



GAMA RTK5 MANUAL

Carlson Software, Inc.

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GAMA RTK5 MANUAL

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Thank you for choosing the Carlson RTk5.

This document is meant to support Carlson End Users as a single go-to document to guide and answer any questions on how to use Gama in combination with the RTk5 tablet. For guidance on how to use the RTk5 in general or SurvPC please consult dedicated manuals.

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1 Gama RTK Technology

The Gama RTK Engine (named after famous explorer Vasco da Gama) is Carlson Software's next generation RTK engine.

Gama deploys a range of innovative technologies to deliver best-in-class performance.

See [Gama RTK White Paper](#) for details on Carlson's RTK technology.

Key features of Gama include:

Optimization for Next-Gen CPUs:

- Takes advantage of modern CPU architectures to enable powerful multi-core computations in embedded and handheld devices.
- Designed to utilize multi-threaded computation routines, unlocking new possibilities and computational performance.

Next-Gen Filters:

- Relies on multiple Extended Kalman Filters that estimate individual error components for each GNSS signal.
- New CPU architectures allow the deployment of extended mathematical models, eliminating past approximations.
- Can estimate over 1000 parameters per second for high accuracy in various environments.

GNSS Signal and Frequency Diversity:

- Designed to maximize the use of all available GNSS signals, including current and potential future signals.
- Implements independent handling of all GNSS signals in multiple frequencies and modulations.
- Can operate in single-frequency mode or with specific subsets of frequencies based on signal availability or interference.

Outlier Detection and Handling:

- Utilizes multiple protection layers for outlier detection and handling.
- Employs iterative robust statistics and strict statistical analysis to identify and manage measurements that deviate from the predefined model.
- Real-time adaptive filtering adjusts GNSS observation models to changing environmental conditions.

Real-Time Adaptive Filtering:

- Employs techniques to ensure accurate GNSS error models despite changing conditions.
- Data-driven error models derived from real environment data provide a solid foundation for estimation processes.
- Pre-processing filters monitor GNSS signal quality and adjust observation models in real-time based on various metrics.

2 Gama RTK Engine Registration

Before using Gama you must register with a valid license key.

Step 1) – Double-click Gama GNSS-UI logo on the Windows Desktop.



Step 2) – Click “Admin” tab and scroll down to “Registration”.

Registration

Unregistered

Modules	Basic RTK North America
Serial Number	XXXXXXXX-XXXXXX-XXXXXX-XXXXXX

Register

Step 3) – Ensure the device has internet access, type in the Gama RTk5 serial number and click “Register”. If you don’t have a serial number please request one from your Carlson Software point of contact.

Step 4) – Type in personal details to complete registration and retrieve Change Key (serial and change key will also be sent to your email for future reference).

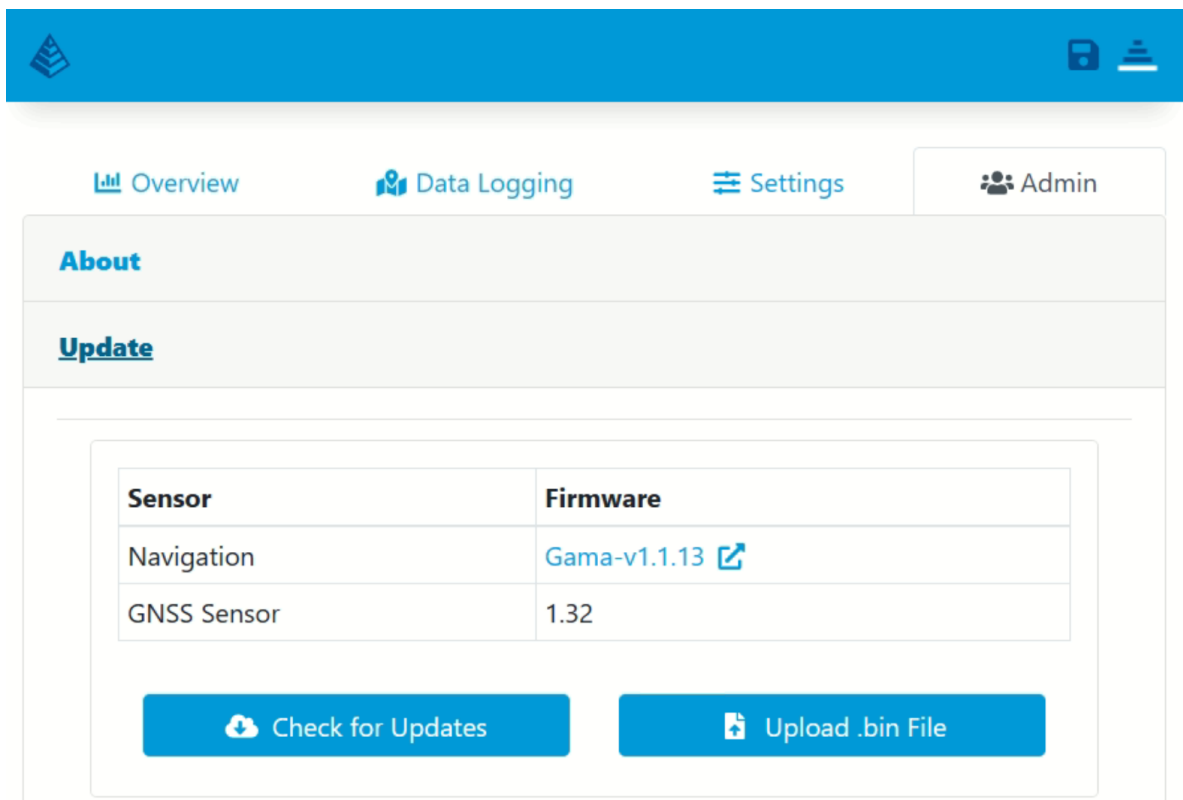
Step 5) – Apply Change Key to complete registration. You should see the Web UI show “Registered” status and blue check boxes on the multiple modules.

3 Updating Gama

Gama can be updated either via the WebUI with an internet connected device, or via a downloaded bin file from the Carlson website.

The preferred method is to allow the WebUI to update itself via the “[Check for Updates](#)” button.

Alternatively, *special circumstances* may require usage of the “[Upload .bin File](#)” using an update bin.



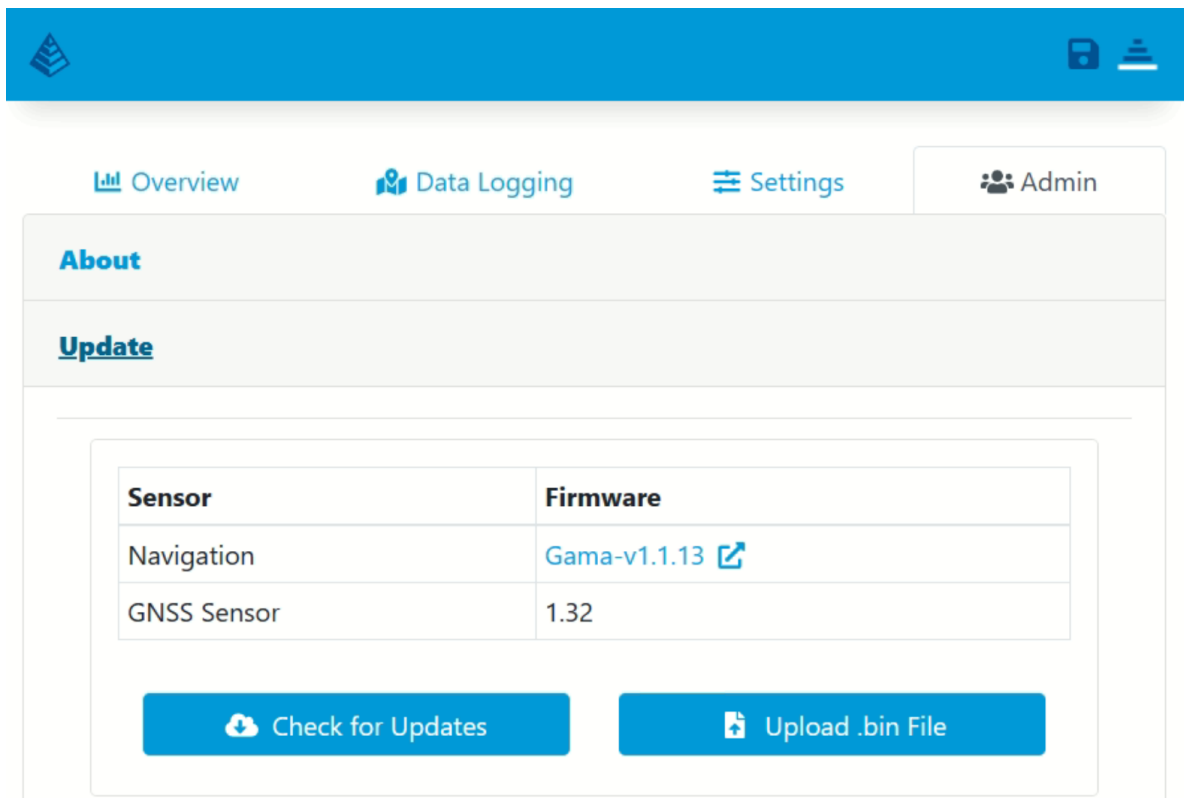
3.1 Updating Gama via Check for Updates

Step 1) – Ensure the RTk5 is connected to the Internet.

Step 2) – Open Gama Web UI using the Desktop icon (alternatively open a browser on the RTk5 and type in 127.0.0.1).

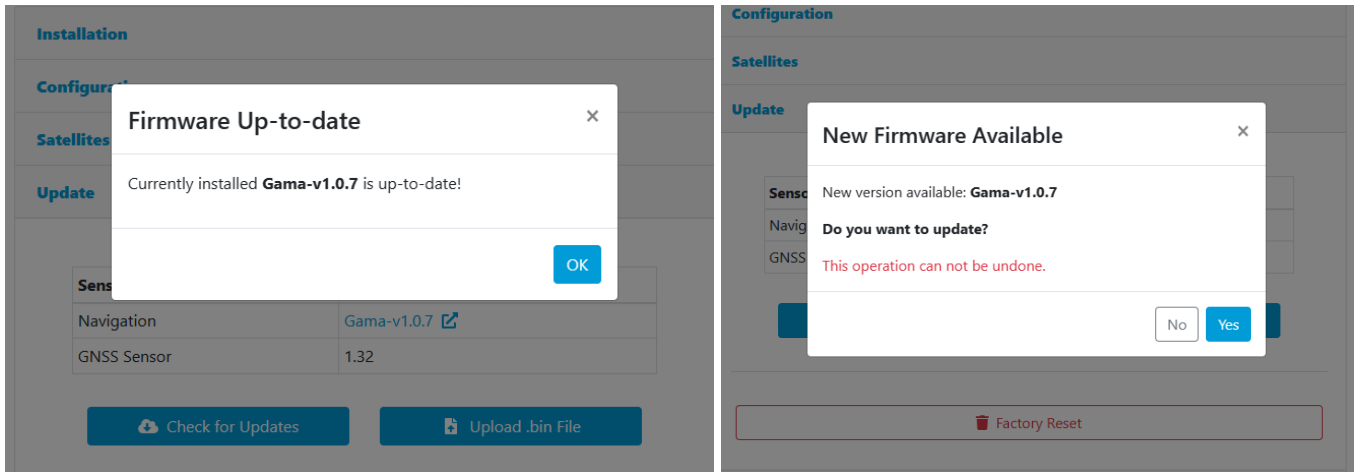


Step 3) – Click “Admin” tab and scroll down to “Update”.



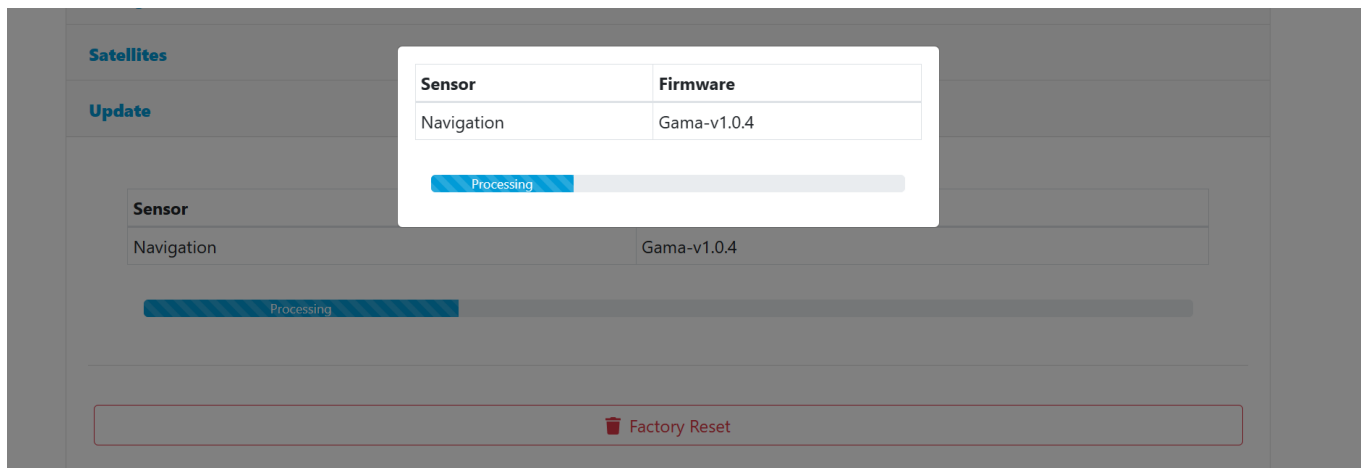
Step 4) – Click “Check for Updates”.

Step 5) – The resulting dialog will either display the current firmware is up-to-date, or if there’s a new update.



Step 6) – To proceed with the update, select “Yes.”

Step 7) – Wait until update procedure finishes.



Step 8) – Once update finishes it will automatically restart and the Web UI will show up again with the new firmware version. You can then use Gama normally via the Web UI or with SurvPC.

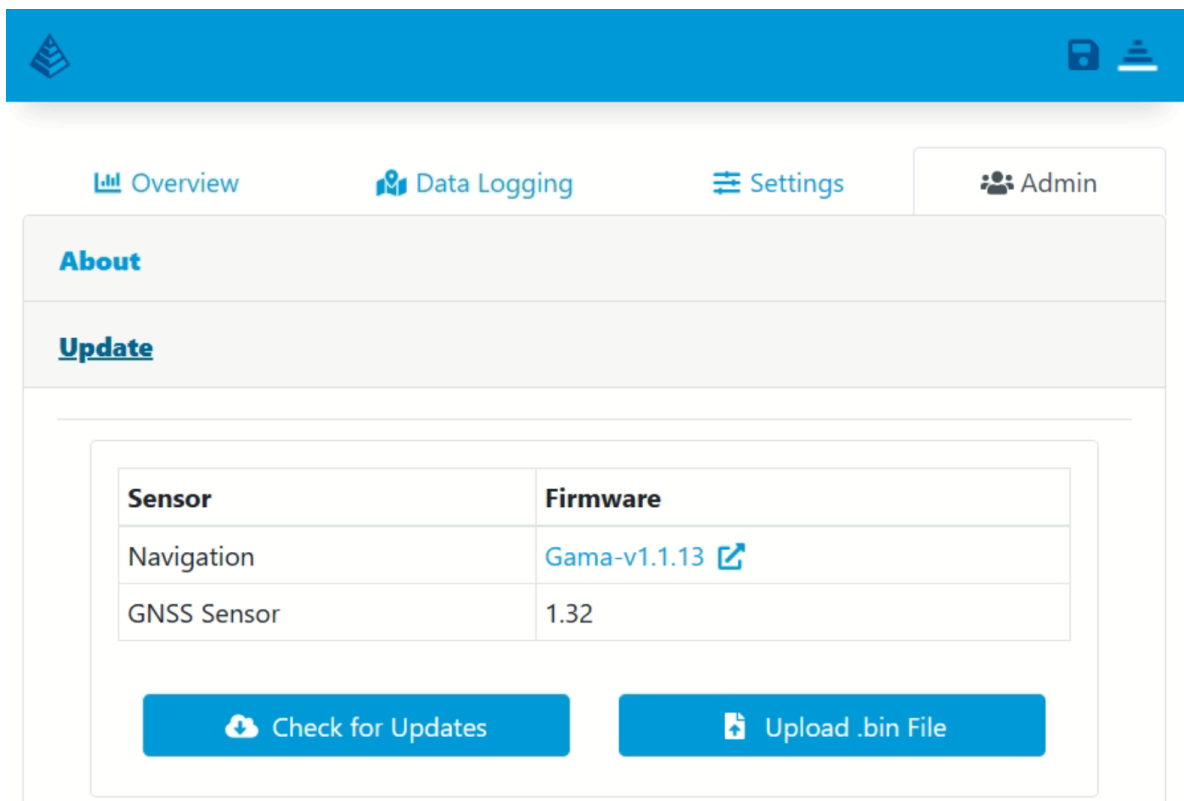
3.2 Updating Gama via Manually Downloaded Bin File

Step 1) – Request Gama update .bin file from your Carlson Software point of contact.

Step 2) – Open Gama Web UI using the Desktop icon (alternatively open a browser on the RTk5 and type in 127.0.0.1).

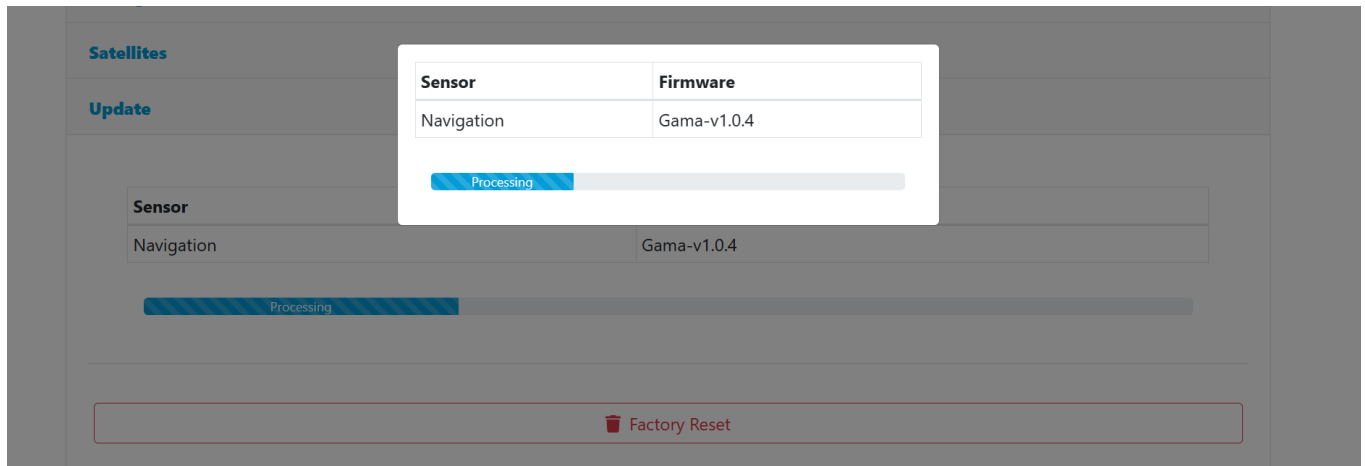


Step 3) – Click Settings tab and scroll down to “Update”.



Step 4) – Click “Upload” button on the Web UI and select the update file.

Step 5) – Wait until update procedure finishes.



Step 6) – Once update finishes it will automatically restart and the Web UI will show up again with the new firmware version. You can then use Gama normally with SurvPC or via the Web UI.

4 Using Gama with SurvPC

Always make sure you have the latest version of SurvPC 7.

To connect SurvPC to Gama follow these steps:

Step 1) – Ensure you have the GNSS antenna correctly connected to the RTk5.

The GNSS antenna connector is the left SMA connector on top of the device:



RTk5 ships with Tallysman 3972XF and Harxon CHX-602A.



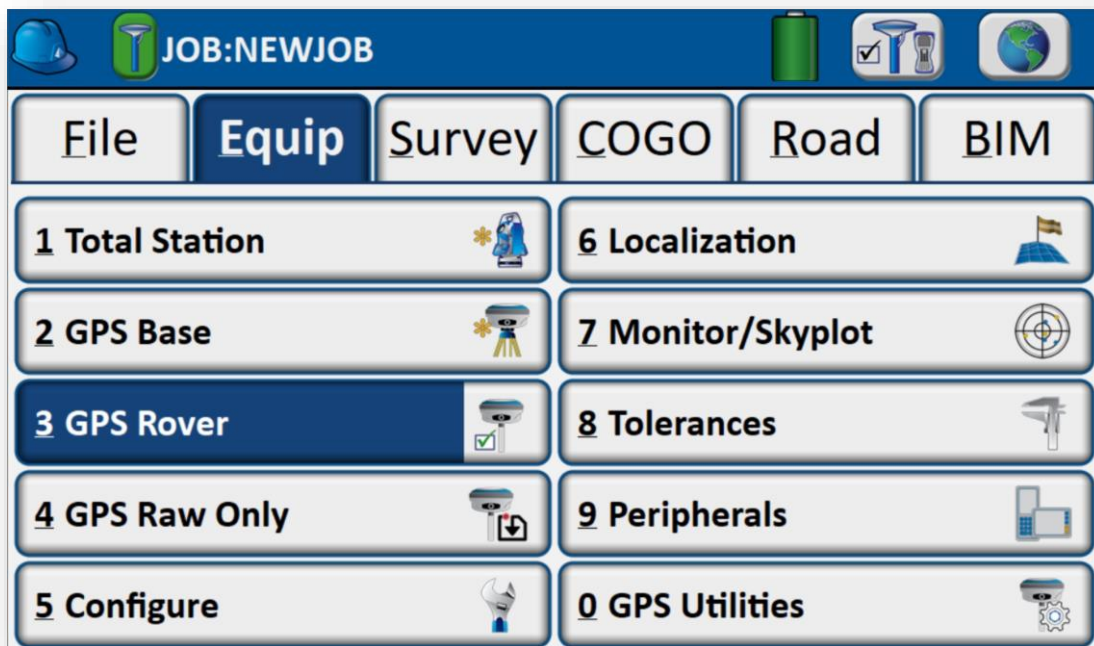
Tallysman TWI3972XF



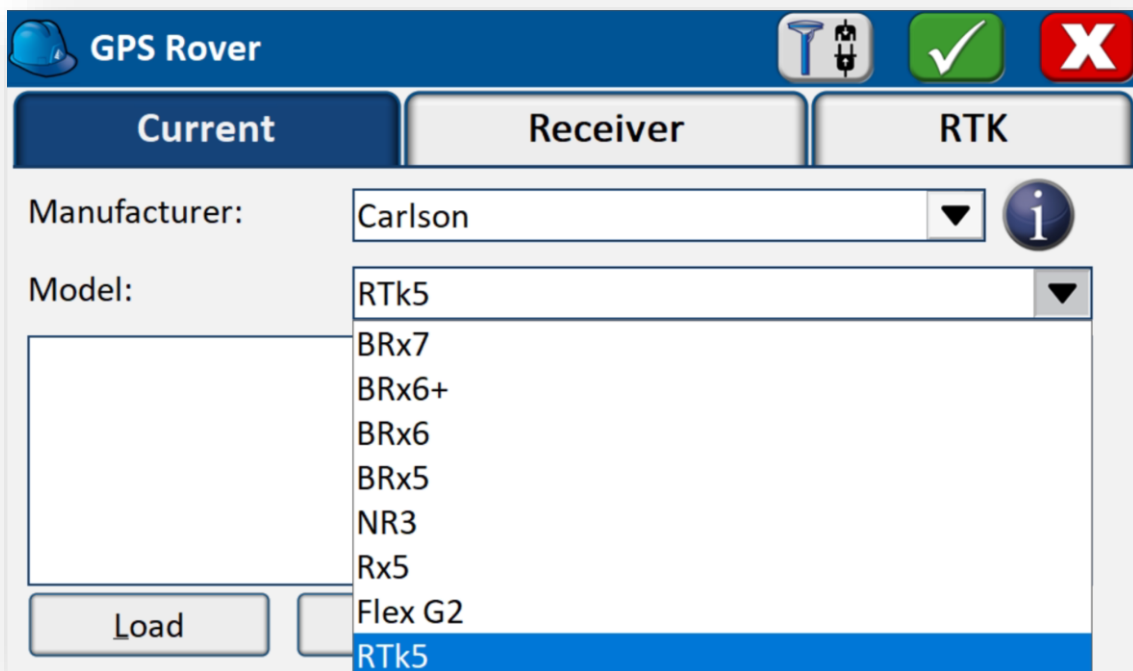
Harxon HXC_CHX602A

Step 2) – Open SurvPC 7.

Step 3) – Click “Equipment” on the top menu and then click “3 GPS Rover”.

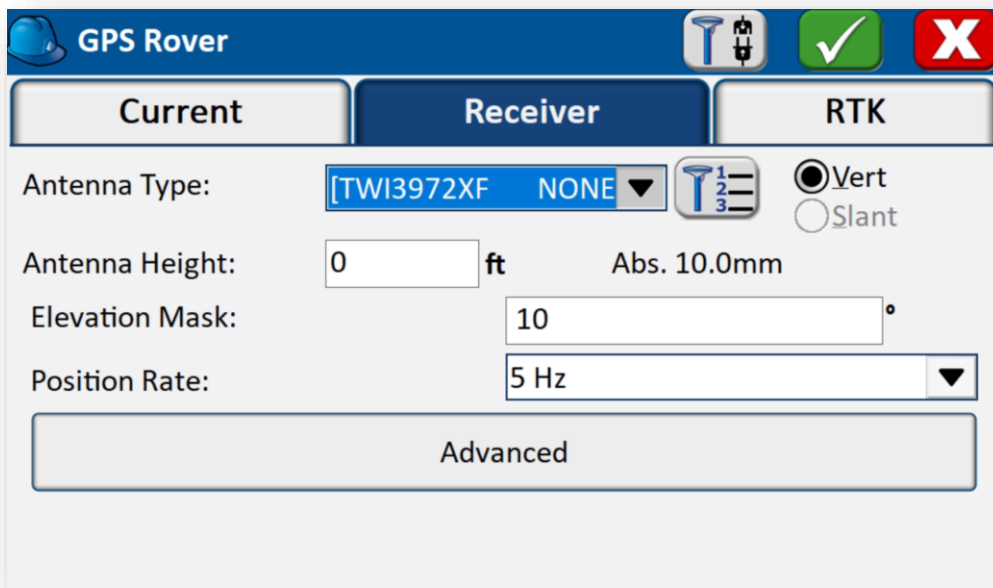


Step 4) – Under manufacturer select “Carlson” and pick “RTk5” under model.



Step 5) – Check the model of your antenna. RTk5 ships with Tallysman 3972XF and Harxon CHX-602A.

Step 6) – Click “Receiver” on the top menu and make sure you have the right antenna type selected. By default the RTk5 tablet is paired with the Tallysman TWI3972XF.



GPS Rover

Current Receiver RTK

Antenna Type: [TWI3972XF NONE ▼]  ☒ Vert ☐ Slant

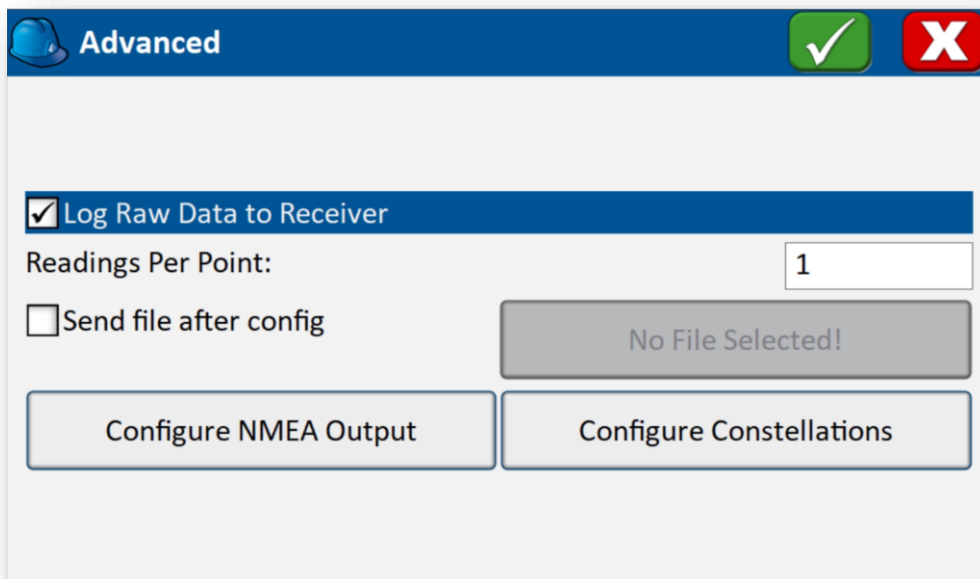
Antenna Height: 0 ft Abs. 10.0mm

Elevation Mask: 10 °

Position Rate: 5 Hz ▼

Advanced

Step 7) – To enable raw logging for post-processing in SurveyGnss: Click "Advanced" and ensure "Log Raw Data to Receiver" is checked.



Advanced

☒ Log Raw Data to Receiver

Readings Per Point: 1

☐ Send file after config

No File Selected!

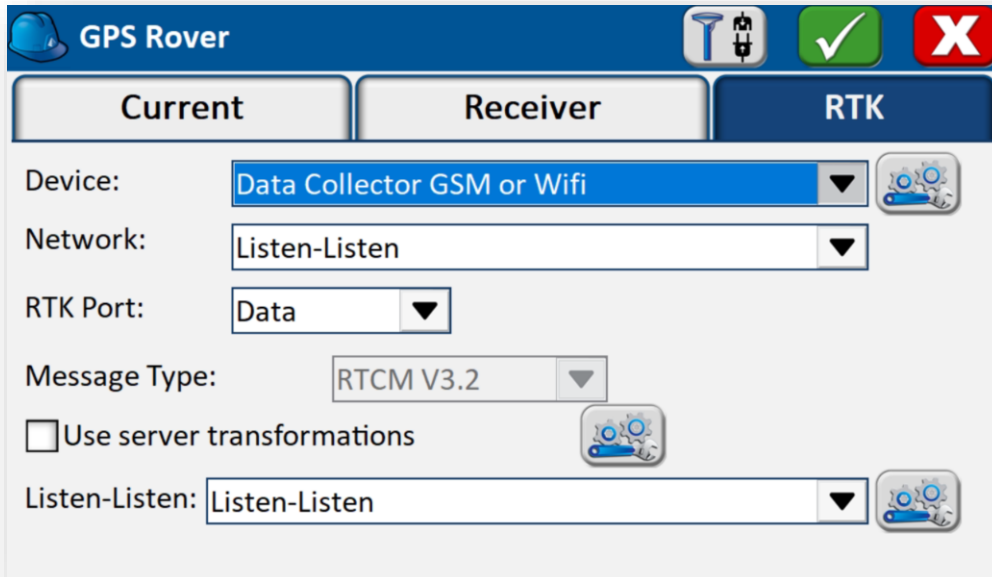
Configure NMEA Output

Configure Constellations

Step 8) – Click “RTK” on the top menu to configure your base station correction stream.

Step 9) – Configure base station input stream.

Step 10) – Click the green check button to setup connection between SurvPC and Gama.

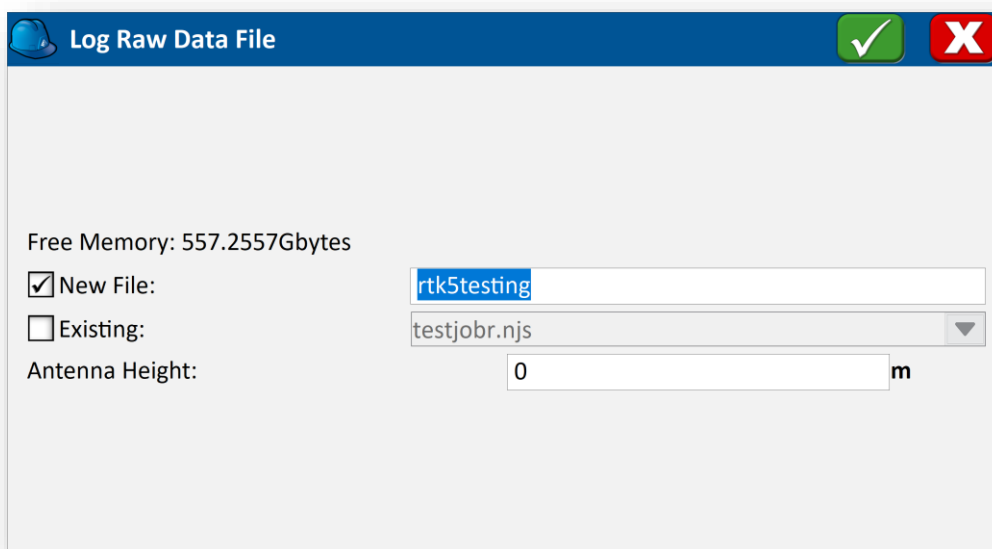


The screenshot shows the 'GPS Rover' application window with the 'RTK' tab selected. The window has a blue header bar with a hard hat icon, the title 'GPS Rover', and three buttons: a USB icon, a green checkmark, and a red 'X'. Below the header are three tabs: 'Current', 'Receiver', and 'RTK'. The 'RTK' tab is active. The configuration fields are as follows:

- Device: Data Collector GSM or Wifi (dropdown menu)
- Network: Listen-Listen (dropdown menu)
- RTK Port: Data (dropdown menu)
- Message Type: RTCM V3.2 (dropdown menu)
- ☐ Use server transformations
- Listen-Listen: Listen-Listen (dropdown menu)

There are gear icons next to the Device, Network, and Listen-Listen dropdown menus.

Step 11) – If raw data logging was enabled, give the raw log file an appropriate name. **Ensure that the name is unique, as a raw recording cannot be appended to, it will always overwrite!** SurvPC opens this file as a Stop+Go file, meaning points recorded in the survey routines will be given event markers which indicate the start and stop of an occupation. These event markers are critical for post-processing. SurvPC will command the recorded data to update the antenna height whenever it's modified.



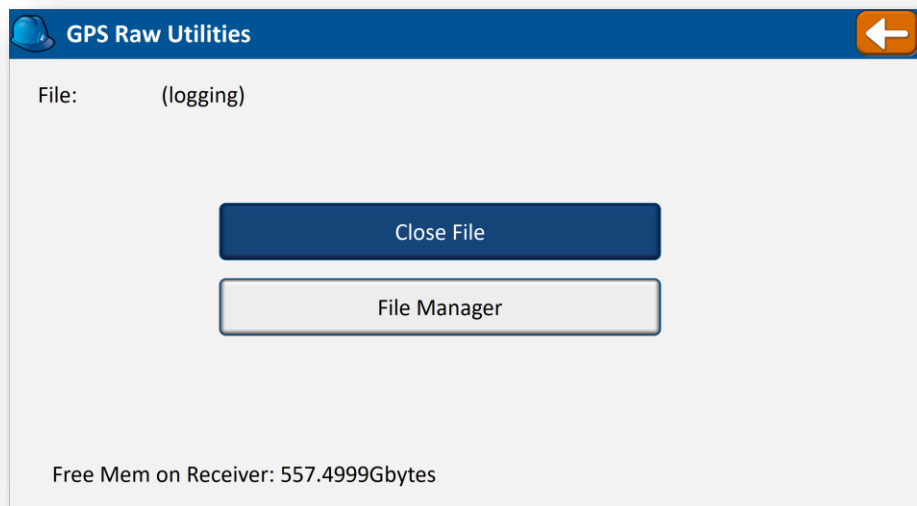
The screenshot shows the 'Log Raw Data File' window. It has a blue header bar with a hard hat icon, the title 'Log Raw Data File', and two buttons: a green checkmark and a red 'X'. The window displays the following information:

- Free Memory: 557.2557Gbytes
- ☒ New File: rtk5testing (text input field)
- ☐ Existing: testjobr.njs (dropdown menu)
- Antenna Height: 0 m (text input field)

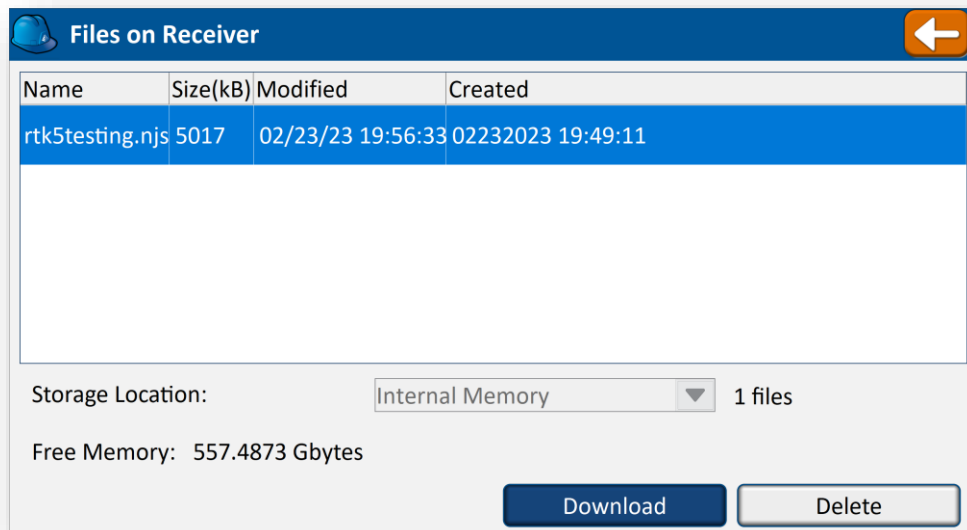
Step 12) – Use SurvPC as normal. If recording data for post-processing, ensure best-practices are followed.

Step 13) – To download raw NJS log, navigate to: Equip -> GPS Utilities -> GPS Raw Utilities.

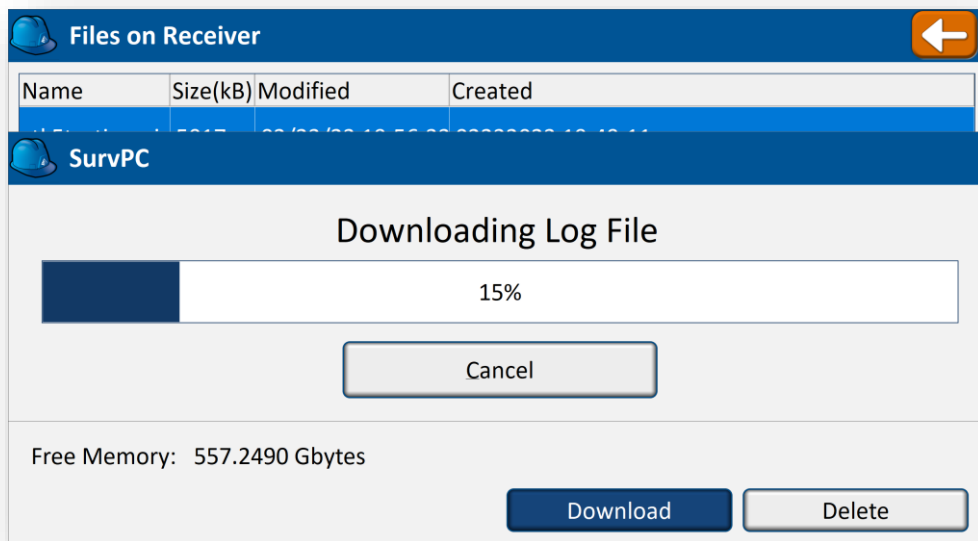
Click “Close File” to ensure the NJS is properly flushed to the disk.



Step 14) – Click File Manager, select the raw file, and click “Download”.



Step 15) – Please wait while the NJS file is downloaded to your job folder.

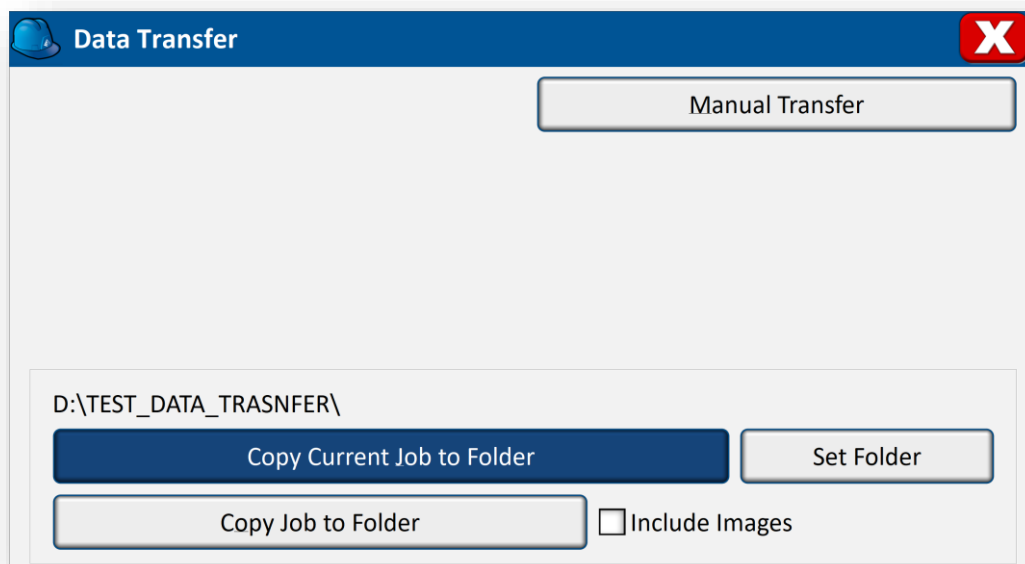


Step 16) – Perform a Data Transfer of the job to removable media e.g. USB Flash Drive.

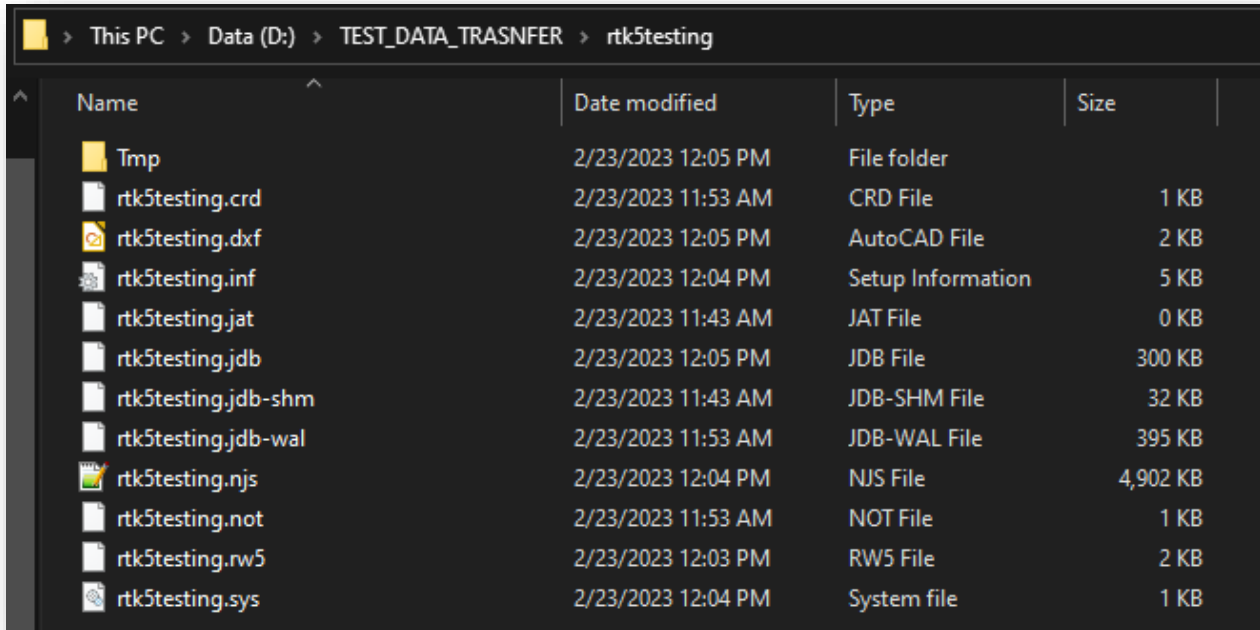
File → Export → Data Transfer

[Set Folder]

[Copy Current Job to Folder]



Step 17) – Exit SurvPC.



The screenshot shows a Windows File Explorer window with the address bar set to 'This PC > Data (D:) > TEST_DATA_TRASNFER > rtk5testing'. The main pane displays a list of files and folders with columns for Name, Date modified, Type, and Size.

Name	Date modified	Type	Size
Tmp	2/23/2023 12:05 PM	File folder	
rtk5testing.crd	2/23/2023 11:53 AM	CRD File	1 KB
rtk5testing.dxf	2/23/2023 12:05 PM	AutoCAD File	2 KB
rtk5testing.inf	2/23/2023 12:04 PM	Setup Information	5 KB
rtk5testing.jat	2/23/2023 11:43 AM	JAT File	0 KB
rtk5testing.jdb	2/23/2023 12:05 PM	JDB File	300 KB
rtk5testing.jdb-shm	2/23/2023 11:43 AM	JDB-SHM File	32 KB
rtk5testing.jdb-wal	2/23/2023 11:53 AM	JDB-WAL File	395 KB
rtk5testing.njs	2/23/2023 12:04 PM	NJS File	4,902 KB
rtk5testing.not	2/23/2023 11:53 AM	NOT File	1 KB
rtk5testing.rw5	2/23/2023 12:03 PM	RW5 File	2 KB
rtk5testing.sys	2/23/2023 12:04 PM	System file	1 KB

5 RTk5 GNSS Antennas

RTk5 ships with Tallysman TWI3972XF and Harxon CHX-602A.

The Tallysman antenna is meant for highest accuracy on-the-pole surveys while the Harxon can be directly attached to the RTk5 for extra flexibility and convenience (no survey pole required). Both antennas are graded for high precision RTK accuracy but the Harxon is more susceptible to suffer from multipath effects.



Tallysman TWI3972XF



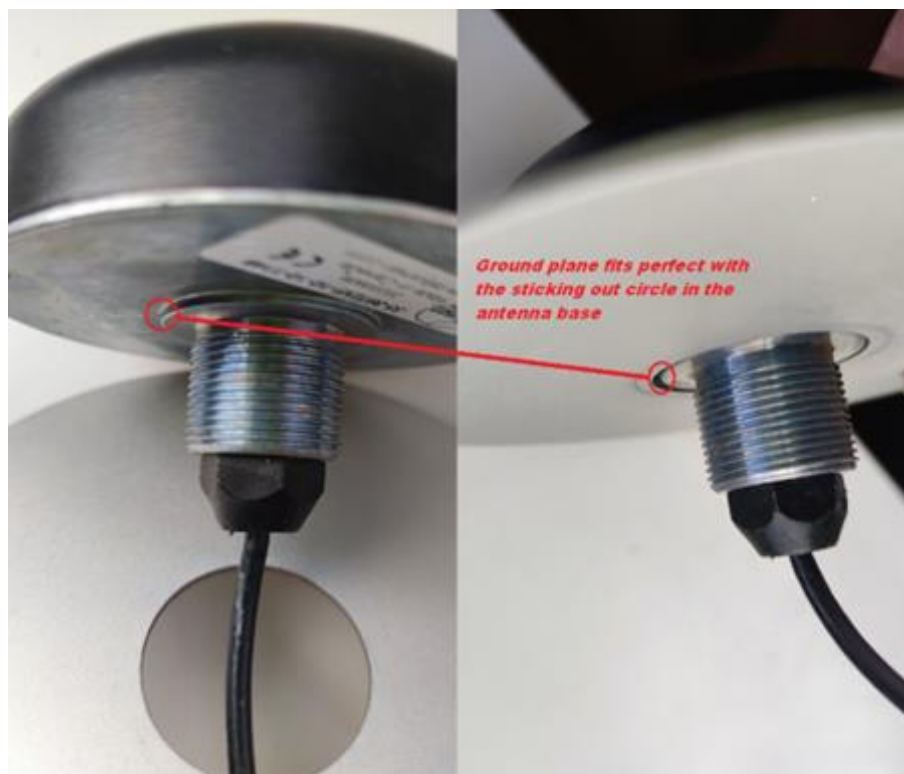
Harxon HXC_CHX602A

5.1 Tallysman TWI3972XF

The Tallysman antenna assembly consists of 2 elements: 1) the antenna and 2) the ground plane.

To install the antenna follow these steps:

- 1) Insert ground plane through 5/8" thread
- 2) Insert antenna cable through the custom survey pole
- 3) Rotate antenna until tightly attached to the survey pole



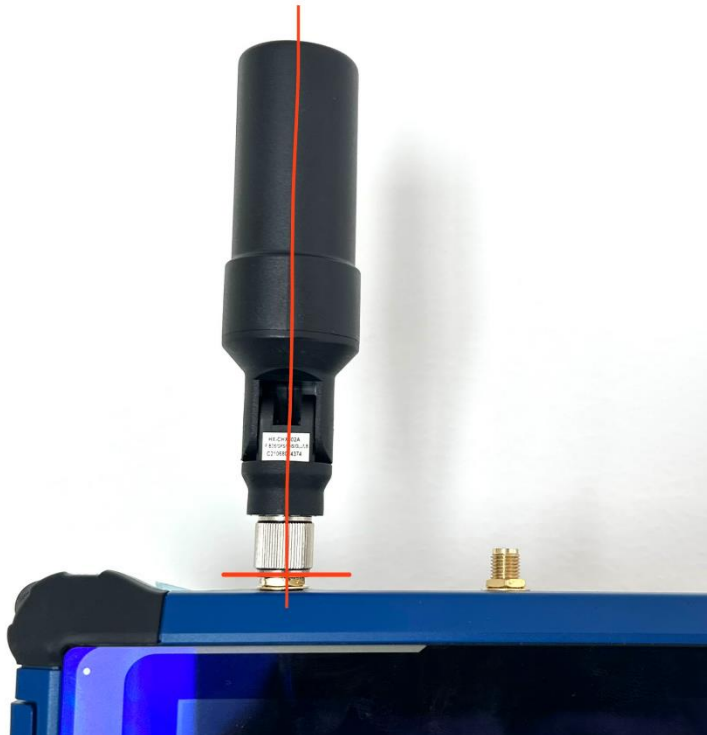
5.2. Harxon HXC CHX602A

In order to achieve high accuracy surveys with the Harxon antenna, it is important to understand how to use the device to avoid unwanted offsets:

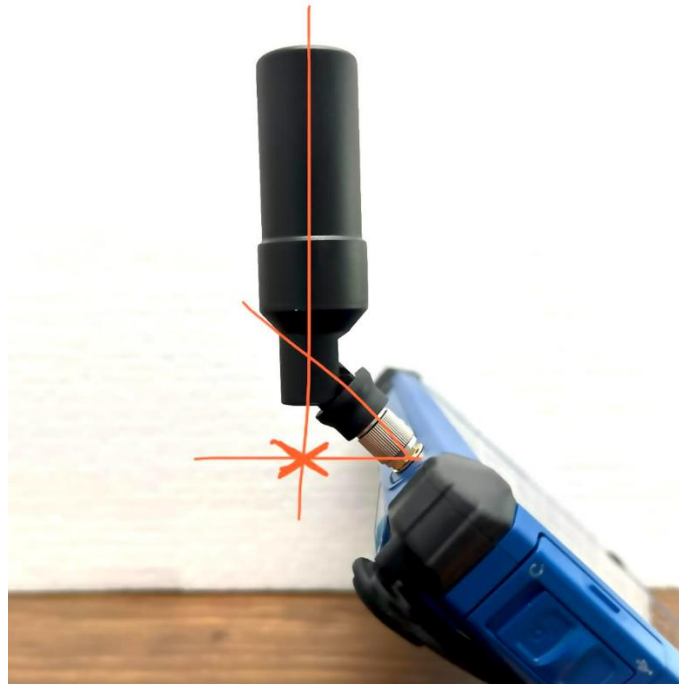
- It is fundamental that the antenna is always vertical with respect to the ground
- The position is reported at the antenna reference point (ARP)

Below are 3 acceptable configurations for surveying. The position reported by the system is tagged with an X in the following images.

1) RTk5 is vertical and antenna is vertical



2) RTk5 is tilted and antenna is vertical



3) RTk5 is flat on a surface and antenna is vertical

Note that in this case the RTk5 measures the height at the surface.



6 Gama Web UI

6.1 Web UI Introduction

The main purpose of the Gama Web UI on the RTk5 is to allow:

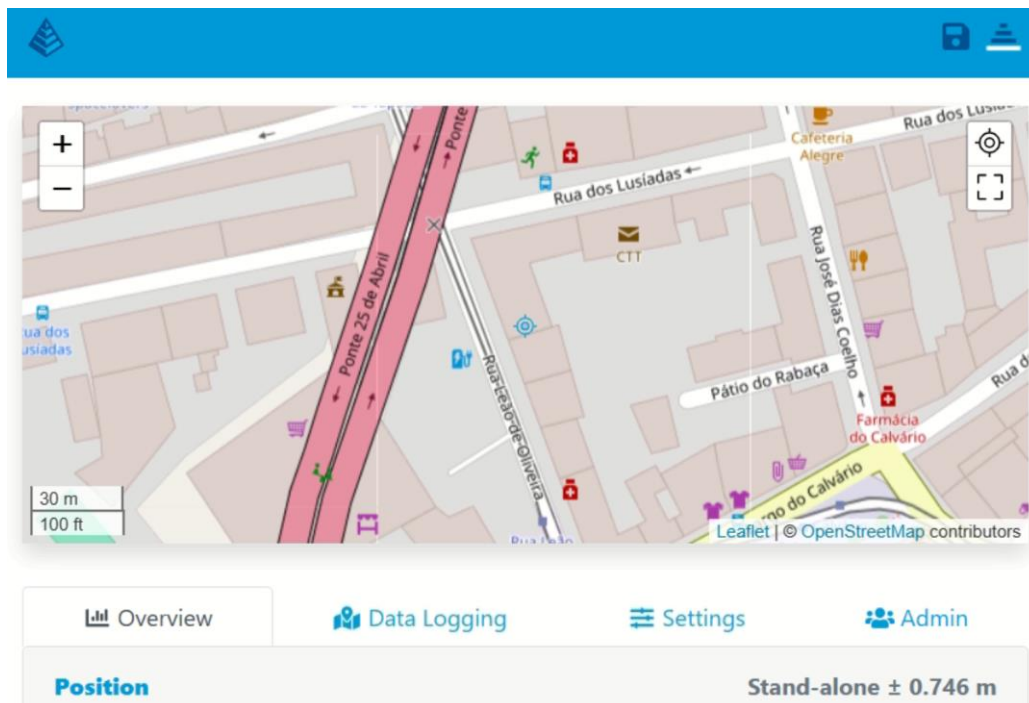
1. Registration of the Gama engine
2. Update Gama and Factory Reset
3. Support and issue tracking
4. Stand-alone tool for using Gama without SurvPC

The Gama Web UI is always accessible on the RTk5 by two options:

1. Double click GNSS UI icon on the Windows Desktop
2. Open a browser and type in 127.0.0.1

The Web UI has 4 main tabs:

- Overview
- Data Logging
- Settings
- Admin



6.1 Overview

 Overview	 Data Logging	 Settings	 Admin
Position	Fixed+ RTK $\pm$ 0.011 m		
GNSS	1 s Latency		
Satellites	21 / 33		
System			

Overview - Position

Monitor detailed information about the GNSS solution, namely status, value, accuracy, differential correction age.

 Overview	 Data Logging	 Settings	 Admin
Position	Fixed+ RTK $\pm$ 0.010 m		
Time	14:37:01.00 PM Off by 0.426 s		
Position	38° 42' 19.0572" N 9° 10' 42.7573" W $\pm$ 0.010 m		
Elevation	92.396 m $\pm$ 0.012 m		

Overview – GNSS

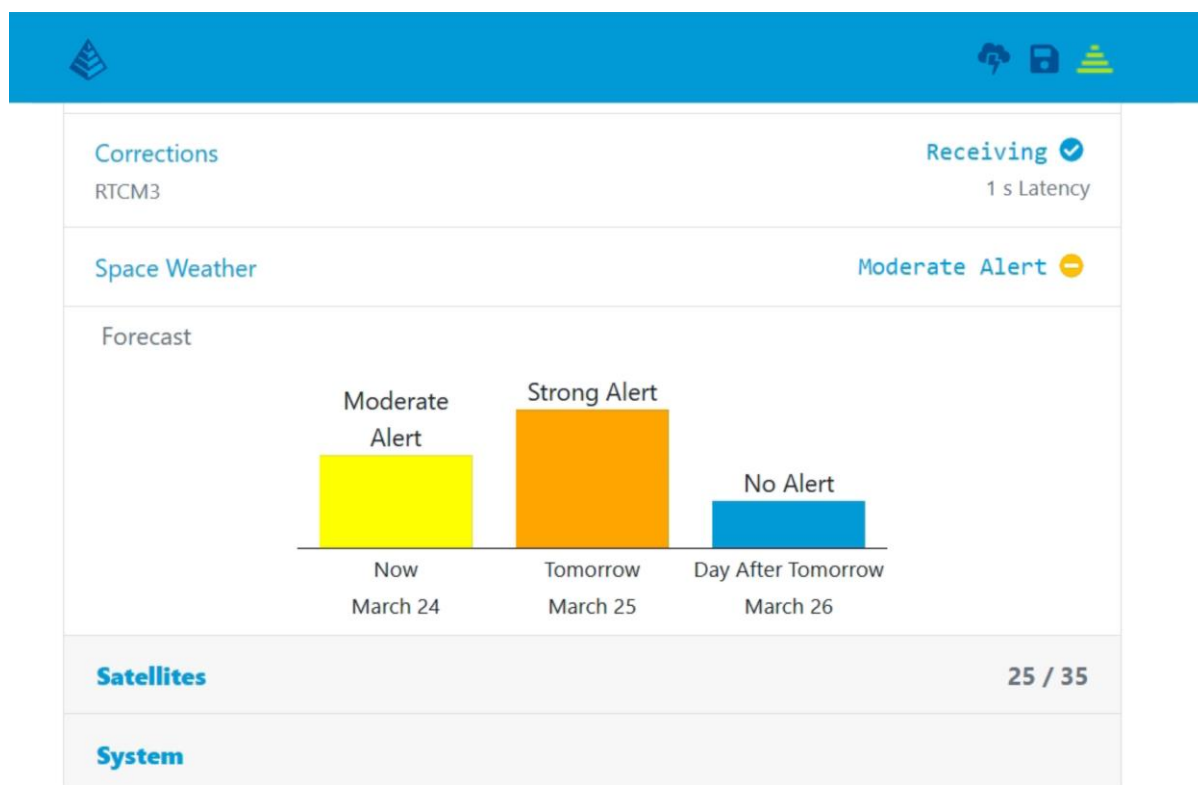
Monitor detailed information about the GNSS status and data flow.

Here you can also issue a Reset of the Gama engine.

In this section you can inspect detailed diagnostics about the GNSS system, namely if the receiver is powered on and connected, if it is tracking and receiving observations, if Gama is running correctly, etc.

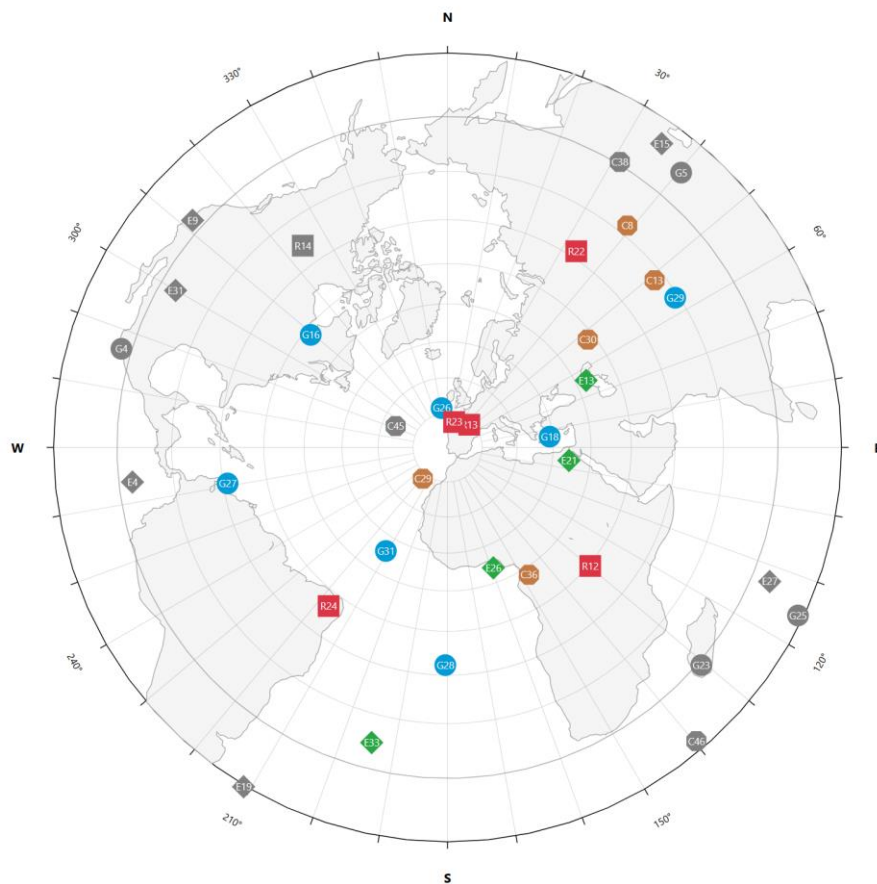
GNSS		1 s Latency
Gama		Computing ✓
Gama-v1.1.13		 Engine Reset
Satellites		GPS 6 / 9 ✓
21 / 34		GLO 5 / 8 ✓
		GAL 5 / 9 ✓
		BDS 5 / 8 ✓
DOPs		1.34 PDOP ✓
Antenna		Tracking ✓
Master		
Corrections		Receiving ✓
RTCM3		1 s Latency
Space Weather		No Alert ✓

In addition, Space Weather provides valuable information on active or future Space Weather event that can disrupt GNSS performance.

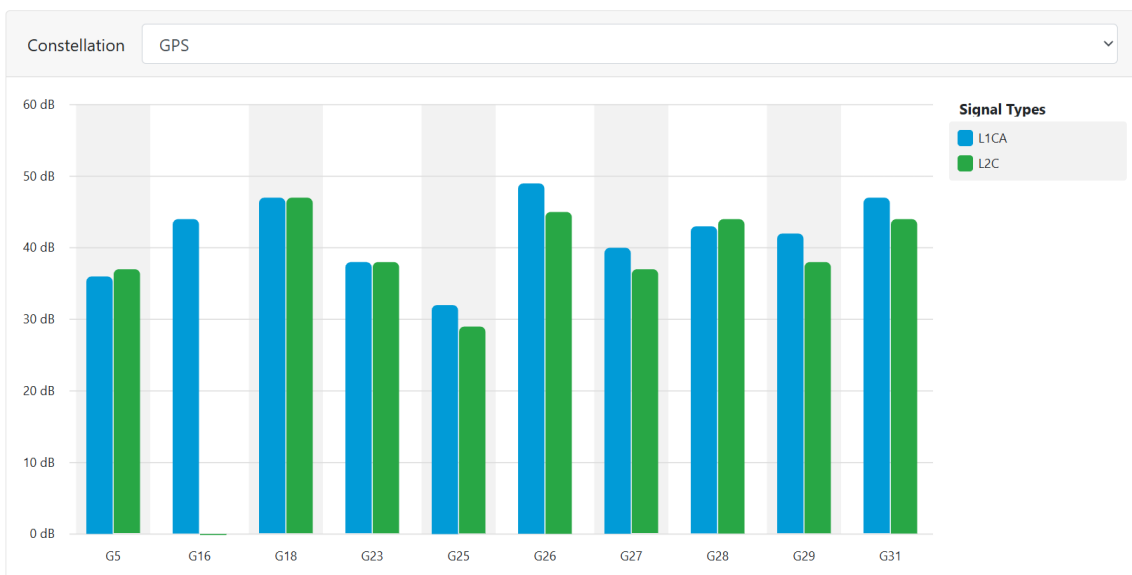


Overview - Satellites

Monitor satellite sky plot, SNR values and satellite usage status.

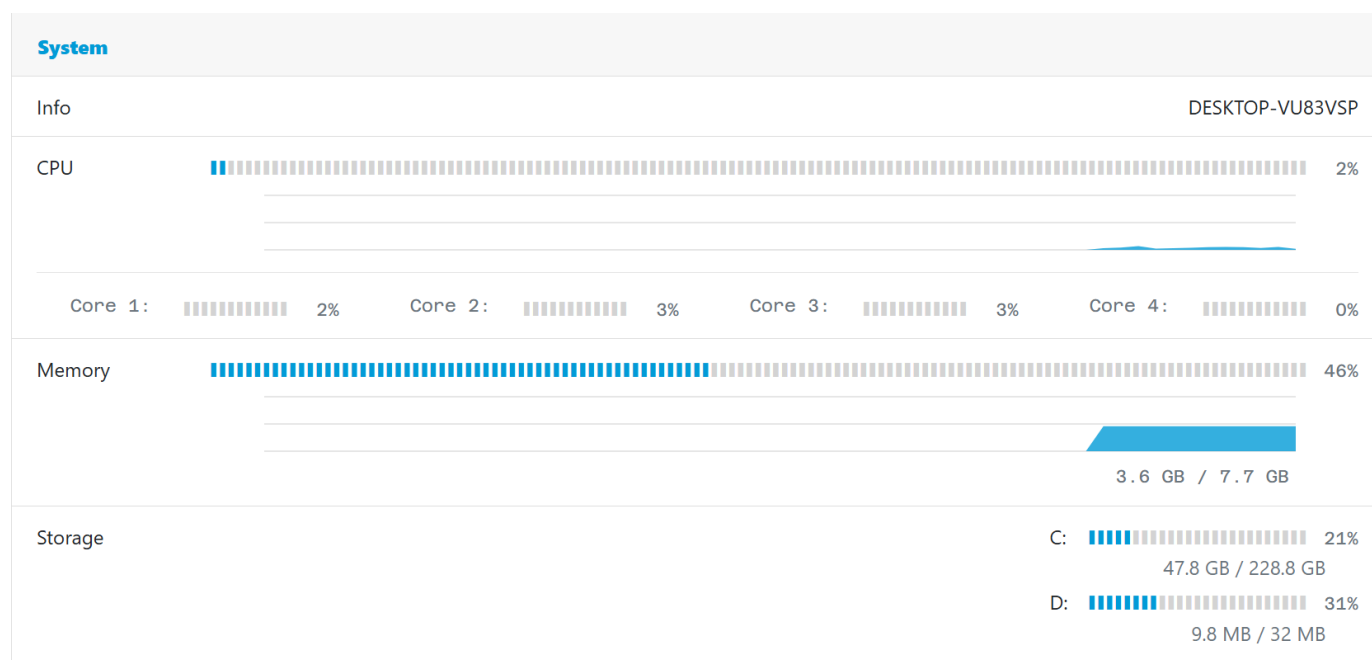


Satellite Signals



Overview – System

Monitor detailed information about system CPU, RAM memory and internal storage.



6.2 Data Logging

Data Logging – Binary NJS and NMEA Logging

Menu for administrating raw data logging independently from Carlson SurvPC.

Binary NJS data files can be converted to RINEX format – see chapter 7.4 RINEX.

Under “Binary / NMEA Logging” section you can:

- Open and close binary NJS log files:
 - Static
 - Stop+Go
 - Kinematic
- Log NMEA;
- Delete existing log files;
- Download existing log files (in order to download you must first close the file by unchecking the “active box”);
- Add “static” and “moving” events to active Stop+Go log files.

You can log multiples files simultaneously. The Web UI is intelligent enough to only add Stop+Go event markers to an open Stop+Go log file.

[Overview](#)
[Data Logging](#)
[Settings](#)
[Admin](#)

Binary / NMEA Logging

Internal								
Active	Name	Type	Status	Size	Events	Created	Modified	Actions
☒	240917-101115-Kinematic	Kinematic	Kinematic	811.3 KB	1	2024-09-17 11:11:35	2024-09-17 11:12:03	Download Delete

New Log File

File Name

Kinematic

▼

Internal

▼

Logging Rate

▼

Antenna Height

Meters

▼

Open

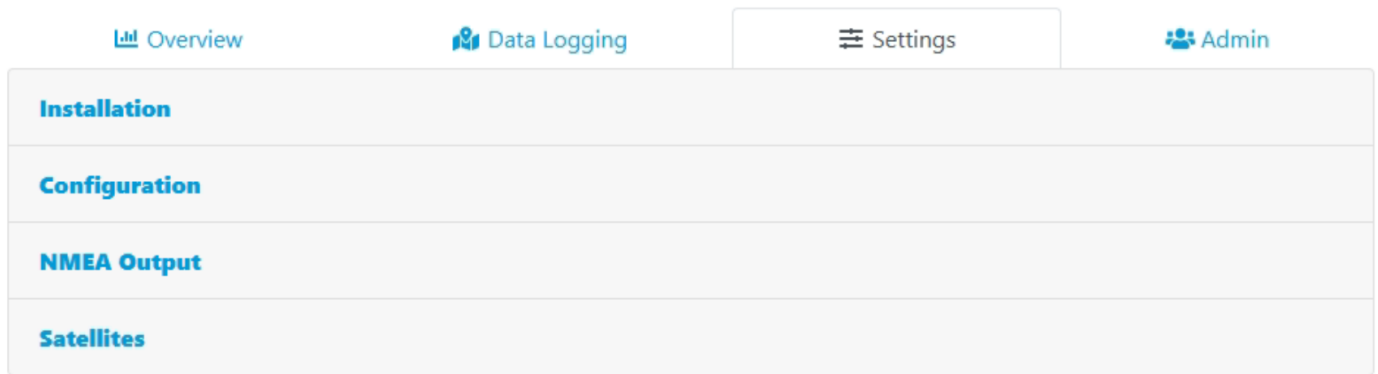
Data Logging – Extended Binary Logging

Log binary file for issue tracking and product support.

Overview	Data Logging	Settings	Admin
NJS Logging			
Extended Binary Logging			
Log binary file for product support		▶ Start	

6.3 Settings

Configure Gama via the Web UI.



Settings – Installation

- Configure antenna type and antenna serial number.

Settings – Configuration

- Configure mode (Rover/Base);
- Set rod height;
- Set GNSS data rate;
- Set data logging rate.

Settings – NMEA Output

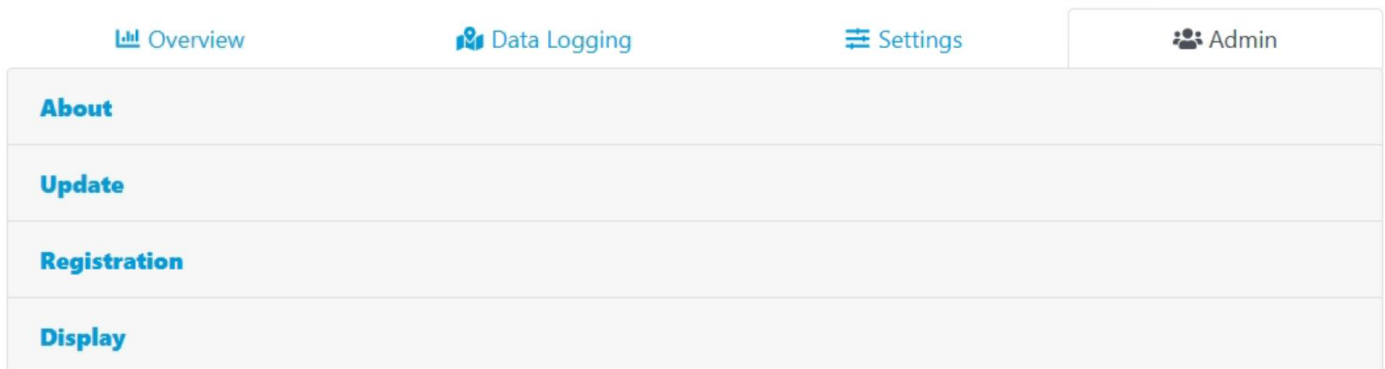
- Visualize NMEA output ports;
- Configure NMEA Position Output Type (APC, ARP or User).

Settings – Satellites

- Configure satellite elevation mask;
- Enable/disable GNSS constellations;
- Exclude satellites.

6.4 Admin

Gama administration tab:



Admin – About

- View product license and Gama version;
- View Release Notes and License Agreement.

Admin – Update

- Update Gama– see section 3 - Updating Gama;
- Perform Factory Reset.

Admin – Registration

- Manage Gama engine license and registration
- The Gama RTk5 license modules are:
 - Basic - Allows recording of Raw Data (NJS) and Communication with SurvPC
 - RTK - Allows usage of corrections streams to go RTK-Fixed
 - North America - Allows usage of RTK within North America

Admin – Display

- Configure display settings and units (metric/imperial);
- Configure Web UI Theme.

7 Output Protocol and Data Logging

7.1 Proprietary NMEA 0183

Proprietary NMEA messages are streamed on port 8082 and therefore available over Ethernet or WiFi.

See Appendix A2 – PCSW Proprietary NMEA 0183 Messages for a reference guide on Carlson Software Proprietary NMEA messages.

7.2 Standard NMEA 0183

Standard NMEA messages are streamed on port 8092 and therefore available over Ethernet or WiFi. Gama RTk5 complies with the NMEA 0183 v4.11 standard.

For details on the NMEA message protocol please refer to the NMEA standard available for purchase on National Marine Electronics Association (NMEA) website:

- <https://www.nmea.org/nmea-0183.html>

7.3 NJS Binary Format

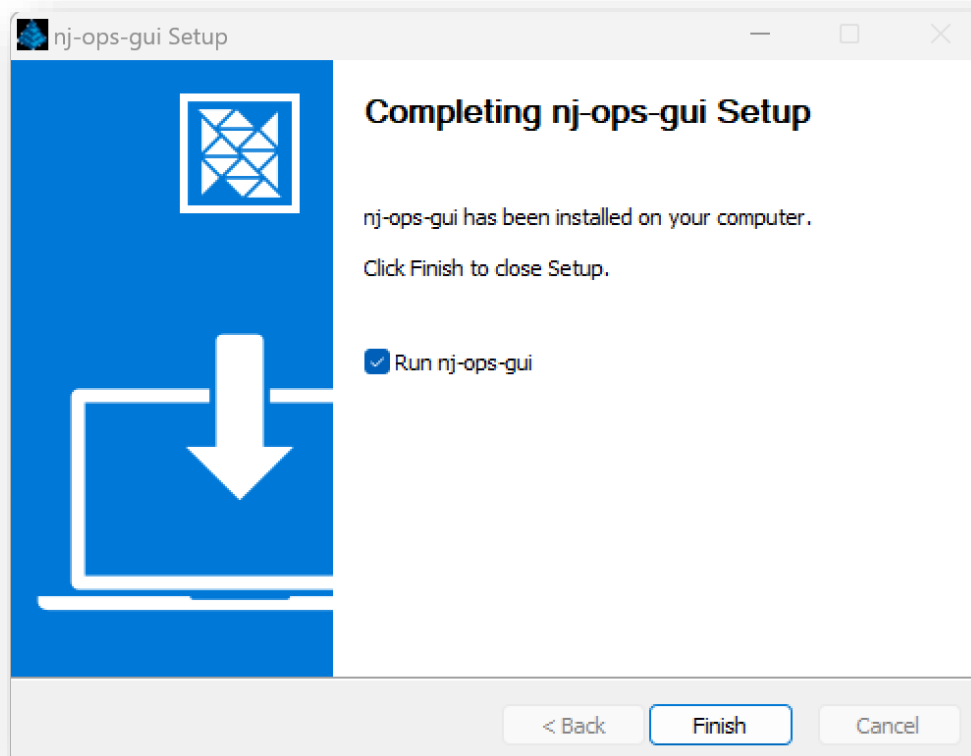
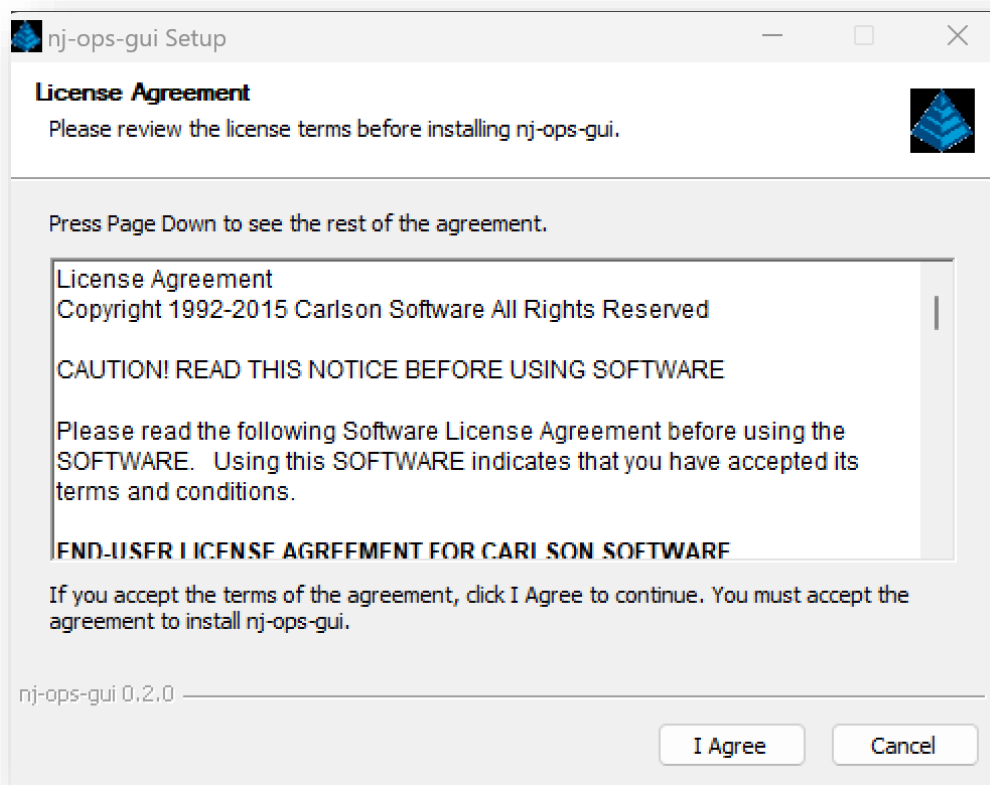
Gama RTk5 is capable of logging NJS binary data, employing a proprietary format that caters to post-processing requirements and facilitates efficient product support.

For instructions on logging NJS data see section Data Logging – Binary NJS and NMEA Logging under chapter 6.2.

7.4 RINEX

NJS files can be converted to RINEX 3 and RINEX 4 format using the Carlson NjOps GUI application for Windows. Instructions are provided below:

- 1) Download and NjOps GUI for Windows from this url:
<https://files.carlsonsw.com/mirror/carlsongnss/index.html>
- 2) Run installer and follow instructions.

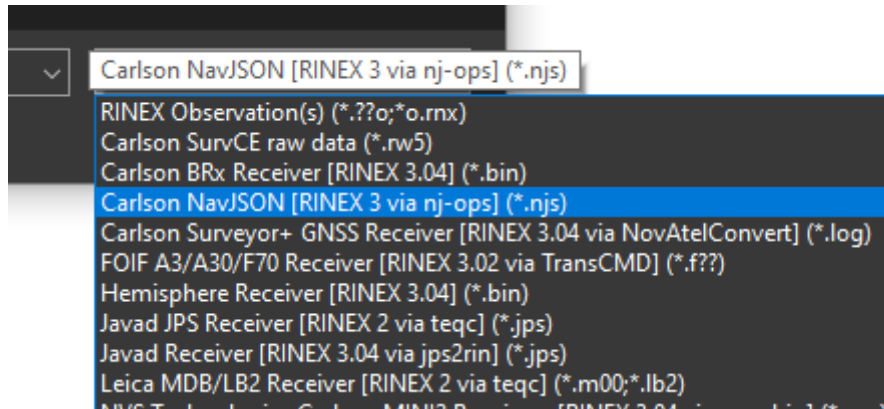


- 3) Run Nj-OPS GUI.
- 4) Click File->Convert->File and select the NJS file you wish to convert to RINEX.

8 Importing to SurveyGNSS

To post-process Gama raw data in SurveyGNSS ensure raw data logging is enabled in SurvPC or via the Web UI.

SurveyGNSS can directly import raw NJS files (SurveyGNSS version 2.3.5 and above), no special procedure is required.



9 Gama Command Line Interface (Gama CLI)

Gama RTk5 offers complete configuration capabilities through direct commands using the Gama Command Line Interface (Gama CLI). This interface serves as the foundational layer used by other Carlson SW products for configuring Gama RTk5, including but not limited to Carlson Grade and Carlson SurvPC. Consequently, it is the recommended interface for third-party software as well, ensuring seamless integration and optimal compatibility with Gama RTk5.

For details on Gama CLI see Appendix A3 - Gama Interface Layer ICD (Gama CLI).

Appendix A1 - Troubleshooting

If Gama becomes unresponsive or is not operating as expected follow these steps:

- 1) Open Gama Web UI using the Desktop icon (alternatively open a browser on the RTk5 tablet and type in 127.0.0.1).
- 2) Inspect Status tab on the Web UI and check if all status are OK.

Normally, all status be in blue colour as shown below. You see any item in red continue reading below for troubleshooting.

GNSS	
Gama Gama-v1.0.7	Computing ✓
Position	Fixed+ RTK ± 0.014 m Engine Reset
Satellites 23 / 34	GPS 7 / 11 ✓ GLO 7 / 9 ✓ GAL 5 / 7 ✓ BDS 4 / 7 ✓
Antenna Master	Observations ✓
	antex ✓ modeled ✓ connected ✓ communication ✓ keepalive ✓ observations ✓ solution ✓
Corrections RTCM3	Receiving ✓
	communication ✓ observations ✓ < 5km ✓
System	

A1.1. Antenna or cable connection problem

If antenna shows “No observation data” status (in yellow) but Gama shows “Idle” (in yellow) then double check your antenna connection and cable.

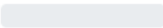
GNSS	
Gama Gama-v1.0.5	Idle 
Position	Invalid  Engine Reset
Satellites 0 / 0	GPS 0 / 0  GLO 0 / 0  GAL 0 / 0  BDS 0 / 0 
Antenna Master	No observation data 
	antex  modeled  connected  communication  keepalive  observations  solution 
Corrections	Receiving 
	communication  observations 
System	

Ensure you have the GNSS antenna(s) correctly connected to the device.

A1.2. Internal GNSS receiver connection problem

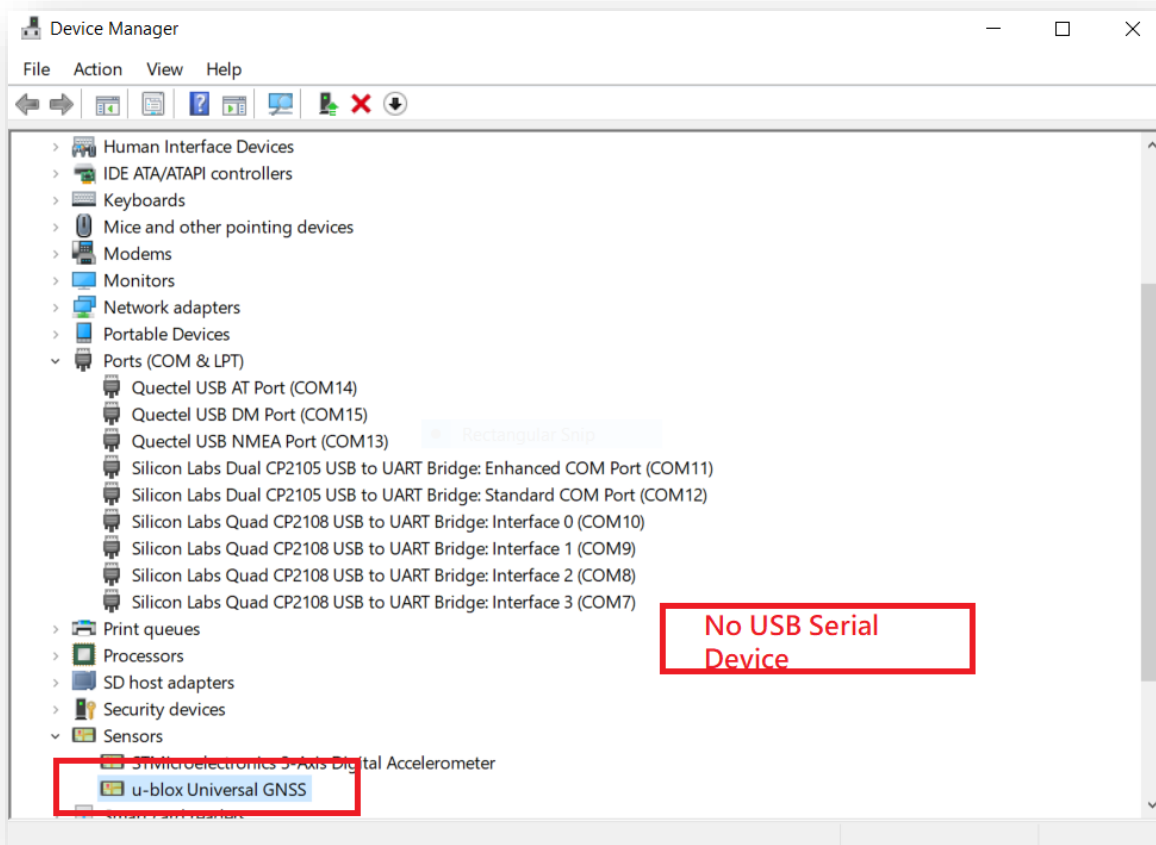
In the event a Windows update takes control of the built-in GNSS, it will block Gama from establishing a connection to the internal GNSS Receiver.

In this case, the “Antenna” field will show the “Disconnected” status. Please follow these steps to identify and resolve this problem.

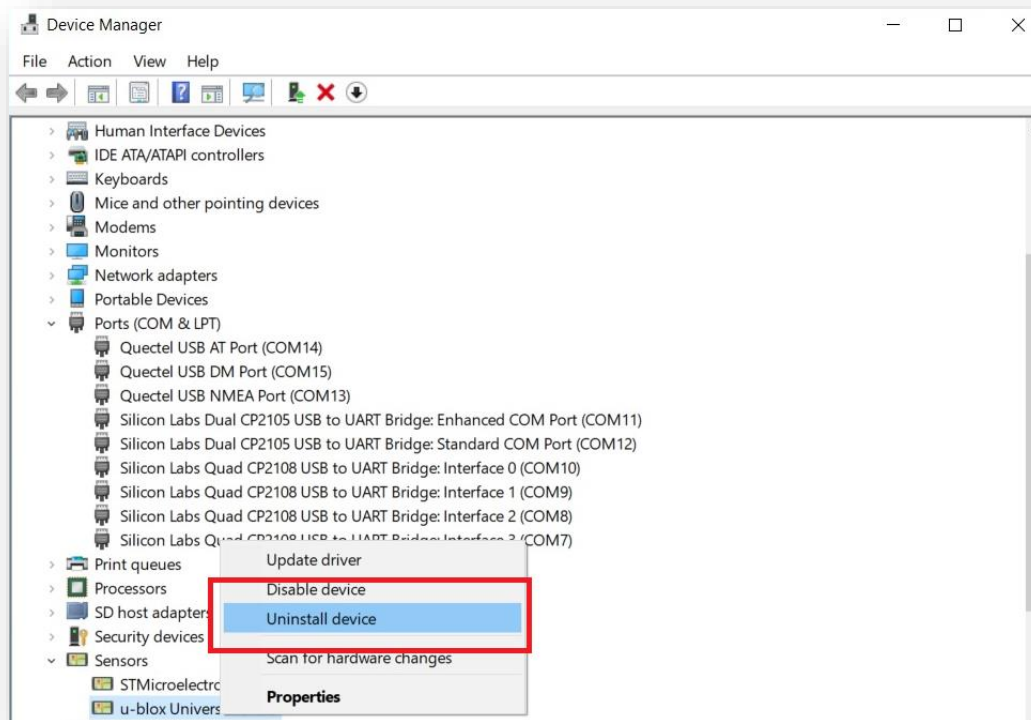
GNSS	
Gama Gama-v1.0.7	Idle  Unregistered 
Position	Invalid  Engine Reset
Satellites 0 / 0	GPS 0 / 0  GLO 0 / 0  GAL 0 / 0  BDS 0 / 0 
Antenna Master	Disconnected 
	antex  modeled  connected  communication  keepalive  observations  solution 
Corrections None	No license module 
	communication  observations   
System	

Open Windows “Device Manager” (click Start and type “Device Manager”).

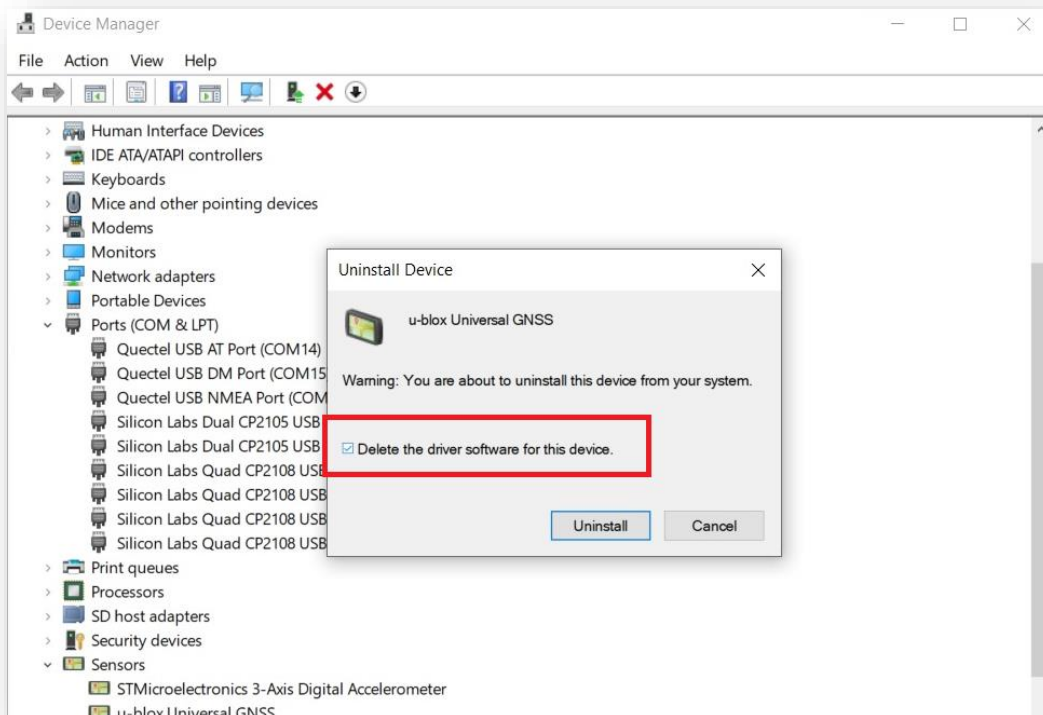
If you see “u-blox Universal GNSS” under “Sensors” than your RTk5 has the wrong driver installed. Follow the next steps to resolve the issue.



1) Right click on “u-blox Universal GNSS” and click “Uninstall device”.

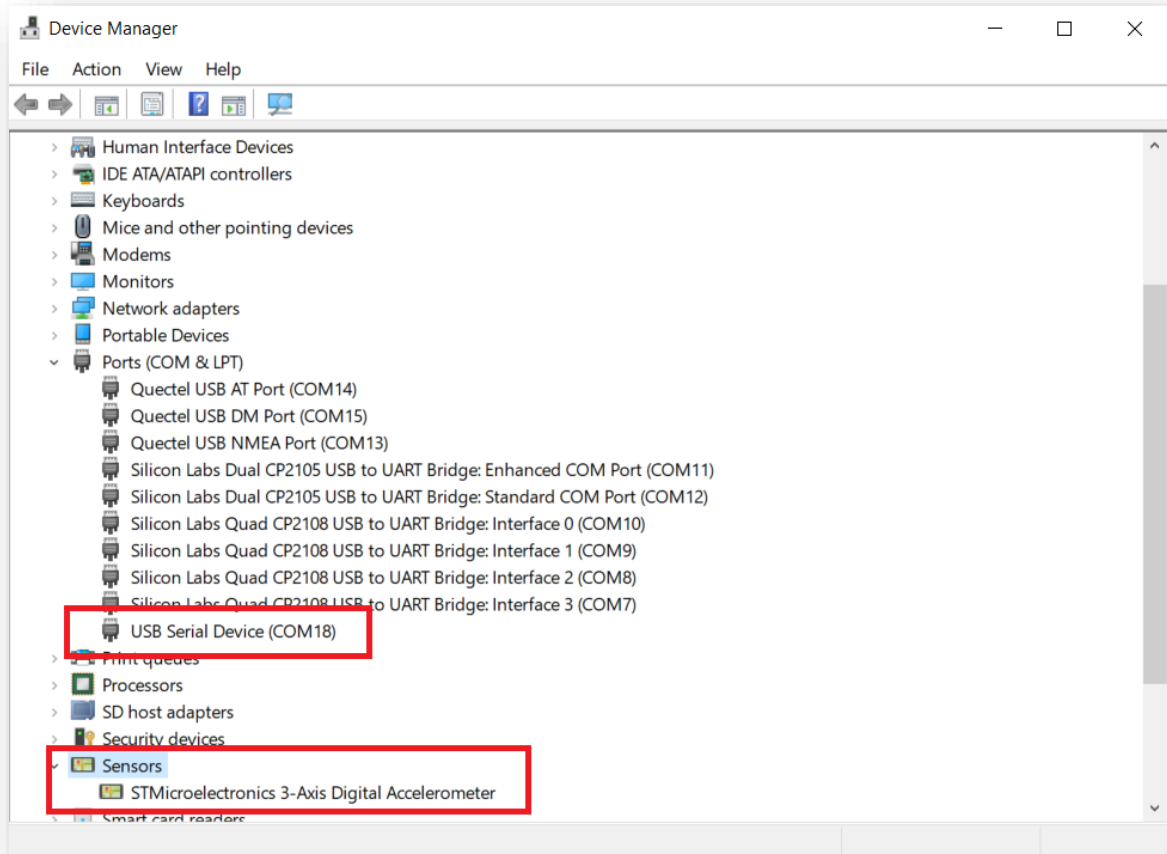


2) Click “Uninstall” to confirm.



3) Shutdown Windows (do not restart, make sure to shutdown).

4) Power on RTk5 and open “Device Manager”. You should now see the following:



A1.3. Gama is unregistered

If Gama is not fixing, if you cannot connect SurvPC to Gama, or some features appear disabled (not able to log NJS raw data) make sure Gama is correctly Registered. To Register Gama see chapter 2 - Gama RTK Engine Registration.

Note that Gama may become unregistered due to data corruption or by executing the Fresh Installation procedure on an existing install of Gama, which will delete the active registration from the device.

GNSS	
Gama Gama-v1.0.4	Idle  Unregistered 
Position	Invalid  Engine Reset
Satellites 0 / 0	GPS 0 / 0  GLO 0 / 0  GAL 0 / 0  BDS 0 / 0 
Antenna Master	Disconnected 
Corrections	No license module 
System	

A1.4. Wrong antenna type

If you forgot to set the antenna type or selected a wrong antenna then Gama will not be able to apply antex calibration (causing vertical offsets) and will not be able to correctly model the antenna SNR response (leading to sub-optimal RTK performance).

GNSS	
Gama Gama-v1.0.3	Computing
Position	Float RTK ± 0.409 m Engine Reset
Satellites 16 / 28	GPS 8 / 8 GLO 8 / 9 GAL 0 / 4 BDS 0 / 7
Antenna Master	Observations
	antex modeled connected communication keepalive observations solution
Corrections	Receiving
	communication observations
System	

If you confirm you did select the right antenna type but still observe a red indicator for “antex” or “model” then you may be using a new type of antenna that is not yet fully supported by Gama. In this case please reach out to your Carlson Software Support point of contact.

A1.5. Baseline degrading performance

If the selected base has a baseline too long, Gama will have sub-optimal RTK performance.

VRS is unique in that the base observations are synthetically generated. Ensure you are within the VRS network.

Corrections Receiving ✓ RTCM3 communication ✓ observations ✓ < 5km ✓	Corrections Receiving ✓ RTCM3 communication ✓ observations ✓ < 15km ✓
Corrections Receiving ⚠ RTCM3 communication ✓ observations ✓ > 25km ⚠	Corrections Baseline ✖ RTCM3 communication ✓ observations ✓ > 45km ✖
Corrections Receiving ✓ RTCM3 communication ✓ observations ✓ VRS ✓	

Review the selected Base and ensure the distance is an appropriate length.

A1.6. Hard crash

If a hard crash occurred but the Web UI is still responsive, you should see a status like this:

GNSS	
Gama 20230204.1	No Response ✖
Position	Invalid Engine Reset
Satellites 0 / 0	GPS 0 / 0 ✖ GLO 0 / 0 ✖ GAL 0 / 0 ✖ BDS 0 / 0 ✖
Antenna Master	Disconnected ✖
Corrections	None ☹
System	

Follow these steps:

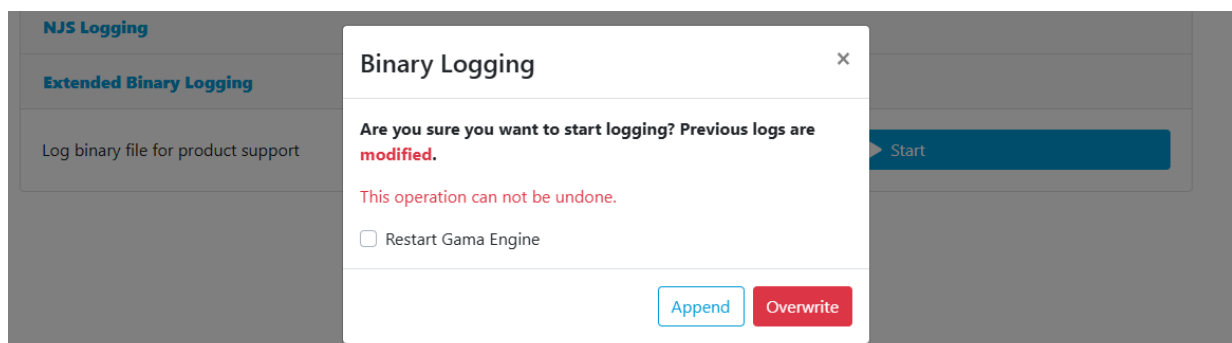
- 1) Open Web UI Data Logging page;
- 2) Start Extended Binary Log without restarting the Gama engine and click Append;
- 3) Stop logging after a minute;
- 4) Click “Download All”;
- 5) Copy downloaded file and forward it to your Carlson Software Support point of contact;
- 6) Reboot device.

[Overview](#)
[Data Logging](#)
[Settings](#)
[Admin](#)

NJS Logging

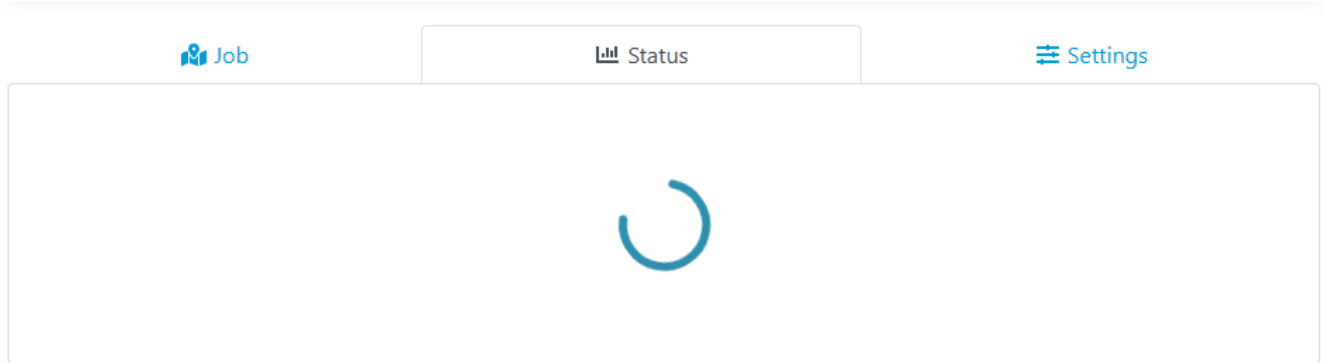
Extended Binary Logging

Log binary file for product support
 [▶ Start](#)



A1.7. Web UI unresponsive

If the Gama Web UI is unresponsive, you may observe the following:



This is expected behaviour after updating Gama. Please wait and refresh (press F5).

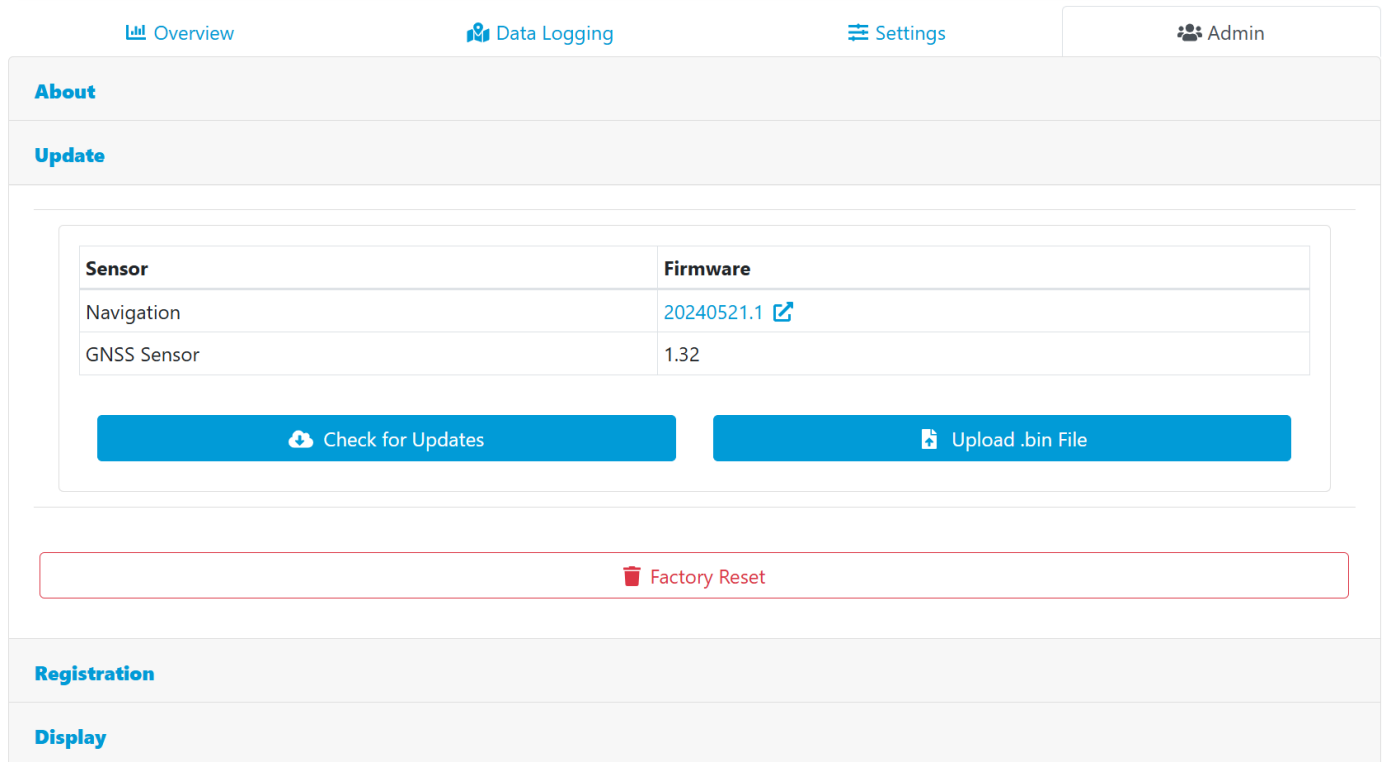
If the Web UI continues unresponsive, follow these steps:

- 1) Open Windows File Explorer and type in the following path "C:\ProgramData\Gama\logs";
- 2) Copy all logs and forward them to your Carlson Software Support point of contact;
- 3) Reboot RTk5 tablet.

A1.8. GNSS Sensor Firmware Out-of-Date

To ensure Gama performs optimally, it is required that the GNSS Sensor be operating within a specified range of firmware (FW) versions.

The current FW version of the internal GNSS Sensor is located on the Gama Web UI update section.



The screenshot shows the Gama Web UI interface. At the top, there are navigation tabs: Overview, Data Logging, Settings, and Admin. Below these, there are sections for About, Update, Registration, and Display. The Update section is active and contains a table with sensor information and two buttons: Check for Updates and Upload .bin File.

Sensor	Firmware
Navigation	20240521.1 ↗
GNSS Sensor	1.32

Below the table, there are two buttons: [Check for Updates](#) and [Upload .bin File](#). At the bottom of the Update section, there is a red button labeled [Factory Reset](#).

At the time of this document, the latest GNSS Sensor firmware is:

GNSS Sensor: 1.32

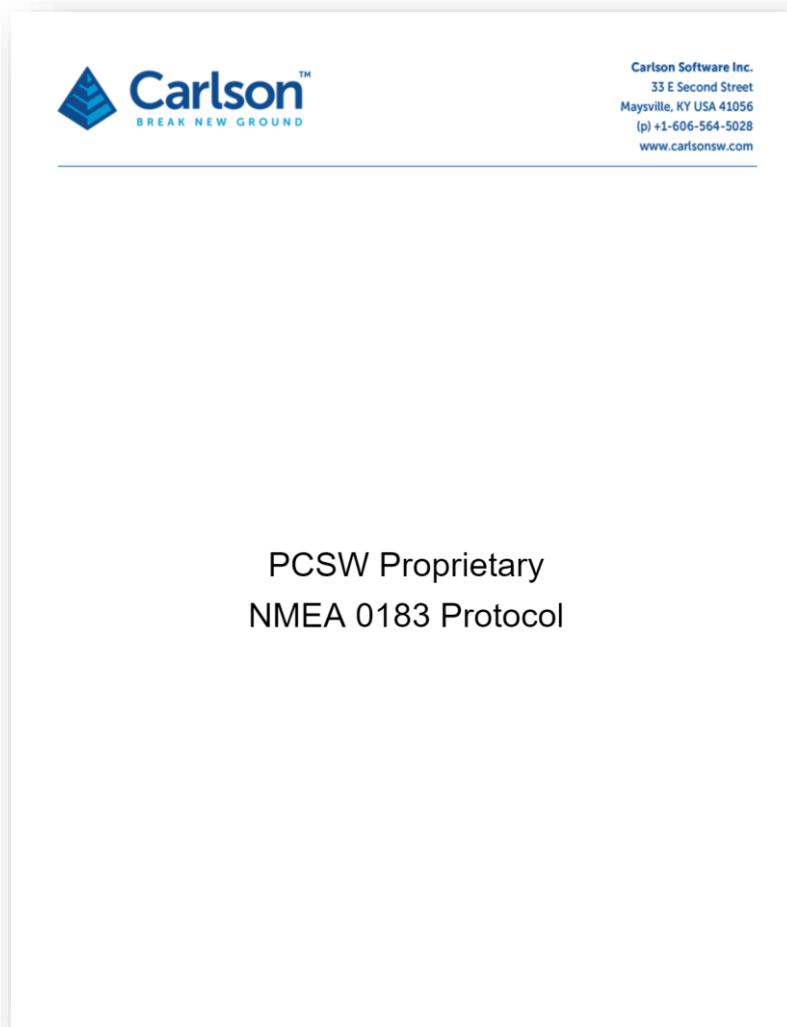
If your displayed version is less than the above, the GNSS Sensor FW can be updated by following the [Updating Gama procedure](#).

Appendix A2 – PCSW Proprietary NMEA 0183 Messages

The NMEA 0183 standard grants hardware manufacturers the flexibility to define proprietary sentences tailored to their specific needs. These exclusive sentences are denoted by commencing with the letter P, succeeded by three letters uniquely identifying the controlling manufacturer. In the case of Carlson Software, its proprietary NMEA sentences start with PCSW.

For the most up-to-date information on Carlson's proprietary NMEA messages, you can download the latest version of the reference guide here:

https://drive.google.com/file/d/1NzhoWkSIKKUmO7DOWw6Zdsa952QOGRIB/view?usp=drive_link

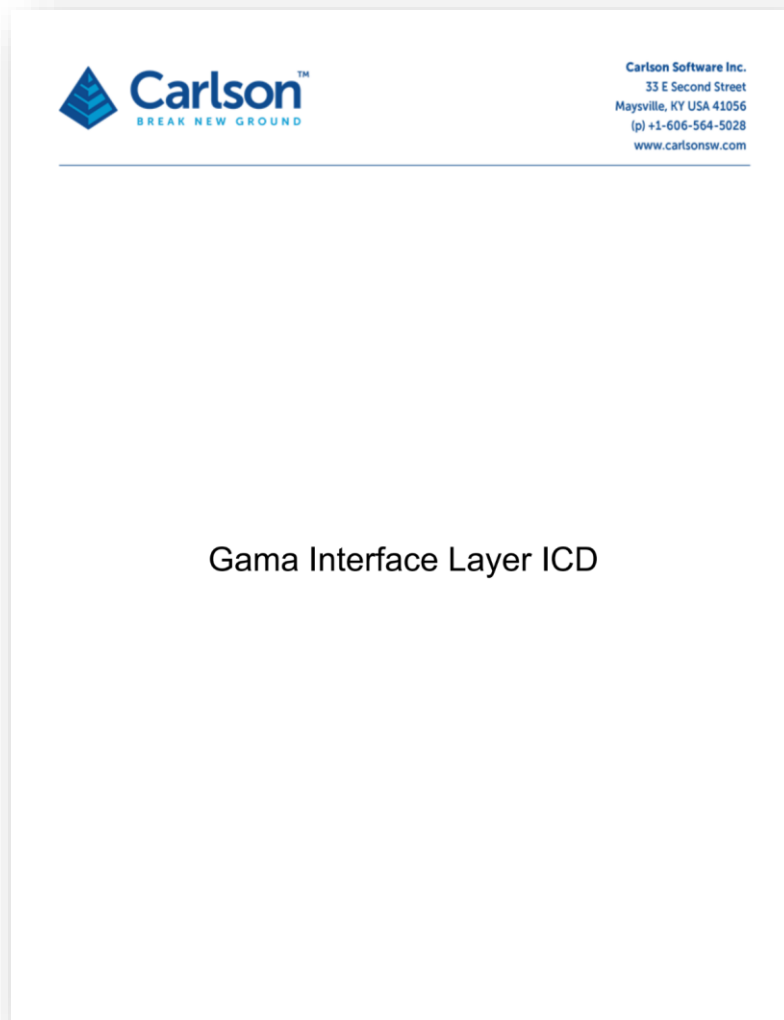


Appendix A3 - Gama Interface Layer ICD (Gama CLI)

Gama RTk5 offers complete configuration capabilities through direct commands using the Gama Command Line Interface (Gama CLI). This interface serves as the foundational layer used by other Carlson SW products for configuring Gama RTk5, including but not limited to Carlson SurvPC and Carlson Grade. Consequently, it is the recommended interface for third-party software as well, ensuring seamless integration and optimal compatibility with Gama RTk5.

The latest version of the Gama CLI reference guide document is available for download here:

https://drive.google.com/file/d/15sEUVNm3TllzUhiab33NilRHbz17IWV7/view?usp=drive_link





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