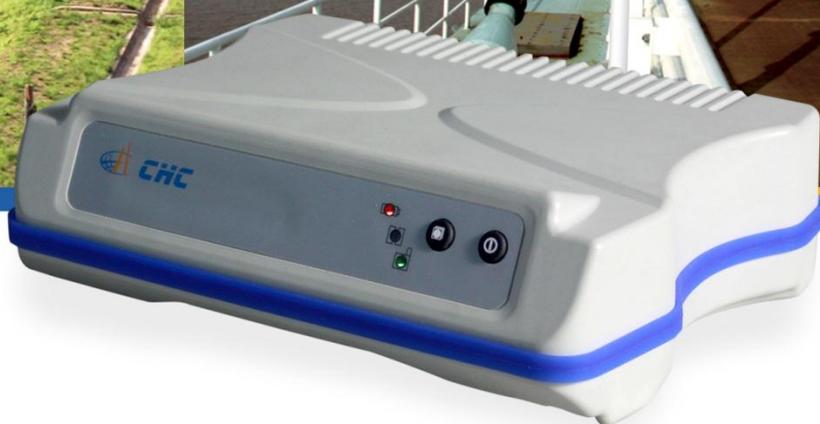


N71 | GETTING STARTED GUIDE

MULTI APPLICATIONS GNSS SENSOR



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Safety Warnings

The Global Positioning System (GPS) is operated by the U.S. Government, which is solely responsible for the accuracy and maintenance of the GPS network. Accuracy can also be affected by poor satellite geometry and obstructions, like buildings and heavy canopy.

FCC interference statement

This equipment has been designed to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules in the Portable Mode. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.



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1. INTRODUCTION

Thank you for choosing the N71 GNSS Sensor.

This Getting Started Guide will provide useful information about your receiver. It will also guide you through your first steps of using N71 GNSS GNSS Sensor.

1.1. TECHNICAL ASSISTANCE

If you have a problem and cannot find the information you need in the product documentation, contact your local dealer from which you purchased the N71. Alternatively, please request technical support using the CHC Website at (www.chcnav.com) or CHC technical support email support@chcnav.com

1.2. YOUR COMMENTS

Your feedback about this Getting Started Guide will help us to improve it in future revision. Please e-mail your comments to support@chcnav.com

1.3. SAFETY INFORMATION

This manual describes CHC N71 GNSS Receivers. Before using the receiver, please make sure that you have read and understood this Getting Started Guide, as well as the safety requirements.

1.4. WARNING AND CAUTIONS

An absence of specific alerts does not mean that there are no safety risks involved.

A Warning or Caution information is intended to minimize the risk of personal injury and/or damage to the equipment.



WARNING-A Warning alerts you to a potential misused or wrong setting of the equipment.



CAUTION- A Caution alerts you to a possible risk of serious injury to your person and/or damage to the equipment.

1.5. REGULATIONS AND SAFETY

The N71 Sensor may be delivered with optional internal data links. Regulations regarding the use of the data link vary greatly from country to country. Depending on local authorities, the N71 can be used without obtaining an end-user license or may require administrative permissions. For license information, consult your local dealer.

1.6. USE AND CARE

The N71 Sensor is designed to withstand the rough environment that typically occurs in the field. However, the N71 Sensor is high-precision electronic equipment and should be treated with reasonable care.

2. OVERVIEW

2.1. FEATURES

Designed for seamless integration, the N71 is a powerful multi-application GNSS sensor which delivers state-of-the-art positioning features in a rugged enclosure. The CHC N71 GNSS sensor provides a cost-effective answer to demanding applications such as geodetic reference station, academic research, precision agriculture RTK network, deformation monitoring, centimeter accuracy RTK sensor for marine survey, dredging or any GPS/GNSS machine guidance when high performances and reliability are required.

The N71 offers outstanding performances with proven and innovative 220-channels GNSS functionality. The future proof multi-constellation tracking feature increases availability in obstructed sky conditions such as construction sites in urban areas while securing RTK accuracy. The very low noise GNSS carrier phase measurement and low level elevation tracking technology make the N71 a powerful reference station solution..

2.2. SPECIFICATIONS

GNSS characteristics

- 220 channels with simultaneously tracked satellite signals
 - GPS: L1C/A, L2E, L2C, L5
 - GLONASS: L1C/A, L1P, L2C/A, L2P
 - SBAS: WAAS, EGNOS, MSAS
 - Galileo: GIOVE-A and GIOVE-B (test)
- Advanced multipath mitigation technology
- Low noise carrier phase measurement with <1 mm precision in a 1 Hz bandwidth.

Performance specifications⁽¹⁾

- Real Time Kinematics (RTK)
 - Horizontal: 10 mm + 1 ppm RMS
 - Vertical: 20 mm + 1 ppm RMS
 - Initialization time: typically < 10 s
 - Initialization reliability: typically > 99.9%
- Post Processing Static
 - Horizontal: 2.5mm + 1ppm RMS
 - Vertical: 5mm + 1ppm RMS
 - Baseline Length: ≤ 300 km

Communications

- 1x LAN port:
 - 1 port with RJ45 connector supports links to 10BaseT/100BaseT networks.
 - HTTP, HTTPS, TCP/IP, UDP, FTP, NTRIP Caster, NTRIP Server, NTRIP Client
 - Proxy server support
 - Routing table support
 - NTP Server, NTP Client support
 - UPnP and Zeroconf support
 - Email Alerts and Position Monitoring
- 1x Lemo 10 pin 1 shell, 3 wire serial with power input, 1x USB 4 wire
- Optional internal GPRS modem: - Quad-band international modem with SMA antenna connector
- Optional radio modem:
 - Internal Rx: 410-430(3) / 430-450(3) / 450-470 MHz
 - External Tx DL5: 1W - 20W adjustable (4)
- Protocols:
 - Correction formats; RTCM2.1, RTCM2.3, RTCM3.0, CMR, CMR+
 - Position/Status I/O: NMEA0183 v2.30, GSOFF
 - Observables: RT17, RT27, BINEX, RTCM 3.x
 - Up to 50 Hz output standard
- Internal data logging storage capacity: 64 Mb

Physical

- Size (LxWxH): 195 x 145 x 51 mm (7.7 x 5.7 x 2.0in)
- Weight: 1.35 kg (48 oz)
- Operating temperature: -30 °C to +65 °C (-22°F to 149°F)
- Storage temperature: -40 °C to +75°C (-40°F to 167°F)
- Humidity: 100% condensation
- Waterproof and dust proof: IP65 and MIL-STD 810F
- Shock: survives a 1.5-meter drop on to concrete

Electrical

- Power consumption: 2.6 W nominal, dependent on usersettings
- External power input: 9-18 VDC

User Interface

- PC Control Utility via Serial
 - Allows for advance receiver setup of UHF, GPRS Modem, data logging
- Web User Interface
 - Secure
 - Allows remote configuration, data retrieval and firmware updates
 - Setup of multiple streaming / monitoring ports

Antenna option

- A220GR GNSS Geodetic Antenna, and C220GR GNSS Choke Ring Antenna

Galileo GIOVE-A and GIOVE-B test satellite support uses information that is unrestricted in the public domain and is intended for signal evaluation and test purposes. (2) Accuracy and reliability specifications may be affected by multipath, satellite geometry and atmospheric conditions. Performances assume minimum of 5 satellites, follow up of recommended general GPS practices. (3) Feature available on demand (4) Use of UHF Tx is subject to country specific type approvals.

2.3. N71 BASIC SUPPLY

The table below provides an overview of the different items composing the N71 Base Kit

Item	
CHC N71GNSS Receiver	
Power Adapter with Cord	
Transport Case	
Whip antenna	
GPS to PC Data Cable	
2M Internet Cable	

3. N71 DESCRIPTION

3.1. RECEIVER FRONT VIEW



- **Power Button**

- Pressing the Power Button switches ON or OFF the N71. Note that due to the 'auto restart' function, the N71 will automatically switches ON when connecting to already powered main supply.

- **Switch Button**

The function of switch button is to select the N71GNSS from RTK mode to static mode. The Switch Button has two functions:

- Function 1: Switching Mode → Long press the button until the Record LED off.
- Function 2: Checking Mode → Press the switch button, if the correction LED turns on, it means the switching succeed.



CAUTION: When checking the N71 Mode, do not press the Switch Button too long as it will re-activate the RTK mode.

- **Power LED**

The LED turns ON when the N71GNSS is powered and OFF when the N71 GNSS switched off.

- **Satellite LED**

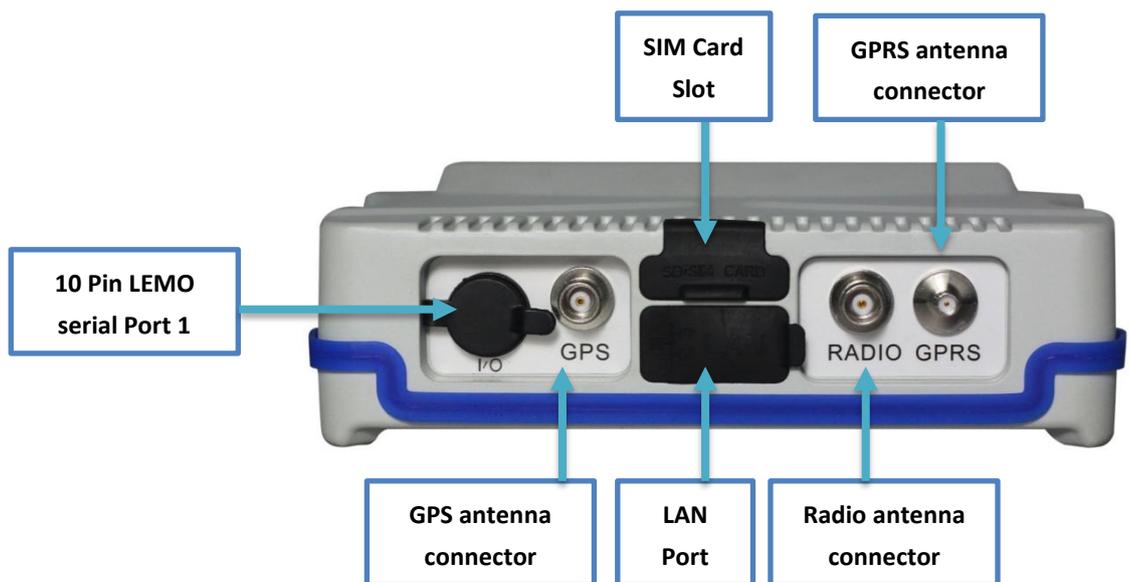
The LED indicator shows the number of satellites tracked by the N71. E.g. the LED flashes 5 times continuously when the receiver is tracking 5 satellites.

- **Differential Data LED**

The Differential Data LED flashes once per second when:

- A. As a Base station → successfully sends out differential data in RTK mode.
- B. As a Rover station → successfully receives differential data from Base station.

3.2. RECEIVER REAR VIEW



➔ **10 Pin Lemo Serial Port 1**

Use this port to connect the N71 CHC to PC or PDA and also to supply power to receiver via the CHC Data Cable.

Refer to Appendix A for the LEMO pin out diagram.

➔ **GPS Antenna Connector**

The TNC GPS antenna connector allows connection of the external GNSS antenna to the N71GNSS.

➔ **Radio Antenna Connector**

The TNC Radio antenna connector allows connection of a whip antenna to the N71GNSS.

➔ **LAN Connector**

Use the LAN RJ45 port to connect the N71 to a PC or Local Network.

➔ **GPRS Slot**

To enable GPRS connection of the N71, insert a active SIM Data Card provided by your local Mobile Network supplier. The GPRS functionality provides wireless data communication channel between base and rover and also connection to RTK Networks.

3.3. SOFTWARE INSTALLATION

3.3.1. CHC SOFTWARE OVERVIEW

The CHC software package is to be installed on CHC recommended PDA (LT30, Getac™ PS236, Recon™ ...).

- HCGPSSet → Overall Receiver setup



CAUTION: To validate the Setting you need to turn the N71 receiver OFF and then ON.

- HCGPRSCe → Radio and built-in GPRS module setup.
- RTKCe / Landstar → Software to perform RTK Surveying Data collection (requires activation).

3.3.2. INSTALLING CHC SOFTWARE

The N71 software RTKCe, HCGPSSet and HCGPRSCe are bundled in one combined CAB format installation package. To install, copy the installation file to your PDA or PC and double click the on the CAB file. The software installation process starts automatically.



CAUTION: Use only the latest CHC software CAB file with the N71

3.4. POWERING THE N71

N71 can be powered by either connecting it to the mains power (A.) or to an external battery (B.)

- A. Connect to the mains power → use CHC GPS to PC cable + Power Adapter



Connect the Power Adapter socket to the mains 100-240 VAC and Power Adapter male Jack connector to the Power Port of the GPS to PC cable.

- B. Connect to external battery → use CHC GPS to PC cable + external power cable (optional) + Car battery.



Properly connect the external power cable to a car battery (respecting the polarity) and then connect the Power Adapter male Jack connector to the Power Port of the GPS to PC cable.



3.5. SYSTEM INSTALLATION

3.5.1. SUPPORTED GNSS ANTENNAS

CHC recommends the use of the CHC A220GR GNSS Antenna or CHC C220GR GNSS Choke Ring with the N71 GNSS Sensor.



Other GNSS antennas may however be used ensuring that the antenna receive the proper GNSS frequencies and operates at either 3.3V or 7.1V with a signal greater than 40 dB at the antenna port.

3.5.2. INSTALLING THE ANTENNAS

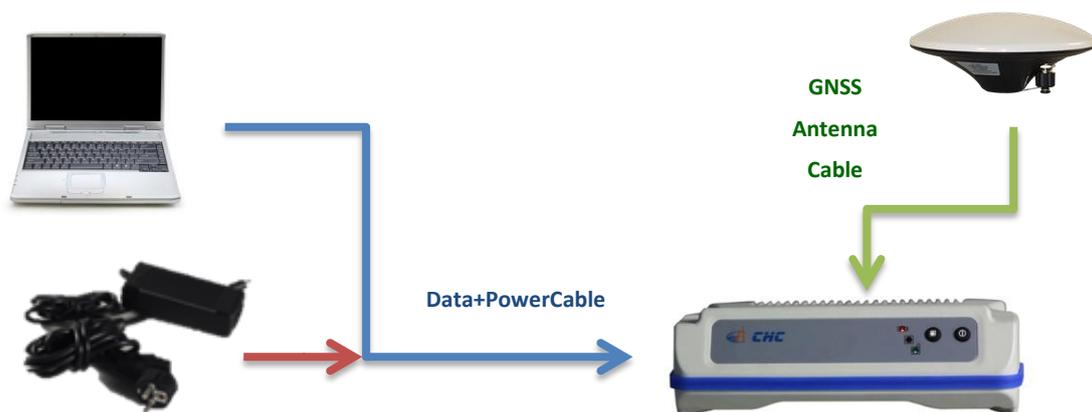
Choosing the correct location for the GNSS antenna is critical to the installation. Poor or incorrect placement of the antenna can influence accuracy and reliability and may result in degraded performances normal operation.

Follow these guidelines to select the antenna location:

- If the application is mobile / kinematic, place the antenna on a flat surface along the centerline of the vehicle.
- Choose an area with open view to the sky and far from metallic objects.
- Avoid areas with high vibration, excessive heat, electrical interference or strong magnetic fields.
- Avoid mounting the antenna close to electrical cables, metal masts and generally close to other antennas

3.5.3. N71 CONNECTION DIAGRAM

Typical connection diagram of the N71 + A220GR Antenna connected to mains power and PC.



4. N71 CONFIGURATION USING CHC SOFTWARE SUITE

The N71 is a versatile GNSS Sensor which offers various setup and configuration software tools. Those software tools are described in the following pages. Please read this Getting Started Guide carefully before selecting the most appropriate ones for your application.

After having completed the installation of the CHC software suite on your PDA (see. 3.3.1), the configuration of the N71 Sensor can be performed via the serial port link (RS232 or USB).

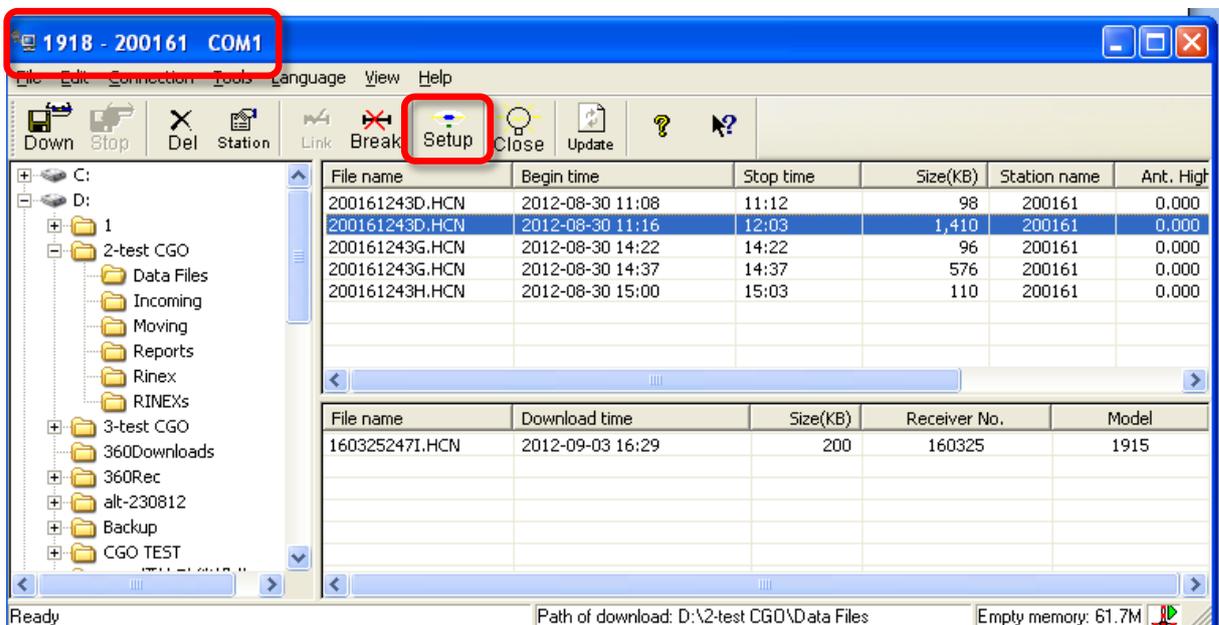
4.1. STATIC SURVEY SETTING - HCLoader

To change the default setting of the GNSS static raw data sample interval and mask angle, you need to install the HcLoader software on your PC. After successful installation of the HcLoader software, follow the steps:

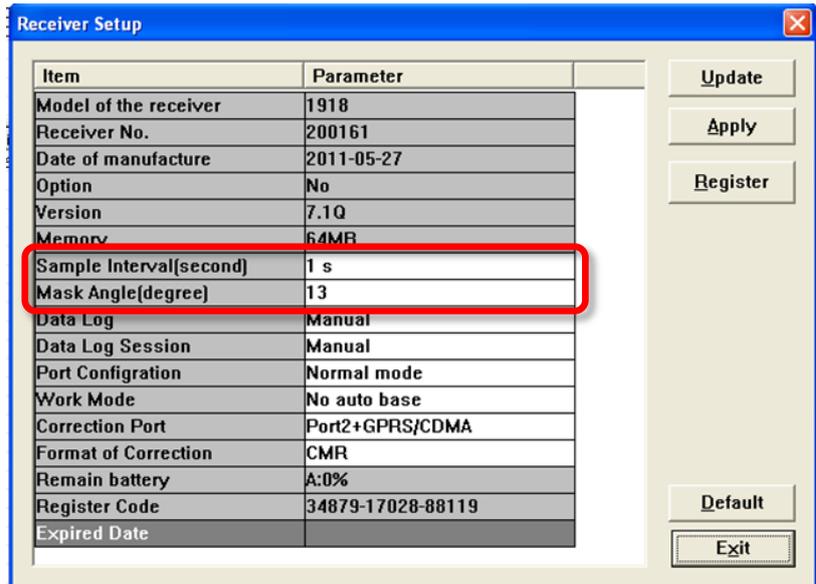
Start Hcloader software → select the connection port of PC

After successful connection, the receiver Serial Number is displayed on the top left corner :

If you use USB port to download, you need first to install the 32 bits OS PC driver available on CD ROM



To modify the Sample Interval and Mask Angle → click on Setup



The GNSS Raw Data Download procedure is described in the Appendix B

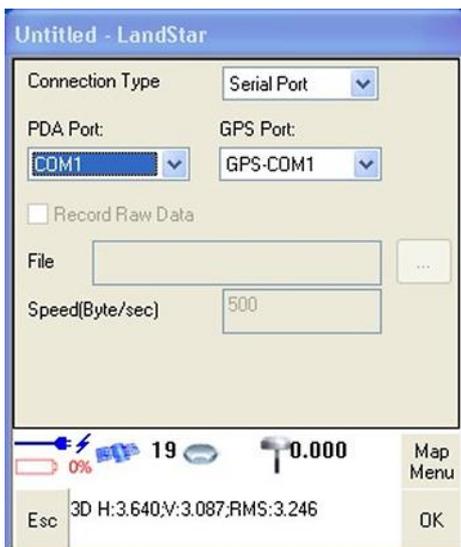
4.2. RTK SETTING – LANDSTAR (RTKCE)

The N71 communication settings can be configured using CHC Landstar field software installed on a PDA. Landstar allows the configuration of the optional radio modem, GPRS modem and connection to RTK Networks.

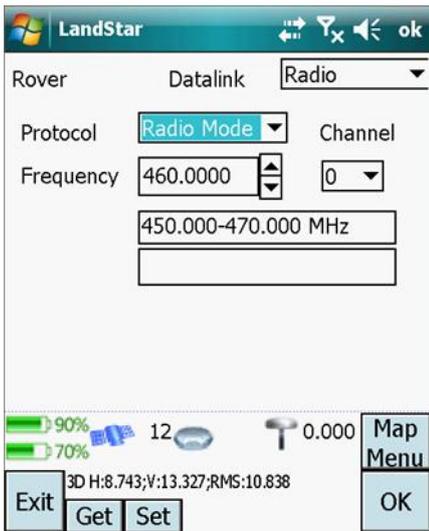
4.2.1. CONNECTING N71 WITH PDA

Connect your PDA to the N71 receiver using the GPS to PC data cable.

Start the Landstar software → Go to Config → Com configuration. In the Connection type → Select serial port as: PDA Port= COM1 and GPS Port = GPS-Com1



4.2.2. SETTING RADIO FREQUENCY AND PROTOCOL



Go to Config → Rover Par. → Correction Link

Select Datalink = Radio

Channel = 0

The optional UHF modem is compatible with the following Protocols to be selected from according to the Transmitter installed at the Base Station

Protocol	Description	Frequency
Radio mode	CHC Radio protocol	Set frequency
TT450S	TrimTalk™ 450S protocol	Set frequency
Transparent	Transparent protocol	Set frequency

CHC UHF modem works at 9 600 bps @ 12.5KHz bandwidth.

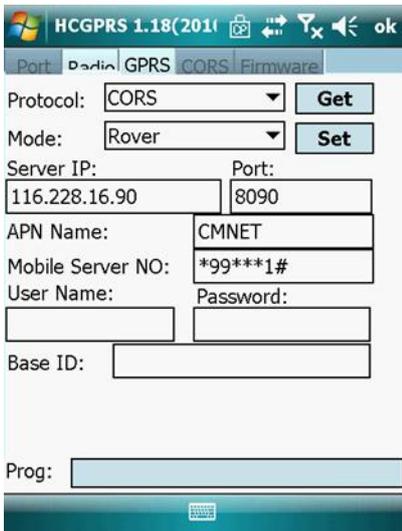


After setting, tap **Set** menu to active the settings.

4.3. SETTING GPRS CONNECTION



Attention: You must connect an external GPRS antenna to the N71 GPRS port to enable the use of the internal GPRS module.



Start the HCGPRS software → set the connection port = COM1 and Work Mode = GPRS Mode → Then tap **SET MODE**.

The Work Mode now changes into GPRS Mode → The Port Tab, GPRS Tab and CORS Tab are now activated.

- In GRS Tab → choose the Protocol = **CORS** → the Mode = **Rover** → Then input **server IP** and **Port** of RTK Network center provided by your CORS/RTK Network Operator → Finally enter the **GPRS information (APN Name, Server N°, User Name and Password)** provided by your GPRS Operator (see example on left side)

The screenshot shows the HCGPRS 1.18(201012) software interface with the CORS configuration tab selected. The interface includes the following elements:

- Protocol:** A dropdown menu set to "Embed TCP/IP" with a "Get" button next to it.
- Log Mode:** A dropdown menu set to "Manual" with a "Set" button next to it.
- Name:** An empty text input field.
- Password:** An empty text input field.
- Source list:** A dropdown menu with a "Get Source" button next to it.
- Diff. Type:** A dropdown menu set to "RTCM3.0".
- Prog.:** An empty text input field.

➤ In CORS Tab, select the Protocol and Mode corresponding to your application/configuration.

- A. Protocol can be chosen between Embed TCP/IP and Own TCP/IP.
- B. Log mode of CORS/RTK center can be set between Auto Mode and Manual Mode. Manual Mode is suggested for this initial configuration step; you will be able to log in later to the CORS/RTK center later using Landstar Software.

Manual Mode → key in the user name and password in LandStar and it will send the GPGGA information to CORS center manually.

Auto Mode → after setting the Receiver as Auto Mode, the Receiver will attempt to log on CORS center automatically after being switch ON. When the correction LED flashes once each second, it means that the receiver has successfully logged in CORS/RTK center

Tips: The Get Source Button can only be used when PDA is connected to internet.



Caution: If you need to switch back to Manual Mode → delete all the information of Name, Password and Source list, then re-select the Manual Mode

5. N71 CONFIGURATION USING TRIMBLE™ SOFTWARE SUITE

This chapter gives a brief introduction of how to use the native OEM Trimble™ BD970 software to configure N71 GNSS Sensor. For more details please read Appendix 3 - “Configuration N71 Using Web Interface”

5.1. CONFIGURATION OF N71 IP by WINFLASH™

Go to the follow link to download the [BD9xx WinFlash V234 V462.exe](#) software:

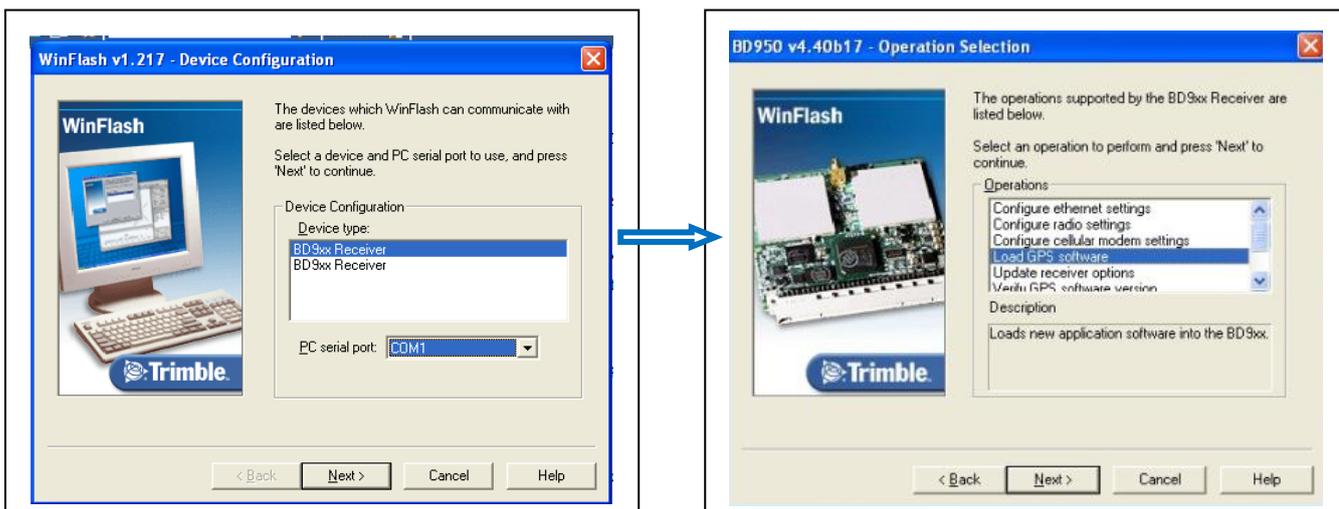
 Download

- Install WinFlash on your PC
 - Connect the N71 to your PC using the GPS to PC Data cable by serial port
- #### 5.1.1 Upgrading the receiver firmware

Start the WinFlash utility. The *Device Configuration* screen appears.

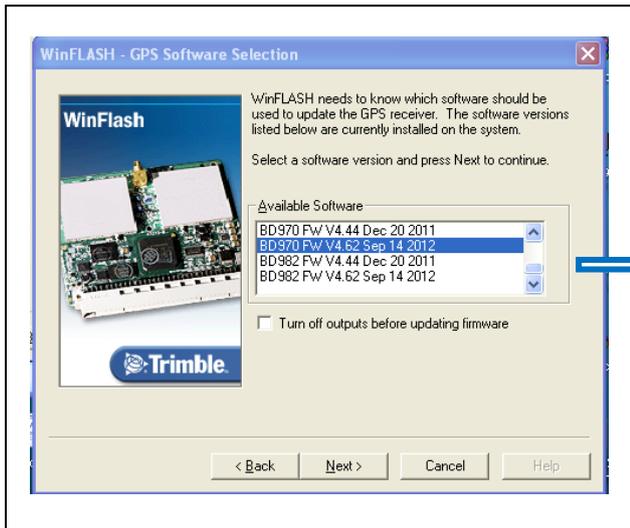
From the *PC serial port* field, select the serial (COM) port on the computer that the receiver is connected to

Click **Next**



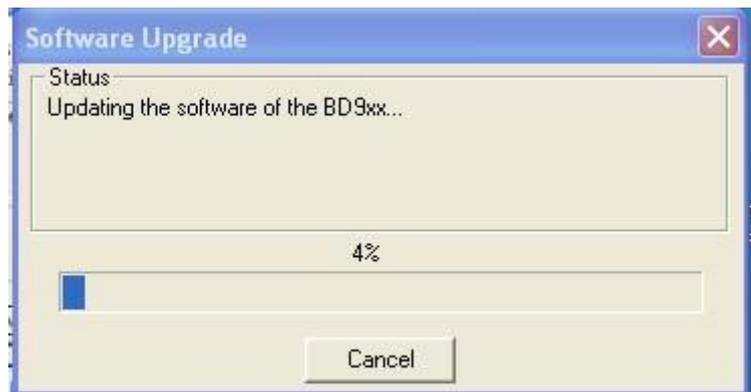
Select *Load GPS software* and then click **Next**.

From the *Available Software* list, select the latest version and then click **Next**.



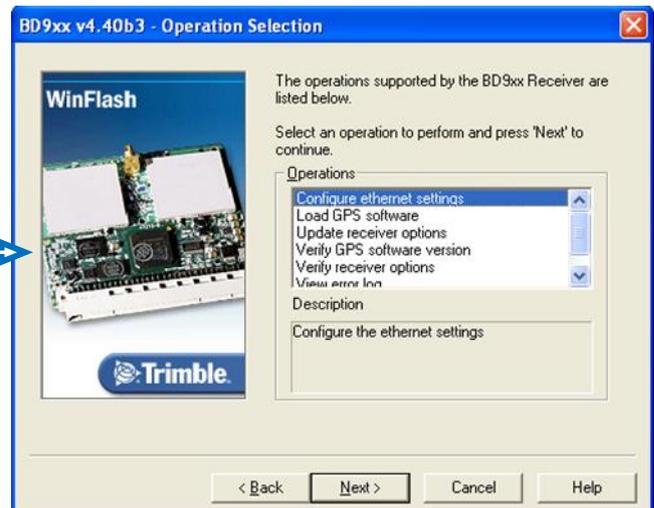
If all is correct, click **Finish**, then Click **OK**.

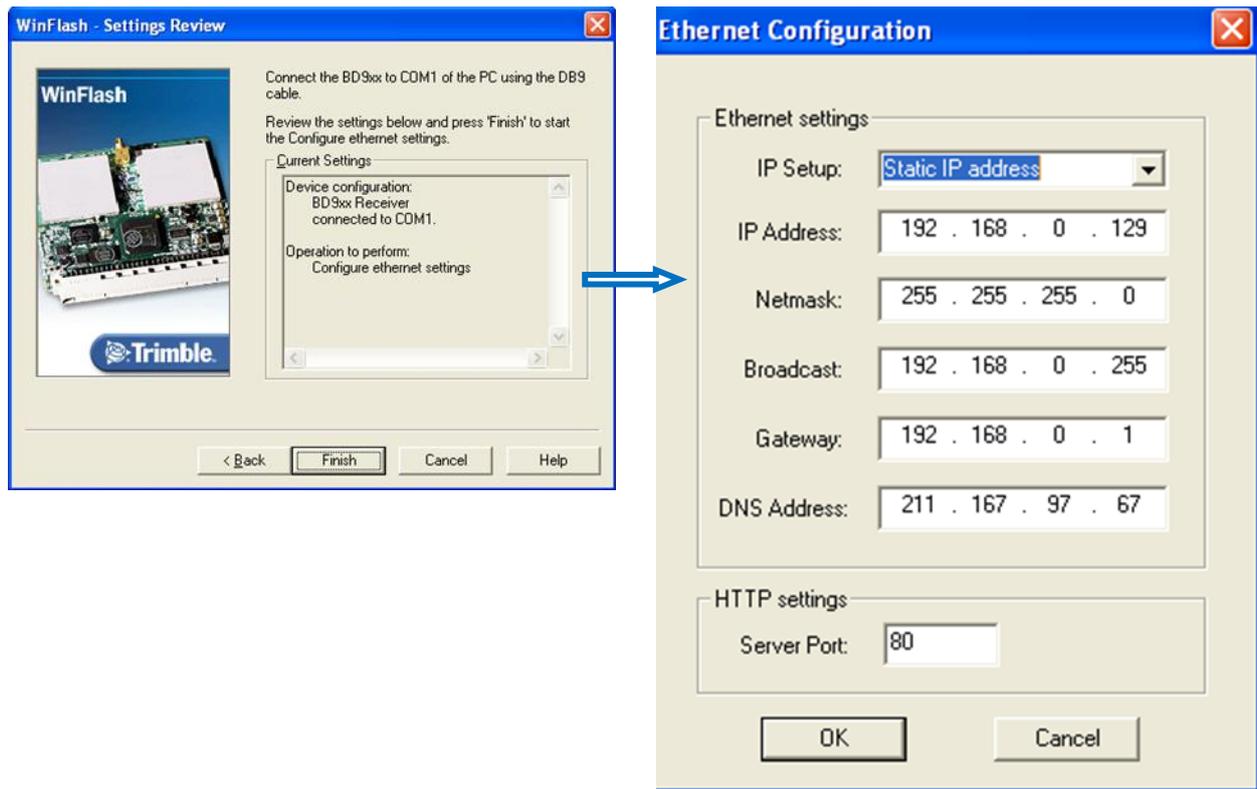
The *Software Upgrade* window appears again and states that the operation was completed successfully.



5.1.2 IP configuration

Start WinFlash and follow the instruction below to set the static IP of N71 sensor to log on internet.





5.2. CONFIGURATION OF N71 OUTPUT ADDRESS WITH TOOLBOX™

We recommend that you use the Web interface to configure the receiver and monitor its status. Not all receiver functions are supported in the Configuration Toolbox software. The Configuration Toolbox is the only utility that can be used to load local datums and coordinate systems into the receiver.

Go to the follow link to download the software



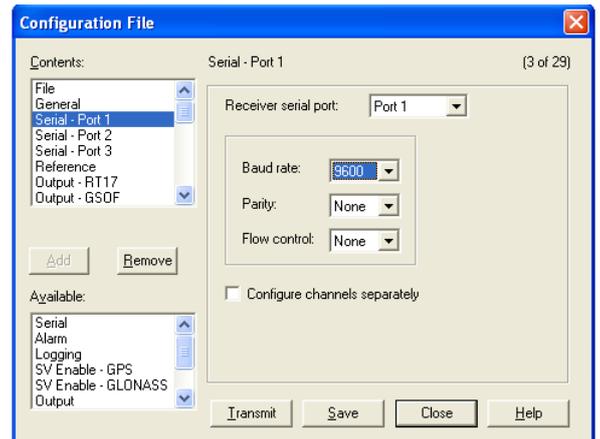
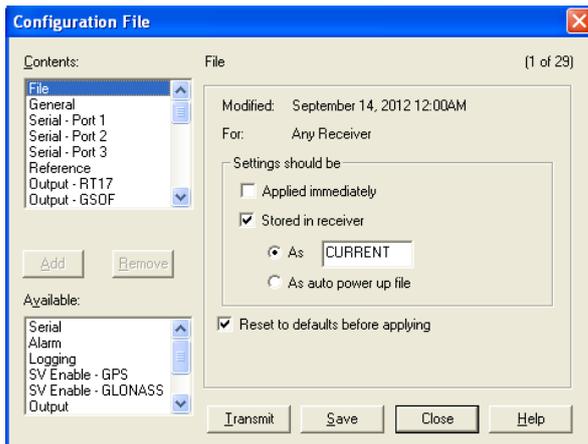
- Install ToolBox on your PC
- Connect the N71 to your PC using the GPS to PC Data cable

The instructions below describes the setup of NMEA output on serial port COM 1 as an example. More set-up are available to match your application requirements.

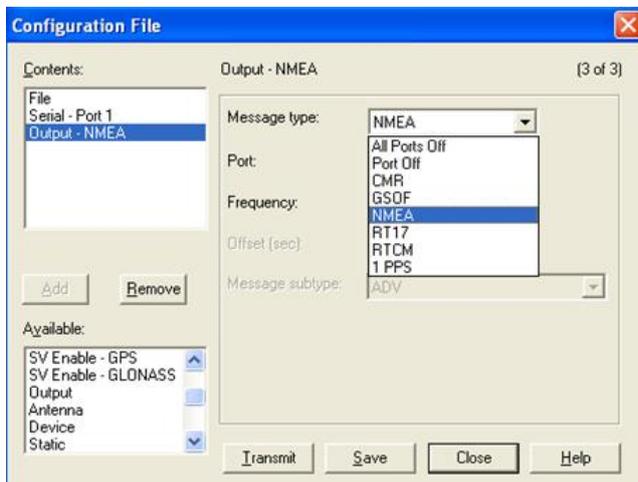
5.2.1. SET THE DATA STREAM OUTPUT

Run ToolBox software, create and save the application file in the Configuration Toolbox software, Select setting to 'Applied immediately' or 'Store in receiver'

Click on 'Serial' under the Available selection box → Click Add to enable Serial – Port 1 → Select the appropriate Baud Rate.

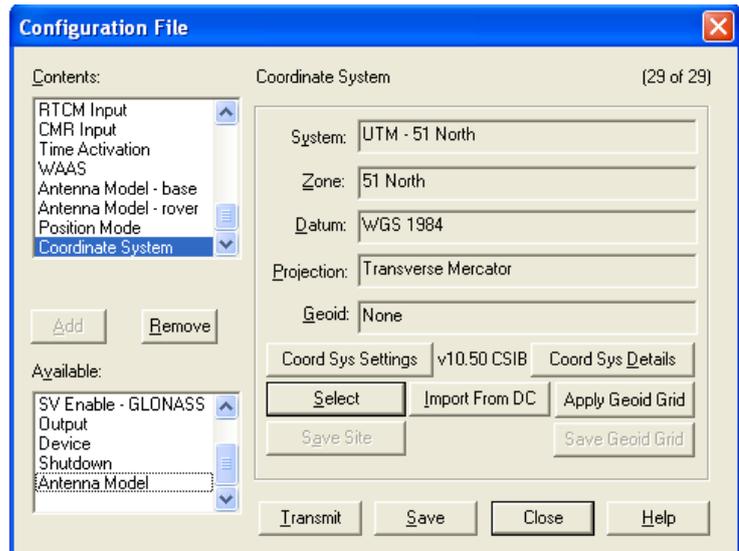


Click on 'Output' under the Available selection box → Click Add to enable Output type selection → Select NMEA, Port 1 and appropriate Baud Rate



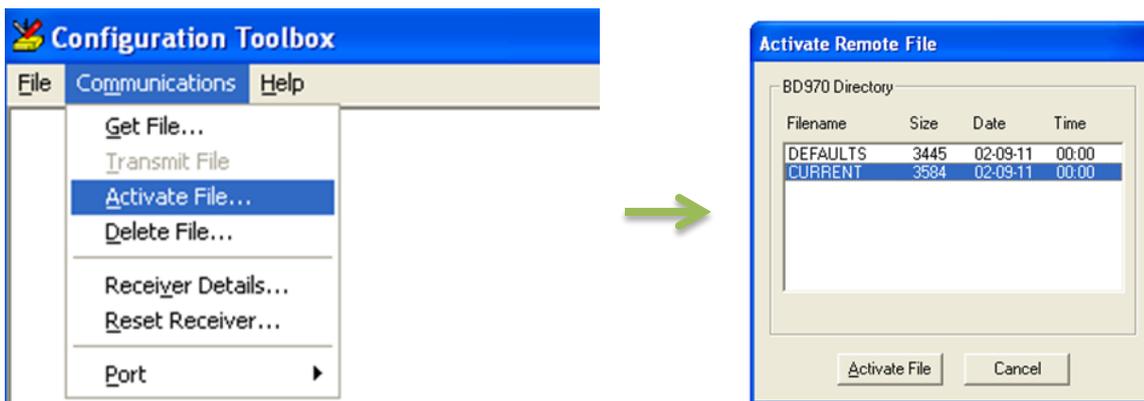
5.2.2. SET THE COORDINATE SYSTEM

On Available selection box → Click coordinate System → then edit the local coordinate system.



After built the application file, go to active the files.

- If the configuration file is stored on the receiver → Go to Communications Menu → Activate File → Select the Current File → Click on 'Activate File'



5.3. CONFIGURATION OF N71 WITH WEBEXPLORE™

When connecting the N71 to your PC using the LAN cable for the first time, follow the steps, if you already configuration N71 static IP (in Chapter 5.1.2), please directly using this static IP to configuration N71.

- Set your PC IP address to "Obtain an IP address automatically"
- Connect PC with N71 with a LAN cable
- Type <http://169.254.1.0> in your default Internet browser
- Enter the default User name = admin and Password = password



- Press OK to login.
- The N71 GNSS Sensor configuration screen will appear

The following menus are available on the left side on the screen:

- ✓ Receiver Status
- ✓ Satellites
- ✓ Receiver Configuration
- ✓ I/O Configuration
- ✓ Network Configuration
- ✓ Security
- ✓ Firmware and Help

➔ Change the User Interface Language

➔ Check the receiver Status: differential status, receiver options

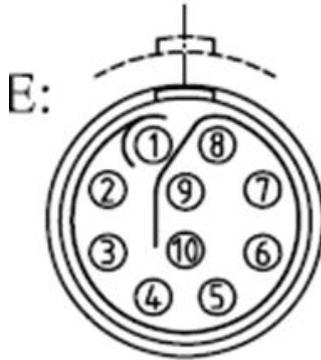
➔ Satellites configuration (Enable / Disable)

➔ Important **Setting** : set up NTRIP Client and Data output message

➔ IP configuration to set the N71 Static IP address



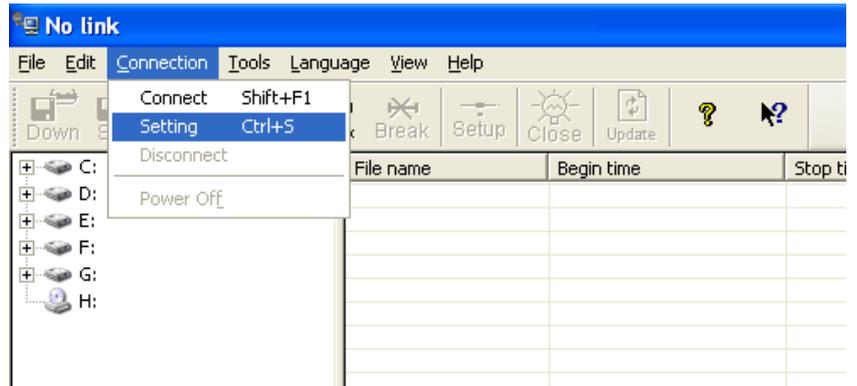
APPENDIX A : LEMO CONNECTOR PIN OUT



PIN	Signal Name	Description
1	TXD	Transmit Data (PC receive data through this pin)
2	RXD	Receive Data (PC transmit data through this pin)
3	PWR	External Power Input (9-15 V DC)
4	PWR	External Power Input (9-15 V DC)
5	GND	External Power Ground
6	GND	External Power Ground
7	USB PWR	
8	D-	
9	D+	
10	Not Used	

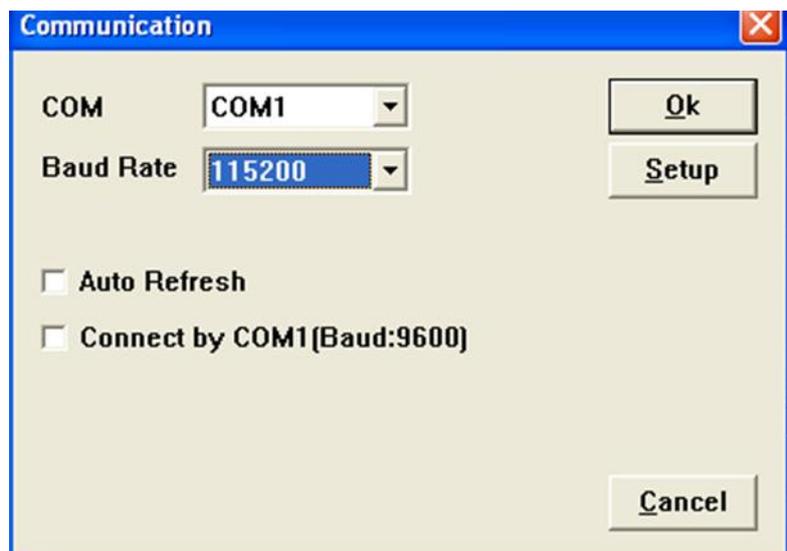
APPENDIX B : DOWNLOADING GNSS RAW DATA

- ➔ Open HLoader PC Software
- ➔ Connect your PC to the N71 serial port
- ➔ Click start → programs → HuaceNav → HLoader
- ➔ Click Connection → Setting

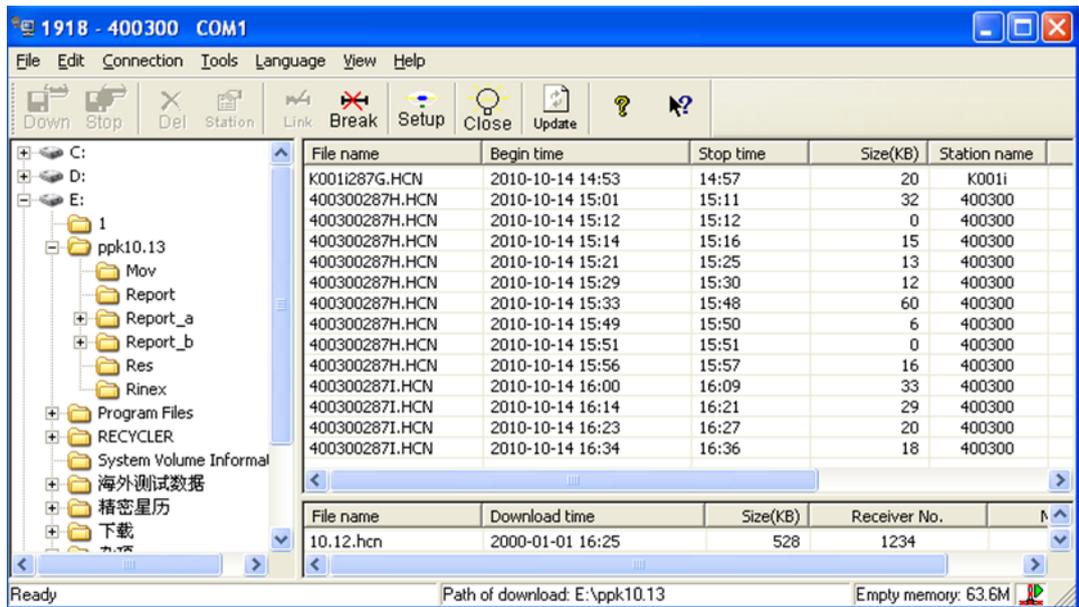


- ➔ COM Select the Serial port of computer or USB
- ➔ Baud Rate:115200
- ➔ Click OK

Tips: if using USB to download data, please install driver first
(available on 32 bits OS PC)

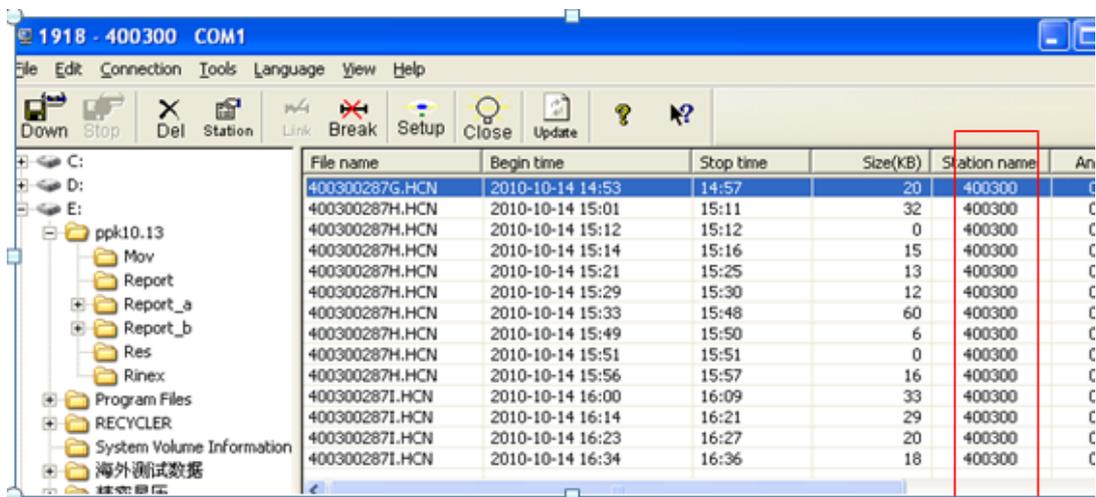


- ➔ Click Update: the N71 Serial Number appears on the top left corner



We suggest you to change the station information when download the HCN format data to ensure a proper conversion to Rinex.

By default, the N71 station name is the SN number of the receiver using 6 characters. The conversion to Rinex truncates the station name to 4 characters only.



To change the station name and enter the antenna height:

- ➔ Select the one observation file
- ➔ Click the right mouse and select Obs. Infor option
- ➔ Enter the station name and antenna high
- ➔ Click OK.

File name	Begin time	Stop time	Size(KB)	Station name	Ant. High
400300287G.HCN	2010-10-14 14:53	15:00	20	400300	0.000
400300287H.HCN	2010-10-14 15:01	15:11	32	400300	0.000
400300287H.HCN	2010-10-14 15:12	15:12	0	400300	0.000
400300287H.HCN	2010-10-14 15:14	15:16	15	400300	0.000
400300287H.HCN	2010-10-14 15:21	15:25	13	400300	0.000
400300287H.HCN	2010-10-14 15:29	15:30	12	400300	0.000
400300287H.HCN	2010-10-14 15:33	15:48	60	400300	0.000
400300287H.HCN	2010-10-14 15:49	15:50	6	400300	0.000
400300287H.HCN	2010-10-14 15:51	15:51	0	400300	0.000
400300287H.HCN	2010-10-14 15:56	15:57	16	400300	0.000
400300287I.HCN	2010-10-14 16:00	16:09	33	400300	0.000
400300287I.HCN	2010-10-14 16:14	16:21	29	400300	0.000
400300287I.HCN	2010-10-14 16:23	16:27	20	400300	0.000
400300287I.HCN	2010-10-14 16:34	16:36	18	400300	0.000

Obs Station Information

Start Time: 2010-10-14 14:53
End Time : 14:57

Setup

Name(8 Characters)

Session(1 character)

Antenna Height(m)

File Format

Device No.: 400300

Please key in station name here, we suggest us 4 characters as station name

Key in the antenna height, the measure method is slope height.

Please check the data information are properly applied by HcLoader → You can download the GNSS Raw data to your compute and select the storage path.

→ Click right mouse on the file session to download, then select Export

The screenshot shows the HcLoader software interface. The main window displays a list of data files with columns for File name, Begin time, Stop time, Size(KB), and Station name. A context menu is open over the file '911693117E.HCN', with the 'Export' option selected. Below the file list, a dialog box is open for downloading the selected file, showing the file name, download time, size, receiver number, and mode. The path of download is set to 'E:\1' and the empty memory is 63.6M.

CHC - Shanghai HuaCE Navigation Technology Ltd.
Building 35, n° 680Guiping Road
200233 Shanghai – China

Tel : +86 21 542 60273

Fax: +86 21 649 50 963

Email : sales@chcnav.com | www.chcnav.com