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Contents

Chapter I: A brief introduction of S8	4
Chapter II: S8 mainframe	6
II.1 The outlook of mainframe.....	6
II.2 Interfaces	6
II.3 The installation of battery	8
II.4 Indicator leds and instrument setup	9
Chapter III: S8 standard accessories.....	14
III.1 The case of S8	14
III.2 Power supply	16
III.3 The antennas.....	17
III.4 Cables.....	18
III.5 Other accessories.....	20
III.6 Controller Getac PS236.....	21
Chapter IV: S8 Configuration.....	23
IV.1 The installation of base and rover.....	23
IV.2 The configuration by using keys	24
IV.3 Standard operation of leds	26
IV.4 How to measure the antenna height	27
IV.5 How to download static data	29
IV.6 Registration of the receiver	30
Chapter V: STONEX® Assistant for S8	31
V.1 Start Stonex Assistant on your PC.....	32
V.2 Settings.....	34
V.2.1. Static Data Survey.....	35
V.2.2. Dynamic working mode	37
V.2.2.1. Base coordinates setting	38
V.2.3. Data Link.....	41
V.2.3.1 Network.....	41
V.2.3.2 UHF Radio	46
V.2.3.3 External.....	47
V.2.3.4. Bluetooth	48

V.2.3.5. No datalink	48
V.2.3.6. Network and external	48
V.2.4 NMEA Output string.....	50
V.3 Import Data	51
V.4 Serial Port Forwarding.....	53
V.5 Register the receiver	55
V.6 Firmware update	56
Appendix 1: Default Radio Settings	58
Appendix 2: Self-check procedure.....	60
Appendix 3: Technical Specifications	61
GNNS module specifications:	61
Connection devices and protocols :	62
Radio module	63
GPRS/GSM module	63
Power Supply:	63
Physical specification:	64
Appendix 4: Copyrights, warranty and environmental recycling.....	65
Copyrights and trademarks.....	65
Release Notice	65
Standard Limited Warranty.....	65
Shipping policy.....	66
Return policy Dead On Arrival instruments.	66
Firmware/Software warranty.	67
Over Warranty repair(s) policy.....	67
Disclaimer and Limitation of Remedy.	67
Instruments	69
Accessories.....	69
Restriction for GPS Boards.....	69
Service Procedure.....	69
Environmental recycling.....	70
FOR COUNTRIES IN THE EUROPEAN UNION (EU)	70
FOR COUNTRIES OUTSIDE EUROPEAN UNION (EU)	71

Chapter I : A brief introduction of S8

The new STONEX S8 are the natural completion of the range of GNSS receivers by STONEX.

After S8III and S7 Series, S8 gives new opportunities to exactly fit the Surveyor's needs, featuring top performances with a budget price.

Like the elder brother S8III, S8 is able to receive both of GPS signal frequencies and also satellite signals from GLONASS, GALILEO, COMPASS and SBAS, so we can correctly speak about a "GNSS receiver".

STONEX S8 comes with a complete range of receivers, and can be equipped with internal UHF transmitting and receiving radio modem, while the GSM/GPRS module for GPS network connection and direct call, and the Bluetooth™ device for wireless purposes are standard equipments on all the S8 GNSS.

STONEX S8 base configuration can transmit with the built-in 0.5-1 W radio or can be connected to a more powerful external radio at user's disposal in order to reach the requested metric range.

A new Italian design with an aluminum bottom cover allows a better heat dissipation for internal radio modem. The batteries and built-in radio are set at the bottom of mainframe, giving more effective dustproof and waterproof qualities and making the S8 receiver a better performer in field of surveying. The Wireless receiver unit weighs only 1.2 kg: which means that the rover is light and easy to carry. The low power consumption of receiver allows users to carry out and work for long time with only one single battery.

STONEX S8 receivers ensure a quick setup for all required working mode.

The 100% compatibility with STONEX S8III and S8II, and with Trimtalk™ protocol, lets you to combine S8 as a TX Base unit with other STONEX and non STONEX Rover GNSS receivers.

Thanks to the new integrated suited CUBE software, survey has never been so easy. Cube combines a fresh and easy interface with a simple and powerful workflow for the user. Its integration with STONEX GNSS receivers makes CUBE the essential tool for professionals' day-

to-day work.

STONEX® provides two year of warranty to S8 receivers . It should be noted that high power signals from a nearby radio or radar transmitter can overwhelm the receiver circuits. Low power transmitter like those used in cell-phones do not normally interfere with receiver's operations. It is important to draw your attention to the operational temperatures, limits which should not be exceeded for a correct functioning (see pag. 61).

After returning from the field, in each weather case, you should keep the container open in a warm and dry place and at the same time take out the controller and receiver from the container, in order to make them dry.

Anyway we advise you to manage the instrument with reasonable care.

Even if you have used other GPS or GNSS products before, we recommend that you spend some time reading this manual to learn about the special features of this product.

If you are not familiar with GNSS technology, we suggest you read a specific book in order to better understand the contents of this manual.

Nevertheless you can ask for any technical support by sending an email to our address support@stonex.it or contact your local dealer.

Chapter II: S8 mainframe

II.1 The outlook of mainframe

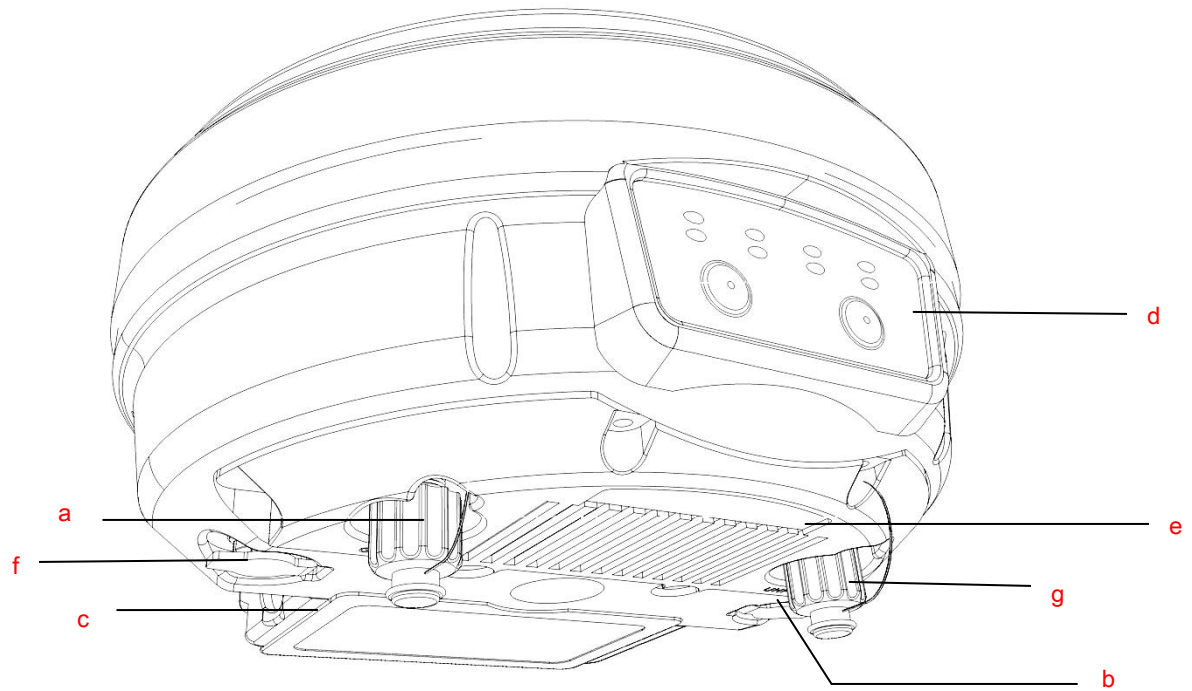
The mainframe has an almost cylindrical shape, with a base larger than the height. There are three parts: an upper cap, a rubber loop and the main structure. The upper cap protects the GNSS antenna placed inside. The rubber loop has the function of softening possible shocks or falls. In the front of the main structure there are 2 keys and 9 lights, on the bottom side there is one slot for the built-in radio and GSM/GPRS module, and one for the battery and SIM card. All the others components of the receiver (Bluetooth device, main board, OEM board, etc.) are contained inside the main structure.



Fig. 2.1 - S8 mainframe

II.2 Interfaces

The mainframe interfaces are shown in Fig. 2.2: the left port (five pins *LEMO*) is used for external power supply and external radio, the right port (seven pins *LEMO*) is used for data transferring between receiver and computer or between receiver and the handheld. Near the radio module there is the radio antenna interface.



- a) TNC connector for GPRS/GSM antenna
- b) 5pins Lemo port for external datalink connection
- c) Battery housing
- d) Front panel
- e) Built-in radio module
- f) 7pins Lemo port for data transfer.
- g) TNC connector for UHF radio antenna

Fig. 2.2 - S8 components and ports

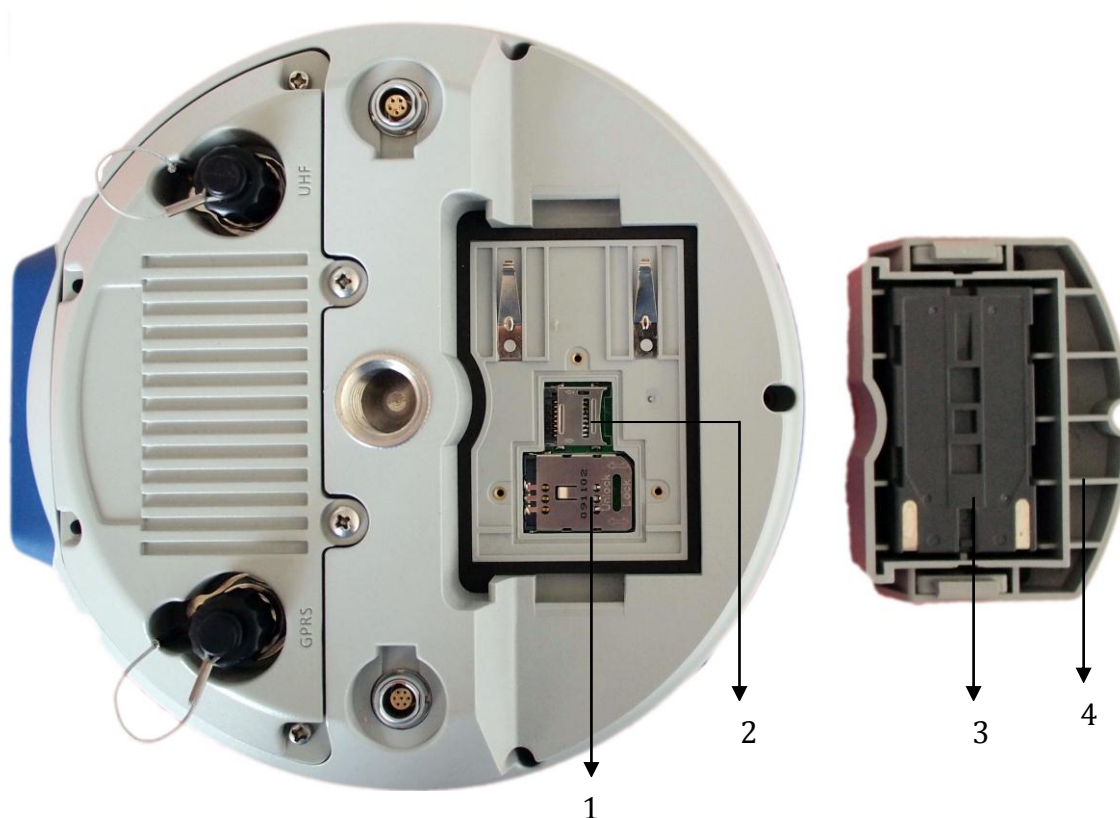


Fig. 2.3 - 5-pins LEMO port



Fig. 2.4 - 7-pins port

II.3 The installation of battery



1. SIM card slot
2. MicroSD card slot
3. Battery
4. Battery housing

Fig. 2.5 - S8 battery housing

Under the place for the battery, there is a slot for SIM card, which is necessary to have when a

connection by GPRS/GSM is used.

II.4 Indicator leds and instrument setup

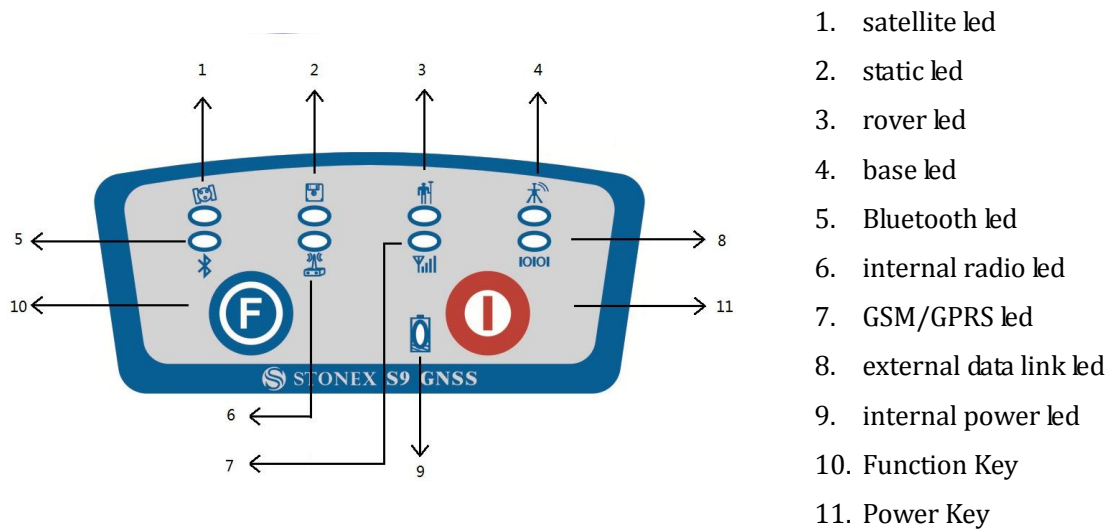


Fig. 2.6 - S8 keys and indicator leds

The functionality as follows, from left to right:

SATELLITE led (green):

It shows the amount of locked satellites; when the receiver links one or more satellites signal, it will start to blink every 30 seconds for a number of times equal to the number of locked satellites.



Fig. 2.7 - S8 satellite led

STATIC led (red):

It switch on if the static mode is selected and it starts to blinks when the receiver is recording data, with the same frequency of the sample rate, if the sample rate is greater than 1 Hz it blink anyway at 1 Hz.



Fig. 2.8 - S8 static led

ROVER led (red):

Rover led is on when the receiver is working in rover mode.



Fig. 2.9 - S8 rover led

BASE led (red):

Base led is on when the receiver is working in base mode.



Fig. 2.10 - S8 base led

BLUETOOTH led (*blue*):

Once you have connected the receiver with the handheld, this led will switch on.



Fig 2.11 - S8 bluetooth led

INTERNAL RADIO led (*green*):

This led is on when UHF internal radio is selected as RTK datalink.

It is blinking when is transmitting data in base mode or receiving data in rover mode.



Fig 2.12 - S8 internal radio led

GSM/GPRS led (*green*):

This led is on when GSM/GPRS module is selected as RTK datalink. It starts to blink when there is data transfer ongoing (download in rover mode and upload in base mode).



Fig 2.13 - S8 gsm/gprs device led

EXTERNAL RADIO led (*green*):

This led is on when external datalink is selected as RTK datalink. It starts to blink when there is data transfer ongoing(download in rover mode and upload in base mode).



Fig 2.14 - S8 external radio led

POWER led (green and red) :

It includes three kind of status:

1. Green: power supply in good condition.
2. Red: low power (below 20%).
3. Red blinking and beeping: very low power (below 10%)

Usually when the light becomes red you have still one hour of power reserve. External power and internal battery share same power light. When external power is used, the led indicates external power level.



Fig. 2.15 - S8 power led

F Key : Function key

It can switch the working mode (static, base or rover) and RTK datalink (built-in radio, external radio or GPRS/GSM).

Switch working mode: Power on the receiver while pressing F key in the meantime, wait until all lights flash, then release both buttons. Now every time you press F key, you will see one red led switched on and moving through the three working mode.

Switch datalink: Press F key in ROVER or BASE mode, then release after the beep, you will see one green led switched on, that moves every time you press F key through the three datalink.

I Key: Power key

It powers on/off the receiver function and has a confirm function.

Power on receiver: Press and hold I key for at least one second, the receiver will power on.

Power off receiver: Press and hold I key for few seconds, after three beeps all lights turn off, at that point release the key, the receiver is off .

Chapter III: S8 standard accessories

On the basis of the configuration chosen (base or rover) some of these accessories are included in the receiver bundle.

III.1 The case of S8

There are two kinds of S8 cases: Rover case and Base case. The inner layout of the Base case and Rover case is different.

Base case contains also the basement and tribrach for fixing the base on a tripod and a 40 cm pole for put the base higher, while Rover case included the bracket for the controller. You can distinguish them from nameplate.



Fig. 3.1 - S8 case



Fig. 3.2 - S8 internal case of Rover



Fig. 3.3 - S8 Base case

III.2 Power supply

Batteries

The standard configuration contains two batteries, a slot for charging batteries (named “charger” for simplicity) and an adaptor. The battery are “lithium-ion” battery (7.4 V - 2500 mAH): a technology which has an higher energy-to-weight ratio with respect to NiCd or NiMh batteries, no memory effect, and slow self-discharge when not in use.



Fig. 3.4 - Lithium-ion battery

Charger

The charger can charge both batteries simultaneously. The lights of the charger shows if the battery is being charged (red light CHARGE) or if it is already charged (green light FULL). Red light POWER shows if the charger is powered on and there is also a light which turns on in case of too high temperature (red light TEMP).



Fig. 3.5 - S8 charger and adaptor

III.3 The antennas

S8 adopts a UHF all-direction transmitting and receiving antenna. Since there are three different internal radio settings with different frequency range, the corresponding antennas have different length. The available range are: 410-430 MHz, 430-450 MHz and 450-470 MHz. the corresponding antennas have length of: 40, 37,5 and 34 cm. They are suitable for field surveying, light and durable. The gain is 2.15 dBi.



Fig. 3.6 – built-in radio antenna (not in scale)

S8 adopts a GPRS/GSM all-direction transmitting and receiving antenna with a frequency in the

ranges 824-960 MHz and 1710-1880 MHz. It is suitable for field surveying, light and durable, the length is about 20 cm, the gain is 2 dBi .



Fig. 3.7 – Gprs/gsm antenna (not in scale)

For S8, it is possible to use like additional accessory (not included in the standard configuration) a high-gain UHF all-directional transmitting antenna for base setup. The available ranges are: 410-430 MHz, 430-450 MHz and 450-470 MHz. The antenna is around 1 meter long and can be mounted on a retractable pole or a tripod for better performance. The higher the antenna is, the larger cover area does it has for the radio signal. The gain of the antenna is 5 dBi.



Fig. 3.8 –External radio antenna (not in scale)

III.4 Cables

Receiver standard cable

This is a multi-function communication cable: it is used for connecting receiver (by a 7-pins

LEMO port) and computer (by a serial and USB port) used for transferring the static data, setting the receiver, updating the firmware and the license.



Fig. 3.9 - Multi-function communication cable

Auxiliary cable

External power supply cables can be ordered and used to connect an external battery (red and black clips) to the receiver (small 5-pin LEMO) :



Fig. 3.10 - External power supply cables

III.5 Other accessories

The other accessories are: 2.45 m retractable pole, 40 cm supporting pole, two kind of brackets depending on the controller, tribrach with plummet, tripod (wood or aluminum, with quick or twist clamps), connector between receiver and tribrach, and measuring tape.



Fig. 3.11 – 2.45m retractable pole



Fig. 3.12 – 40cm supporting pole



Fig. 3.13 – Bracket B1 for Getac



Fig. 3.14 – Bracket B2 for S3



Fig. 3.15 – Tribrach and adapter with optical plummet



Fig. 3.16 – Connector between tribrach and receiver



Fig. 3.17 – Measuring tape.

III.6 Controller

The S8 can usually be provided with two model of handheld: Getac PS236 or Stonex S3

controller in the standard configuration. Anyway the controller is not part of the accessories for S8, it must be purchased separately.



Fig. 3.18 - Getac PS236 controller



Fig. 3.19 – Stonex S3 controller

Chapter IV: S8 Configuration

IV.1 The installation of base and rover

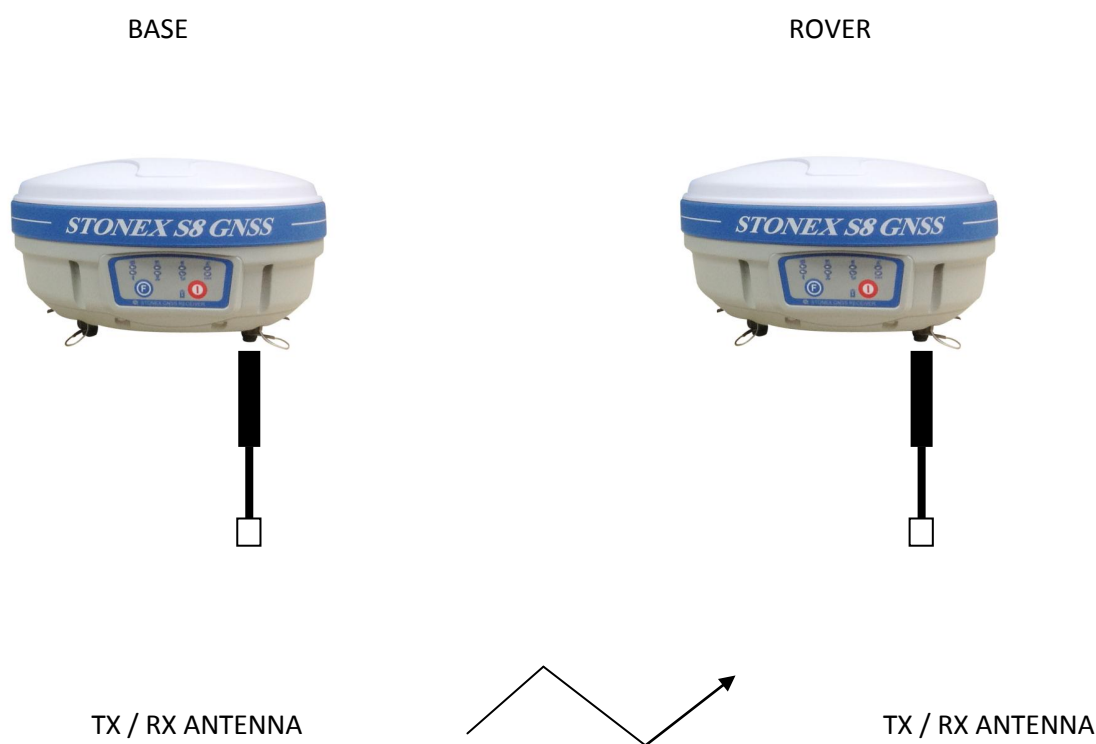


Fig. 4.1 - Base and rover configuration

Installation of Base

- Install the tripod on the chosen location, level it and attach the receiver into tribrach.
- Attach the transmitting radio antenna into the port "UHF": using the 40cm supporting pole is better, since increases the height of the antenna. If you are using a direct GSM connection you should attach the gsm antenna into "GPRS" port.
- Switch on the receiver and check the working mode. If it is not correct, please see next

paragraph IV.2 for understanding how to select the correct working mode or you can change it later using the handheld software.

- Switch on the handheld and start the software for the radio channel configuration and inserting the base coordinates, otherwise it is possible to make the settings by Stonex Assistant pc software.

Installation of Rover

- Fix the bracket on the pole, fix the handheld into the bracket, put the rover on the pole and attach receiving radio antenna into the port "UHF" or gsm antenna into the port "GPRS", depending on the connection used.
- Power on the receiver and check the working mode. If it is not correct, please see next paragraph IV.2 for understanding how to select the correct working mode or you can change it later using the handheld software.
- Switch on the handheld and start the software, then you can do the advanced setting of the instrument and finally start the survey.

If you want to take very accurate measures (around or below cm accuracy), we recommend you to use another tripod also for the rover.

IV.2 The configuration by using keys

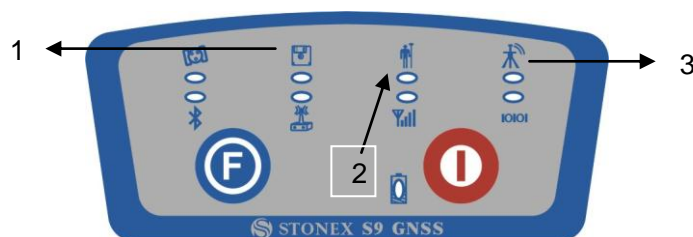
How can you select the working mode?

- Insert the battery in the battery box, then press and hold I key + F key: the receiver will start.
- Keep pressed I key + F key until all lights blink at the same time (Fig. 4.2), then release the keys.



Fig. 4.2 - S8, all led blinking at the same time

- Now every time you press F key, the STATIC/ROVER/BASE lights will switch on in the corresponding order. You can select three different red lights, each of them refers to one working mode.
- Press I key when the chosen light is blinking and the receiver will start in the selected working mode . Summary of working modes:



1. Static mode
2. Rover mode
3. Base mode

Fig. 4.3 - S8 summary of working mode led

How can you select data link?

- After you entered working mode, press and release F key, the UHF/GPRS/EXT lights will blink by turns at every pressure of F key. Then you can select different green lights, each one refers to different data link. This situation refers only to the rover and base mode,

since in static mode there is no green light blinking.

- Press I key when the chosen light is blinking and the receiver will start in the selected working mode. Summary of data link types:

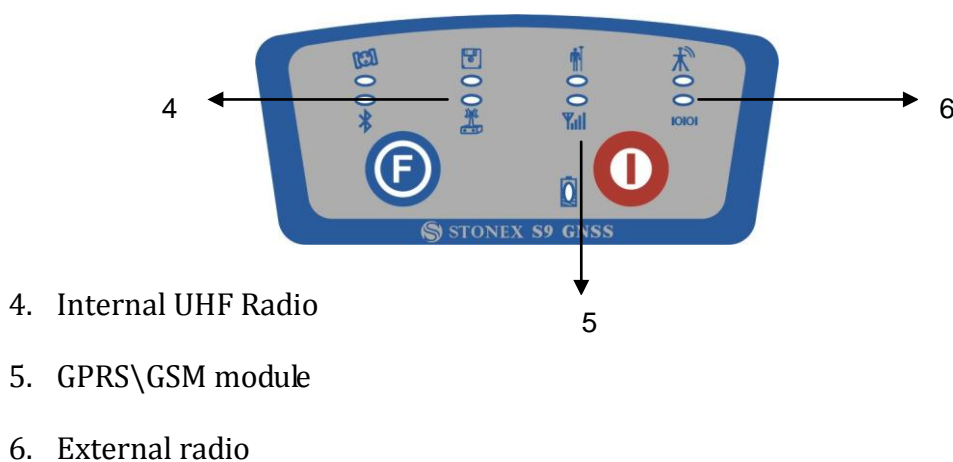


Fig. 4.4 - S8 summary of data-link led

The next time you will switch on again the receiver, the working mode and data-link will be the last selected.

If you prefer, you can select the correct data-link by handheld software.

As regards the advanced working parameters, for instance sampling interval, minimum elevation angle, antenna height, etc, they can be set by handheld software or by Assistant, without modifying the parameters the receiver will work with default parameters.

The static mode parameters cannot be selected by the controller, but only by Assistant.

IV.3 Standard operation of leds

Static mode

The STATIC and power led will keep lighted. When satellites fulfill the conditions (at least 4 GPS or 4 GLONASS satellite), receiver will start recording epochs, you will hear a beep, STATIC light will flash according to sampling interval (if you don't set up, the default is 5 seconds) and the satellite light will flash a number of times equal to the locked satellites.

Base mode

The BASE, power led and selected datalink (UHF, GPRS/GSM or EXTERNAL) will keep lighted. When satellites fulfill the conditions, the base will enter into the transmit mode and start to send data through the datalink. The datalink green led flashing every one second means the base transmit normal. The satellite light will blink according to the number of satellites as described for static mode.

Rover mode

The ROVER, power led and selected datalink (UHF, GPRS/GSM or EXTERNAL) will keep lighted. The datalink green led flashing every one second means the rover is receiving data packets. The satellite light will blink according to the number of satellites as described for static mode.

IV.4 How to measure the antenna height

The height of receiver is 99mm, the diameter is 186mm, the height from the center of the sealed rubber ring to the bottom is 62mm.

The antenna height is conventionally defined as the vertical height from the phase centre to the ground surveyed point (the distance “h” in fig. 4.5). It is not possible to measure it directly: you have to measure other reachable heights (the distances “a”, “d”, “s” in fig.4.5). The distance “a” is the vertical height from the ground to the mainframe’s bottom, “d” is the vertical height from the ground to the middle of the rubber ring: both are defined as “vertical heights”. On the contrary the distance “s” is measured from the ground surveyed point to the middle of the rubber ring and is called “slant height”. You have to choose the measuring method according to the used software.

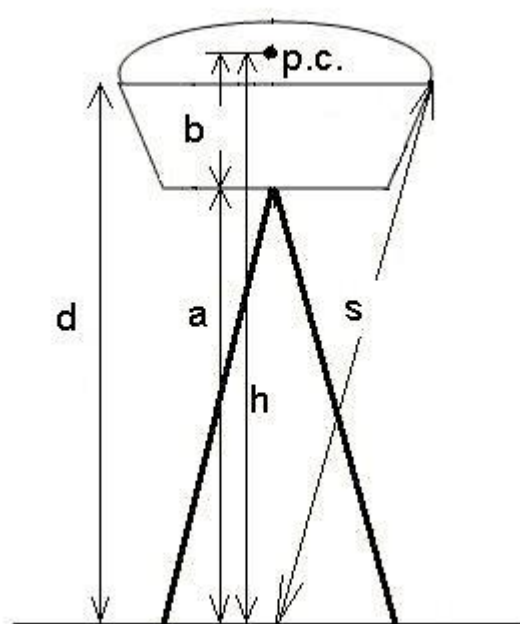


Fig. 4.5 - Different measures of the antenna height

1. In rover and base mode you have to insert the correct antenna height according to RTK software. In *STONEX® SurvCE*, for example, the distances “a” and “s” are permitted: software will add the distance “b” to “a” (or convert “s”) to obtain “h”. For other software please read the specific user guide.
2. In static mode you have to write the correct antenna height in .DAT or RINEX file. If you are using *STONEX® GPS Processor* you have to specify the correct antenna height before processing .DAT data or exporting it into RINEX format. The same if you are using *STONEX® Assistant* for converting .DAT into RINEX. Please read the specific manual of *STONEX® GPS Processor*, it should be noted that however the slant height “s” corresponds to the definition “Line of Edge of antenna”, “a” to “Bottom of antenna” and “d” is equal to “Bottom of antenna mount”.

IV.5 How to download static data

For a correct connection between receiver and PC, follow the procedure described below. By using a different procedure it may be very difficult to make a connection.

At first turn on the mainframe, then connect the cable to the communication interface of the receiver (7-pins Lemo port), then insert the USB port in the PC. The taskbar will show as follows:



Fig. 4.6 - Taskbar of windows including the receiver

The PC considers the receiver as a “removable disk”, so open the “removable disk”, and then you can get the data files in the memory.

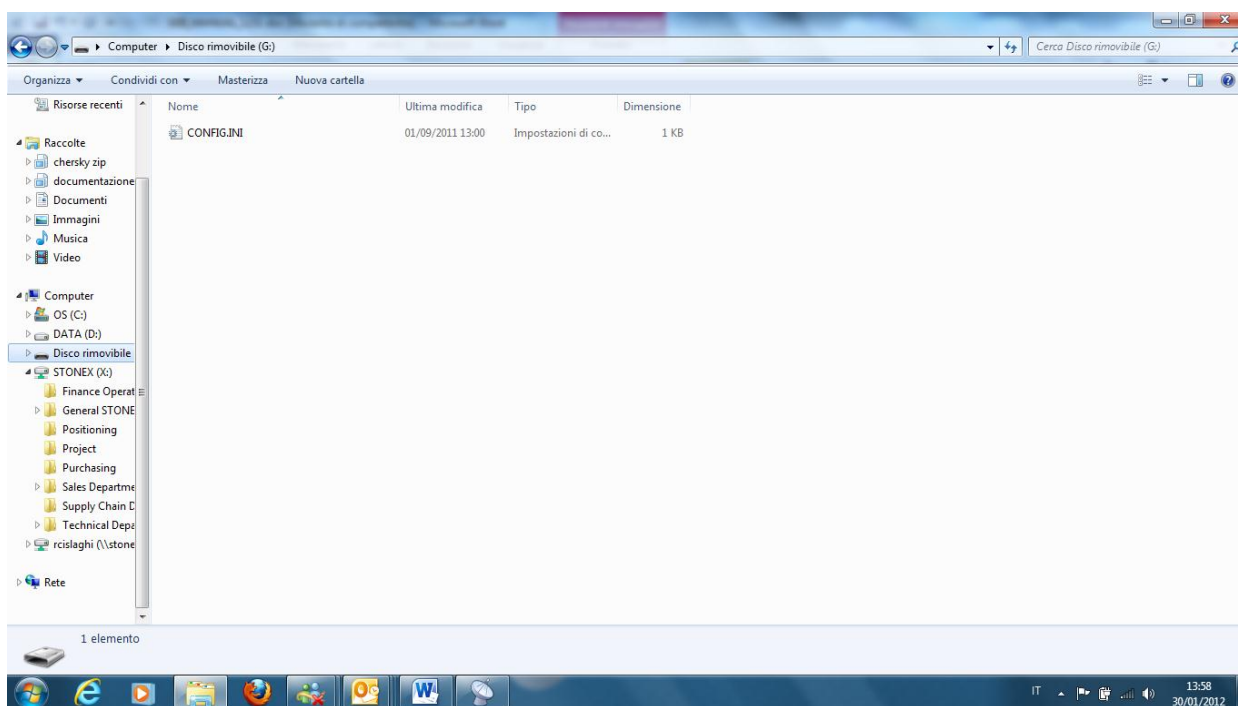


Fig. 4.7 - Example of receiver files

You can copy the original file to PC and if necessary modify the file names. As Fig. 4.7, for example, shows, .INI file is the configuration file stored in the memory of S8. You can open also the “CONFIG.INI” file as a simple text file and set some parameters of static mode: sampling frequency, minimum elevation angle, etc. Please modify this parameters with care and do not change any parameter which is not clear because you could compromise the correct working of the receivers.

You can use the STONEX® Assistant to download the raw data and set the parameters in a safer way, as explained in Chapter V.

IV.6 Registration of the receiver

If the provisional license expired, you need to insert a new license code in the receiver for continuing to use it. The license is composed of a 32 characters code. For inserting the new license you can use RTK software *STONEX® SurvCE*: you have to enter into the submenu “Equipment” → “GPS utilities” → “Send command”, then write the command “SET,DEVICE.REGI,[license code]”.

However it is also possible to register the receiver using the STONEX® Assistant, as explained in Chapter V.

Chapter V: STONEX[®] Assistant for S8

STONEX[®] Assistant is a tool which is conceived for aiding the user to make easier different operations with the receiver S8. It is contained in the bundle CD, the actual version is 1.49.

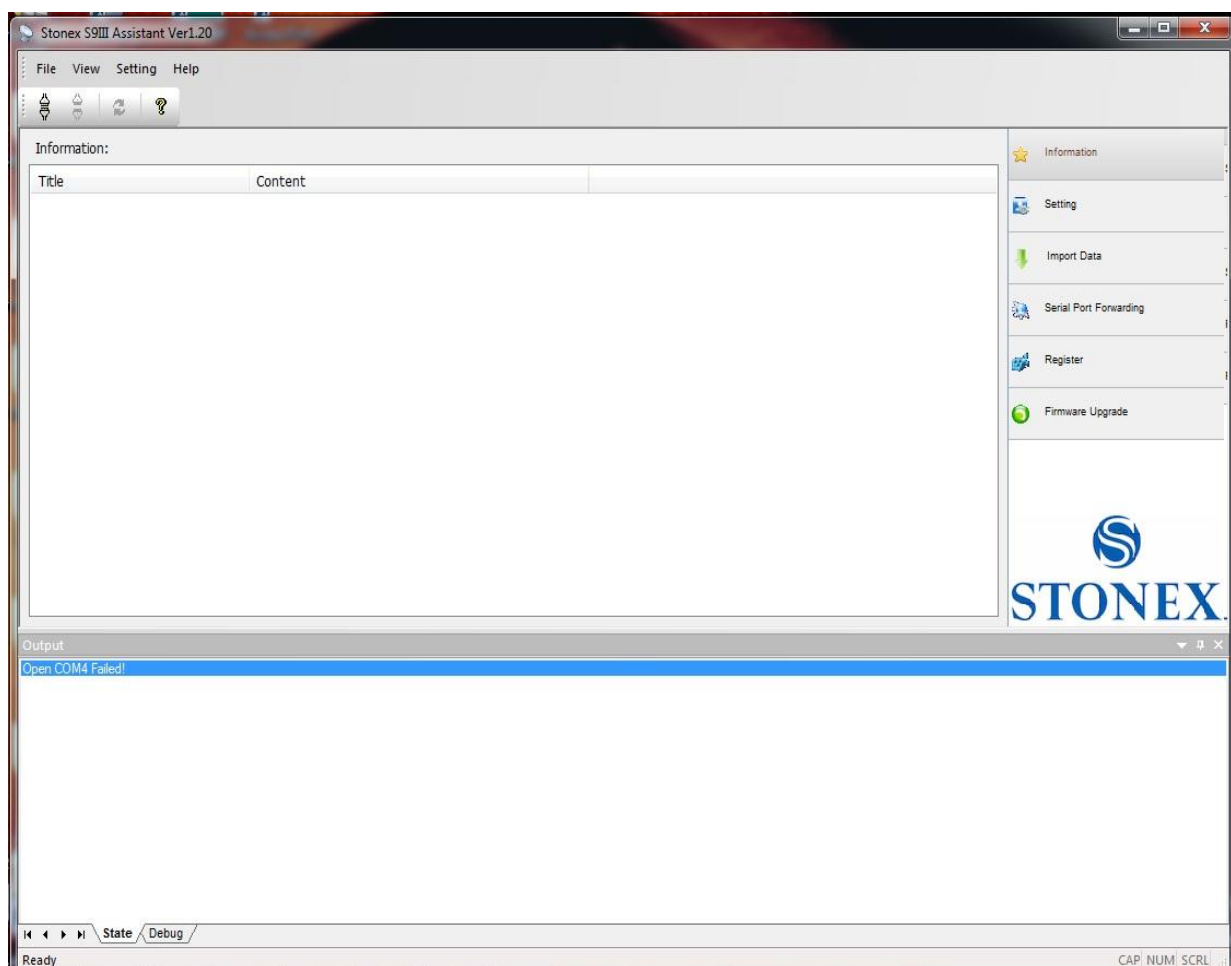


Fig. 5.1 – Main page of Stonex Assistant

The opening page, is showed in Fig. 5.1. It reports internal system configuration of the GPS

receiver S8 after get PC connection.

V.1 Start Stonex Assistant on your PC.

Connect the S8 to the PC USB port using Lemo7 – USB/Serial cable.

Switch on the receiver; automatically the program should search the COM port where the receiver is connected. If this doesn't happen, for example at the first starting of Assistant in the Pc, you have to disconnect from the wrong port and select the right COM port manually. Click on the icon showed below by number "1" for disconnection, then click on icon "2" for connecting again, a new windows will be opened ("3"):

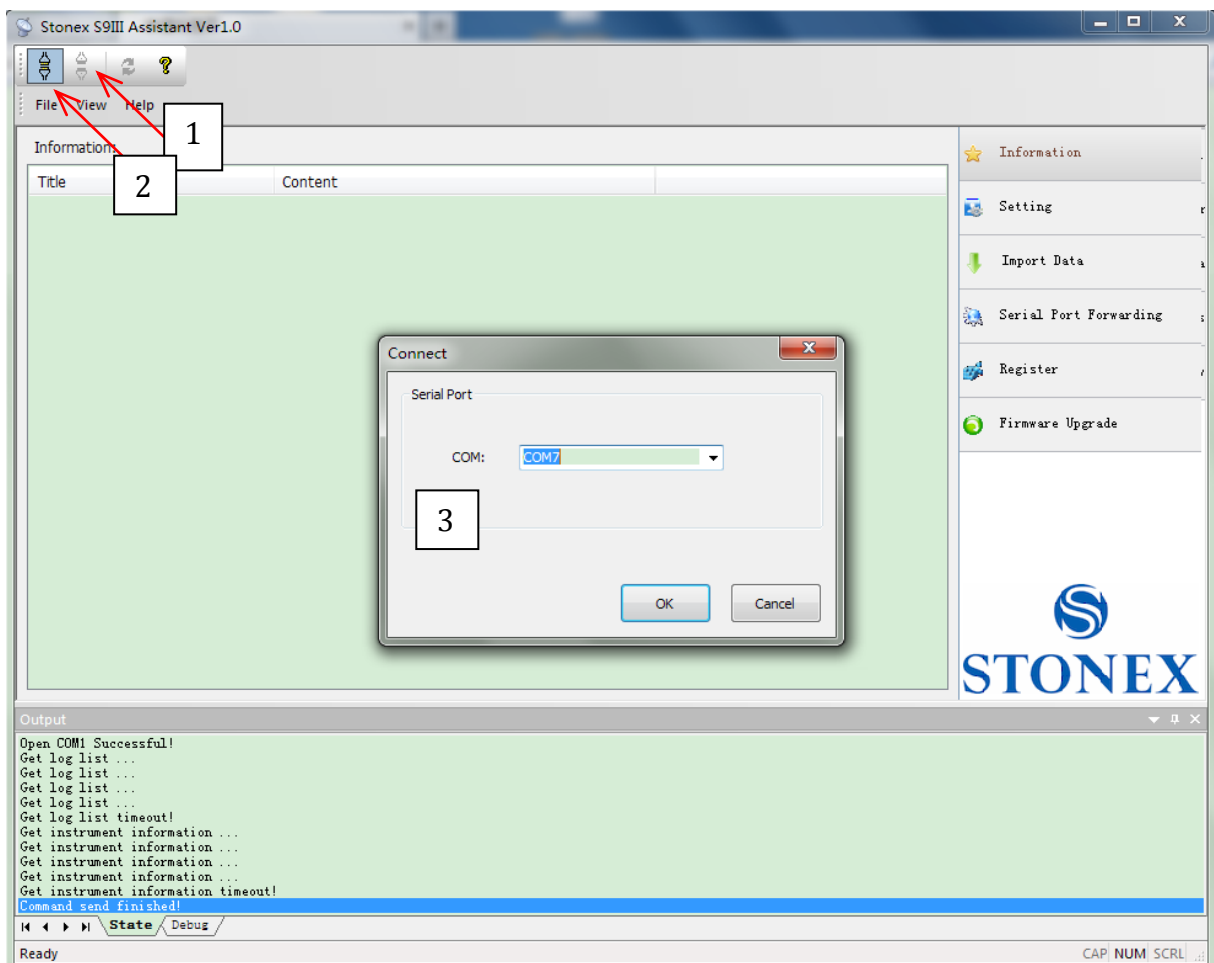


Fig. 5.2 - Opening COM port

Here you have to insert the correct COM number. Usually when the cable is inserted on the USB port, the computer should create a new “virtual” serial port with a new COM number, you should check in the device manager of Pc and insert this number, then select “OK” button. When you find the right COM port, you should see the screen shown in Fig 5.3 that show you in the main window the system information.

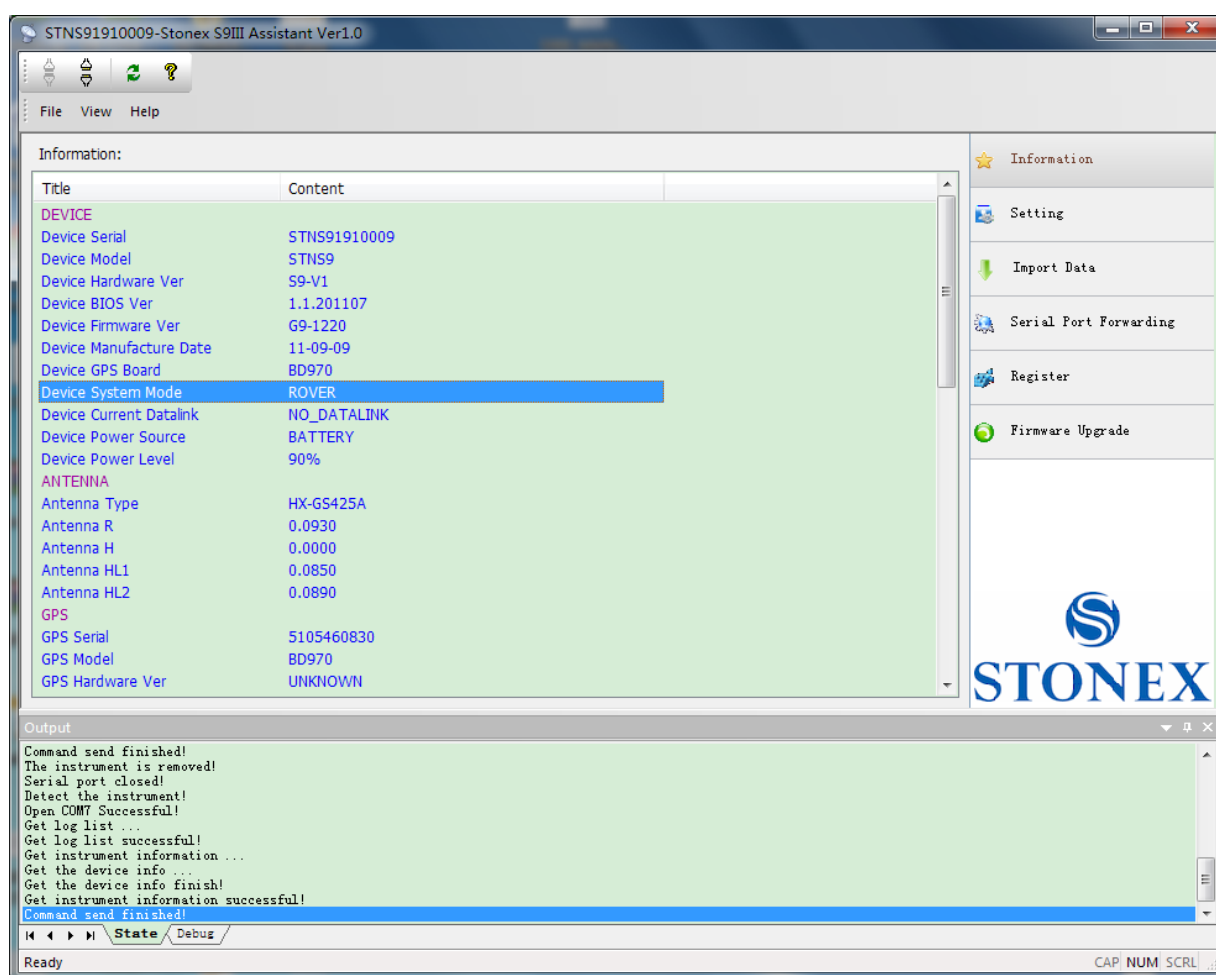


Fig. 5.3 – Information page of Stonex Assistant

From the showed information you can understand about: the battery level, the firmware version of GNSS board, the antenna information, the firmware of radio and gprs internal device, the free disk space and the current working and datalink setting.

V.2 Setting

If you click on the menu “Setting” on right, a new menu window is opening as in Fig. 5.4.

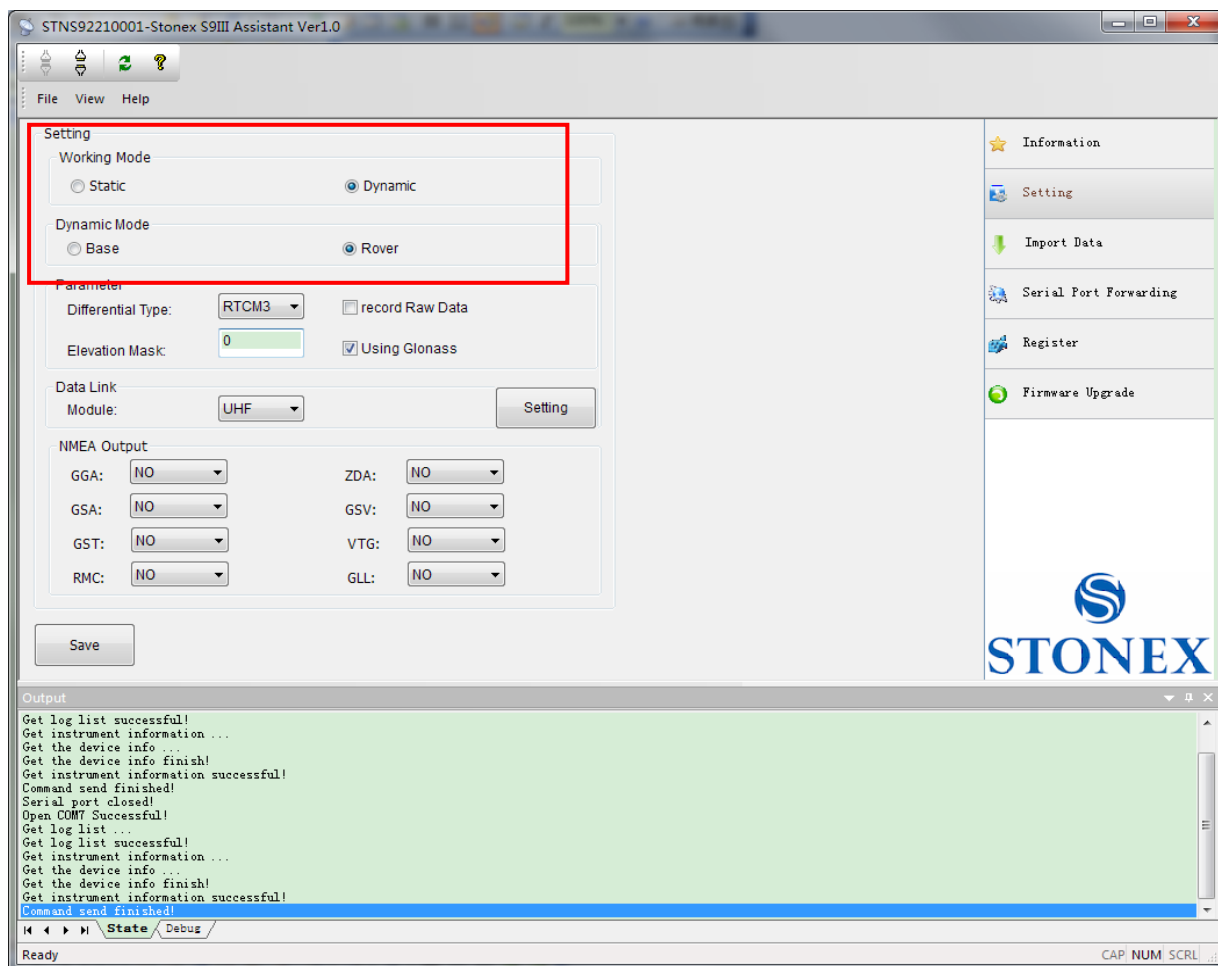


Fig. 5.4 – Setting window

From this window you can set the most important parameters of the receiver without opening the CONFIG .INI file and modifying it by hand in a text editor (**not recommended**).

You can set the survey working mode (Static, Dynamic --> Base/Rover) and the kind of datalink (NETWORK, UHF, EXTERNAL, BLUETOOTH) of S8 (see the red rectangle in Fig. 5.4).

Some definitions of working mode:

Static: is the stand-alone station that collect raw observations and need a post-processing in office for getting accurate results.

Base: is the fixed GPS station used to provide differential corrections to the mobile GPS receiver.

Rover: is the mobile receiver used to survey on field.

Some definitions of available datalink:

Network: is an internet connection by GPRS band to a base that provide differential corrections or a connection between base and rover by a GSM direct call (like a phone call).

UHF: is a connection between base and rover by the internal radio communication.

External: is a connection between base and rover by an external device attached through the 5-pin LEMO port, it is usually an external radio.

Bluetooth: is an option for sending or receiving the NTRIP corrections to the receiver through the Bluetooth channel.

Select “Static” for a static survey operation, “Dynamic” if you want to do RTK measures with your S8.

V.2.1. Static Data Survey

Static mode data entry page is reported on Fig 5.5:

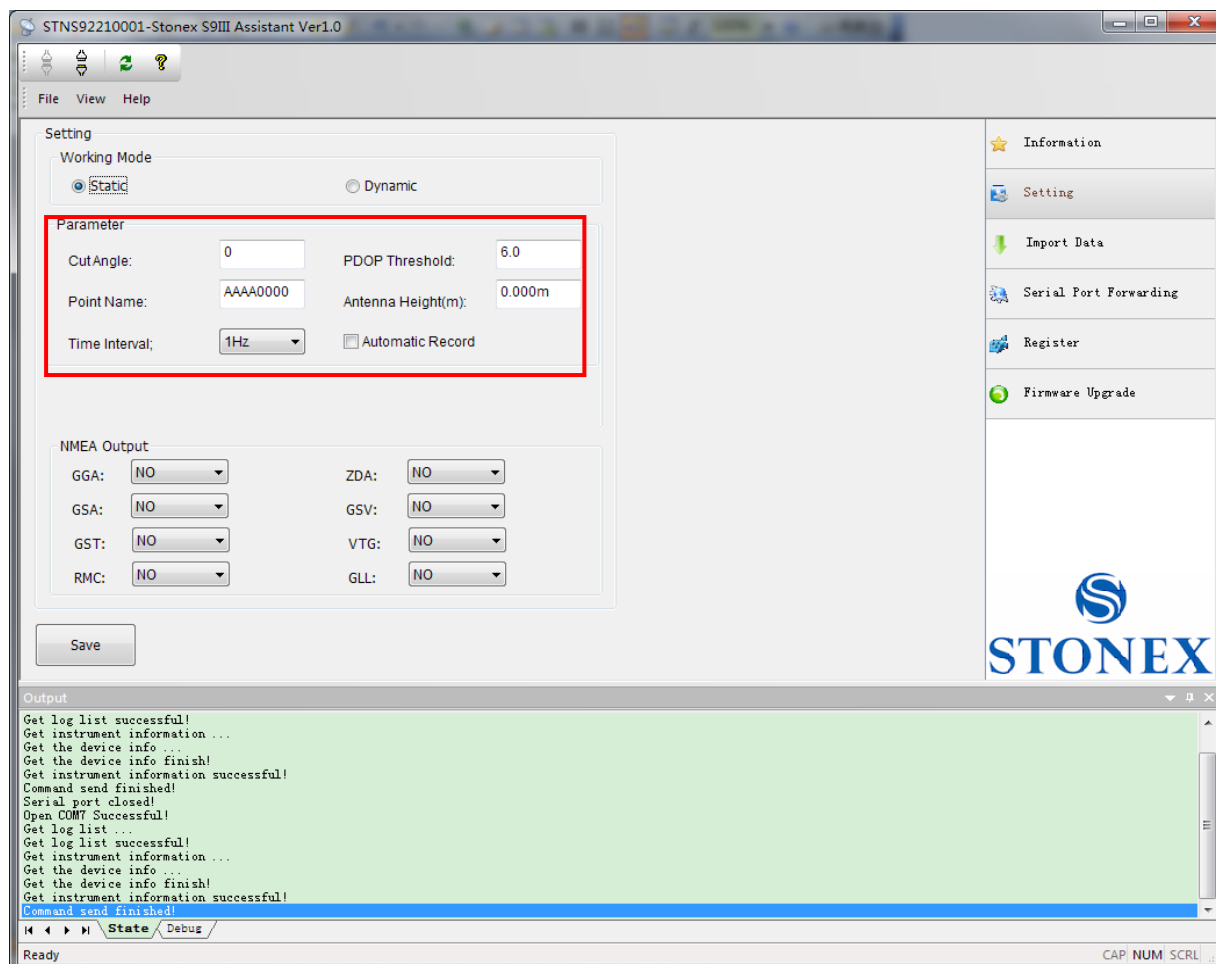


Fig. 5.5 – Static working mode

From here you can control following data settings:

Cut Angle: Define the minimum elevation of satellite to be collected in order to avoid noisy satellites (suggested value between 20° and 10°).

PDOP Threshold: Define the maximum value of PDOP for valid GPS data in order to avoid bad satellite configuration in the sky (suggested value below 3).

Point Name: Assign a “name” to the point you are surveying.

Antenna Height: Introduce GPS antenna height from ground, see Par IV.5 .

Time Interval: Set sampling frequency between different GPS epochs (from 60 s to 5 Hz).

Automatic Record : Start automatic GPS static survey after power on. For static survey this option strictly NEED to be enabled in Stonex Assistant.

When the configuration is completed, click on button “Save” to update the Receiver configuration.

V.2.2. Dynamic working mode

In the Dynamic working mode (Rover or Base) the following parameters should be specified, as you can see in Fig. 5.6.

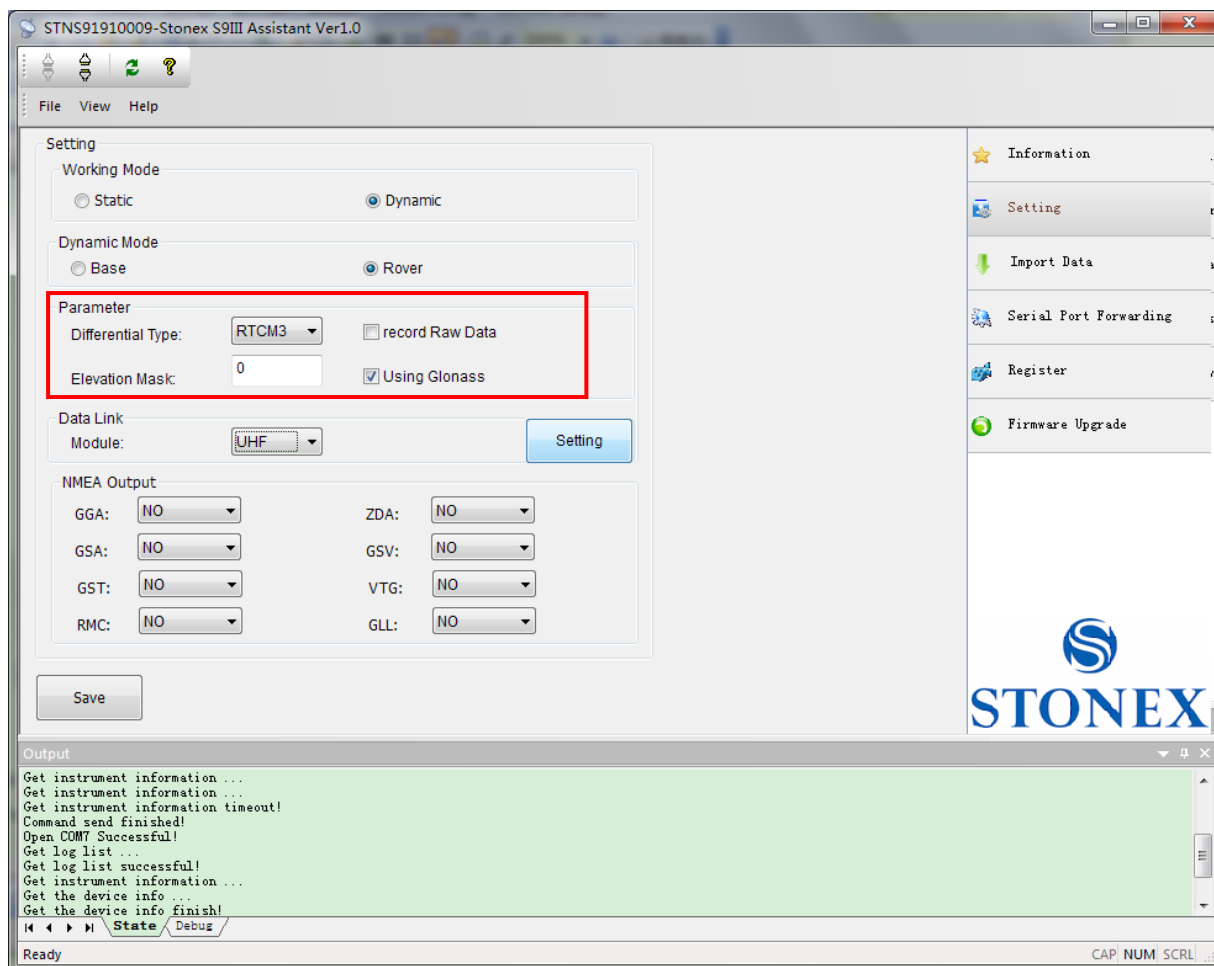


Fig. 5.6 – Dynamic working mode parameters

Differential type: To select the format of the differential corrections transmitted or received.

Elevation mask: Define the minimum elevation of used satellite to be collected in order to avoid noisy satellites (suggested value between 20° and 10°).

Record Raw data: to record raw data inside memory of S8.

Using Glonass: to enable/disable Glonass reception.

V.2.2.1. Base coordinates setting

If you choose “Dynamic” and “Base” option, a “Base Setting” button will appear on the screen, see red arrow in Fig. 5.7. Click on it, and the Base Setting module will appear on the screen:

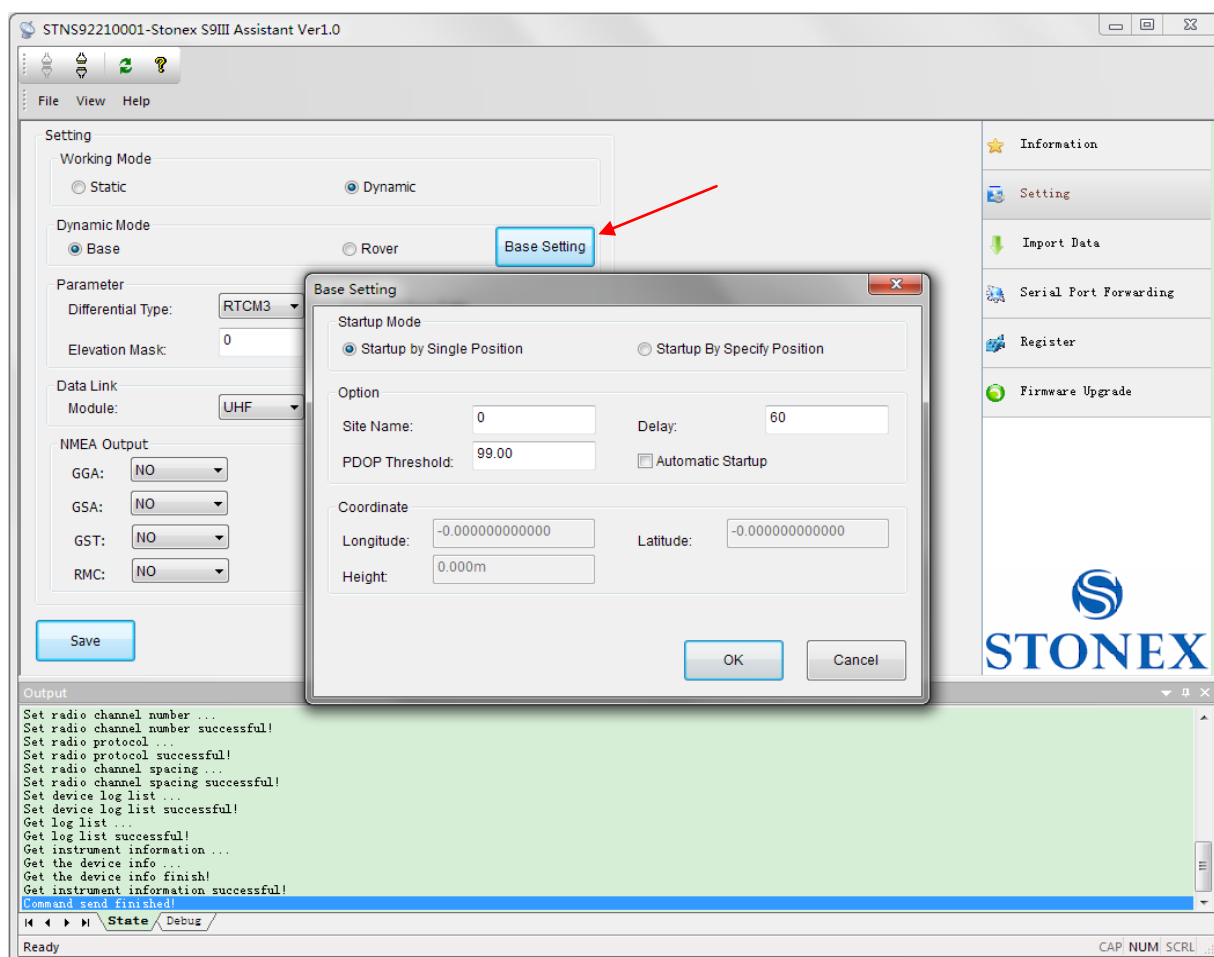


Fig. 5.7 – Base Setting window

Inside this form, you can choose if the Base coordinates must be inserted manually (“Start Up By Specific Position”) if known, or calculated from GPS observations (Automatic Start Up By Single Position) if unknown.

Automatic Start Up By Single Position

If checkbox “Automatic Start Up” is selected, the GPS Receiver will calculate the geographical coordinates of the base using an average value from GPS observations. The time delay to be wait before switching on for base transmission must be inserted in the Text Box “Delay”.

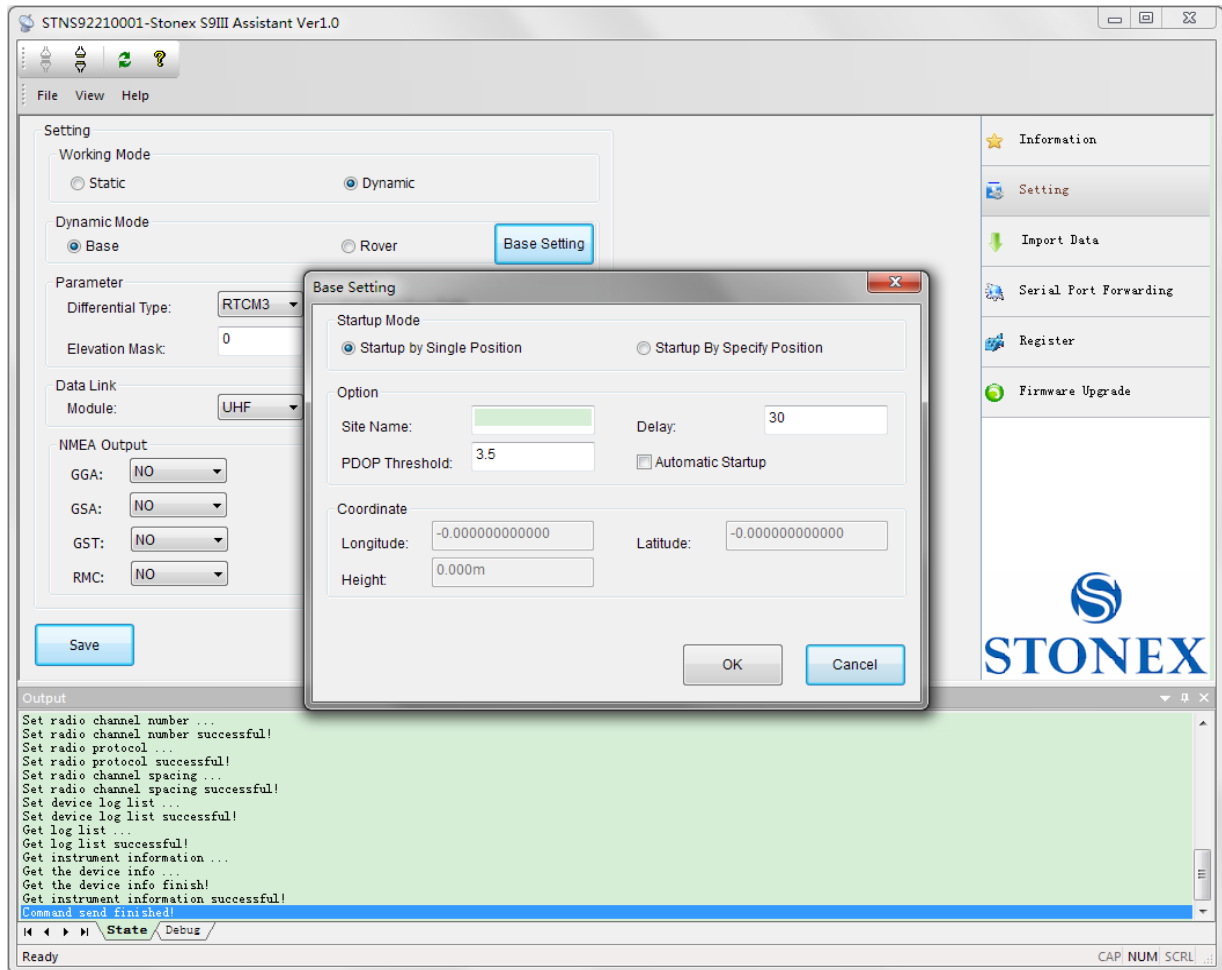


Fig. 5.8 – Automatic Start Up By Single Position

Click “OK” to confirm your data entry.

Start Up By a Specific Position:

By choosing the “Start Up by Specific Position” it is possible to introduce directly the geographical coordinates of the base (Known point): you can insert also geocentric X,Y,Z.

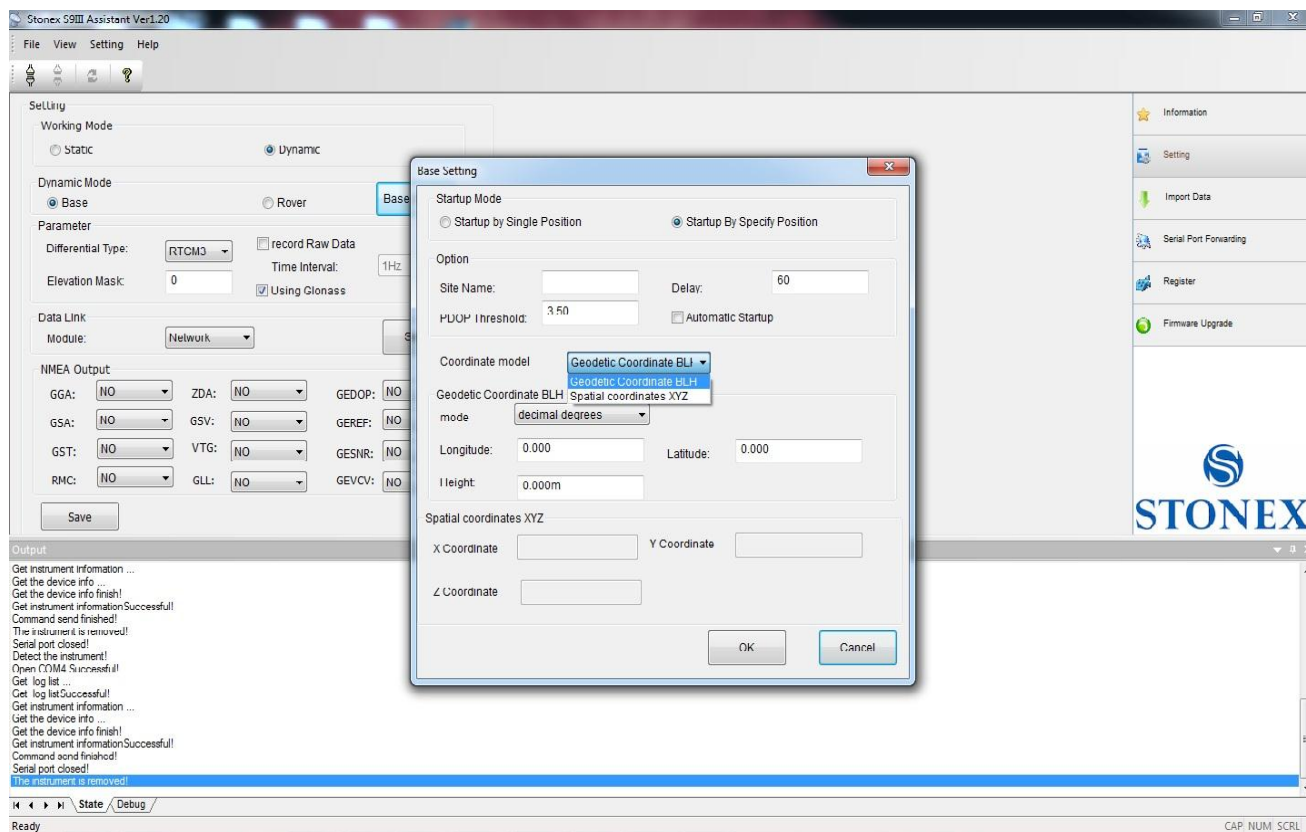


Fig. 5.9 – Start Up by a specific position

V.2.3. Data Link

Here you can select the type of datalink used to get/provide differential corrections.

Four different options are available for “rover” mode: GPRS/GSM modem (“Network”), internal radio (“UHF”), external radio or external device (“External”), Bluetooth device (“Bluetooth”), or no datalink (“No Data link”).

In the “base” mode we have the same first four choices (Network, UHF, External, Bluetooth) and another choice, that is “Network and External”, which allows base to transmit at the same time to the GPRS/GSM modem and to the external device.

V.2.3.1 Network

This option is relative to get GNSS differential corrections from a CORS system.

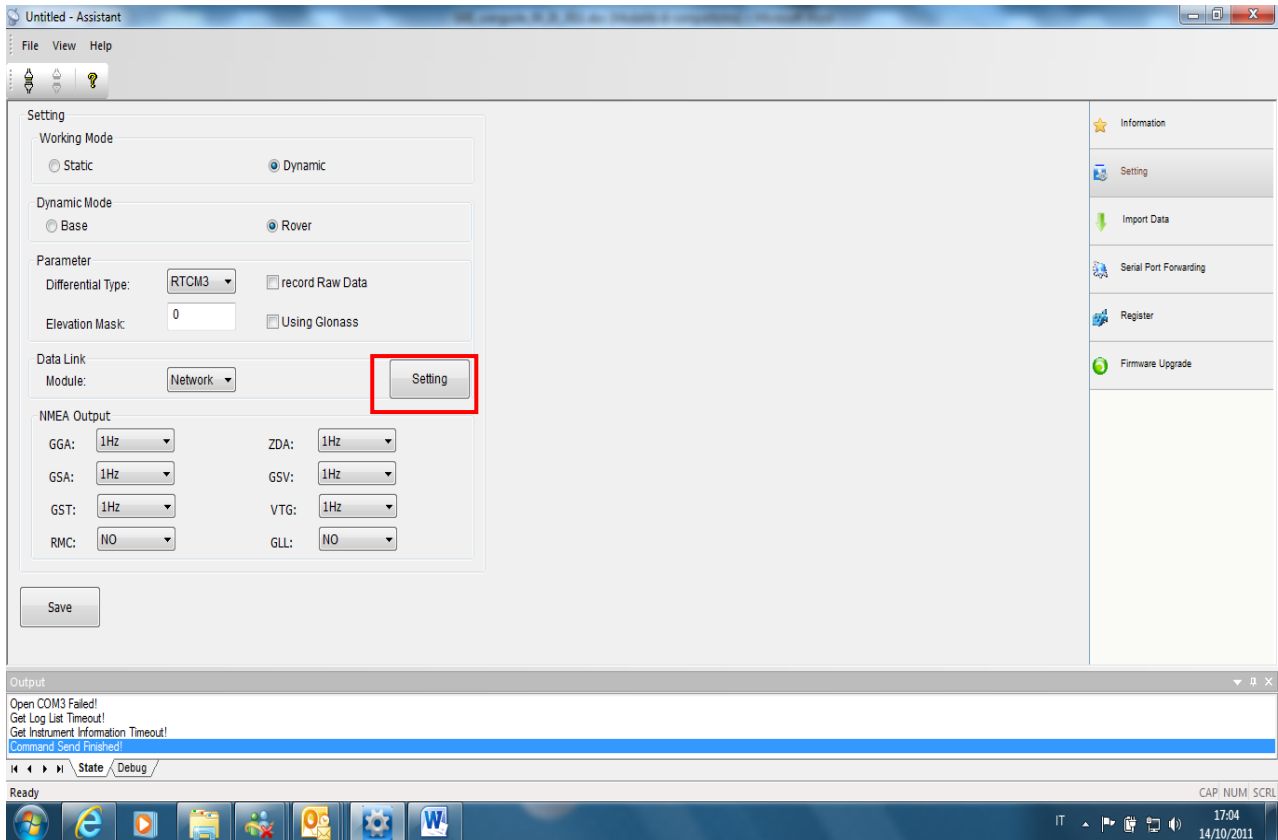


Fig. 5.10 – Network

If you will click on the button “Settings” (red rectangle in Figure 5.10), a new form will open. From here you can choose the type of connection:

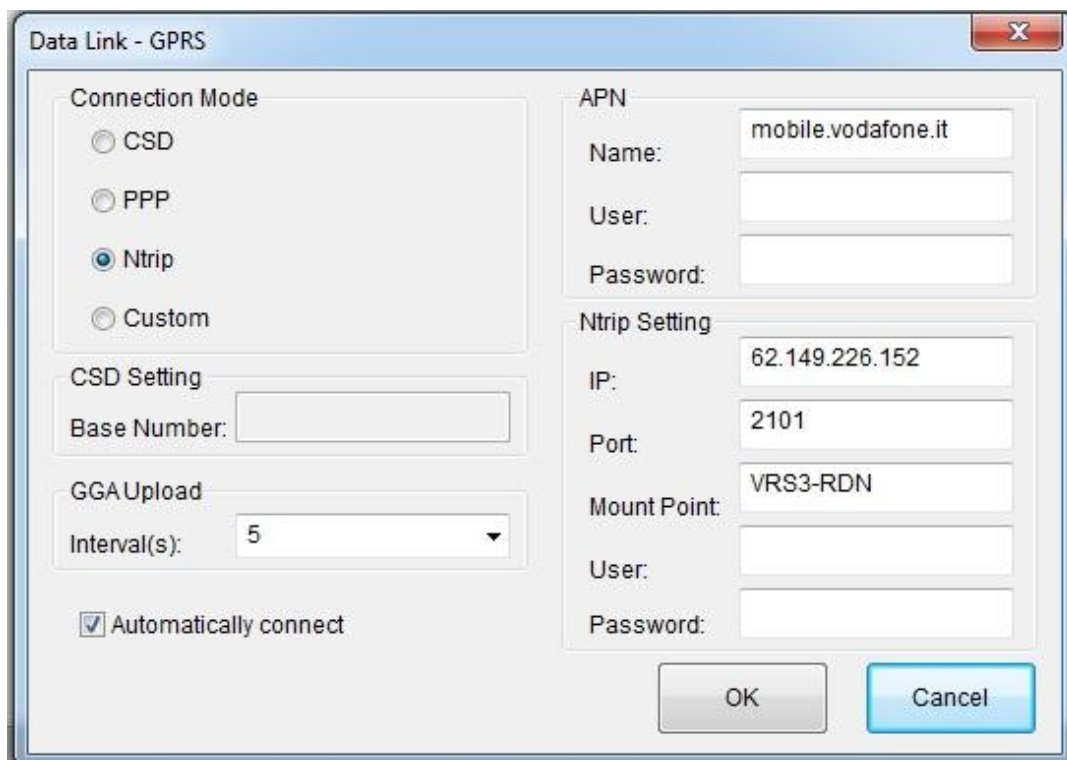
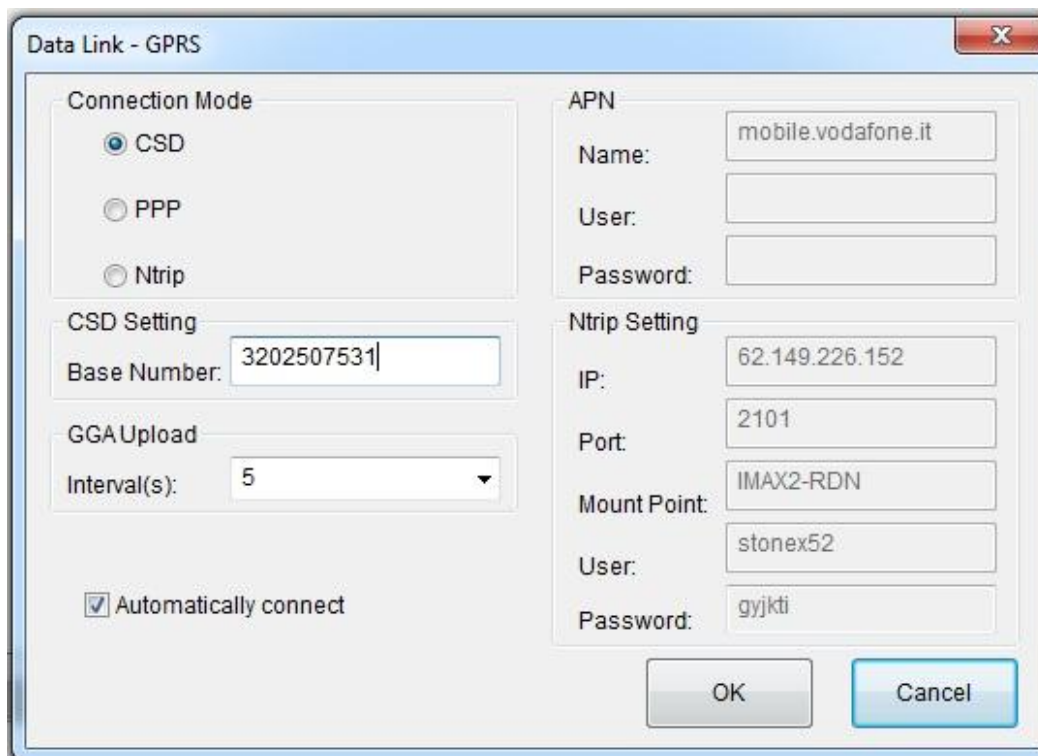


Fig. 5.11 – Network menu

CSD: Normal dial GSM call, using a phone number that you can insert in “Base Number” Text Box. When user need to set a rover for a direct call, the right part of the page becomes grey (see in Figure 5.12), in the left part he should insert:

- a) the Base SIM telephone number
- b) set an interval for GGA upload (the suited interval depends of the correction source)
- c) enable the automatic connection.

In the base configuration he should only enable the automatic connect, not other set is required, it is also necessary to switch on first the base and then the rover. Anyway you can also refer to a specific tutorial regarding how to set a direct call between two S8.

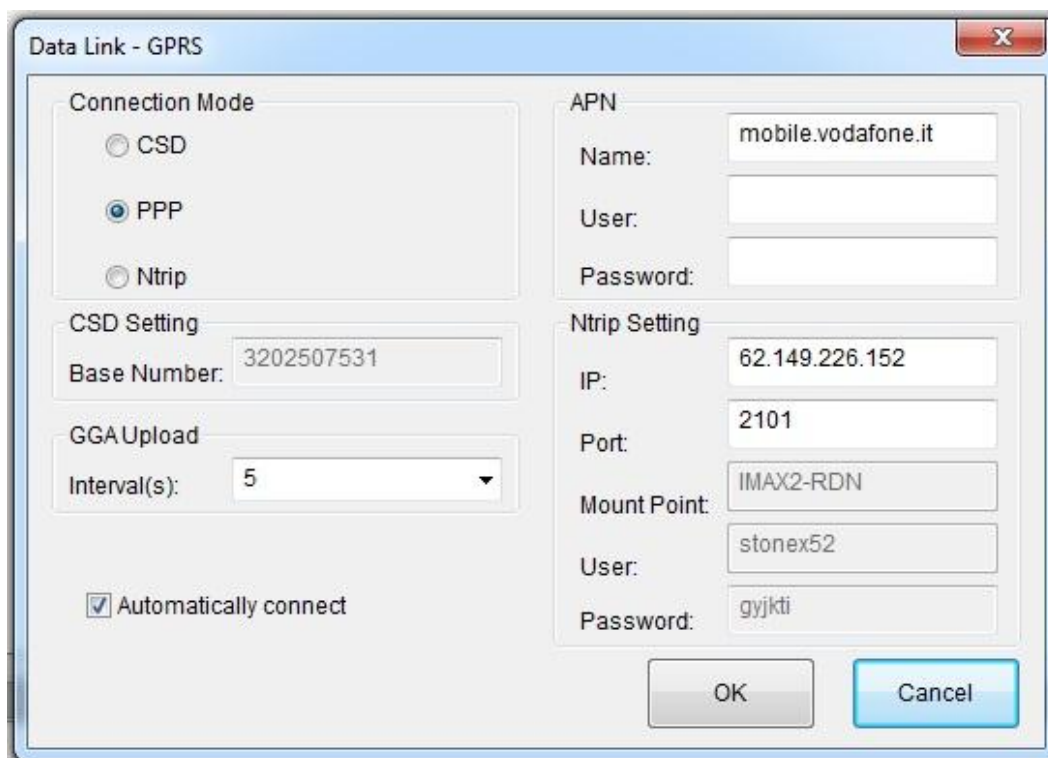


The image shows a software window titled "Data Link - GPRS" with a close button (X) in the top right corner. The window is divided into two main sections. The left section contains "Connection Mode" with three radio buttons: "CSD" (selected), "PPP", and "Ntrip". Below this is a "CSD Setting" group with a "Base Number" text box containing "3202507531". Underneath is a "GGA Upload" group with an "Interval(s)" dropdown menu set to "5". At the bottom left is a checked checkbox labeled "Automatically connect". The right section contains "APN" settings with "Name" (mobile.vodafone.it), "User", and "Password" text boxes. Below that is an "Ntrip Setting" group with "IP" (62.149.226.152), "Port" (2101), "Mount Point" (IMAX2-RDN), "User" (stonex52), and "Password" (gyjkti) text boxes. At the bottom right are "OK" and "Cancel" buttons.

Fig. 5.12 – CSD Settings

PPP: For VPN (Virtual Private Network) users, where each SIM card has assigned a static IP address, or for a connection with a single CORS station. Therefore the rover can be connected directly to the base via entering the base IP. The user have to set into the right part (see Figure 5.13):

- APN parameters for internet connection, that depends on the provider of the network connection, usually only "Name" is required.
- IP address and port.



The image shows a 'Data Link - GPRS' dialog box with the following settings:

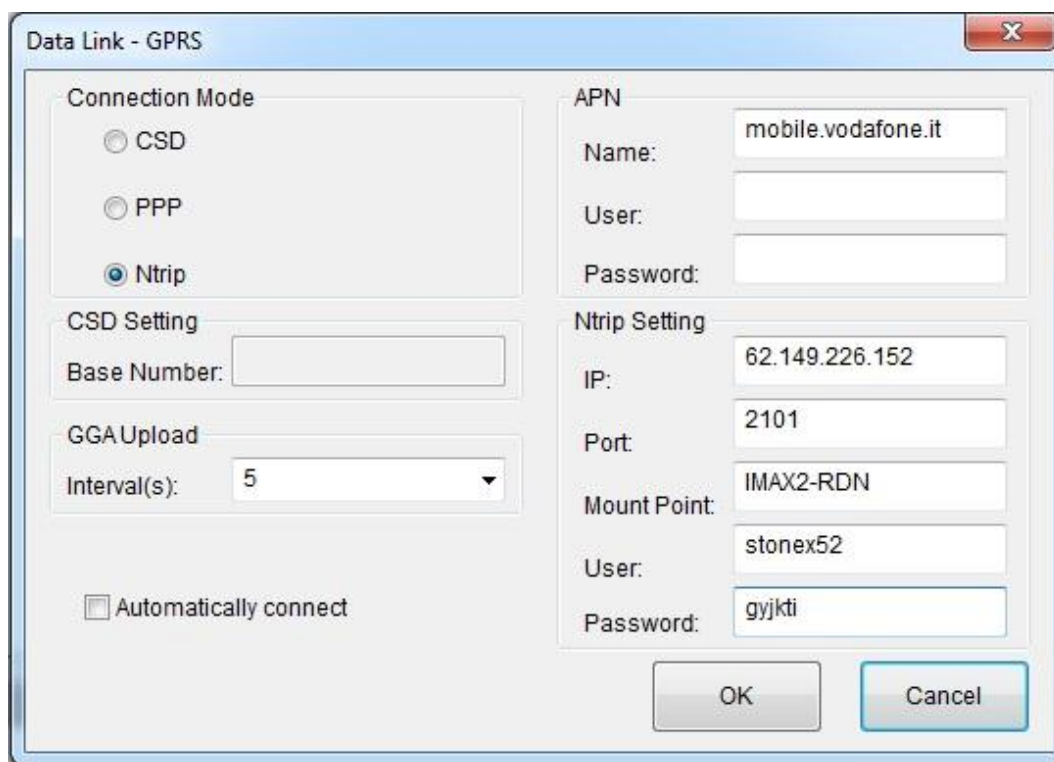
- Connection Mode:** CSD (unselected), **PPP** (selected), Ntrip (unselected).
- CSD Setting:** Base Number: 3202507531.
- GGA Upload:** Interval(s): 5.
- Automatically connect:** Checked.
- APN:** Name: mobile.vodafone.it, User: (empty), Password: (empty).
- Ntrip Setting:** IP: 62.149.226.152, Port: 2101, Mount Point: IMAX2-RDN, User: stonex52, Password: gyjkti.

Buttons: OK, Cancel.

Fig. 5.13 – PPP Settings

NTRIP: It is the most common. Connection to a provider using data transfer in accord with NTRIP protocol by internet GPRS connection. If you select this option, you have to insert the following data in the right side (see Figure 5.14):

- APN parameters for internet connection.
- NTRIP setting parameters: IP address of CORS provider, Port number, Type of Mount Point, User Name and Password of the user.



The screenshot shows a dialog box titled "Data Link - GPRS". It contains several sections:

- Connection Mode:** Three radio buttons are present: "CSD", "PPP", and "Ntrip". The "Ntrip" button is selected.
- CSD Setting:** A text field labeled "Base Number:" is empty.
- GGA Upload:** A section with a label "GGA Upload" and a dropdown menu labeled "Interval(s):" set to "5".
- Automatically connect:** A checkbox that is currently unchecked.
- APN:** A section with three text fields: "Name:" (containing "mobile.vodafone.it"), "User:" (empty), and "Password:" (empty).
- Ntrip Setting:** A section with five text fields: "IP:" (containing "62.149.226.152"), "Port:" (containing "2101"), "Mount Point:" (containing "IMAX2-RDN"), "User:" (containing "stonex52"), and "Password:" (containing "gyjkti").

At the bottom right, there are "OK" and "Cancel" buttons.

Fig. 5.14 – NTRIP Settings

GGA Upload: input window provide the interval of NMEA GGA string upload, this string contains the rover coordinates that must be sent to the CORS or base, the proper interval depends on the base.

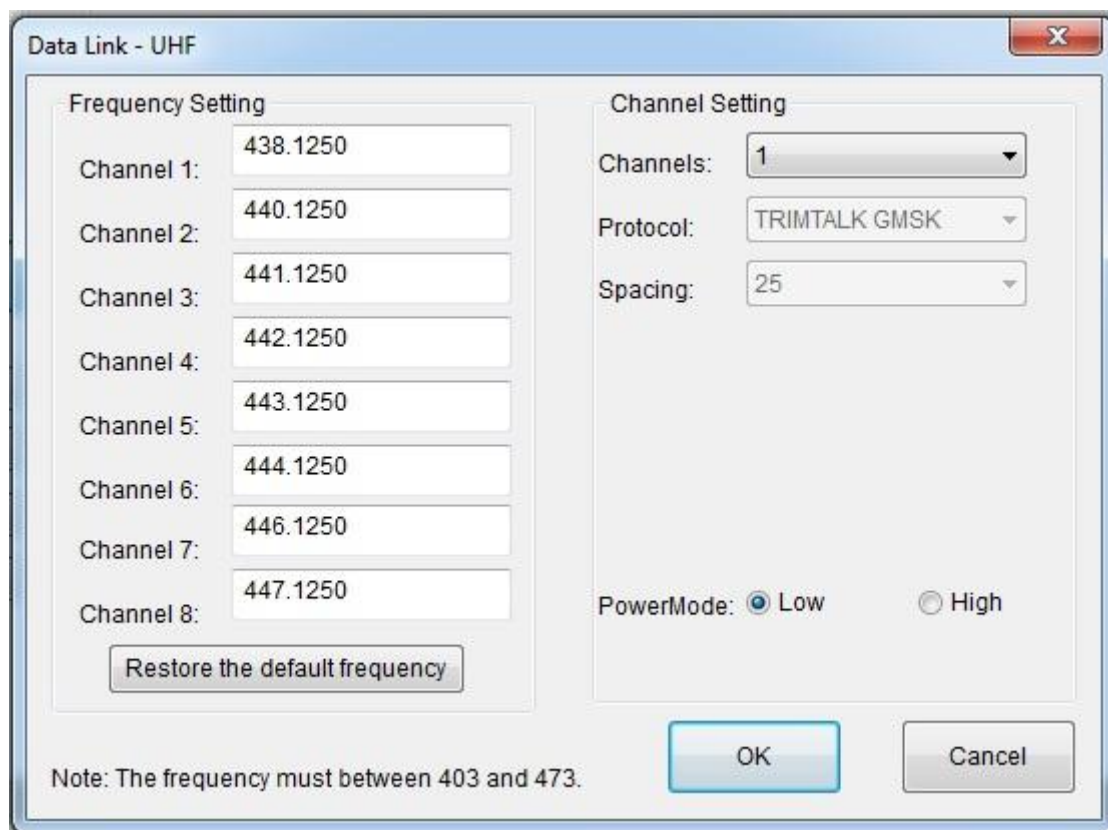
Automatically connect: when this box is enabled, the receiver, as soon as it is switched on, will try automatically the connection to the previously stored server without need that user sends any command through a software.

Click on "OK" button to confirm your entry.

V.2.3.2 UHF Radio

Choose this option when you are taking differential corrections from your GPS Base.

If you select UHF from the Scroll box and click the "Setting" Button a new form will open, where you can introduce following data: Frequency settings, Channel number and Transmitting power, as you can see in Fig 5.15.



The dialog box titled "Data Link - UHF" contains two main sections: "Frequency Setting" and "Channel Setting".

Frequency Setting: This section lists eight channels, each with a text input field for its frequency in MHz. The frequencies are: Channel 1: 438.1250, Channel 2: 440.1250, Channel 3: 441.1250, Channel 4: 442.1250, Channel 5: 443.1250, Channel 6: 444.1250, Channel 7: 446.1250, and Channel 8: 447.1250. Below these fields is a button labeled "Restore the default frequency".

Channel Setting: This section includes a "Channels:" dropdown menu currently set to "1", a "Protocol:" dropdown menu set to "TRIMTALK GMSK", and a "Spacing:" dropdown menu set to "25". At the bottom of this section are two radio buttons for "PowerMode": "Low" (which is selected) and "High".

At the bottom of the dialog box, there is a note: "Note: The frequency must between 403 and 473." and two buttons: "OK" and "Cancel".

Fig. 5.15 - UHF Radio Settings

Frequency setting: insert the frequency, expressed in MHz, of the radio link associated to each channel. There are 8 channels available in the internal UHF radio.

Channels: Selected the "default" Radio channel active after power on.

Power mode: Select the transmission power level low (0,5 Watt) or high (1 Watt).

Please note that Protocol and Spacing option cannot be modified, they are "TrimTalk GMSK" and 25 KHz.

Click on button "OK" to confirm your choice.

V.2.3.3 External

This option gives us the possibility to use an external device, usually an external UHF Radio connected by cable at lemo-5 connector.

If you select "External" and Click on "Settings", a new form will open and in this form you can

insert the baud rate of the external radio:

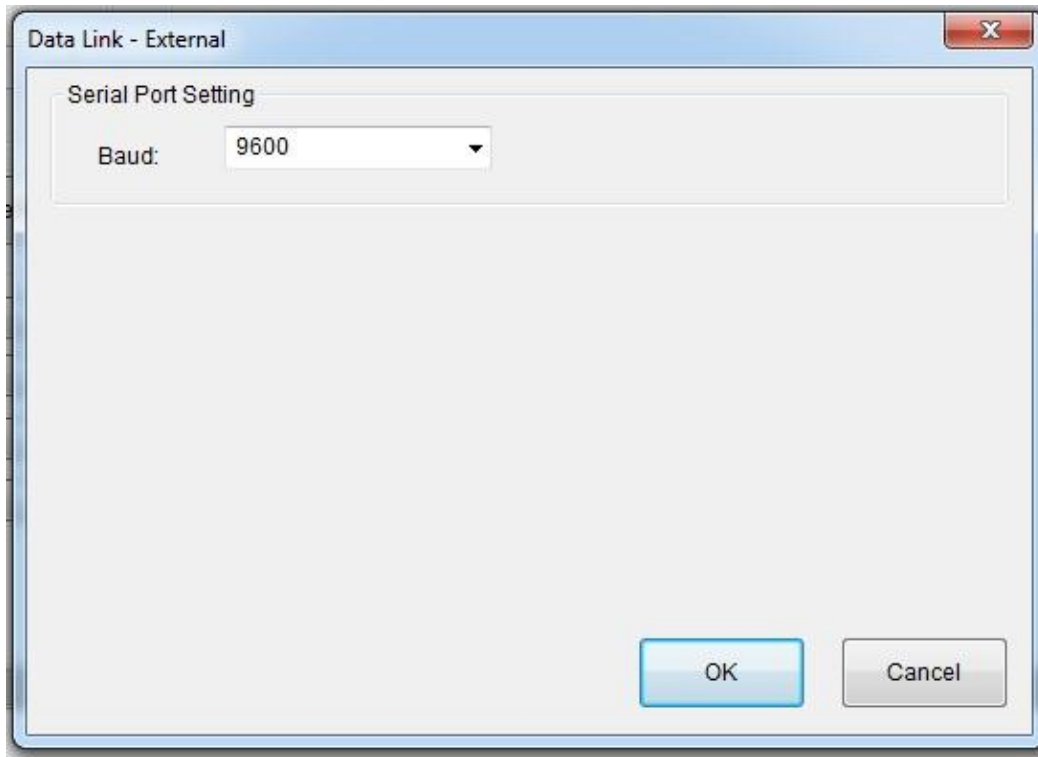


Fig. 5.16 - External radio baud rate

Click on button "OK " to confirm.

V.2.3.4. Bluetooth

This option give us the possibility to use Bluetooth device for RTK data exchange. In this case the same channel with commands and position information between handheld and receiver is used also for transmitting the differential corrections from handheld to the receiver, for example if the handheld is connected through internet or it is connected to a mobile phone connected to internet. Please remember that if you select Bluetooth as datalink, you do not see any datalink led on the display.

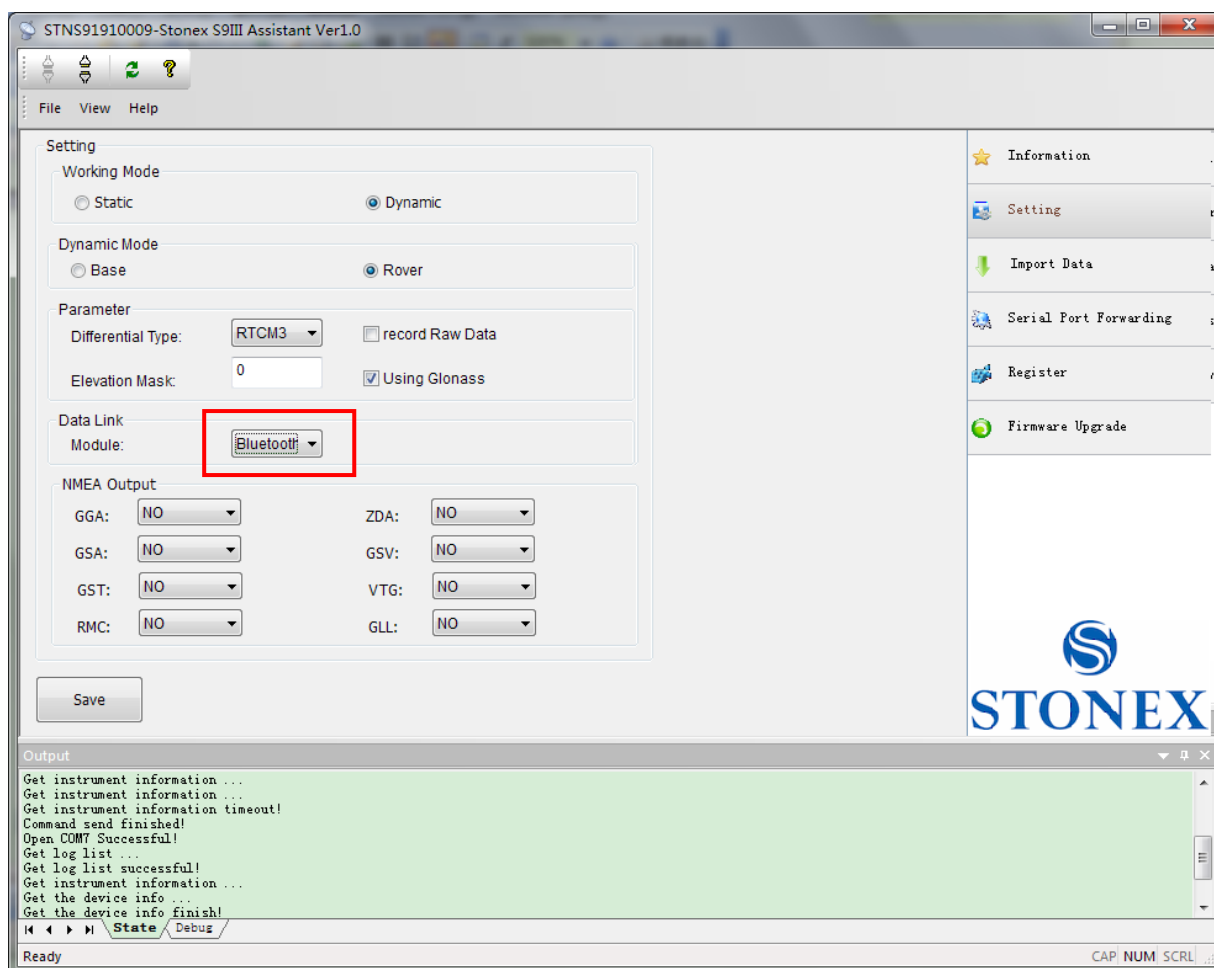


Fig. 5.17 - Bluetooth

When you have completed all your selection, please click on “Save” button and the configuration will be stored inside S8 memory.

V.2.3.5. No Datalink – only for Rover

This option has to be selected if customer don’t need any kind of corrections.

V.2.3.6. Network and External - only for Base

This option give to the base the possibility to transmit the corrections to two different data links at the same time: to an external device and to the GSM/GPRS modem. This case can be

useful for example if the external device is an external radio, but the customer knows that can be too far for receiving the radio signal, so he can put a SIM card inside his rover and try a direct GSM call to the base, this is an example but there can be others application of this functionality. In Figure 5.18 you can see the setting for the described example: the CSD mode is selected, the “automatically connect” function is enabled, at the same time the baud-rate for external radio connection is set to 19,200.

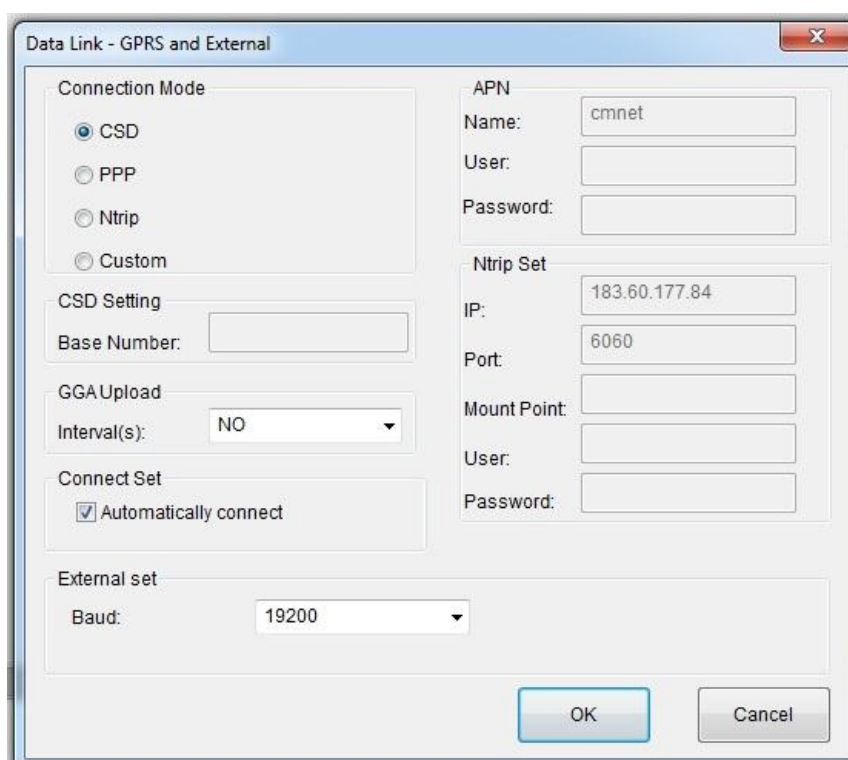


Fig. 5.18 – Network and External option

V.2.4 NMEA Output string

NMEA output messages setting is available in the Setting session, as you can see in the following figure 5.19.

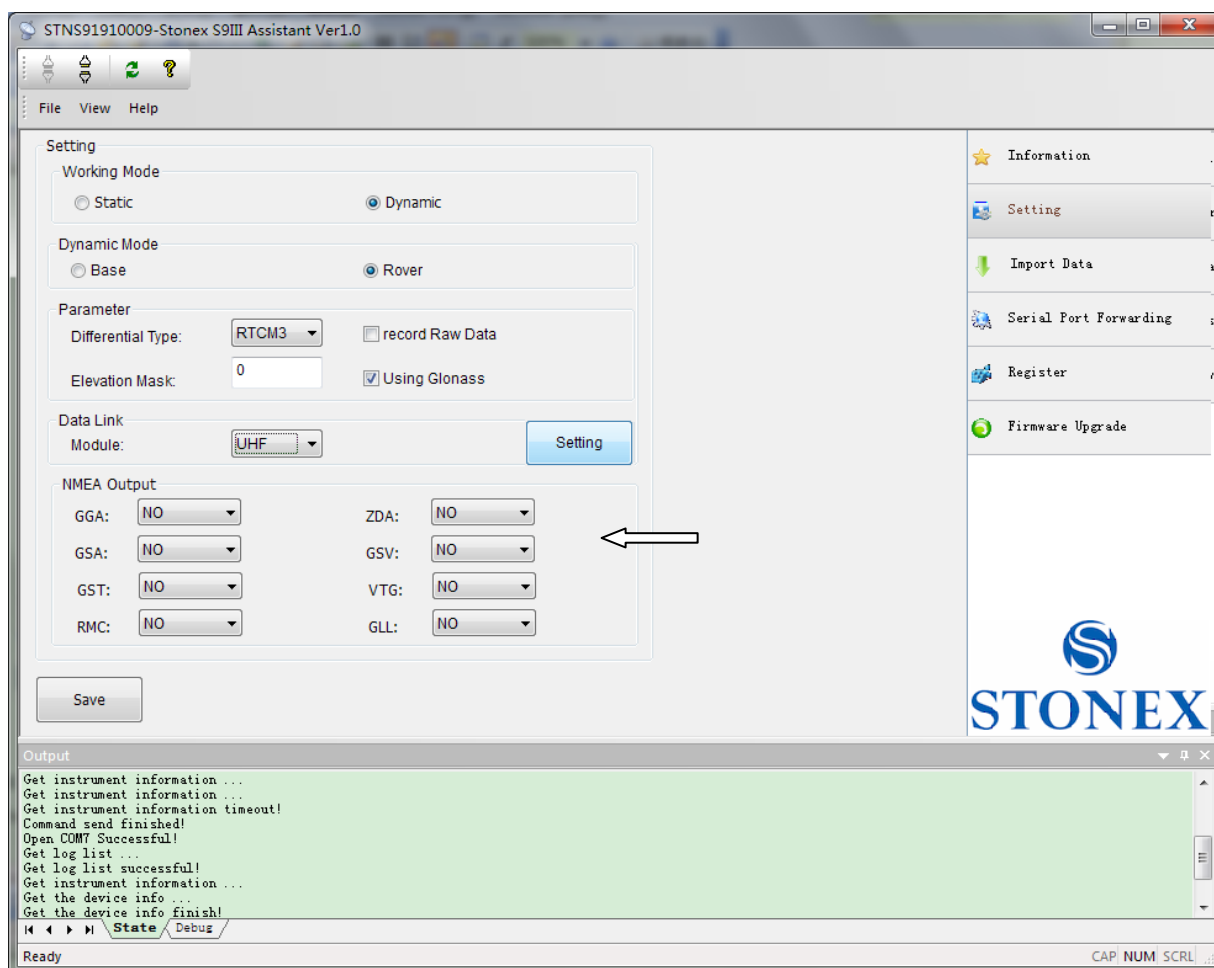


Fig 5.19 - NMEA String

In this area you can configure the default NMEA messages that are output to the datalogger at the startup of the receiver, enabling or disabling the different string.

V.3 Import Data

This section of the Assistant allows the user to download raw data from S8 memory to Pc, instead of doing manual copy of files. After connecting the receiver click on “Import Data”: a new window is opened as in Fig. 5.20.

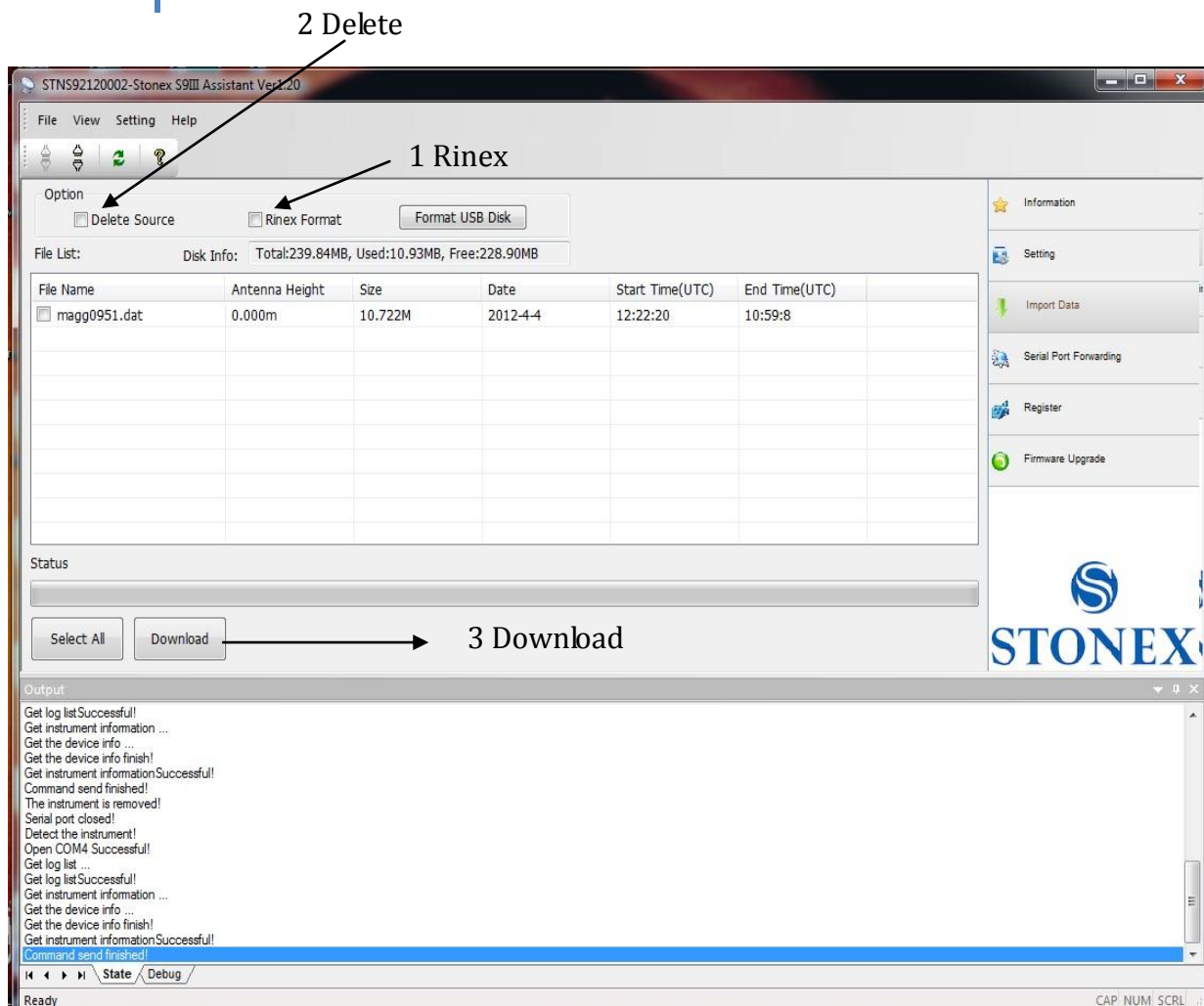
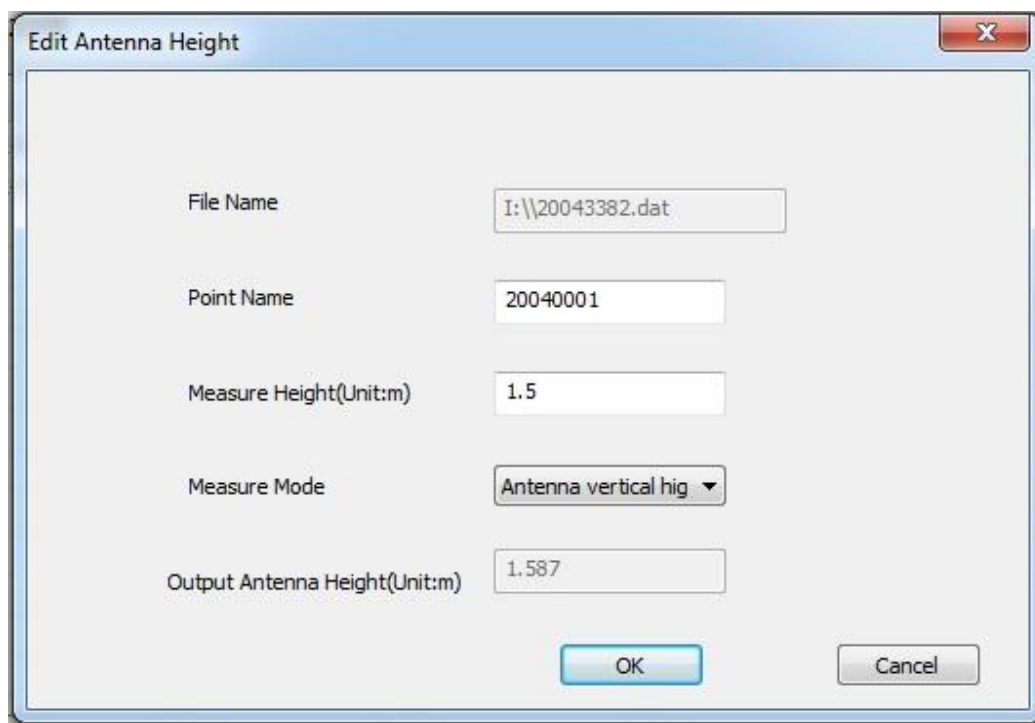


Fig. 5.20 – Import Data window

Inside this window you can see all files saved in the memory of S8 (excluding the configuration file), which are files with raw GPS measures.

By checking only one box or more at the left of each file, you can select it for download operations. You can also choose to convert the downloaded file into RINEX format by checking at box “Rinex Format” in the Option area on the top of the page (1). Checking at “Delete Source” you can enable the automatic erase of the selected files after download on the PC memory (2). Using the “Download” button, at the bottom of the form (3), you can save the marked files on your PC, in the folder you prefer. If you double click on one row, you can also modify the value of the antenna height of the receiver used during survey, as you can see in

Figure 5.21 :



The image shows a software dialog box titled "Edit Antenna Height". It contains five input fields and two buttons. The fields are: "File Name" with the value "I:\\20043382.dat", "Point Name" with the value "20040001", "Measure Height(Unit:m)" with the value "1.5", "Measure Mode" with a dropdown menu showing "Antenna vertical hig", and "Output Antenna Height(Unit:m)" with the value "1.587". At the bottom right are "OK" and "Cancel" buttons.

Field	Value
File Name	I:\\20043382.dat
Point Name	20040001
Measure Height(Unit:m)	1.5
Measure Mode	Antenna vertical hig
Output Antenna Height(Unit:m)	1.587

Fig. 5.21 – Edit Antenna Height window.

In the “Edit Antenna Height” menu you can modify the point name, insert the correct antenna height in meters and specify how the height was measured (“Measure Mode” box), there are three different option:

- a) Antenna phase center : from ground to the phase center (not possible from the practical point of view)
- b) Antenna slant height mode : from ground to the white line in the middle of blue rubber.
- c) Antenna vertical height : from the ground to the bottom of receiver.

In “Output Antenna Height” box you will see the resulting antenna height from ground to the phase center.

V.4 Serial Port Forwarding

This function is for advanced users and technical support only.

Port forwarding allows the configuration of the GNSS OEM module, UHF module and GPRS module directly. This functionality is valid only for DB9 serial port connection from 5-pin Lemo. Click on “Serial Port Forwarding”: a new window is opened as in Fig. 5.22.

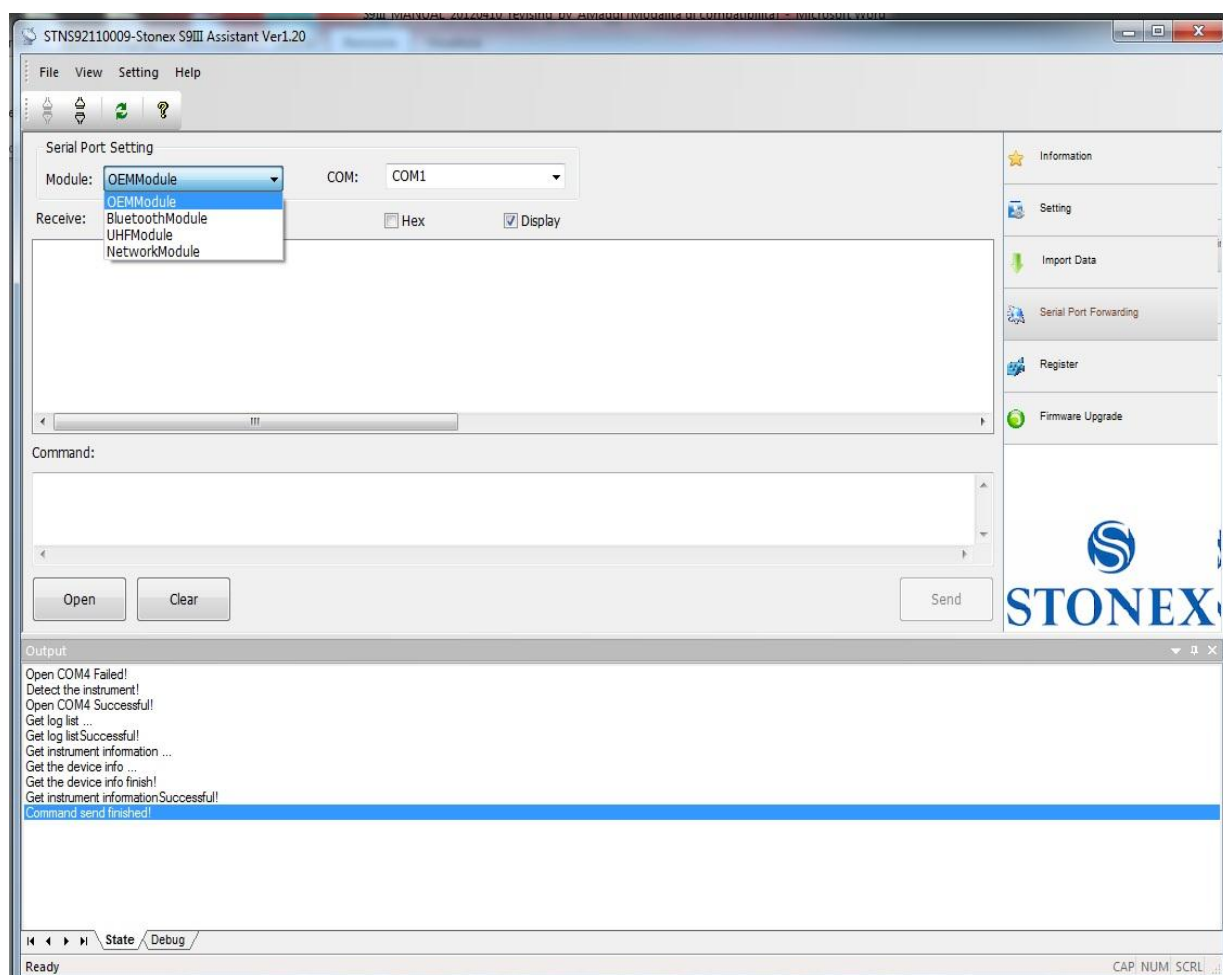


Fig. 5.22 – Serial Port Forwarding window

Select the module you want to connect and the serial port then press “Open”, then follow the instruction to restart the receiver. Then you will be able to communicate with the module directly. Please note that unintended commands might affect the operation of the receiver.

V.5 Register

This command allows you to register the license code in a different way with respect to that explained in chapter IV.7. Click on “Register” and a window as in Fig. 5.23 is opened.

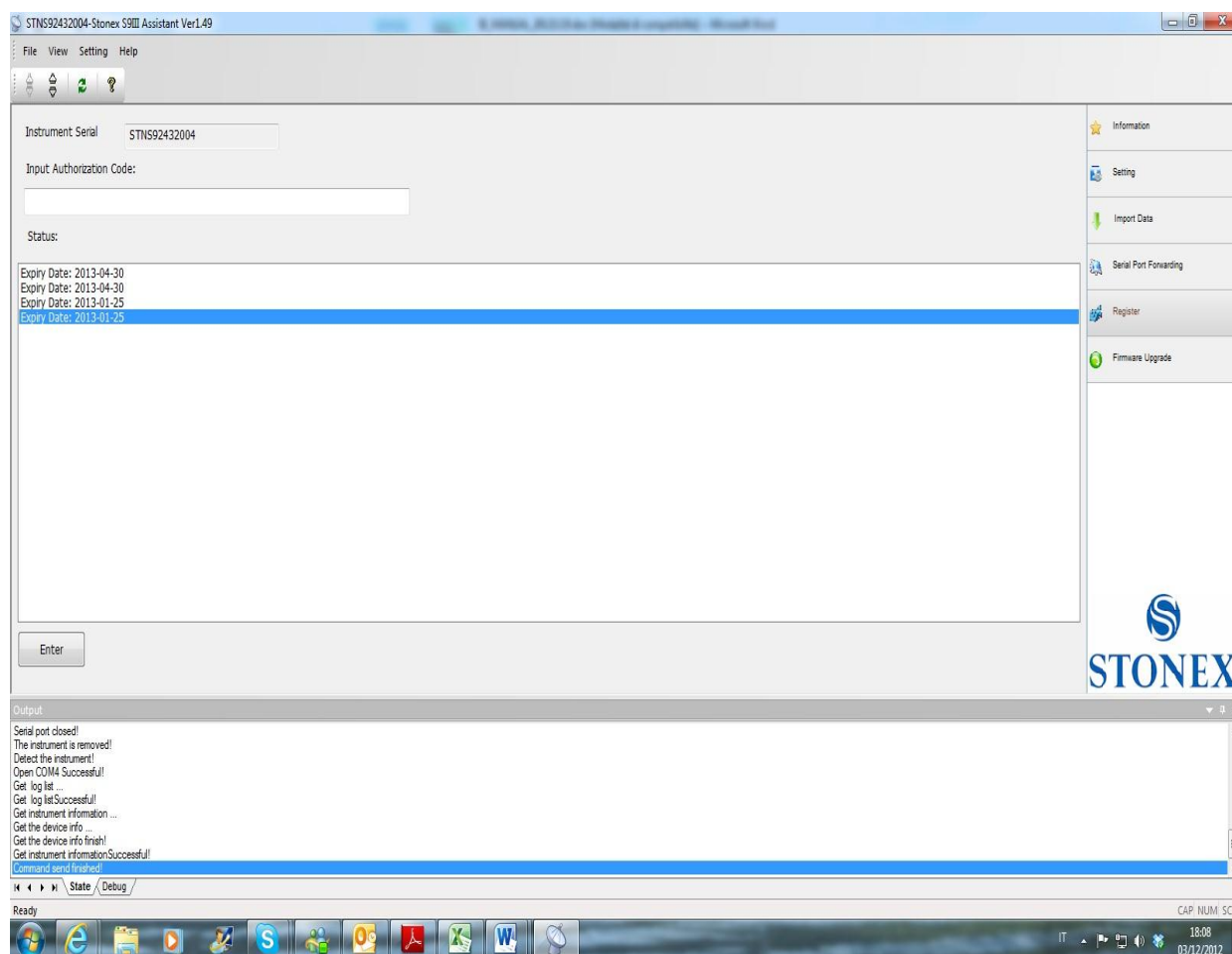


Fig. 5.23 –Register the receiver

- a) In the “Status” window, you can see the data of expiry of the license, **if the expire date contains the year 2050, it means that the license is already permanent.**
- b) In the “input authorization code” window you can insert the new temporary or permanent code provided by Stonex. Click on “Enter” to confirm. A confirmation box is

opened, push “Confirm” to allow the new code installation.

If your code is expired, please ask to your local dealer/agent.

V.6 Firmware update

Click on “Firmware Upgrade” button and a new window as in Fig. 5.24 is opened. Then click on “Upgrade” button showed by red rectangle to select the location of the folder where the update firmware is located. Then select the firmware file and automatically it will be downloaded into the receiver, finally restart the receiver.

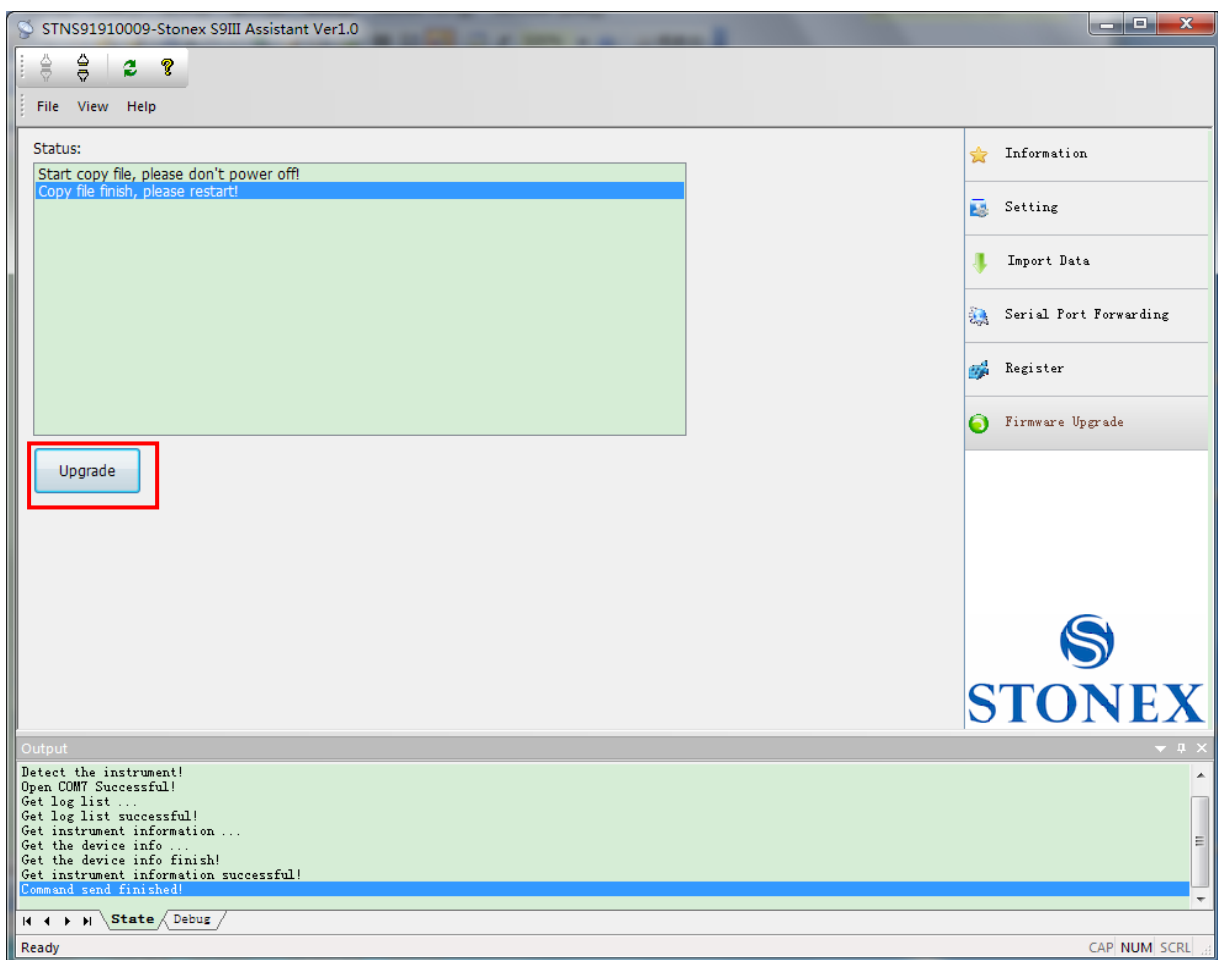


Fig. 5.24 – Firmware update window

If Stonex will release a new firmware, you will receive a communication from your local dealer/agent. In any other case before doing this operation please ask to the technical support of your dealer or of Stonex Support office.

Appendix 1: Default Radio Settings

S8 uses a single UHF radio to cover the different the whole band 410-470 MHz . Preset values is done directly from Stonex Europe in accord to the following tables :

Rate Channels	MHz
1 channel	411.050
2 channel	412.050
3 channel	413.050
4 channel	414.050
5 channel	415.050
6 channel	416.050
7 channel	417.050
8 channel	418.050

Tab. 6.1 – Internal radio default frequency (MDA)

Rate Channels	MHz
1 channel	438.125
2 channel	440.125
3 channel	441.125
4 channel	442.125
5 channel	443.125
6 channel	444.125
7 channel	446.125
8 channel	447.125

Tab. 6.2 – Internal radio default frequency (MDB)

Rate Channels	MHz
1 channel	464.500
2 channel	464.600
3 channel	464.450
4 channel	464.650
5 channel	464.400
6 channel	464.700
7 channel	465.350
8 channel	466.750

Tab. 6.3 – Internal radio default frequency (MDC)

Appendix 2: Self-check procedure

Self-Check: it is a procedure predisposed for verifying the correct working of the instrument devices, the operation way is:

- Press and hold I key for more than 10 seconds, as for turning it off, but keeping pressed the key after all lights have turned off.
- Release the key when you hear another beep: receiver will start to make a self-check.

Self-check lasts typically around 30 seconds. During this procedure the meaning of lights is:

- Internal radio led: *ON* if UHF module pass the test; *FLASH* if UHF module fails the test.
- GSM/GPRS led: *ON* if GSM/GPRS module pass the test; *FLASH* if GSM/GPRS module fails the test.
- satellite led: *ON* if GNSS OEM module pass the test; *FLASH* if GNSS OEM module fails the test

If you have noticed at least one problem during self-check, please contact your local dealer or email to support@stonex.it

After the self-check procedure the receiver will turn on and begin to work normally.

Appendix 3: Technical Specifications

GNSS module specifications ():*

- Channels: 120

Satellite signals tracked:

- GPS: Simultaneous L1, L2, L2C.
 - GLONASS: Simultaneous L1, L2.
 - GALILEO: E1.
 - GIOVE-A, GIOVE-B: test.
 - COMPASS: reserved
 - SBAS.
-
- Horizontal Position Accuracy (RMS)
 - Single Point L1 1.5 m
 - Single Point L1/L2 1.2 m
 - SBAS 0.6 m
 - DGPS 0.4 m
 - RT-20 0.2 m
 - RT-2™ 1 cm+1 ppm
 - Initialization time < 10 s
 - Initialization reliability > 99.9%
-
- Data Rate
 - Measurements up to 50 Hz
 - Position up to 50 Hz

- Default rate: 1Hz
- Time to First Fix
 - Cold Start < 50 s
 - Hot Start < 35 s
- Signal Reacquisition
 - L1 < 0.5 s (typical)
 - L2 < 1.0 s (typical)
- Time Accuracy 20 ns RMS
- Velocity Accuracy 0.03 m/s RMS
- Velocity Limit 515 m/s
- Internal Memory: 4 Gb with micro SD card (over than 60 days of raw static data storage with recording sample every 1 second)
- 256Mb without micro SD card

Connection devices and protocols :

- Connectors I/O: 7-pins LEMO and 5-pins LEMO interfaces.
- Multi-cable with USB interface for connecting with PC.
- 2.4GHz Bluetooth device class II: maximum range is 50m.
- GSM/GPRS data modem
- Cable for RTK connection by external datalink(optional).
- Serial protocols

Reference outputs: CMR, CMR+, RTCM 2.3, RTCM 3.0, RTCM 3.1.

Navigation outputs: GGA ZDA GST GSV GSA GGK GLL RMC VTG

Radio module

- Internal transmitting and receiving radio: MDS TRM 450
- Frequency range available: 410-470 MHz.
- Emitting power: 0.5 W – 1 W
- Compatibility with Trimtalk protocol (Trimble/Pacific Crest radio).

GPRS/GSM module

The GPRS/GSM board mount a Telit_GC864-QUAD_V2 unit for GSM/GPRS communication.

This module supports:

- Quad-band operation at 800 MHz, 900 MHz, 1800 MHz, 1900 MHz.
- GPRS Multislot class 12.
- EDGE (E-GPRS) Multishot class 10.
- GSM release 99.
- Output power: class 4 (2 W) for EGSM850 AND EGSM900, class 1 (1 W) for GSM1800 and GSM1900.

Power Supply:

- 9 to a 15V DC external power input with over-voltage.
- Voltage: 7.2 V.
- Working time in static mode: typically 6 hours.

- Working time in RTK rover mode: typically 4 hours.
- Charge Time: typically < 7 hours.
- Power consumption: < 3.8 W.
- Remaining time with battery light blinking: 1 hour.

Physical specification:

- Size: Height 96 mm x Diameter 186mm. 60 mm from the center of the rubber loop to the bottom.
- Weight: 1.2 Kg with internal battery, radio standard UHF antenna.
- Operational temperature: -30°C to 60°C (-13°F to 140°F) (Internal radio TX mode 50°C)
- Storage temperature: - 40°C to 80°C (-67°F to 185°F)
- Waterproof: protected from temporary immersion to depth of 1 meter and from 100% humidity.
- Dustproof.
- Shock resistance: designed to survive a 2m pole drop on the concrete.
- Vibration resistance.

*Typical values. Performance specifications subject to GPS system characteristics, US DOD operational degradation, ionospheric and tropospheric conditions, satellite geometry, baseline length, multipath effects and the presence of intentional or unintentional interference sources.

Appendix 4: Copyrights, warranty and environmental recycling

Copyrights and trademarks

© 2012, STONEX® Limited. All rights reserved.

STONEX®, the STONEX® logo, and S8 GNSS receiver are trademarks of STONEX® Limited

STONEX® Assistant, STONEX® GPS Processor and STONEX® SurvCE are trademarks of STONEX® Limited.

Bluetooth is a trademark owned by Bluetooth SIG, Inc. and licensed to Trimble Navigation Limited. All other trademarks are the property of their respective owners.

Release Notice

This is the November 2012 release of the STONEX® S8 GNSS new model receiver user guide.

The following limited warranties give you specific legal rights. You may have others, which vary from state/jurisdiction to state/jurisdiction.

Standard Limited Warranty

Version 2012

The terms and conditions of this Limited Warranty constitute the complete and exclusive warranty agreement between The Customer or Dealer and STONEX® for the Product and supersedes any prior agreement or representation made in any STONEX® sales document or advice that may be provided to Customer by any STONEX® representative in connection with Customer's purchase of the Product. No change to the conditions of this Limited Warranty is valid unless it is made in written form and signed by an authorized STONEX® supervisor.

STONEX® Europe warrants that its Products:

- (1) are free from defects in materials or workmanship for generally 2 years (see appendix 4).

- a) accessories or specific parts for which different limited warranty period shall apply (see appendix 5).

- (2) have been tested/calibrated in proper working status prior to shipment.

The warranty period starts from date of first sale of the instruments. At its sole discretion, under the warranty period, STONEX® Europe will repair the product or send parts for replacement at its expense. STONEX® Europe agrees to repair or replace the defected instrument within thirty (30) days only if STONEX® Europe recognizes that the defects of the instrument are not caused by human factors or no obvious damage to its surface is visible. STONEX® Europe warrants any new replaced parts or products are warranted to be free from defects in materials and workmanship for thirty (30) days or for the remainder of the Limited Warranty Period of the Product in which they are installed, whichever is longer. Faulty Parts or Products replaced under this Limited Warranty shall become property of STONEX® Europe. All products that have to be repaired have to be returned to our technical representative office location via any delivery company the customer prefers, nevertheless STONEX® Europe is not accountable for the unlikely event that the Products gets lost in transit. Any damage inflicted by the customer or by third party after the products has been delivered to the customer is excluded from the limited warranty as well any damage arising from an improper use, from any action or use not provided for in the enclosed user guides and/or manuals.

Shipping policy.

The Customer or the dealer is required to pay for the charges for shipping of fault parts or instruments to STONEX® Europe representative office and STONEX®

Europe is providing the shipping for return. Dealers needs to follow STONEX® Europe repair/service procedure (see appendix 6) to achieve a better and prompt service result.

Return policy Dead On Arrival instruments.

All returned products have to be shipped to STONEX® Europe representative office.

The original Purchaser has a period of seven (7) days starting from date of purchasing to signal

the existence of a defect in the instrument for a full refund (less shipping and handling), provided the merchandise is in new, resalable condition and returned in the original, undamaged packaging. Customer has to pay for both the return and the original freight fees, regardless of the original freight paid by the Company. All warranty books, instruction manuals, parts and accessories must be included as well as the original box in which the item was shipped. We recommend to place the original carton inside another box, to avoid any additional damage to the carton itself. In some cases, returns of special items will require a re-stock fee. Acceptance of returned merchandise is final only after inspection by STONEX®Europe.

Above terms and policies shall apply as for hardware. Dealers needs to follow STONEX®Europe repair/service procedure (see appendix 4) to achieve a better and prompt service result.

Firmware/Software warranty.

Stonex Europe does not warrant that operation of Firmware/Software on any instruments will be uninterrupted or error-free, or that functions contained in Firmware/Software will operate to meet your requirements.

Stonex will forward the Software/Firmware Fix to the dealer or customer. Firmware/software Fix means an error correction or other update created to fix a previous firmware version that substantially doesn't conform to the instruments specification.

Over Warranty repair(s) policy.

Customer shall pay the standard repair fees for any service (whether part replacement or repairs) and performed by STONEX®Europe under request and explicit authorization of the customer itself. In this case the customer is charged for return shipment's fees as well.

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Instruments

Two (2) years on STONEX® Products:

GPS receiver: S8 GNSS Series/Vector/ Walker II / PLT1

Accessories.

Accessories & Specific Parts Warranty :

For Accessories provided by Stonex with the instruments S8 GNSS the following general warranty time is for reference:

Batteries: 7 months.

Battery chargers: 7 months.

Adapters for battery chargers, Cables, Tribrach, Pole, Antennas: 2 years.

Restriction for GPS Boards.

For GPS receiving boards (Trimble, Novatel) used on S8 and S8 family of GPS receivers, Stonex Europe provides warranty time for one (1) year.

Service Procedure

Repair/Service procedure for dealers.

- (1) S/N of the instrument and a detailed description of the defect (sometimes pictures or video) will be required to indicate the cause and problem.
- (2) If dealer wants to repair an instrument under warranty period on their site:
 - 1) If dealers do not have the part in stock they have to send an official order to STONEX® Europe and pay for it and so STONEX® Europe will send the new part to them so they can repair the instrument.
 - 2) When the repair is over, the dealer has to fill the "Spare Part Refund" module and send it to the dedicated mail address.
 - 3) wait for STONEX® Europe's authorization SPR no;
 - 4) when dealer receive the SPR authorization no they can send back to STONEX® Europe

appointed office the broken part with attached the SPR module;

5) when STONEX® Europe receives the broken part STONEX® Europe shall verify it and if everything is ok the cost of the part shall be refund (refund will be done only after check of the failure part and final approval of STONEX® Europe).

(3) If the instrument needs to be sent back to STONEX® Europe for repair/replacement, dealer/customer has to send to STONEX® Europe a “Returned Merchandise Authorization (RMA)” before they send back the fault instrument. STONEX® Europe shall, at its sole discretion, decide on the place of performance for work under warranty.

Environmental recycling

The cardboard box, the plastic in the package and the various parts of this product have to be recycled and disposed of in accordance with the current legislation of your Country.

FOR COUNTRIES IN THE EUROPEAN UNION (EU)

The disposal of electric and electronic device as solid urban waste is strictly prohibited: they must be collected separately.

Contact Local Authorities to obtain practical information about correct handling of the waste, location and times of waste collection centres. When you buy a new device of ours, you can give back to our dealer a used similar device.

The dumping of these devices at unequipped or unauthorized places may have hazardous effects on health and environment.

The crossed dustbin symbol means that the device must be taken to authorized collection centers and must be handled separately from solid urban waste.



FOR COUNTRIES OUTSIDE EUROPEAN UNION (EU)

The treatment, recycling, collection and disposal of electric and electronic devices may vary in accordance with the laws in force in the Country in question.