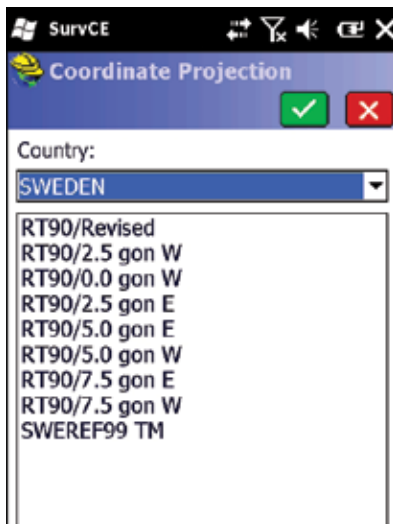
Settings belonging to System tab:


Distance: Metric

Angle: Gon / Grad

Zero Azimuth Setting: Must be North.

Edit Projection List button is clicked for the selection of Projection.



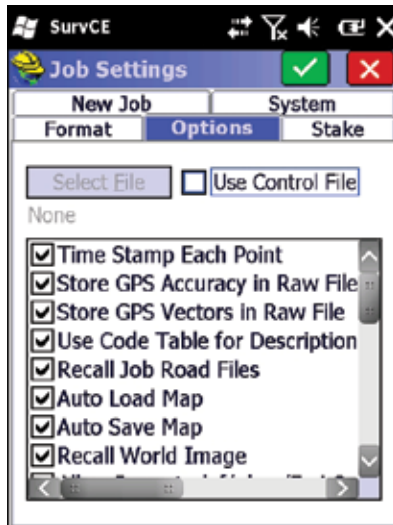
Select **Add Pre-defined** in the pop-up window. Then select your **Country**, followed by the name of **Coordinate Projection** (example is shown for Sweden where SWEREF99 (Grid) has been selected. 


Coordinate system selection is finished by clicking Okay .



In the **Format** tab of the tab settings, **Coordinate Display Order** is selected in accordance with the system used. Please make sure that you set it as defined for your country.

4. Satlab SurvCE Guide



Time Stamp Each Point option should be selected in the **Options** tab. As long as this option is not selected, the date-time information that belongs to measurements will not be stored. After the selection click on  Okay and job settings will be loaded.

Attention: The selected job settings will be accepted as default for the future job. Do not confirm this, if you intend to perform changes in your settings besides the settings you have chosen.

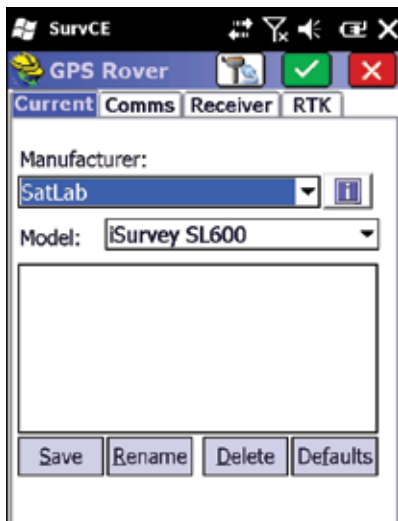


4. Satlab SurvCE Guide

4.2. Network Rover Settings

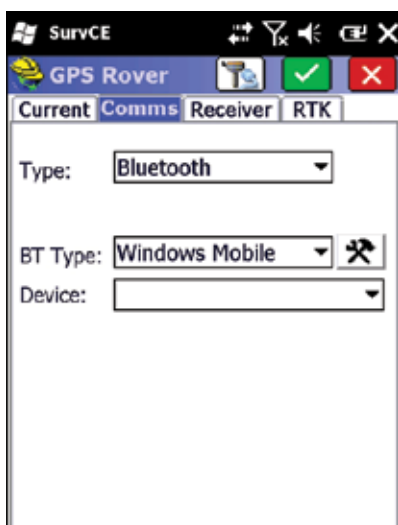


GPS Rover is selected in the **Equip** menu.




Under the **GPS Rover** menu you will find these tabs: **Current**, **Comms**, **Receiver** and **RTK**.

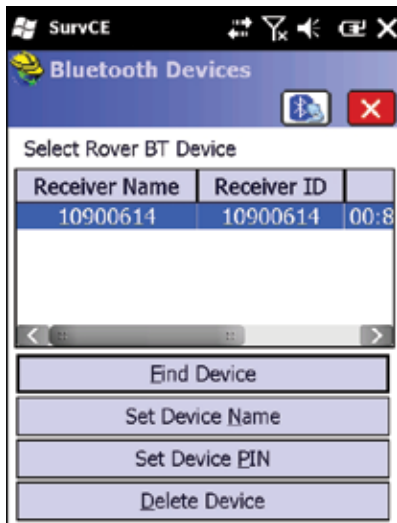
In the Current tab select:
Manufacturer: SATLAB
Model: SL600



Through the **Comms** tab you will define the communication between the GNSS receiver and control unit, typically via Bluetooth. For this purpose;

Bluetooth is selected. In order to match GNSS receiver with the control unit, click the  box and this will open the **Bluetooth Manager**.

4. Satlab SurvCE Guide





In the **Bluetooth Devices** menu;

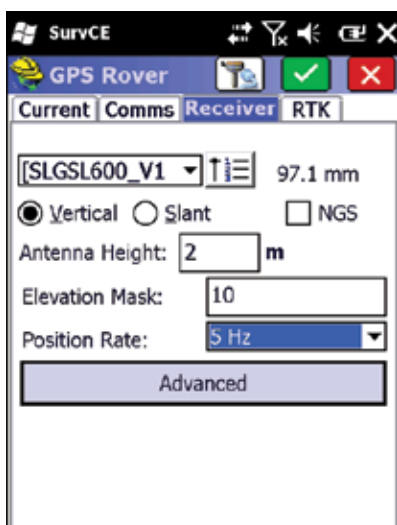


Select the **Find Receiver** and the devices will be listed.



Devices are displayed in a list like this. Select the rover serial number that will be communicated and click  **Ok**.

Add the selected recipient to the list. For the safety of the connection, click on **Set Receiver PIN**, enter **1234** as PIN code and click on  **Ok**.



After setting up the Bluetooth connection, go to the **Receiver** tab. The settings that are under this tab; Select **SLGSL600_V1** antenna (with pre-defined offset for Satlab)

Antenna Height: measure your antenna height and enter **Elevation Mask: 10**


Position Rate: 5 Hz

In addition, select the type of antenna height: **Vertical** or **Slant**.

4. Satlab SurvCE Guide



Finally, move to the tab **RTK**. This section is extremely important for initializing a survey. For a receiver that will be utilized as Mobile Rover CORS;

Device: Select **Internal GSM Modem** and click  Settings. Select a profile to connect the SIM card in the device to the Internet.

APN Server:	<input type="text" value="internet"/>
APN User Name:	<input type="text"/>
APN Password:	<input type="text"/>
GPRS Dial:	<input type="text"/>


After the selection click  **Ok**.



Go back to **RTK** tab.

Network: Select **NTRIP** and click  Settings. A window will be opened with **NTRIP Servers**.




In this section, enter information about the **NTRIP Broadcaster** CORS service server to which a connection will be established. Click on the arrow  in the name box and write a profile name. Example is shown for SWEPOS (Sweden) Below information can be obtained from the provider of your CORS network:

IP Number:

Port:

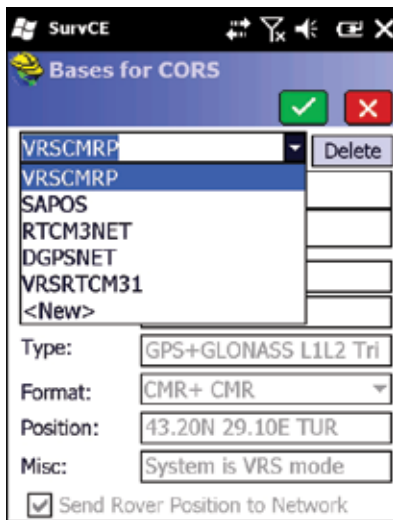
User Name:

Password:

After this information is entered correctly, click  **Okay** and the connection process starts.

Caution: The passwords are case sensitive. Please enter the password as it was sent to you.

4. Satlab SurvCE Guide



After a while, a pop-up window lists available bases for CORS solution. Example shows SWEPOS network with selected base station Goteborg. This table shows which format and type of message is used by this base station as well as the geographic co-ordinates of the base station. You should select the closest base station to your location or one of the proposed network services, according to recommendations of the reference network provider.

Select the most suitable method click **Okay**. **Connection Successful** appears in the screen of the control unit and the corrections will start to be transmitted.



4. Satlab SurvCE Guide

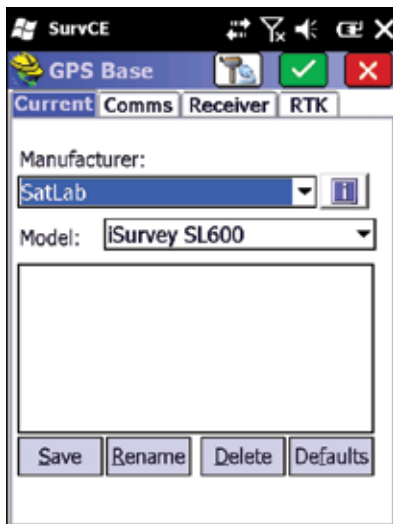
4.3. UHF Base Settings



4. Satlab SurvCE Guide

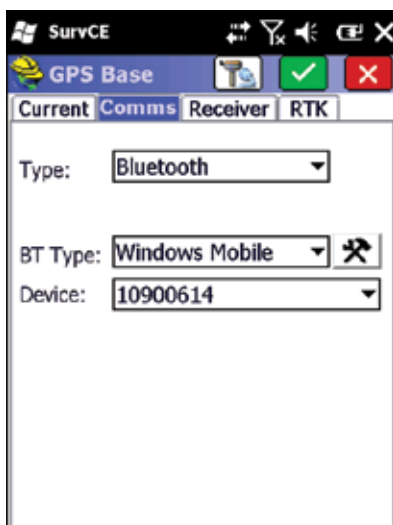



GPS Base is selected in the **Equip** menu.



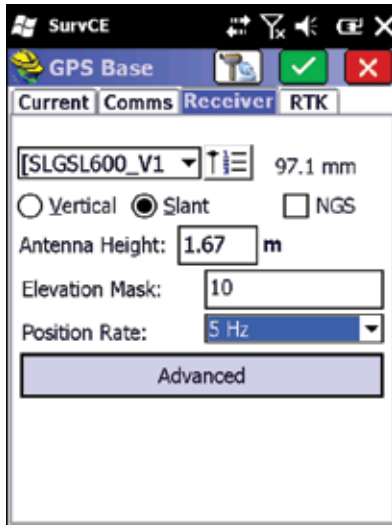
There are 4 tabs under **GPS Base** menu. All settings are done through these tabs.

In the **Current** tab select;
Manufacturer: SATLAB
Model: SL600



In the **Comms** tab;
Bluetooth is selected and when no automatic connection has been established, after clicking  the button a connection is established via Bluetooth assistant.

4. Satlab SurvCE Guide



After setting up the Bluetooth connection, go to the **Receiver** tab. The settings that are under this tab Select **SLGSL600_V1** antenna (with pre-defined offset for SATLAB)

Antenna Height: measure your antenna height and enter
Elevation Mask: 10
Position Rate: 5 Hz

In addition, select the type of antenna height: **Vertical** or **Slant**.



In the **RTK** tab;

Device: Select **Internal UHF** and click the  button.

Power:
Channel:
Over the Air Baud:

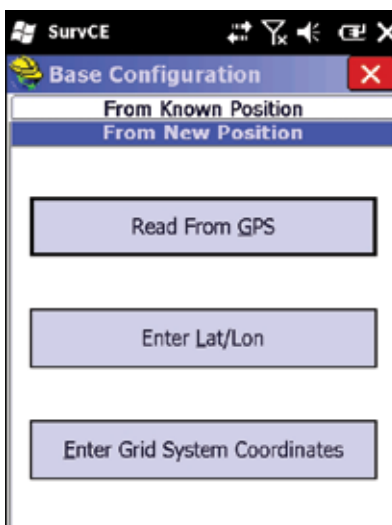
In the window that appears select

Power: High, Medium or Low

Channel: 1, 2, 3.... (whichever you will use).

Click  Okay and choose **Message Type: CMR+, RTCM3.0** etc.

Click  Okay again.




In this step of the installation, coordinates must be entered for the base setup. If you have no coordinate for your position; select **Read from GPS**.

If there is a coordinate, select **Enter Grid System Coordinates**.

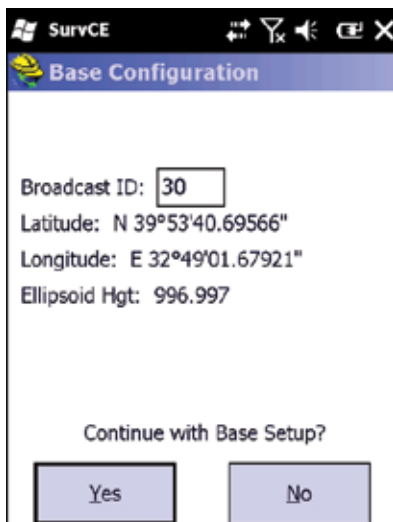
4. Satlab SurvCE Guide



The screenshot shows the 'Grid Coordinate' dialog box in the SurvCE software. It features a title bar with the SurvCE logo and standard window controls. Below the title bar, there are 'OK' and 'Cancel' buttons. The main area contains a 'Point From File:' text box with a list icon and a pencil icon below it. Underneath, it says 'Current Zone is'. There are three input fields for 'Northing:', 'Easting:', and 'Elevation:', each followed by a unit 'm'. At the bottom, there are two radio buttons: 'Ellipsoid' (which is selected) and 'Orthometric'.

Coordinate may be inserted manually directly or read from a file. Also if the point is registered in the control unit, it can be selected from the list via the **Point List**  button or selected from map screen.

Once selection is made, click  Okay.




The screenshot shows the 'Base Configuration' dialog box in the SurvCE software. It features a title bar with the SurvCE logo and standard window controls. Below the title bar, there are 'OK' and 'Cancel' buttons. The main area contains a 'Broadcast ID:' text box with the value '30' entered. Below this, it displays 'Latitude: N 39°53'40.69566"', 'Longitude: E 32°49'01.67921"', and 'Ellipsoid Hgt: 996.997'. At the bottom, there is a question 'Continue with Base Setup?' followed by 'Yes' and 'No' buttons.

The coordinates you entered are displayed as converted into geographic coordinates. In the **Broadcast ID:** section, you must enter a value between 1-32 that supports the CMR + type of message. After the ID is entered, click Yes and all the parameters you entered will be sent to the modem.

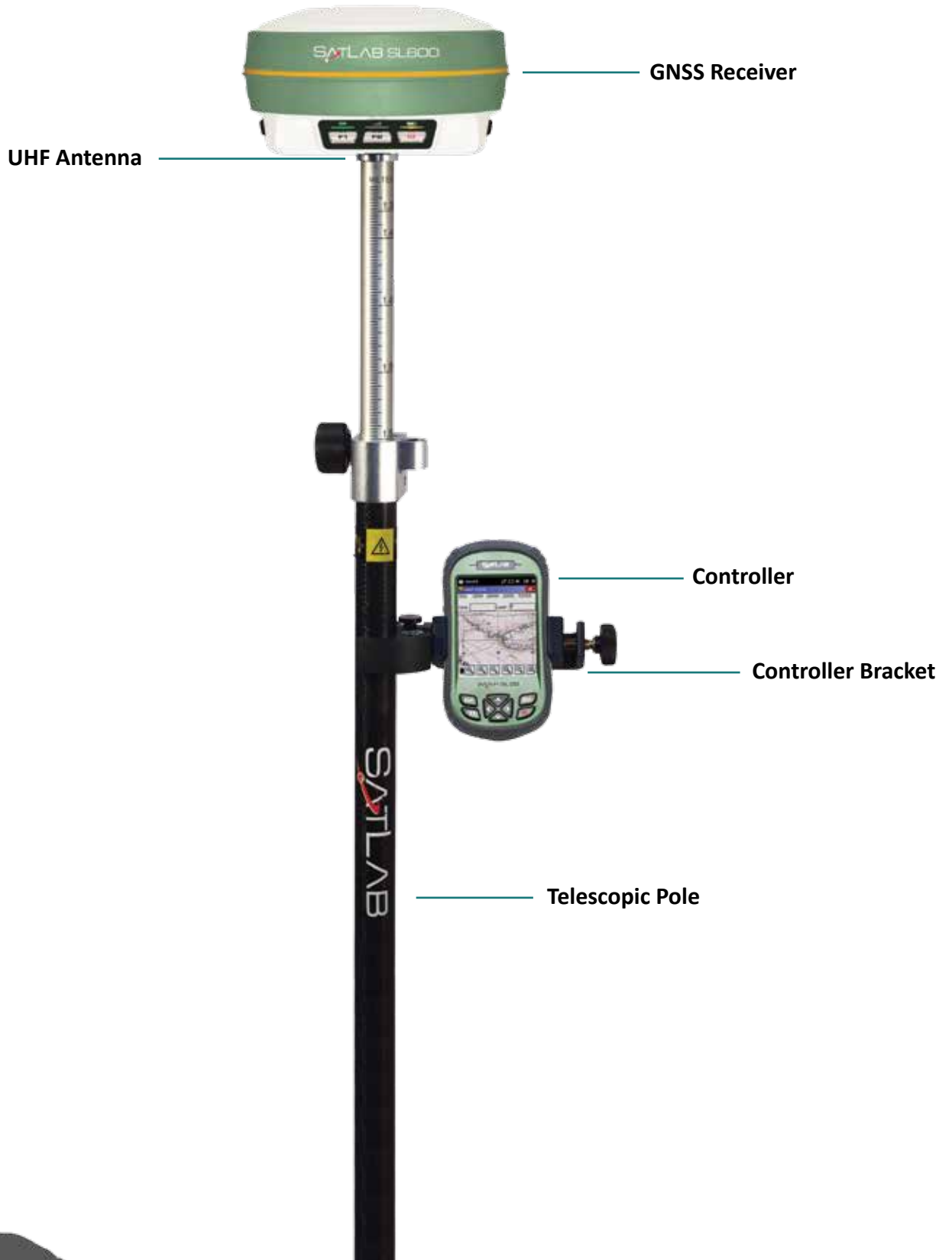


The screenshot shows a small dialog box titled 'SurvCE' with the text 'Base Configuration Successful. Save Settings to File?'. Below the text are 'Yes' and 'No' buttons.

At the end of operation: **“GPS Base setup is successful. Save the settings to file?”** warning appears and **Yes** is selected. For saving a file record that has the same name as job name and extension .ref, select  Okay .

4. Satlab SurvCE Guide

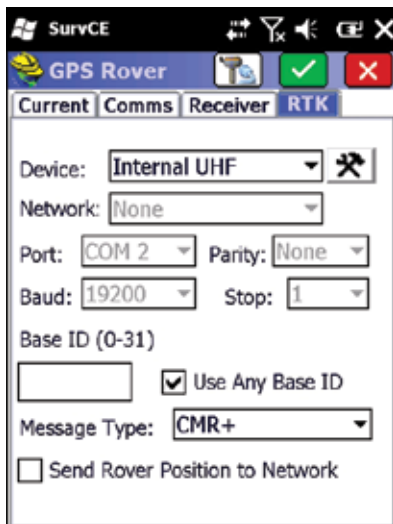
4.4. UHF Rover Settings



4. Satlab SurvCE Guide

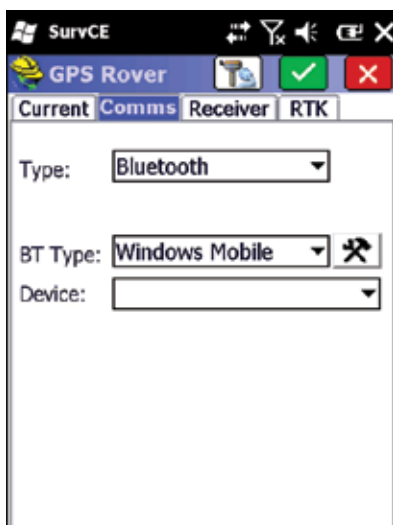



GPS Rover is selected in the **Equip** menu.



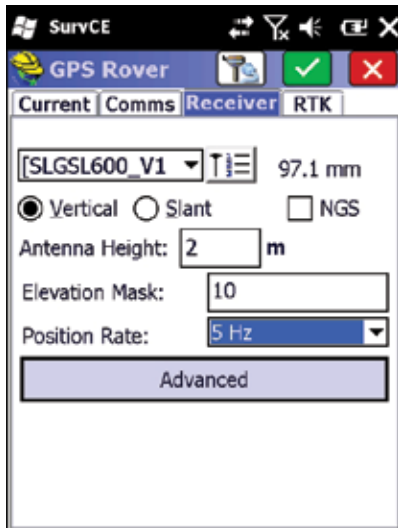
There are 4 tabs under **GPS Rover** menu. All settings are done through these tabs.

In the Current tab select;
Manufacturer: SATLAB
Model: SL600



In the **Comms** tab; **Bluetooth** is selected and when no automatic connection has been established, after clicking the  a connection is established via Bluetooth assistant.

4. Satlab SurvCE Guide



After setting up the Bluetooth connection, go to the **Receiver** tab. The settings that are under this tab Select **SLGSL600_V1** antenna (with pre-defined offset for SATLAB)

Antenna Height: measure your antenna height and enter
Elevation mask: 10
Position Rate: 5 Hz

In addition, select the type of antenna height: **Vertical**



In the **RTK** tab;

Device: Select **Internal UHF** and click the  button.

Power:
Channel:
Over the Air Baud:

In the window that appears select

Power: High, Medium or Low

Channel: 1, 2, 3.... (whichever you will use).

Click  Okay and choose **Message Type: CMR+, RTCM3.0** etc.

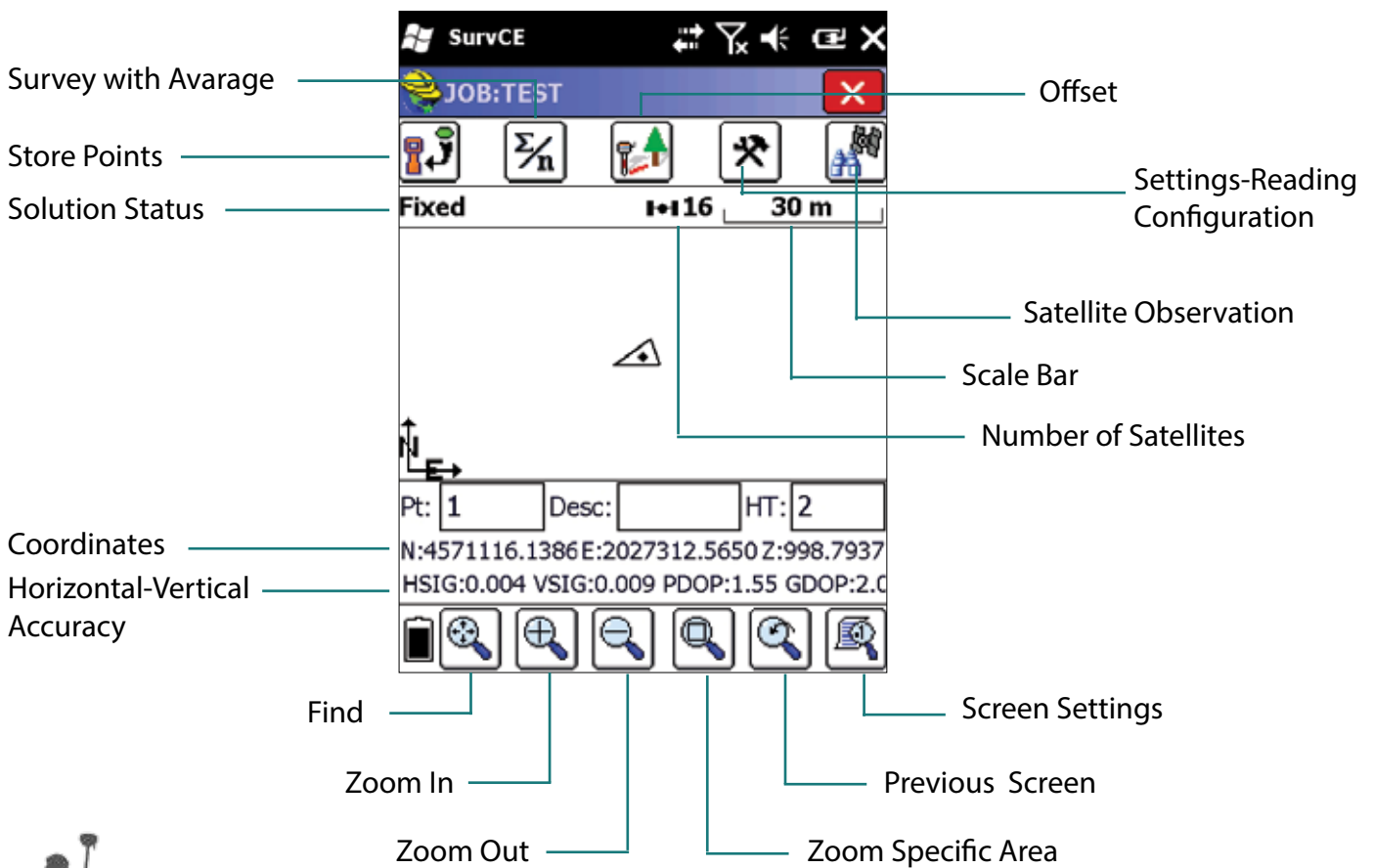
Click  Okay again.

4. Satlab SurvCE Guide

4.5. Recording Points












In the **Survey** menu, **Store Points** is selected.



4. Satlab SurvCE Guide

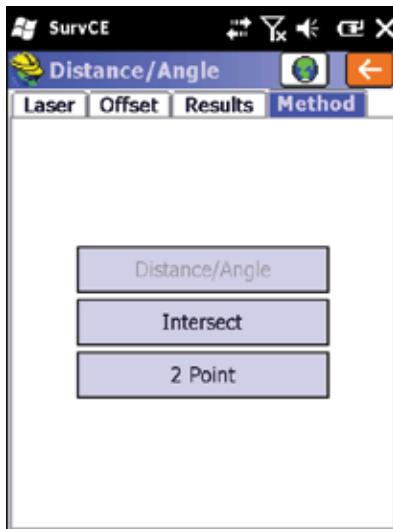
Before initiating the survey with storing points, enter a point name in the **Pt:** line. **HT:** connotes the height of the antenna which you enter according to your antenna height. The functions of the buttons you see on the screen are as follows:


	Measures once and saves automatically. The ENT key on the control unit keyboard also fulfils this function.
	Measures as much as the desired number and saves automatically.
	The offset function for unreachable places. This will be explained in detail in the next section.
	The settings for point storing are made here.
	This is the menu for satellite tracking and observation. The information about the satellites tracked, DOP information, correction status situation and information about reference station can be obtained here.
	Fits the screen at the background to its limits.
	Zoom in the graphic screen.
	Zoom out the graphic screen.
	Point attributes and layer status can be changed from here.



4. Satlab SurvCE Guide

4.6. Offset



Click on the  **Offset** button in **STORE PTS** screen.

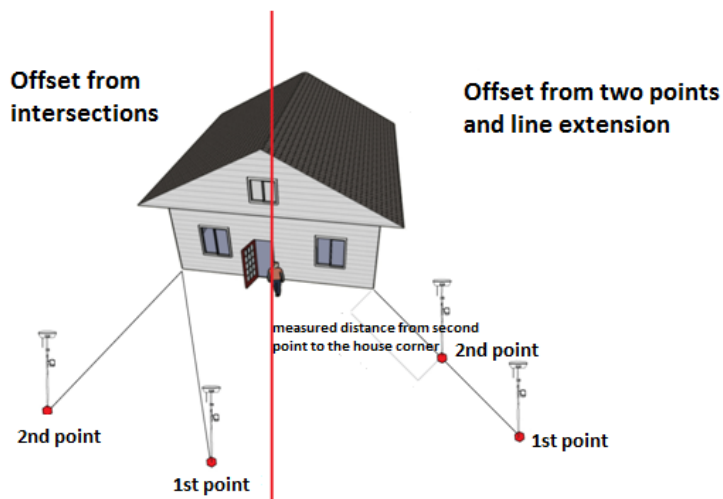
In the **Method** tab, select **Intersect** or **2 Point** method.

2 Point method is described as an example.



Come to a stop on the point number 1 and read via **Point 1 Read**. Go to point number 2 and while on this number read via **Point 2 Read**.

The distance is measured from the point number 2 to the corner of the building and is entered in the offset window. It can be also read from a laser distance meter device. The computed offset point is saved by the

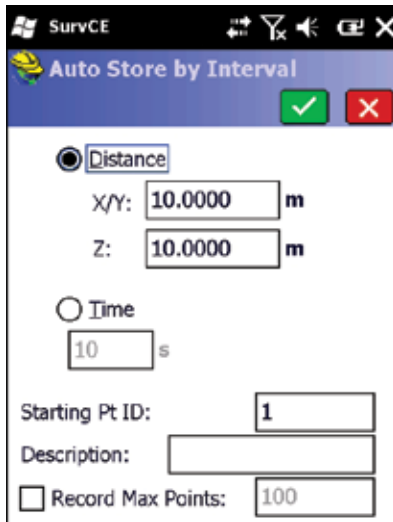


4. Satlab SurvCE Guide


4.7. Auto Recording



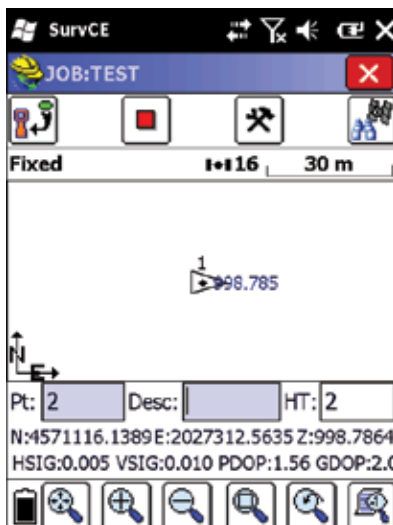
Select the **Auto by Interval** in the **Survey** menu.




Select necessary settings depending on the required point storing intervals.

Write the Starting Pt ID, where the automatic point storing will be started and click on  Okay. Automatic point storing will begin as you move your position accordingly.

Caution: If only the horizontal move should be taken into consideration, 0 shall be written to Z: window.



Press red stop button to stop automatic point storing. During the automatic point storing you can also store points manually by clicking on  button.

4. Satlab SurvCE Guide

4.8. Stake Out





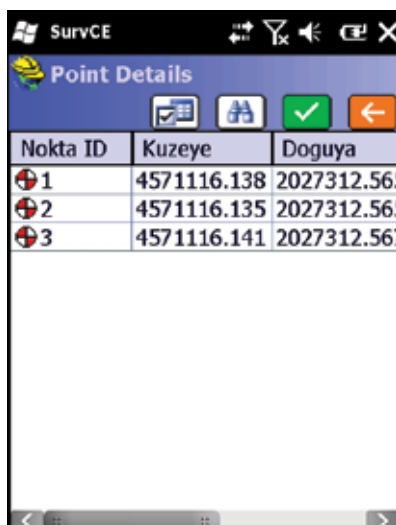
Select **Stake Points** button in the **Survey** menu.




A window opens where you define points to be staked out:

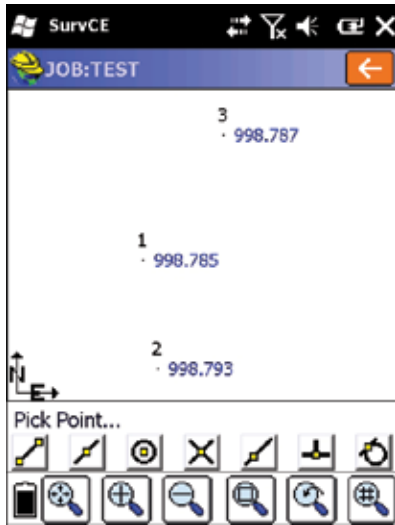
A point that should be staked out can be selected in three ways;

1. Manual entry of coordinates
2. From the **Point List** by pressing the  button
3. From the graphic **Map Screen** by pressing the  button.

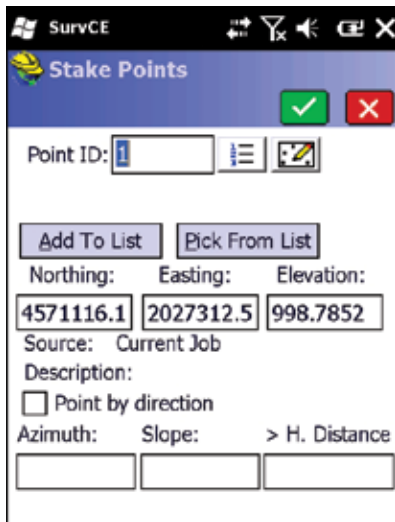


Point list: Click on the point to be staked out and select by pressing  Okay.

4. Satlab SurvCE Guide

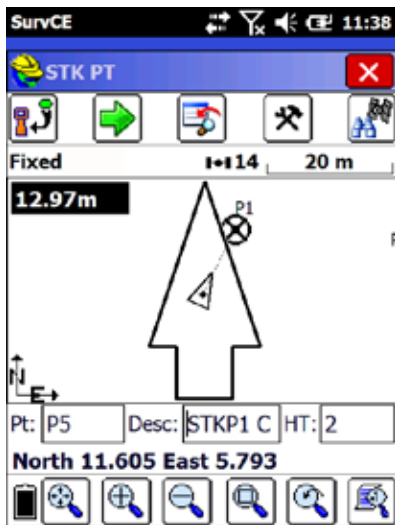


Using graphic screen you can select points for staking out directly from the map.





In either way, after selecting a point, the software shows the selected point number and coordinates on the screen for checking.

Click on  Okay to start the stake out procedure.



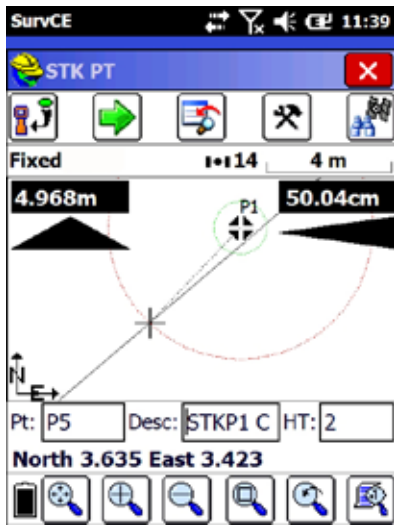
By default, stake out starts with the graphic display. The meaning of objects and information shown on the graphic screen is as follows.

-  The point to be staked out
-  Current GPS Position

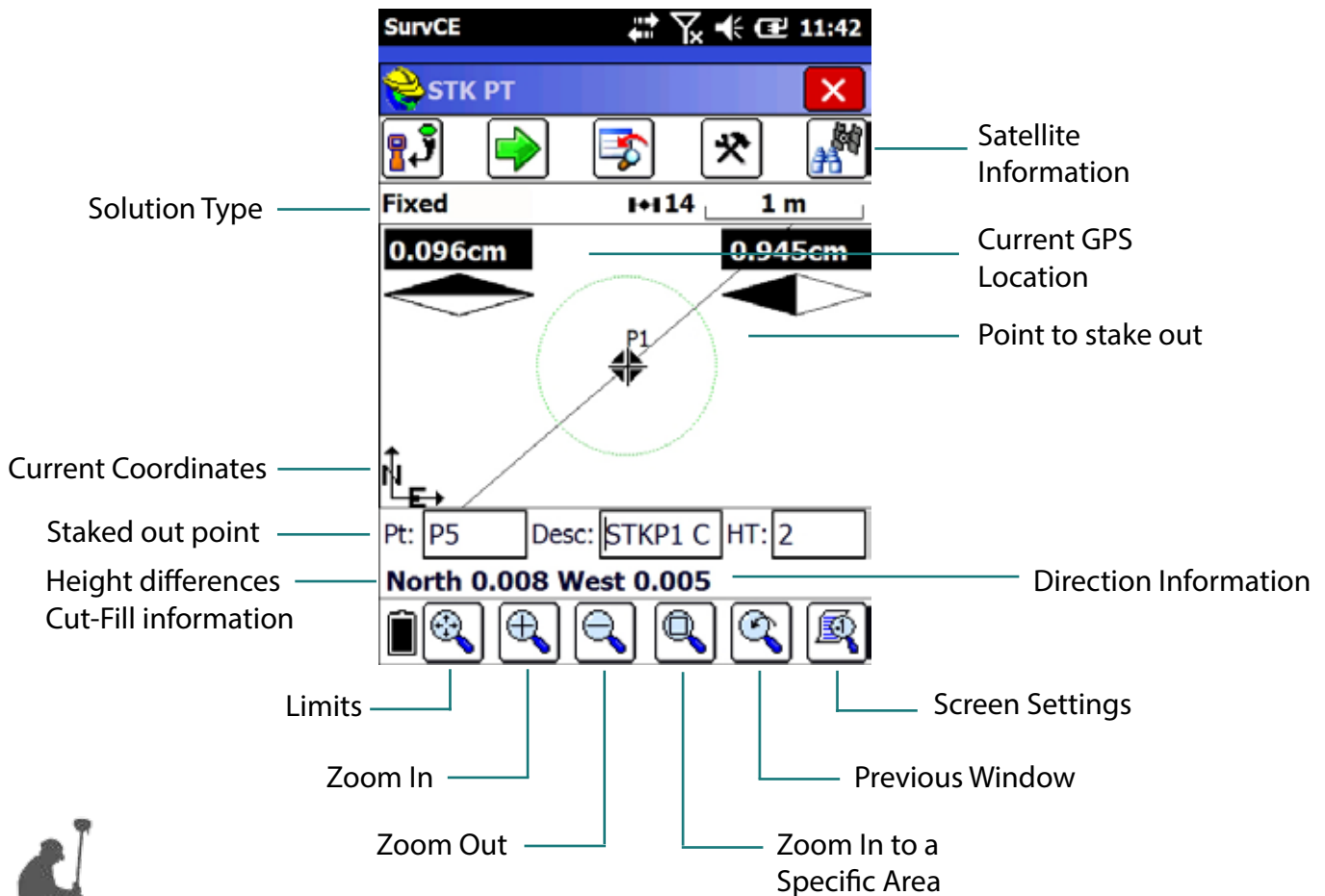
South 1.998 East 4.997 Navigation Information

In order to stake out a point in this screen, the shape expressed by triangle shall approach to the point. As you approach, a sensitive "bull's eye" is generated.

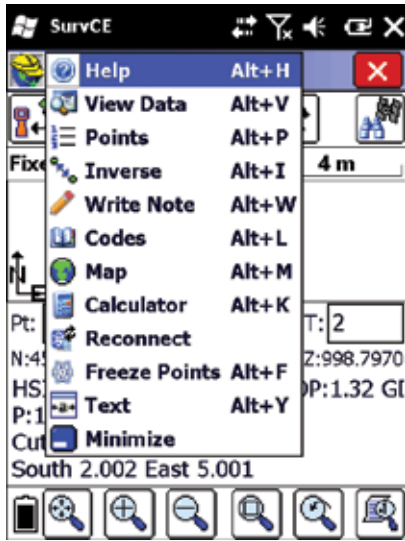
4. Satlab SurvCE Guide




As you approach, the scale of the screen automatically changes and gets more sensitive. Tolerance circles appear around the point. According to the required precision of stake out, the point is found.



4. Satlab SurvCE Guide



There is also an alternative screen view for stake out. In this view, base map does not appear. Only the point to be staked out and the current receiver position is shown.

In order to move to text view screen, click the  icon at the upper left section of the screen and a menu containing shortcuts will appear.

Select **Text** in this menu.



In the stake out information as appears at text view screen, follow the tip of the triangle icon to the point. The direction to the desired point is shown in these values:

NORTH: 0.001
WEST: 0.001
FILL: 0.006



If a point is approached within the given tolerances, red signs appear at the four corners of the graphic screen.

User can specify the mode of stake out information. There are four different methods; you can select the one which is the most convenient for you. For this, click on the down arrow under the graphic screen.

4. Satlab SurvCE Guide

4.9. Download/Upload Points

In order to import points for staking out or export surveyed points, first of all the connection between the controller and the computer must be established. The users with Windows XP as operating system shall install **Microsoft ActiveSync**, while the users who have Windows Vista and Windows 7 as operating system shall install the **Microsoft Mobile Device Center**.

Importing Points to the Controller

Extension of the points to be installed in the control unit can be .CSV, .XYZ, .ASC, .TXT. Before the installation, check if space, comma, tab, or special forms of separation are used in format of the file that includes the point coordinates.



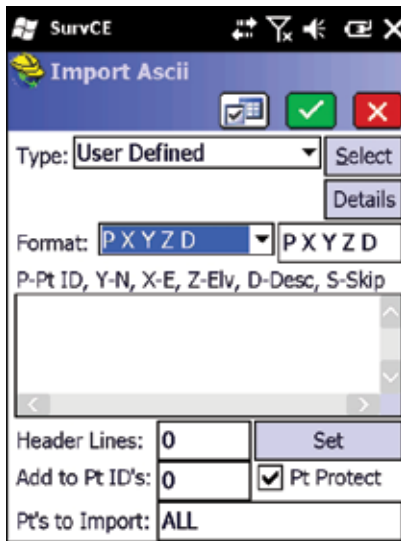
Click on the **Import/Export** button in the **File** menu.



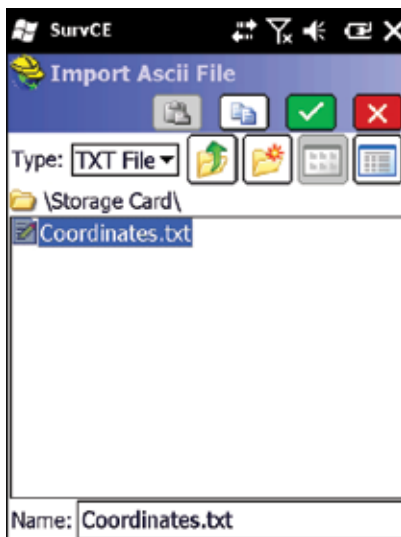
Select **Import Ascii File**.



4. Satlab SurvCE Guide



Select the desired type and format of points to be imported.



Select a file which is shown in a directory under the NandFlash folder and click **Okay**.

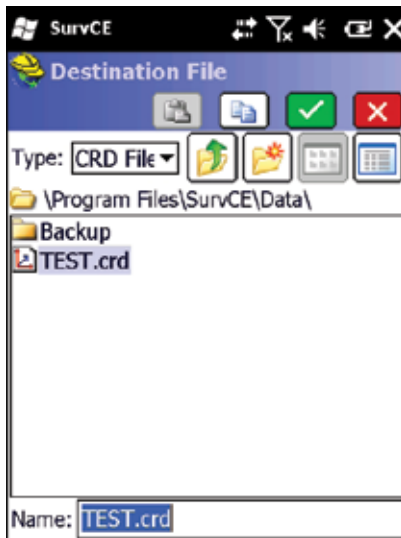
In the example on the left, Coordinates.txt file from Storage Card directory has been selected.




Make sure that the format of your .txt file matches with the selected format. In this screen you can define the sequence of co-ordinates and codes, skip header lines of the file, etc.

Click on **Okay** if the sequence that is viewed is correct.

4. Satlab SurvCE Guide



Select destination file: the job into which the points will be loaded and click  **Okay**. You obtain then information about number of imported points and the import is completed successfully.

The screenshot shows the main window of SurvCE with a table of imported points. The title bar indicates 'Pts:137 <= YKN92B'. The table has columns for 'Nokta ID', 'Kuzeye', and 'Doguya'. Below the table are buttons for 'Edit', 'Add', 'Find', and 'Delete'.

Nokta ID	Kuzeye	Doguya
YKN87B	4470898.663	466865.02
YKN88A	4467138.809	460534.95
YKN88B	4467136.625	460532.19
YKN89	4463633.155	453513.37
YKN90A	4463262.006	450773.16
YKN90B	4463288.135	450759.58
YKN91A	4463277.337	450845.96
YKN91B	4463287.733	450870.02
YKN92A	4458820.764	450136.27
YKN92B	4458819.461	450142.80

If you want to check if the points are loaded correct or not, click on the **Points** button under **File** menu.

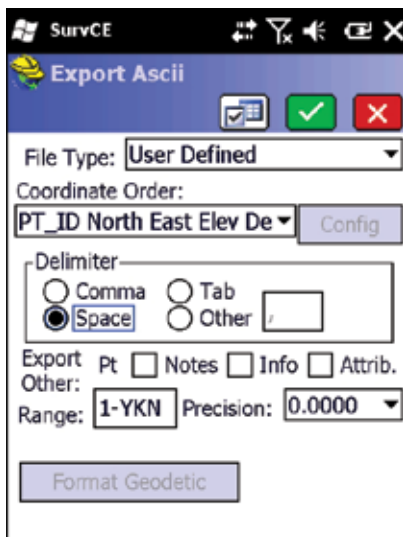


4. Satlab SurvCE Guide

4.10. DXF-DWG Export/Import

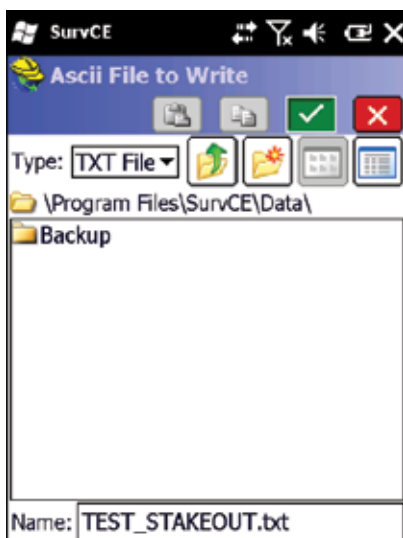


Click on the **Import/Export** button in the **File** menu. In the pop-up window, select **Export Ascii File**.



Select **File Type: User Defined** and make your choice about the coordinate order, delimiters, range of points etc.

Click Okay.



Provide a name and path of the file to be exported Click on Okay and save the points with .txt extension.

Attention: Do not forget the directory where you saved the point file. In the example on the left, the file is saved under the Program Files/SurvCE/Data directory.

The saved file is copied to your computer.

5. Specifications

5.1. Technical Specifications

Signal Tracking

- 220 Channels
- GPS : L1 C/A, L2E, L2C
- GLONASS : L1 C/A, L1 P, L2 C/A, L2 P
- BEIDOU : B1, B2
- GALILEO : L1 BOC, E5B
- QZSS : L1 C/A, L1 SAIF, L2C
- SBAS : L1 C/A, (WAAS-EGNOS-MSAS-GAGAN)

Data Management

- 10 Hz Update (up to 50 Hz)
- sCMRx, CMR, CMR+, RTCM SC104 2.x, 3.x
- VRS, FKP, MAC Support
- NMEA Output
- 1 GB Internal Memory
- microSD External Memory Recording
- RINEX Data Logging

I/O Interface

- 2 x RS232 Serial Port
- 2 x DC External Power Input
- 1 x USB
- 1 x Bluetooth, >50 m Range
- 1 x microSD Card Slot
- 1 x SIM Card Slot
- 1 x Speaker
- 3 Push Button Control Panel
- 3 LED Indicator Panel

Communications

- Internal 3.5G UMTS/HSDPA GSM Modem
- Internal Digital UHF Modem Options
 - ADLF1 : 2 Watts, SATLAB Protocol
 - XDL : 2 Watts, Trimtalk, Satel, TrimMark, Transparent Protocol

Power

- DC 6-28 V Input
- Dual Battery Compartment
- 10.000 mAh Hot-Swap Li-Ion Battery
- Battery Life
 - 24 Hours Static Measurement
 - 18 Hours RTK Rover
 - 15 Hours RTK Base

Accuracy

- RTK : Horizontal 8 mm + 1 ppm, Vertical 15 mm + 1 ppm
- PP : Horizontal 2.5 mm + 1 ppm, Vertical 5 mm + 1 ppm
- RTK Init : < 10 sn
- Confidence Level : %99.9

Environmental

- IP67 Environmental Protection
- Waterproof to 2 m Depth
- Shock Resistant Body to 3 m Drop
- Operating Temperature : - 45 °C to 65 °C
- Storage Temperature : - 55 °C to 85 °C

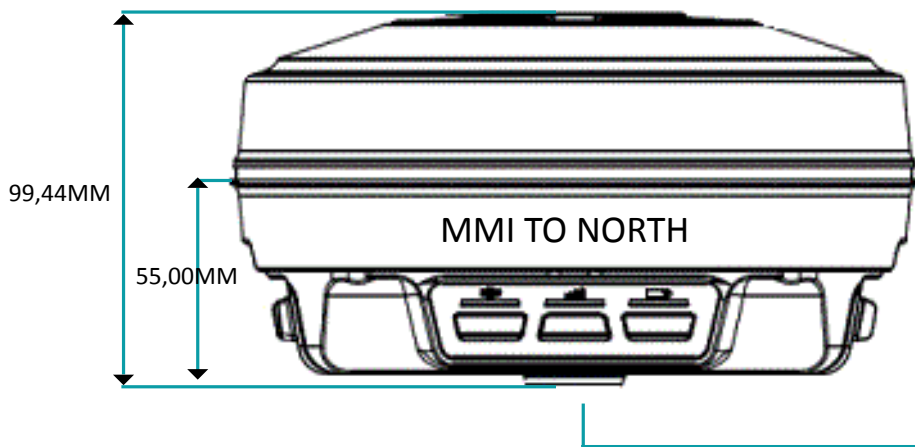
Physical Properties

- XENYO 5220U Housing
- Size : 182 mm x 92 mm
- Weight : 1.2 kg



5. Specifications

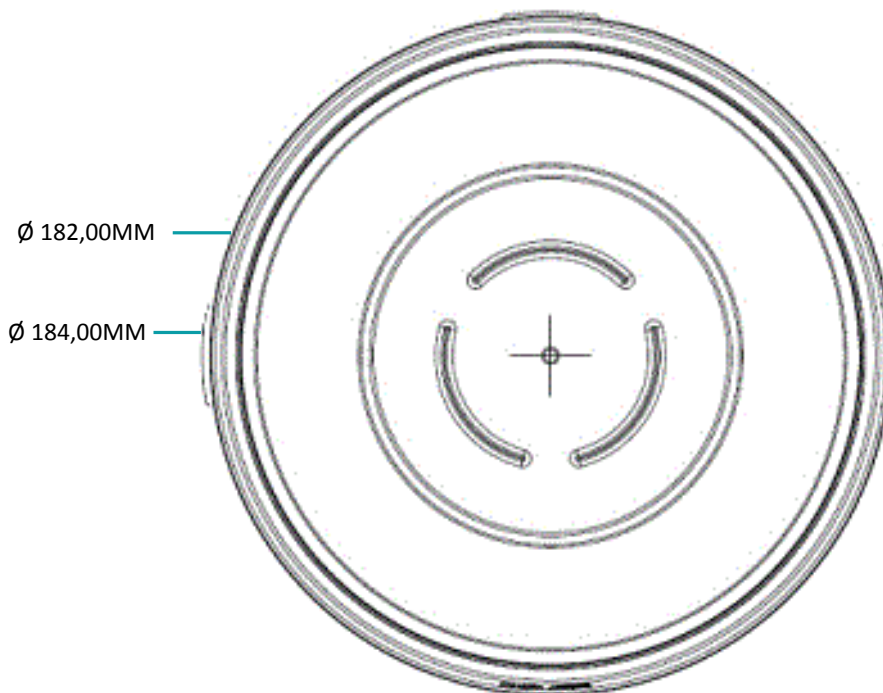
5.2. NGS Antenna Parameters



SLGSL600_V1+NONE

Azimuthal Orientation
Display Panel

Reference surface for NGS
vertical offset measurements



6. Trouble Shooting

Symptom	Possible Reason	Solution
Unit does not start	Battery	Make sure that there is at least one battery placed and secured in the battery compartment with some power.
	Power Button	In order to Power On or Off the receiver, power button is needed to be kept pressed for at least three seconds. This is to avoid pressing power button by mistake.
	Firmware Failure	Reset Receiver by F1 or sending \$RST by any terminal tool.
	Firmware Failure	Upgrade firmware or consult to Local Dealer
Bluetooth Connection fails	Pin Code	In order to connect to SL600 by Bluetooth, a pin code of 1234 is required. Without pin code, bonding Bluetooth is not possible.
	COM1 Cable	When Y communication cable is installed on COM1, it disables BT connection. In order to communicate via Bluetooth, COM1 cable must be removed from COM1 port.
Base / Rover UHF fails	Radio Parameters	In order to communicate, all the parameters from bandwidth to modulation format need to match up. It is advisable to check all the parameters before starting any UHF base / rover operation.
	Channel Number	There are 32 different frequencies can be tuned / assigned to radio channels in case of using different frequencies for different purposes. Consequently, selecting the same channel and so frequency is crucial to communicate.



6. Trouble Shooting

Symptom	Possible Reason	Solution
High error in position calculation	Coordinate system setup	Make sure that both base and rover stations are set by the same coordinate reference and the same settings.
Ntrip connection fails	SIM Card	Make sure that SIM pin is disabled and internet service is available.
	Ntrip Subscription	Make sure that subscription is available to access. To check, free external PC tools like Ntrip Internet Radio could be used to check subscription.
Cable connection fails	Serial Port parameters	Make sure that the COM port in the computer has been selected correctly. Baud rate must be 19200 bps 8n1
	USB Serial Coverters	It is always advisable to use real Serial Ports on computers. In case of absence, USB-Serial converters can be used. Make sure that converter driver has been installed properly.
Low number of satellites	Correction Type	The total number of satellites being used in the position calculation can vary depending on the type corrections. If any constellation is not included in the correction stream, total number of satellites will decrease. Make sure that correction format supports and includes all possible constellations.

