	Issue: 02	Date: 2023/06/02

Document Title:

Gama RTk5 End User Manual

Summary / Scope:

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 tablet in general or SurvPC please consult dedicated manuals.

Reason for Issue:

- Support End Users getting started with Gama and RTk5 product;
- Single go-to document for all questions on how to use Gama with the RTk5.

Distribution:

Suitable for external distribution.

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

Contents

1 Gama RTK Technology 3
2 Gama RTK Engine Registration 4
3 Updating Gama 8
3.1 Updating Gama via Check for Updates 9
3.2 Updating Gama via Manually Downloaded Bin File 11
4 Using Gama with SurvPC 13
5 RTk5 GNSS Antennas 20
5.1. Tallysman TWI3972XF 20
5.2. Harxon HXC CHX602A 22
6 Gama Web UI 24
5.3. Web UI Introduction 24
5.4. Job 25
5.5. Status 27
5.6. Settings 29
7 Importing to SurveyGNSS 31
8 Troubleshooting 32
8.1 Antenna or cable connection problem 33
8.2 Internal GNSS receiver connection problem 35
8.3 Gama is unregistered 39
8.4 Wrong antenna type 40
8.5 Baseline degrading performance 41
8.6 Hard crash 42
8.7 Web UI unresponsive 43
8.8 Installing Tallysman antenna 44
8.9 GNSS Sensor Firmware Out-of-Date 45

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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 new technologies to deliver best-in-class performance.

See our Gama RTK White Paper for details on RTK technology and competitive test results.

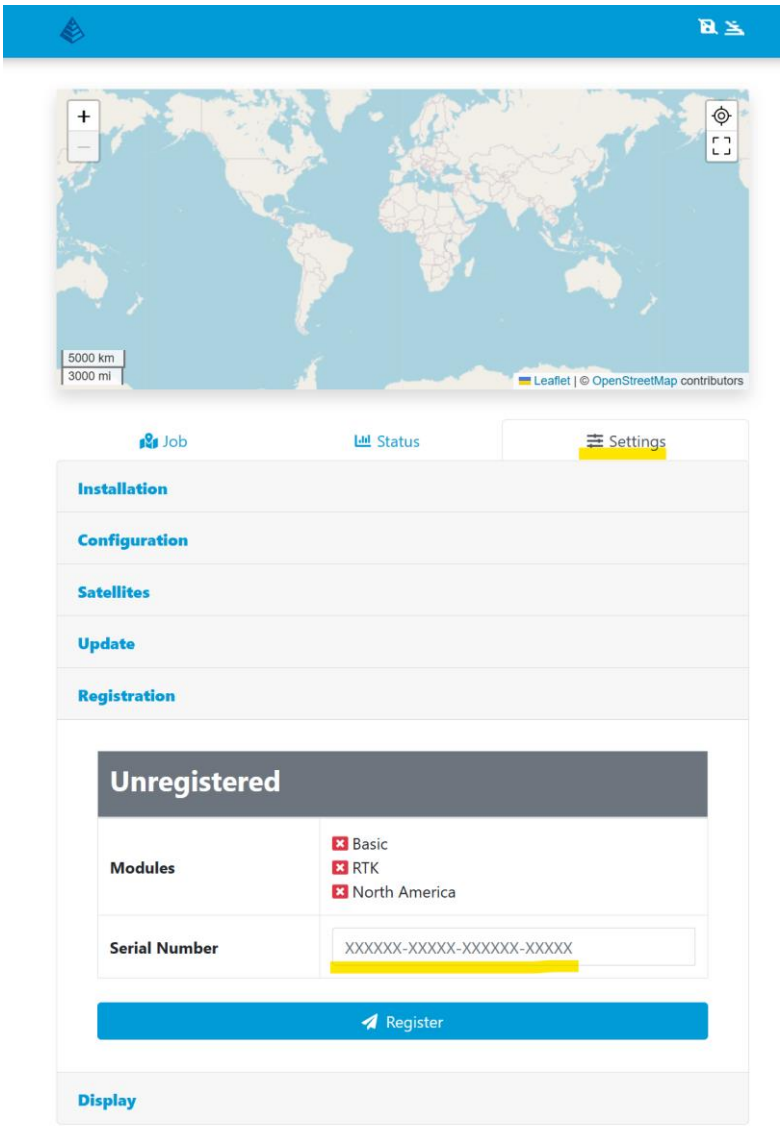
Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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.

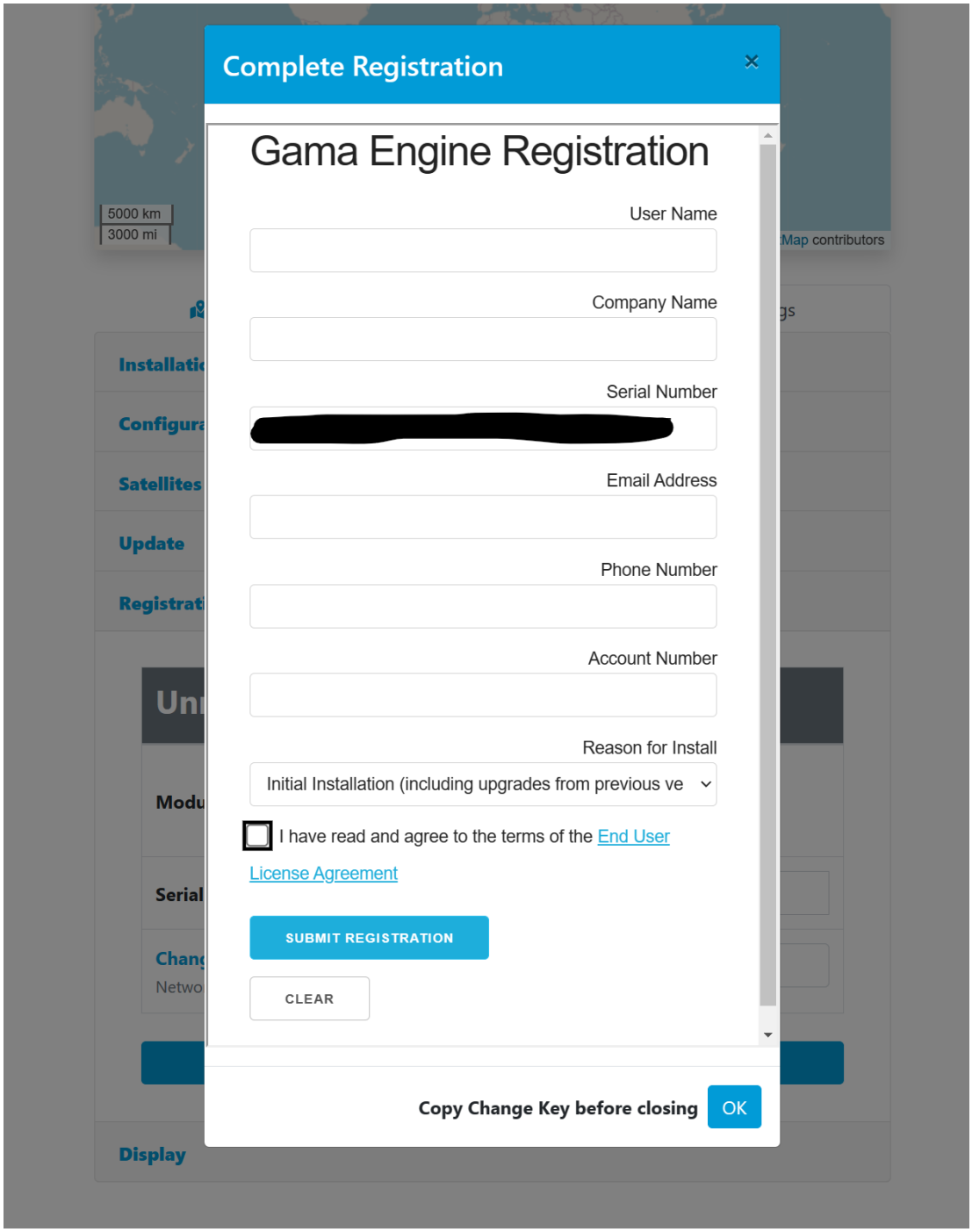
Step 2) – Click Settings tab and scroll down to “Registration”.



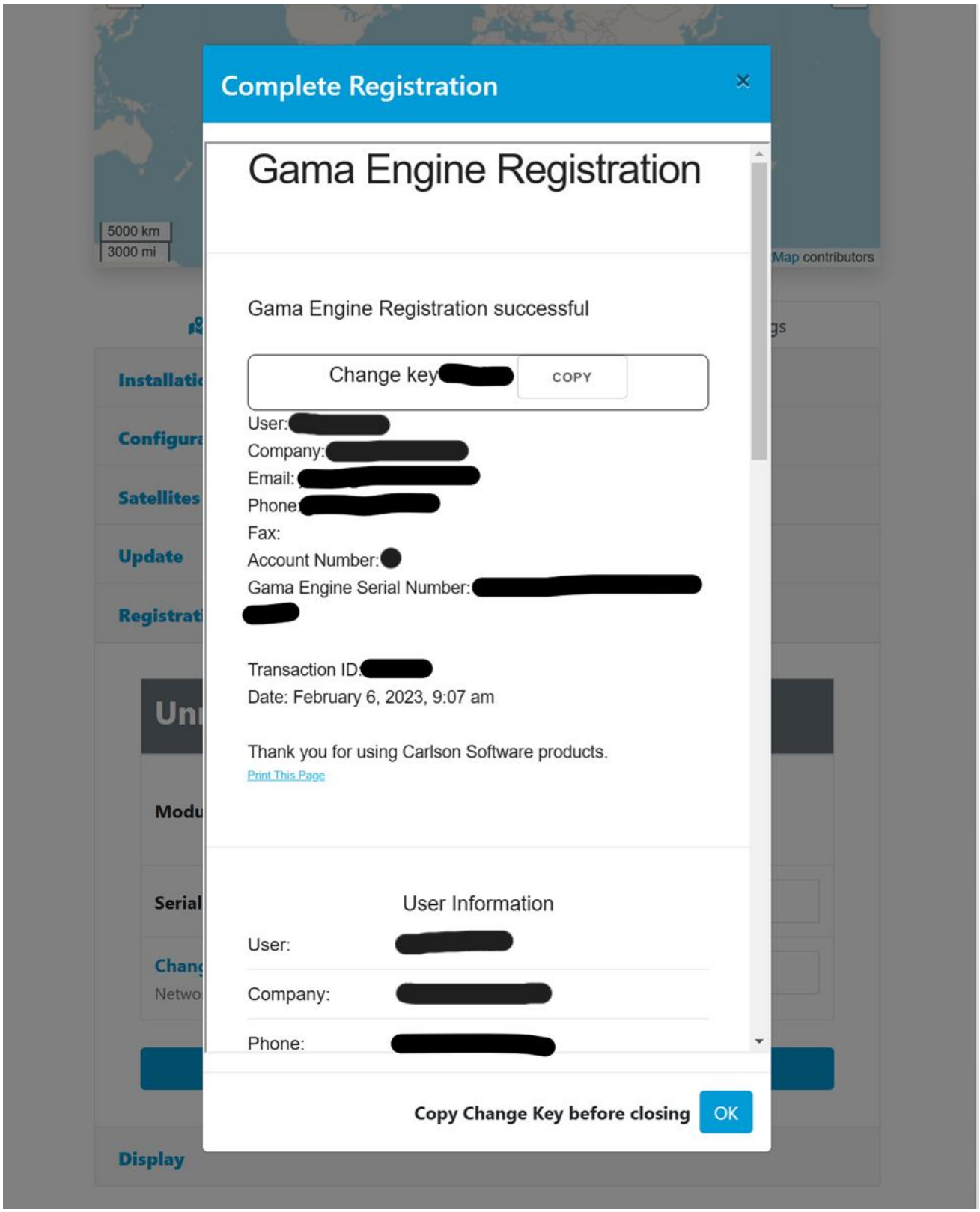
Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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 – You will need to copy the Change Key from this page, it is not automatic:

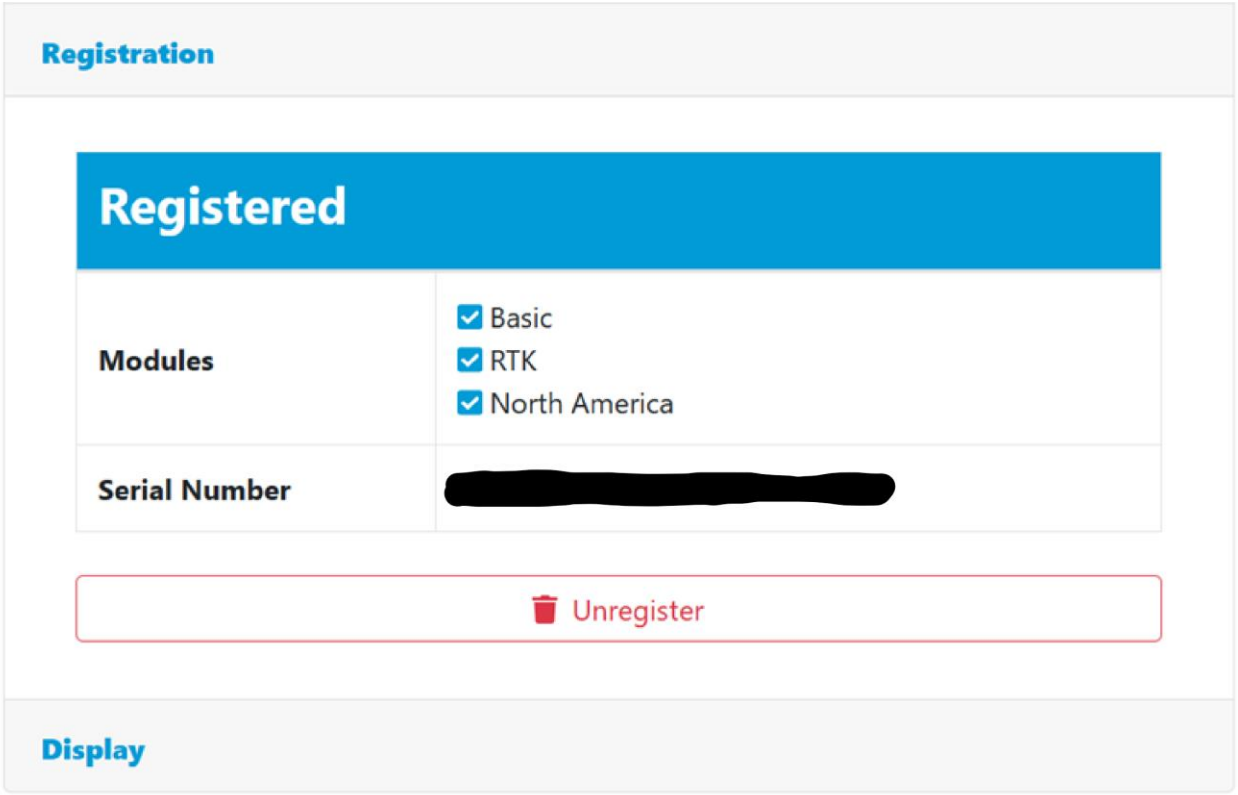


Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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.



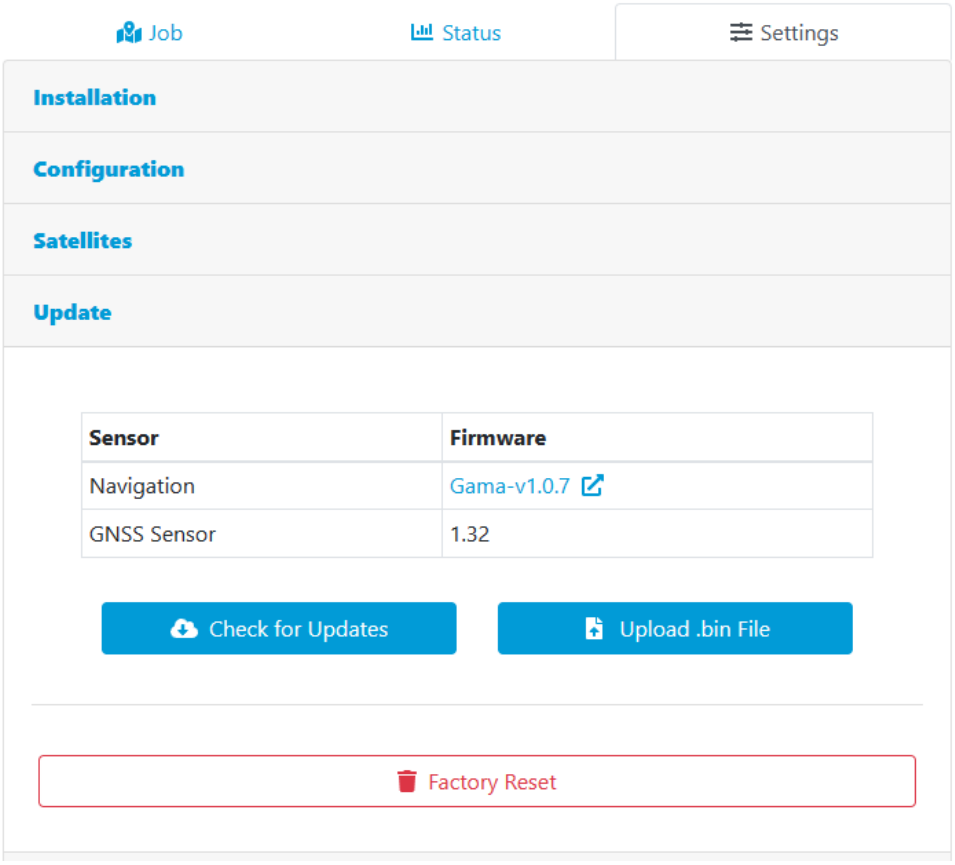
Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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.



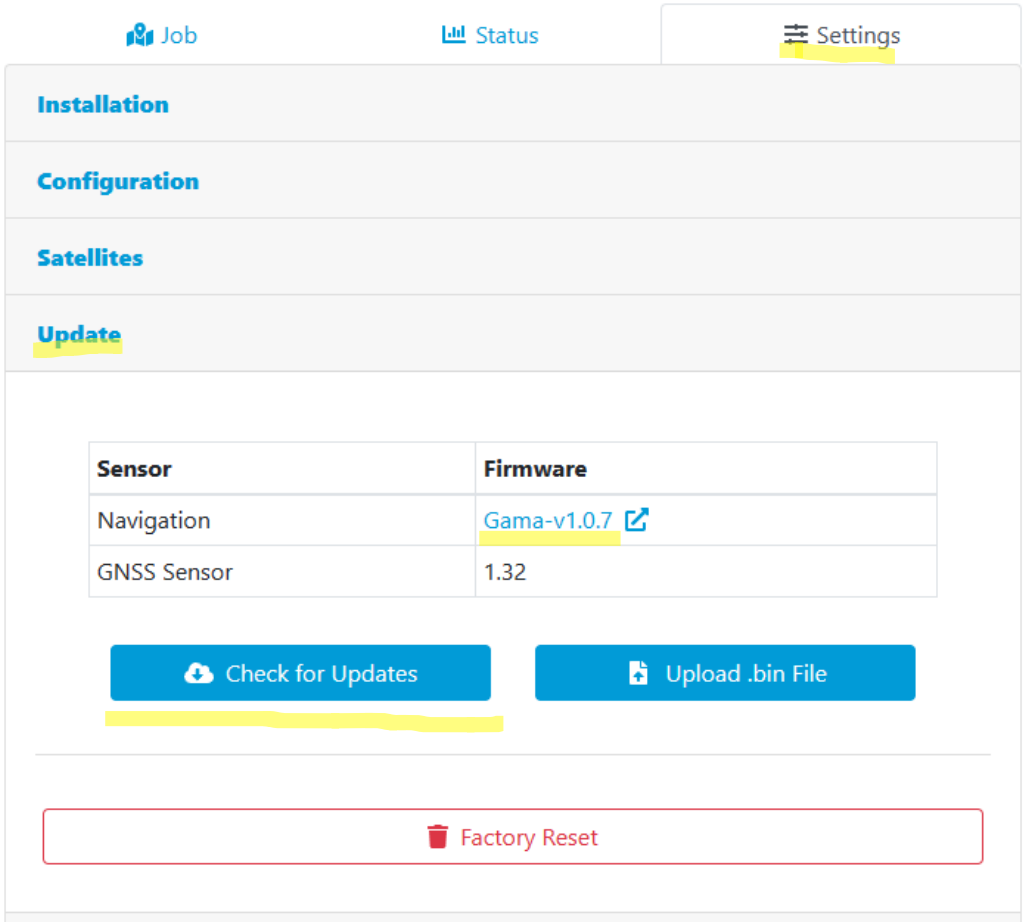
Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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 tablet and type in 127.0.0.1).

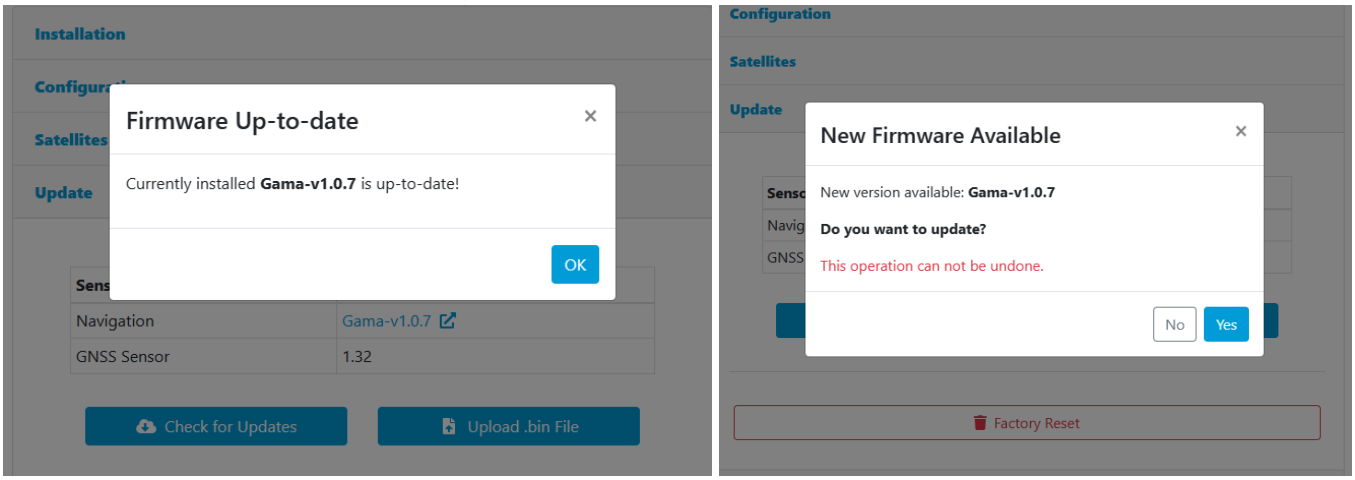
Step 3) – Click Settings tab and scroll down to “Update”.



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

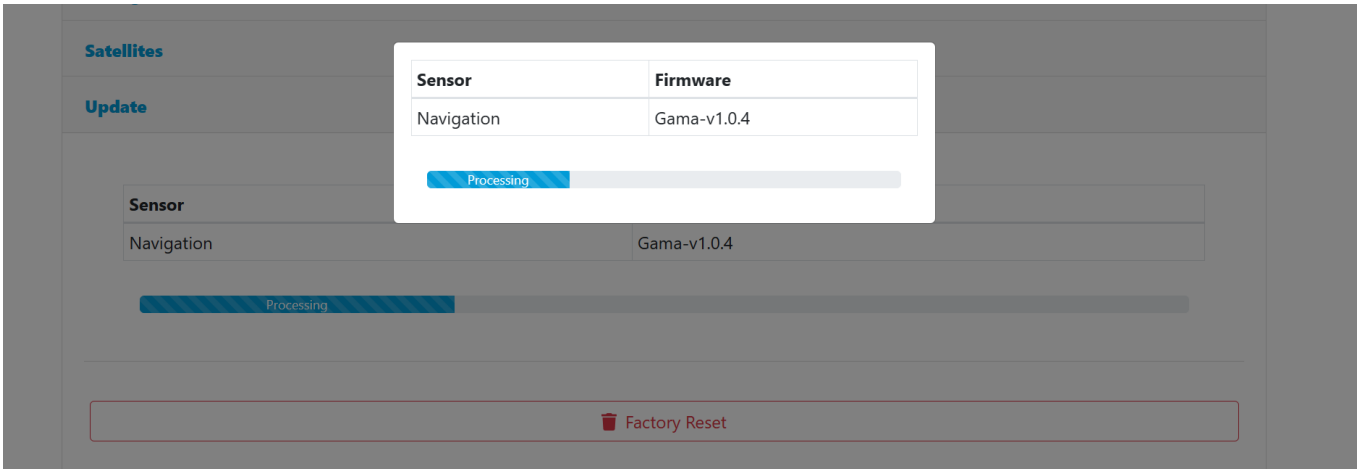
Step 4) – Click “Check for Updates”.

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.

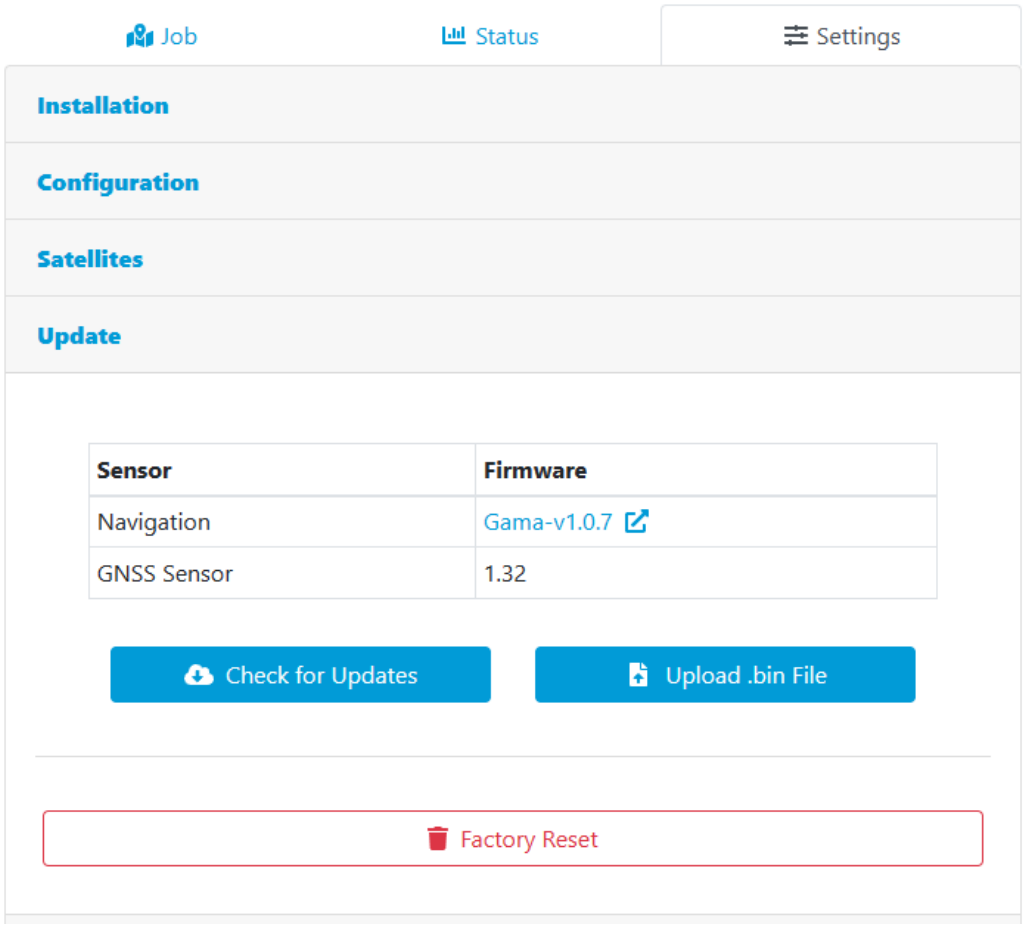
Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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 tablet and type in 127.0.0.1).

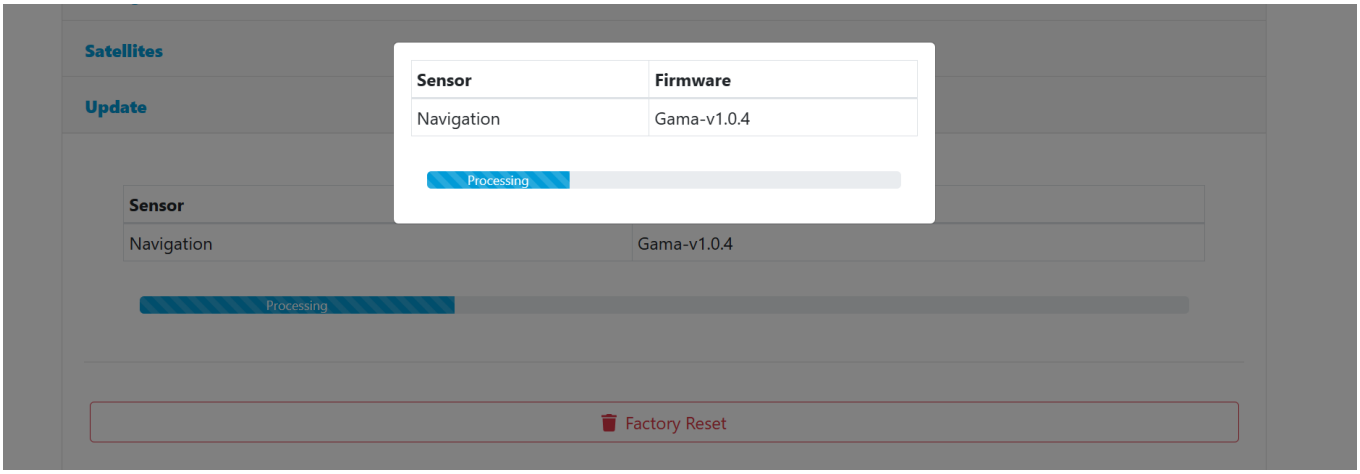
Step 3) – Click Settings tab and scroll down to “Update”.



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

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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.

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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.

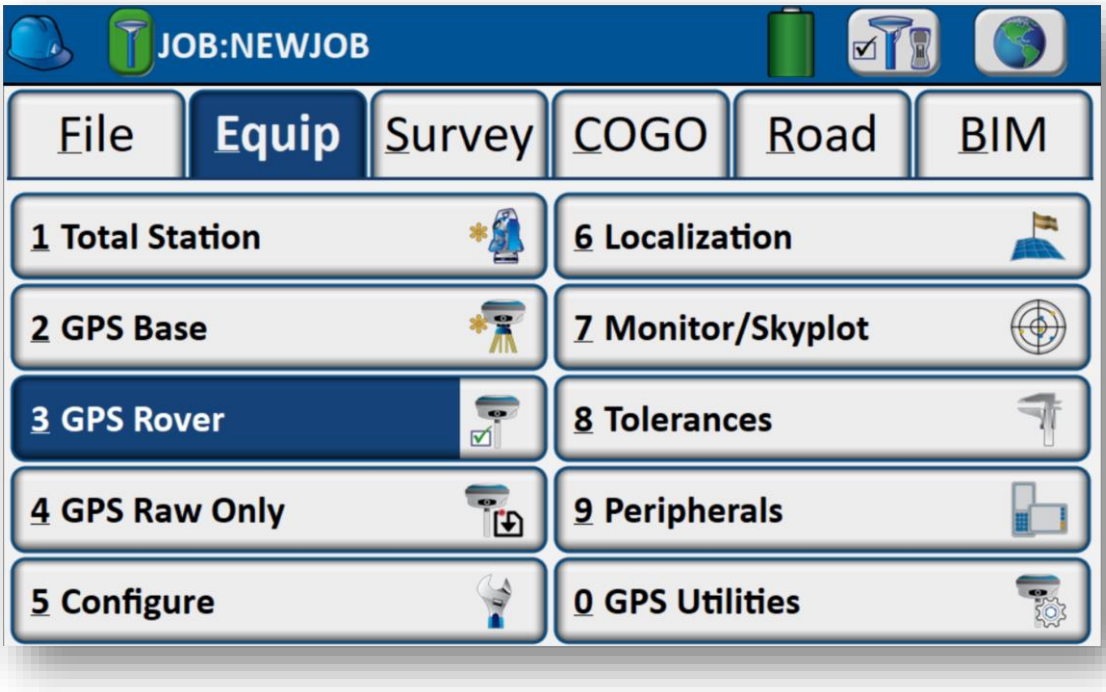
Tallysman TWI3972XF

Harxon HXC_CHX602A

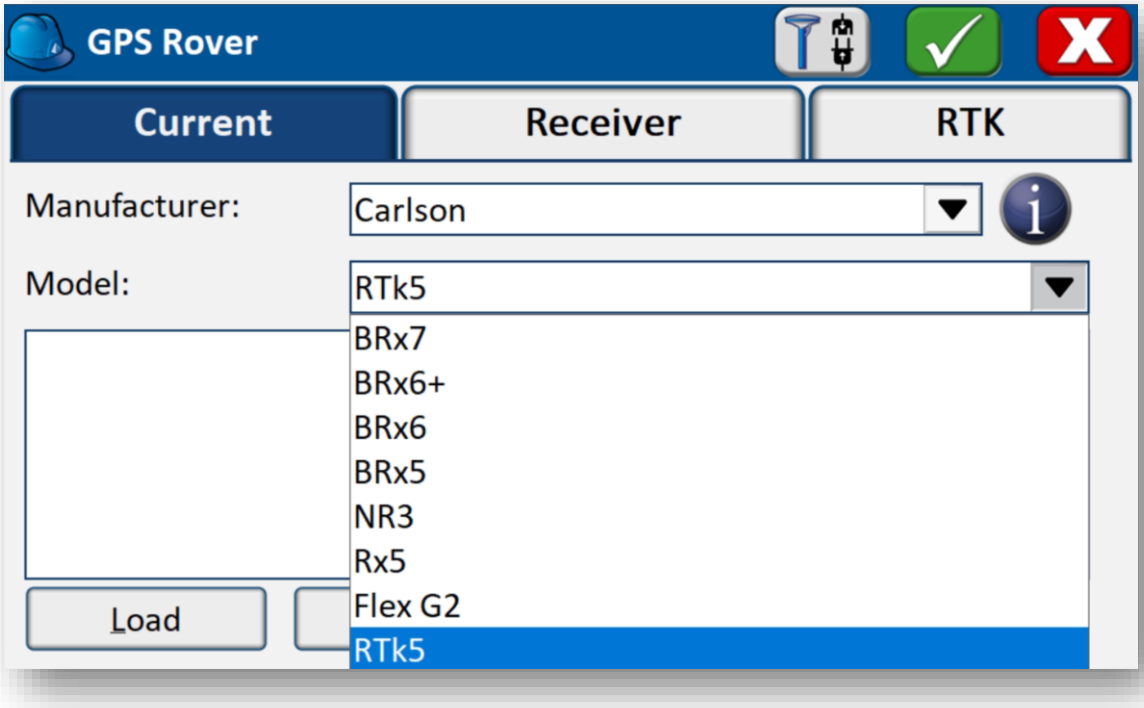
Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

Step 2) – Open SurvPC 7.

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



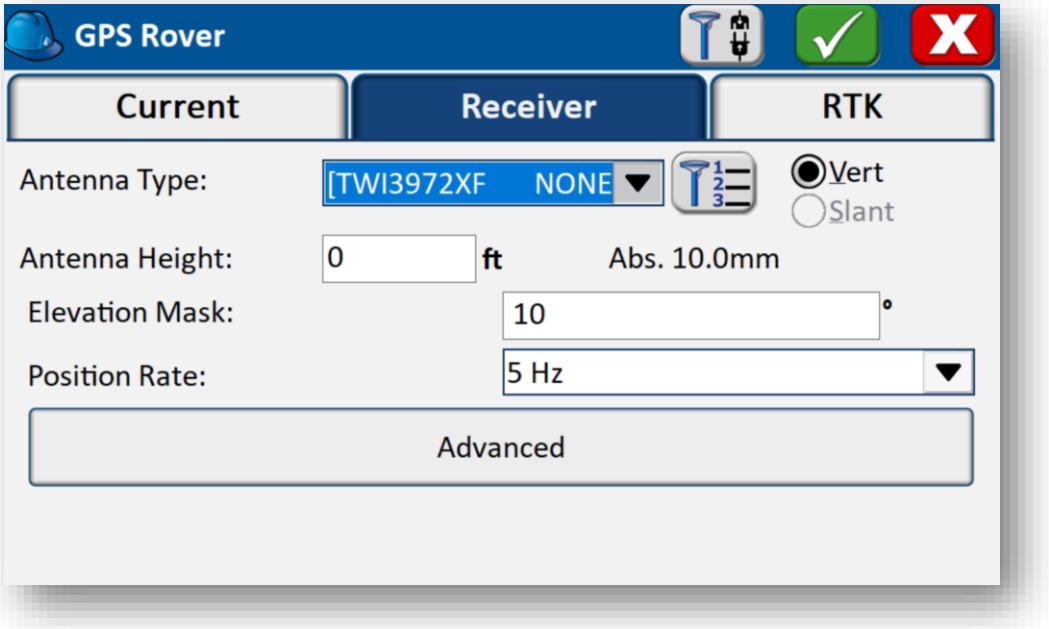
Step 4) – Under manufacturer select “Carlson” and pick “RTk5” under model.



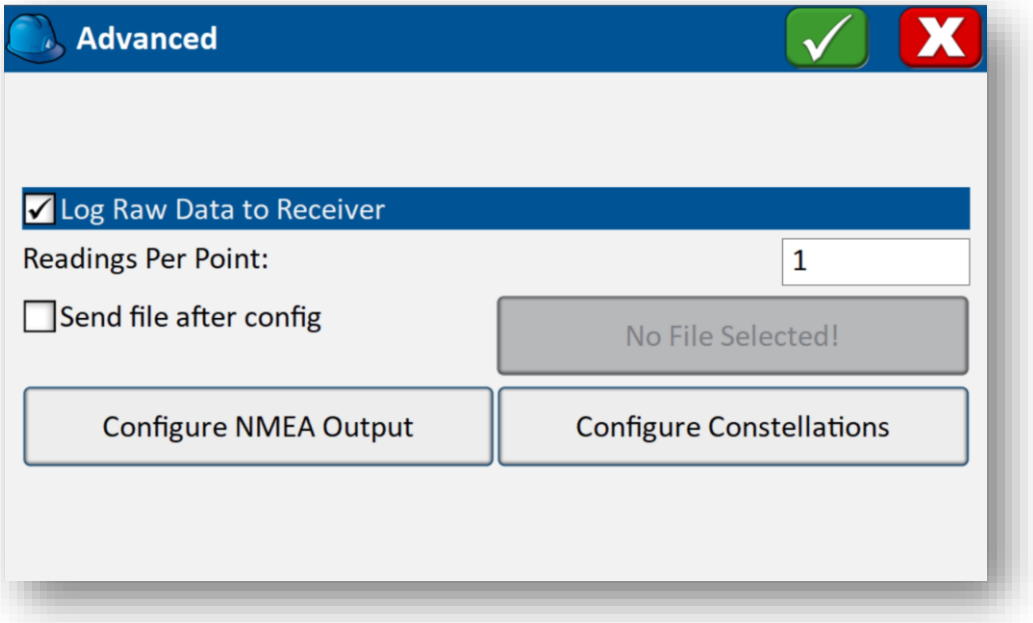
Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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 will be shipping with the Tallysman TWI3972XF.



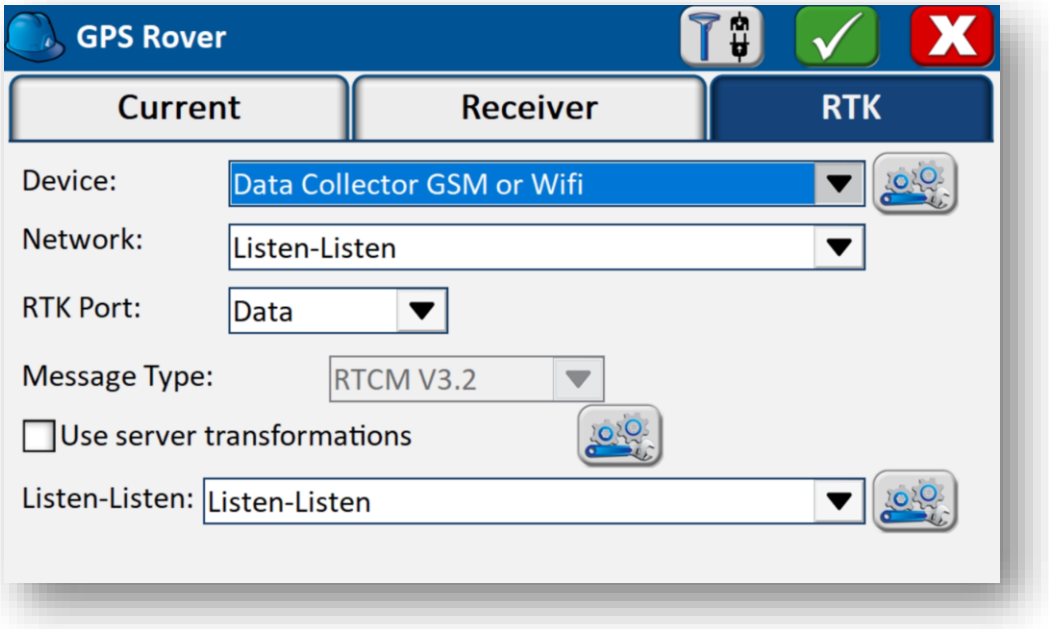
Step 7) – To enable raw logging for post-processing in SurveyGnss: Click "Advanced" and ensure "Log Raw Data to Receiver" is checked.



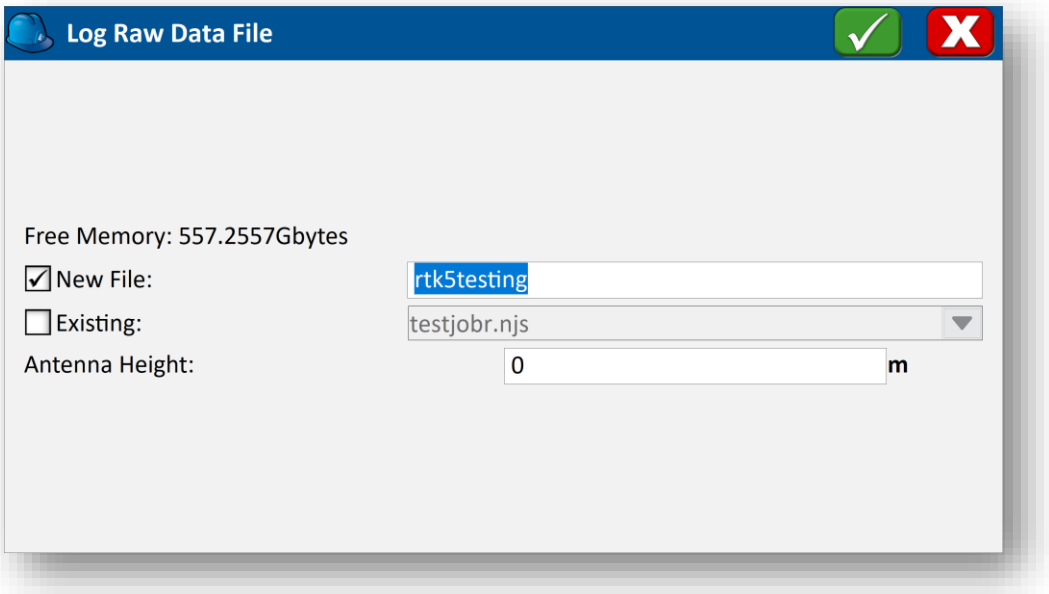
Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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

Step 9) – Click the green check button to setup connection between SurvPC and Gama.

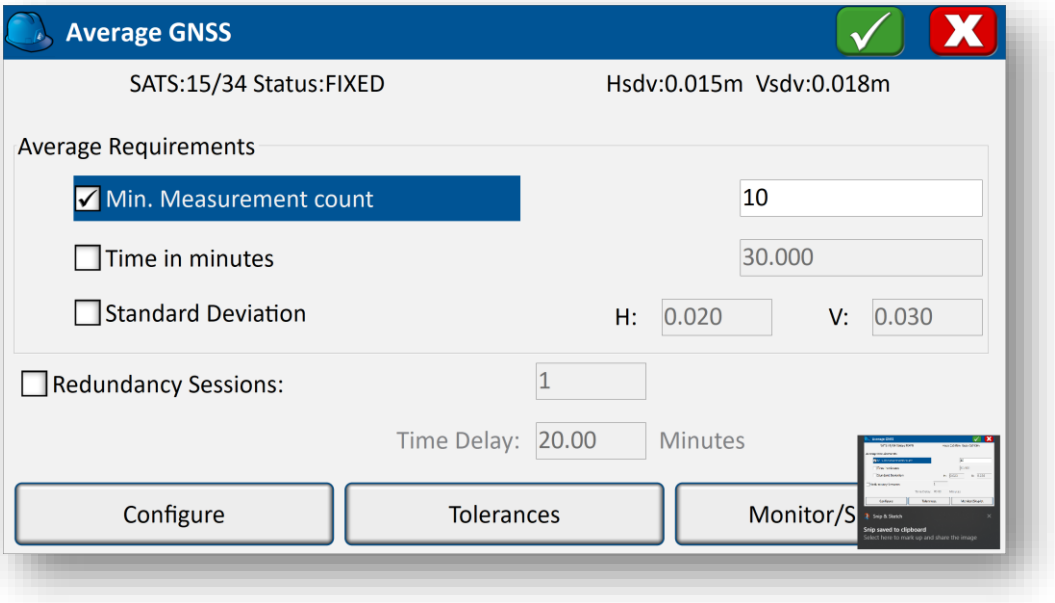


Step 10) – If raw data logging was enabled, give the raw log file an appropriate name. **Ensure that the name is unique, as a raw recording cannot be appended to, it will always overwrite!** SurvPC opens this file as a Stop+Go file, meaning points recorded in the survey routines will be given event markers 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.



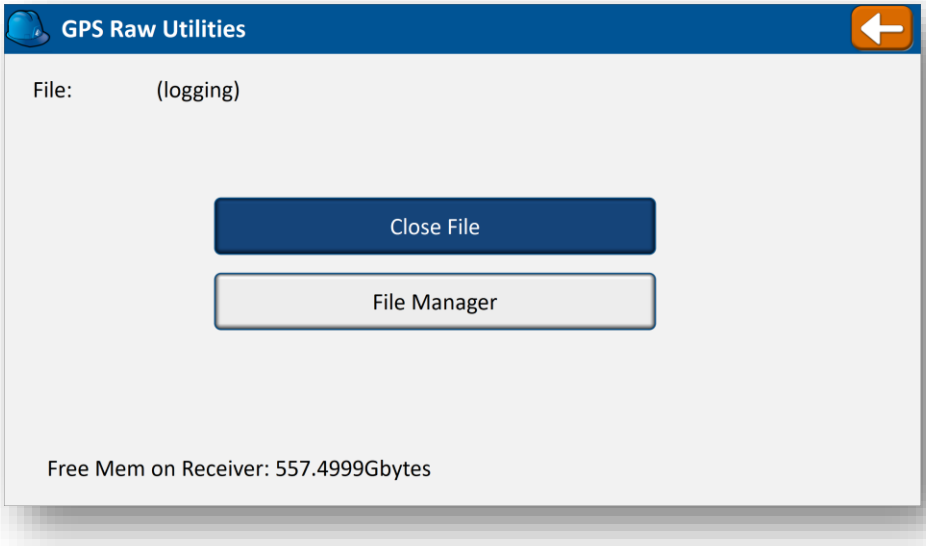
Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

Step 11) – Use SurvPC as normal. If recording data intended to be used for post-processing, ensure best-practices are followed.



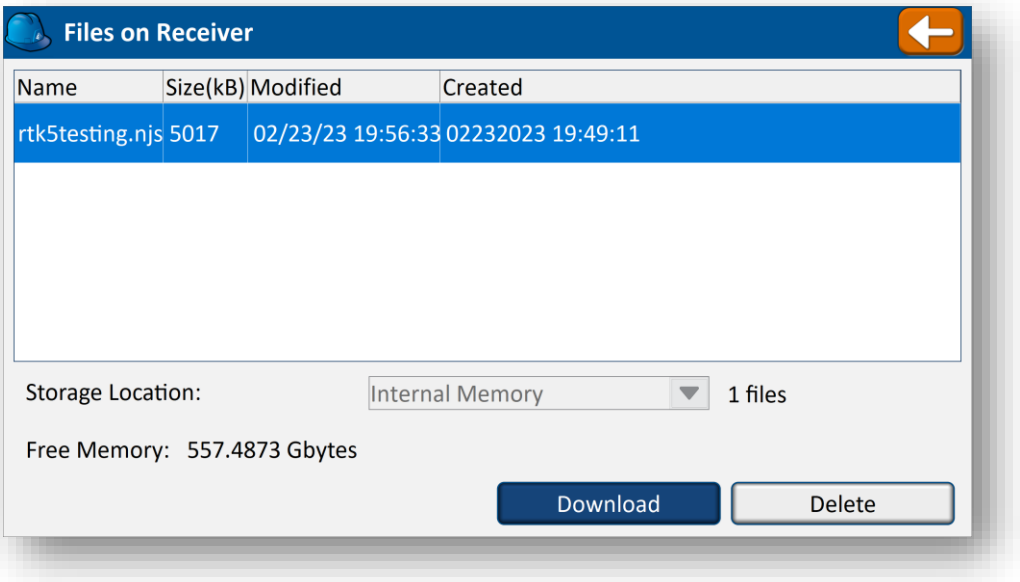
Step 12) – To download raw NJS log, navigate to: Equip -> GPS Utilities -> GPS Raw Utilities.

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

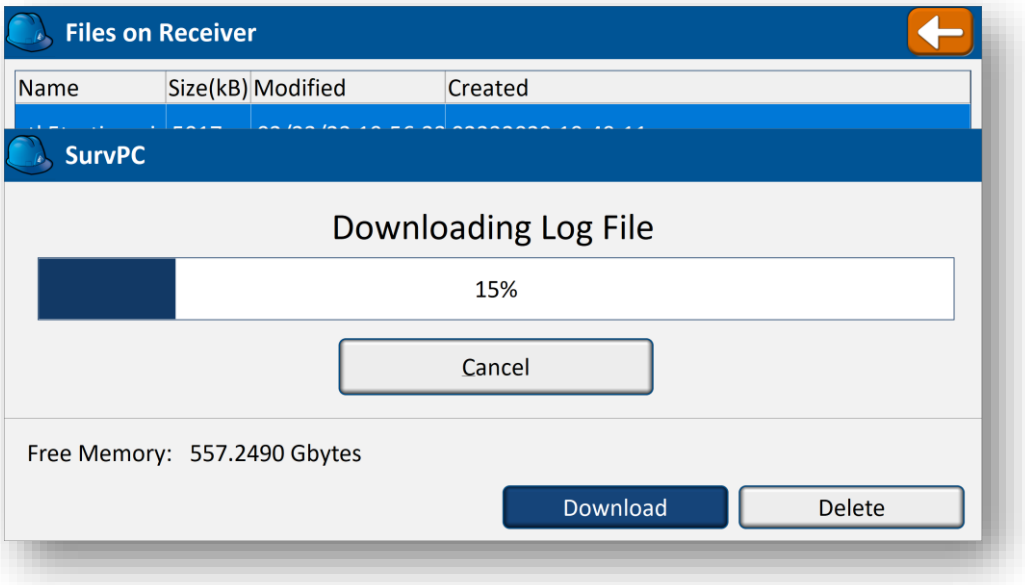


Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

Step 13) – Click File Manager, select the raw file, and click “Download”.



Step 14) – Please wait while the NJS file is downloaded to your job folder.



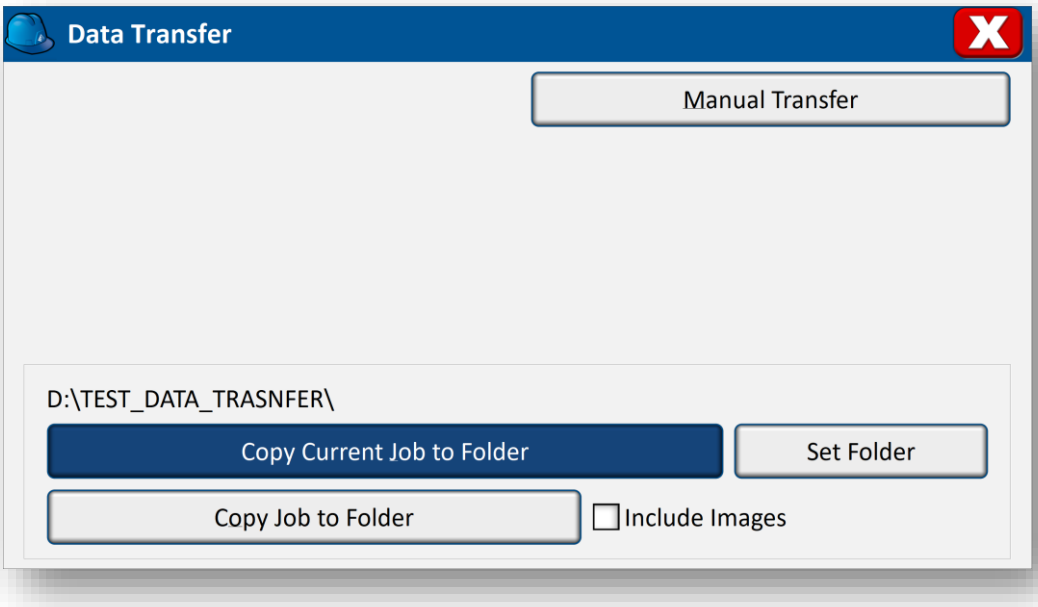
Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

Step 15) – Perform a Data Transfer of the job to removeable media e.g. USB Flash Drive.

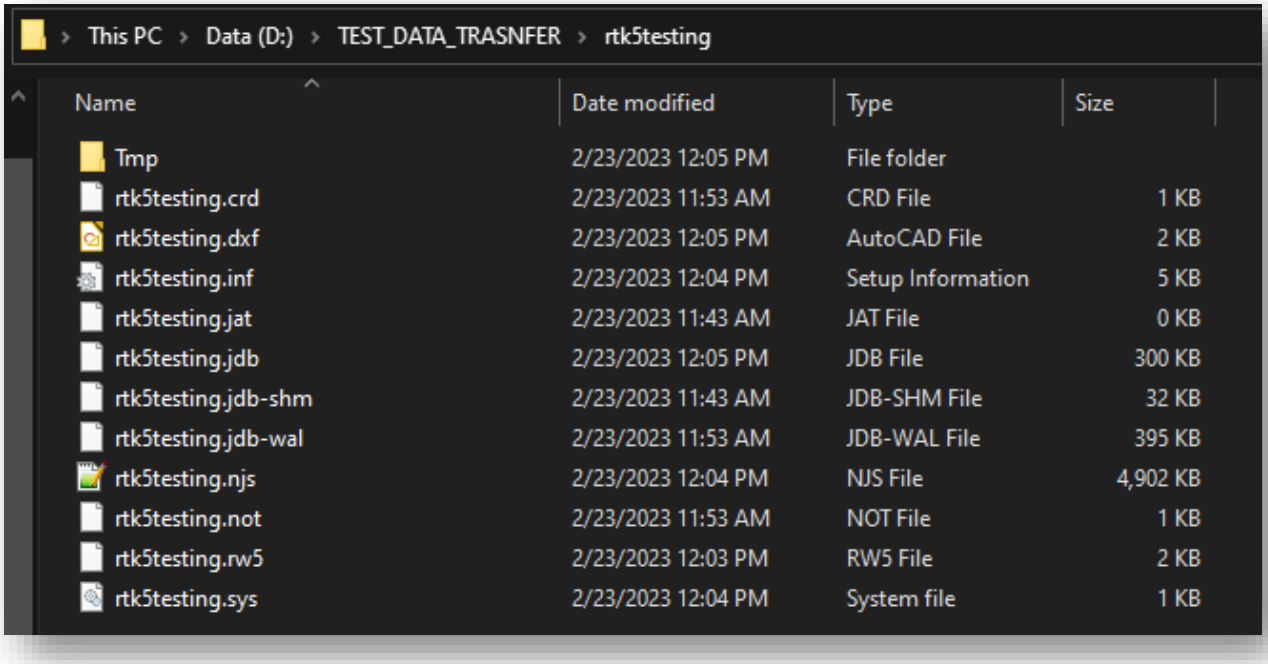
File → Export → Data Transfer

[Set Folder]

[Copy Current Job to Folder]



Step 16) – Exit SurvPC.



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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

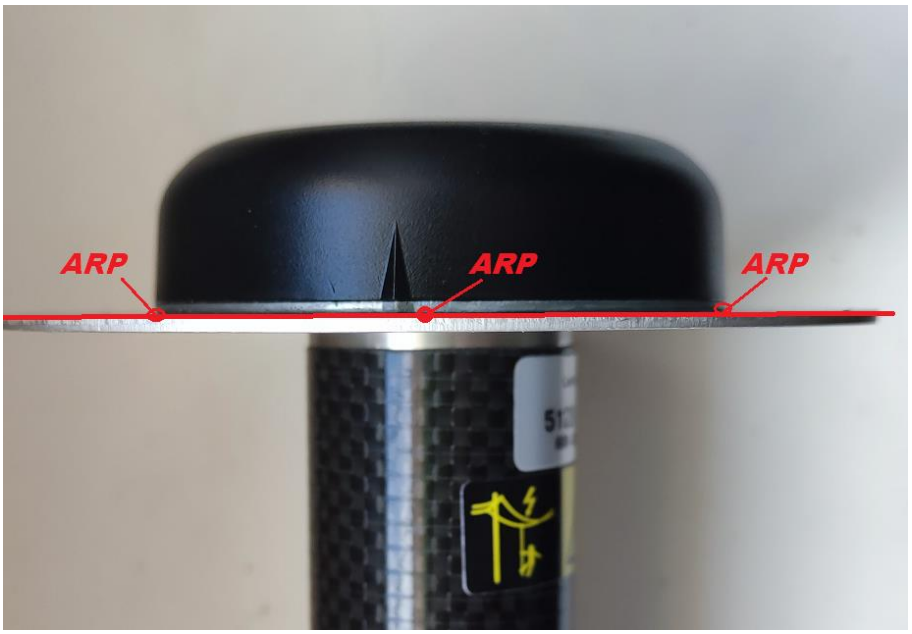
5.1. Tallysman TWI3972XF

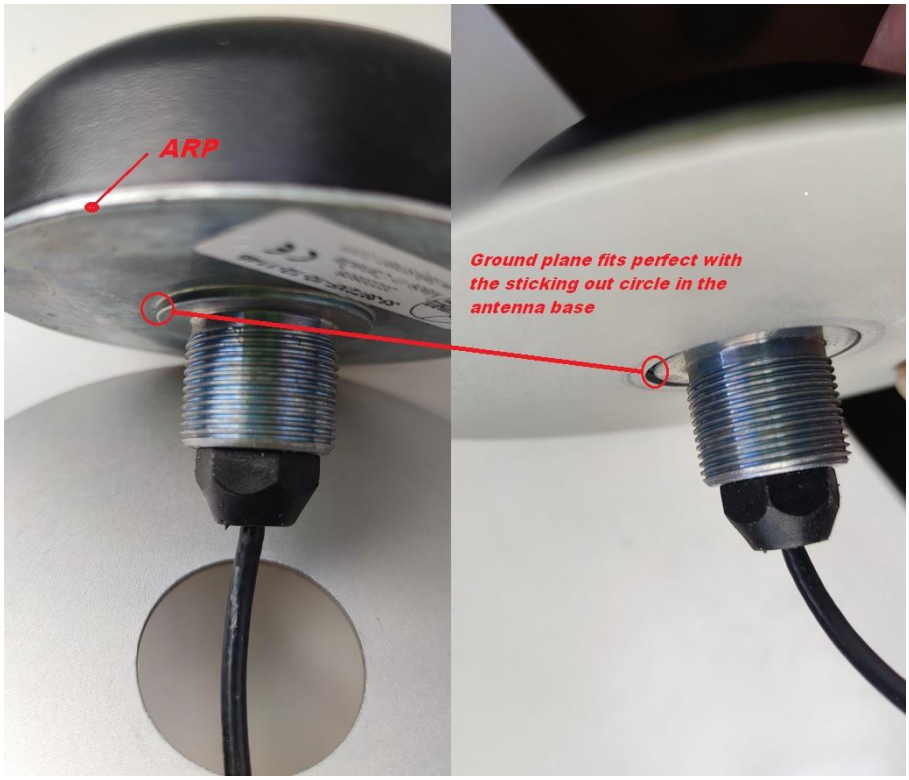
The Tallysman antenna assembly consists of 2 elements: 1) the antenna and 2) the ground plane.

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

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com





Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

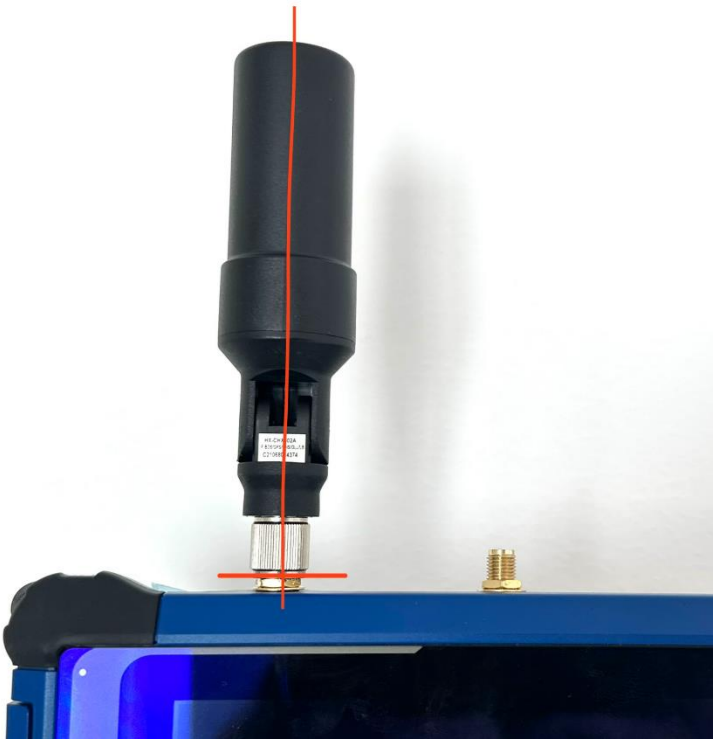
5.2. Harxon HXC CHX602A

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)

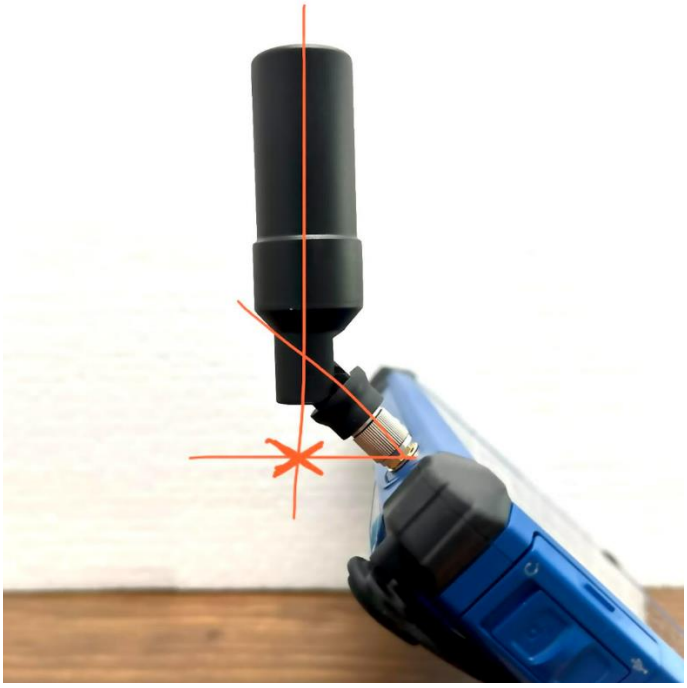
Below are 3 acceptable configurations for surveying. The position reported by the system is tagged with an X in the following images.

1) RTk5 is vertical and antenna is vertical



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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.

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

6 Gama Web UI

5.3. Web UI Introduction

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

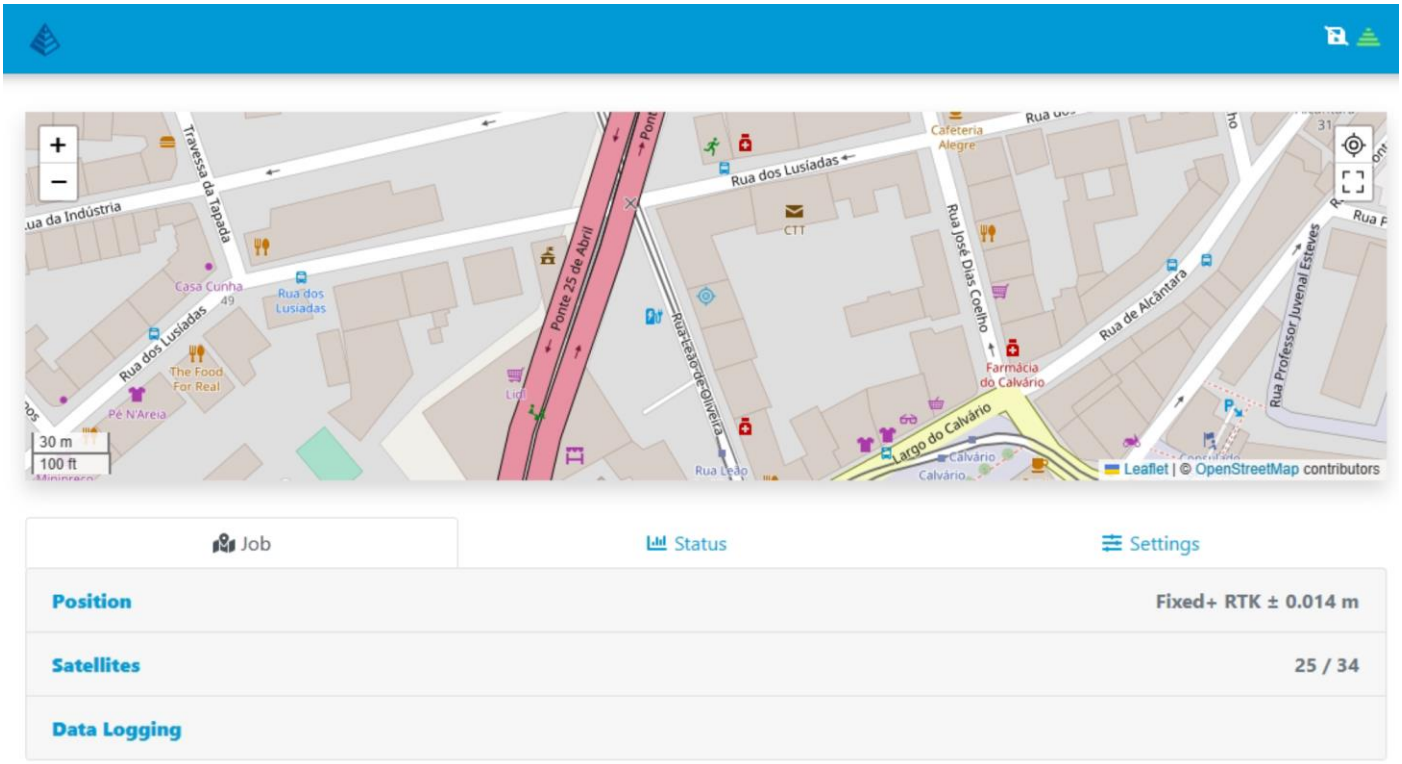
1. Registration of the Gama engine
2. Update Gama and Factory Reset
3. Support and issue tracking
4. Stand-alone tool for using Gama without SurvPC

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 3 main tabs:

- Job
- Status
- Settings

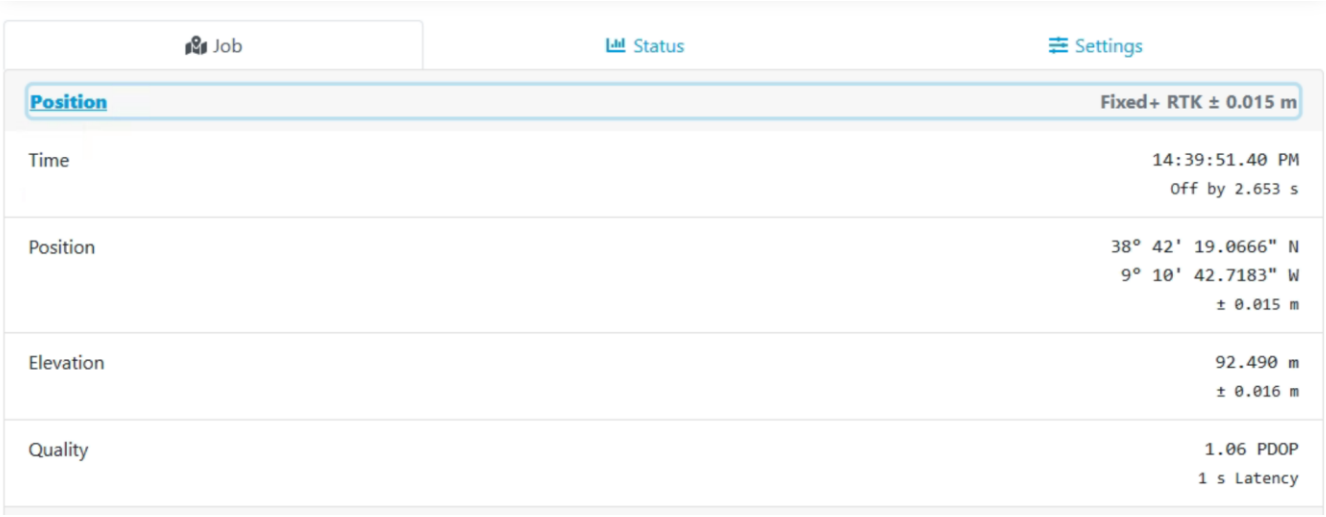


Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

5.4. Job

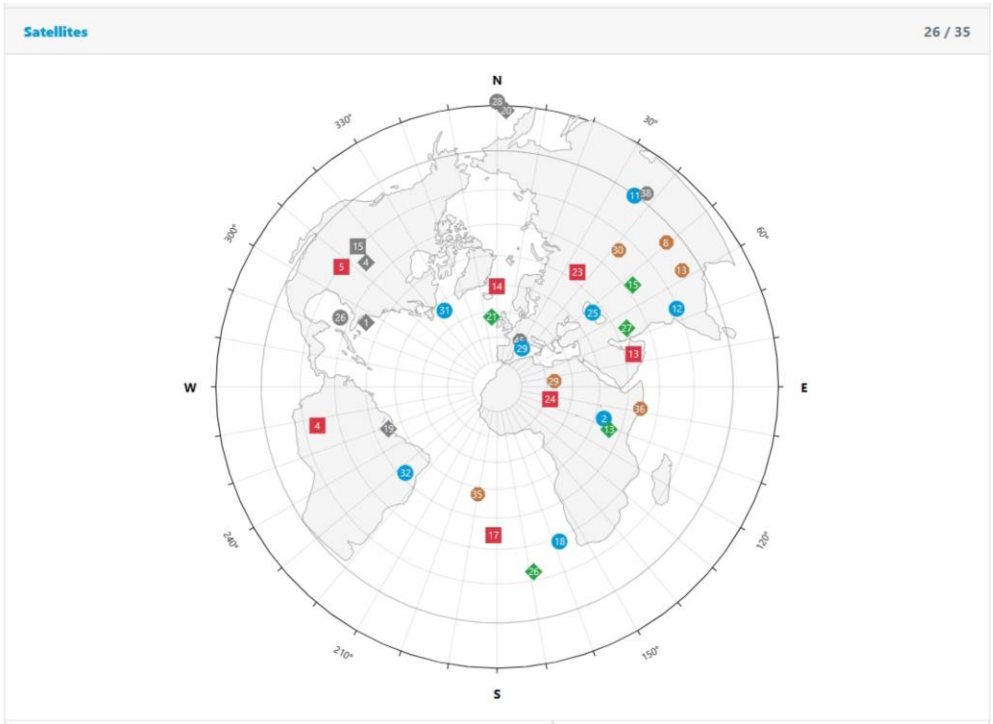
Job - Position

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



Job - Satellites

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



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

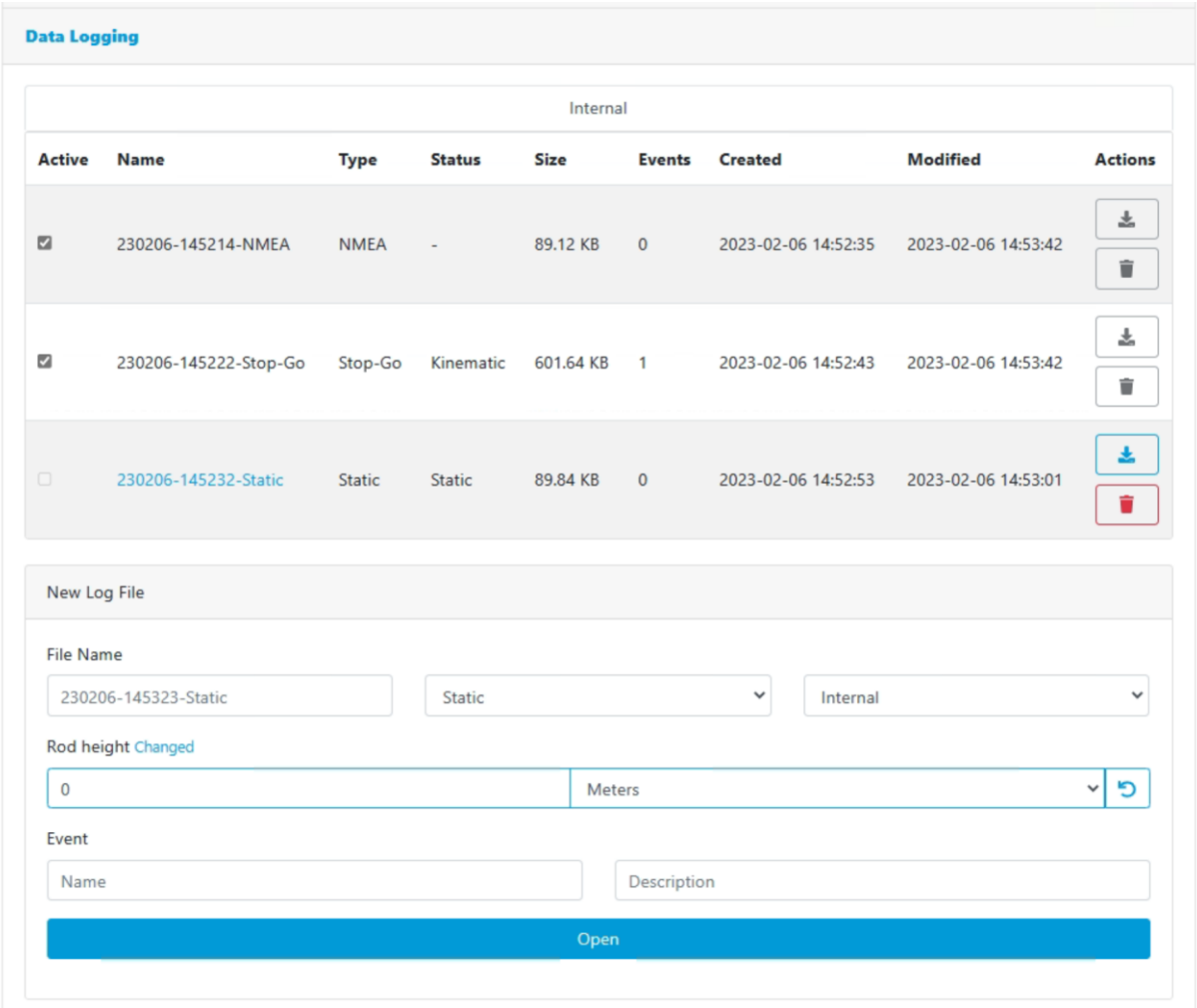
Job - Data Logging

Menu for administrating raw data logging independently from SurvPC.

Under this section you can:

- Open and close 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 WebUI is intelligent enough to only add Stop+Go event markers to an open Stop+Go log file.



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

5.5. Status

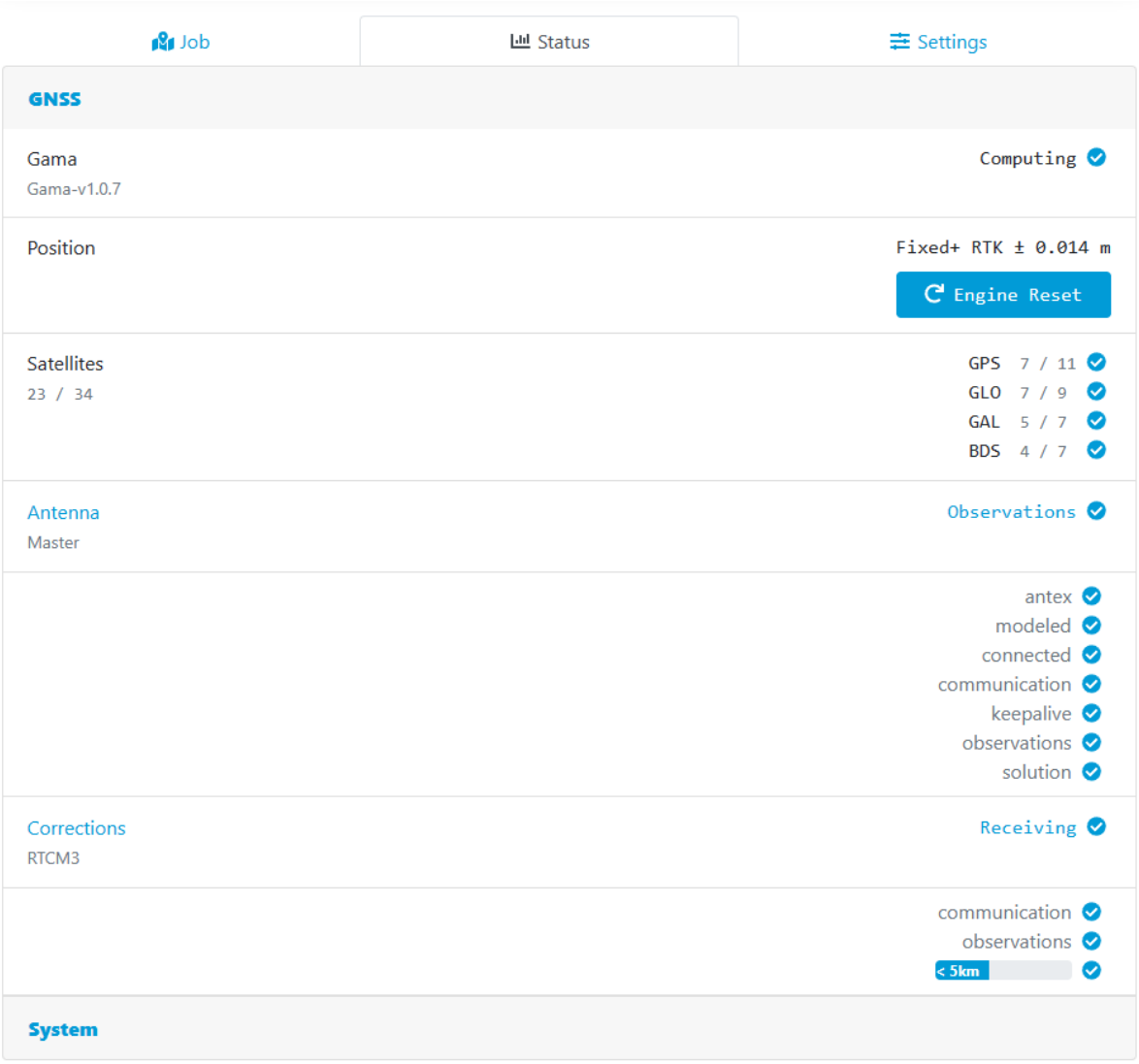
Monitor overall status of the Gama GNSS system and issue track potential problems.

Status – GNSS

Monitor detailed information about the GNSS status and data flow.

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

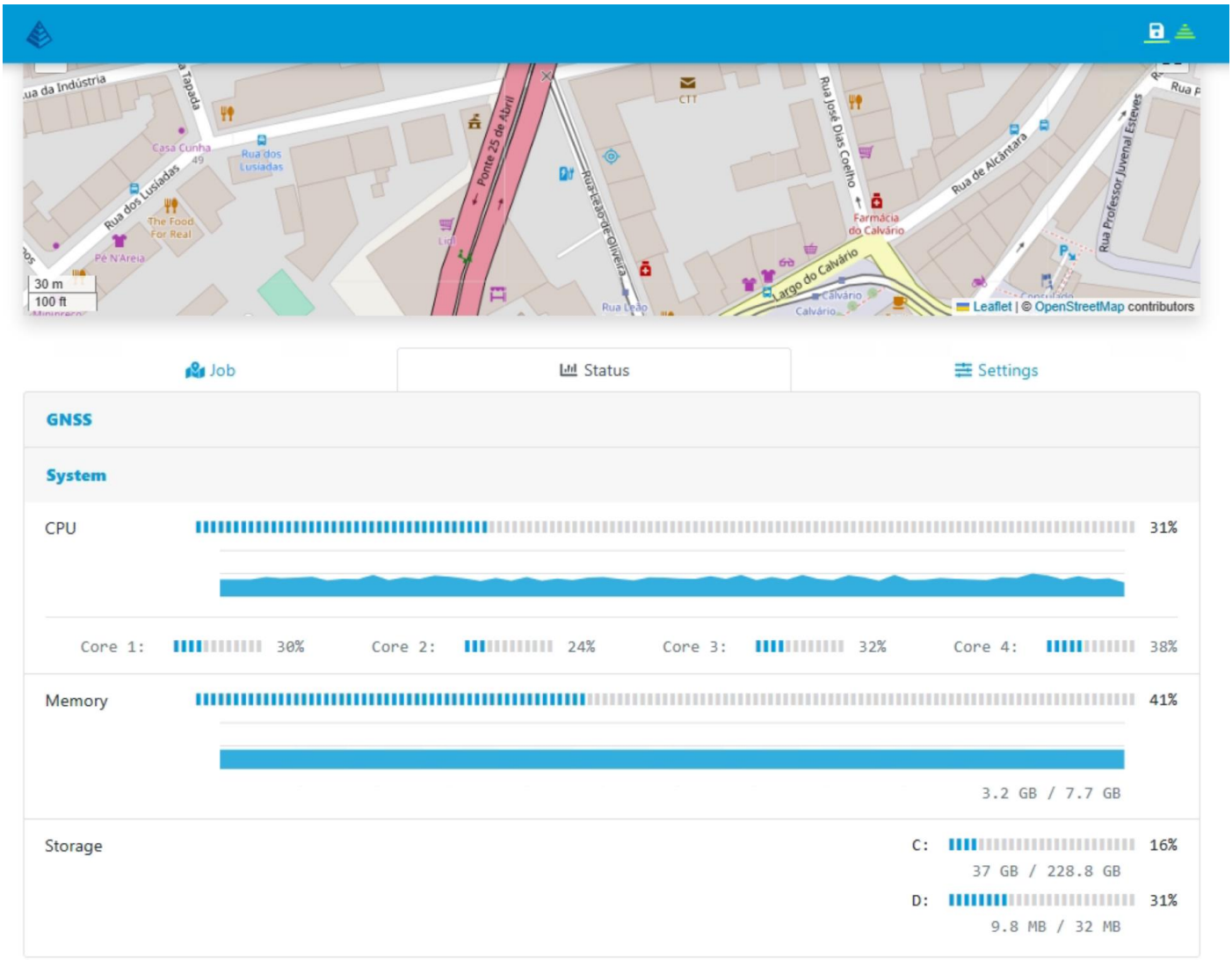
In this section you can inspect detailed diagnostics about the GNSS system, namely if the receiver is powered on and connected, if it is tracking and receiving observations, if Gama is running correctly, etc.



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

Status – System

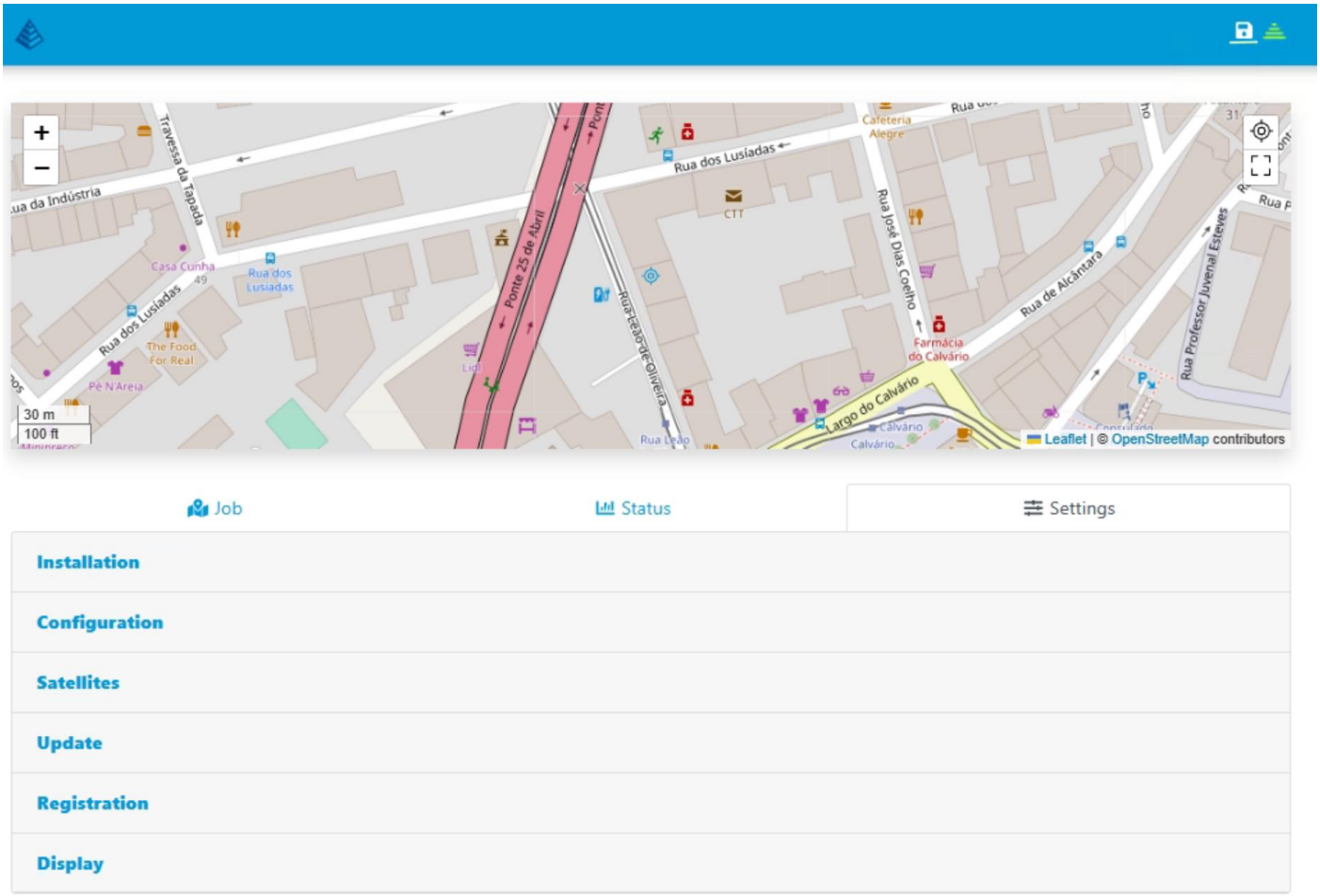
Monitor detailed information about RTk5 CPU, RAM memory and internal storage.



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

5.6. Settings

Configure Gama via the Web UI.



Settings – Installation

- Configure antenna type and antenna serial number.

Settings – Configuration

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

Settings – Satellites

- Configure satellite elevation mask;

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

- Enable/disable GNSS constellations;
- Exclude satellites.

Settings – Update

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

Settings – 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

Settings – Display

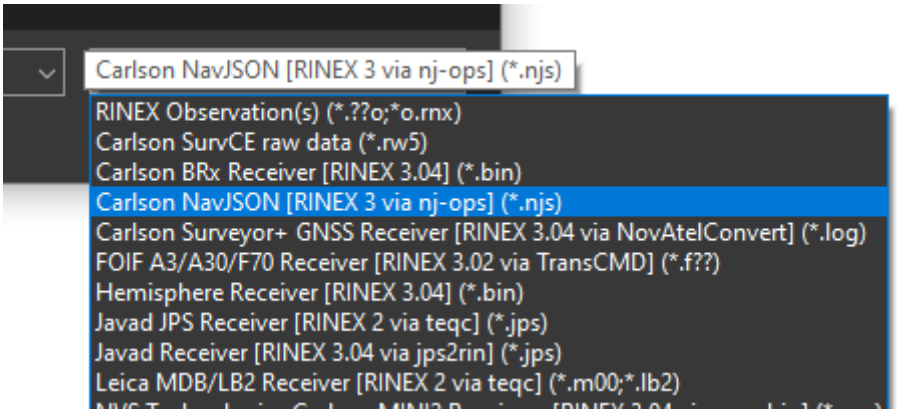
- Configure display settings and units (metric/imperial).

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

7 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.



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

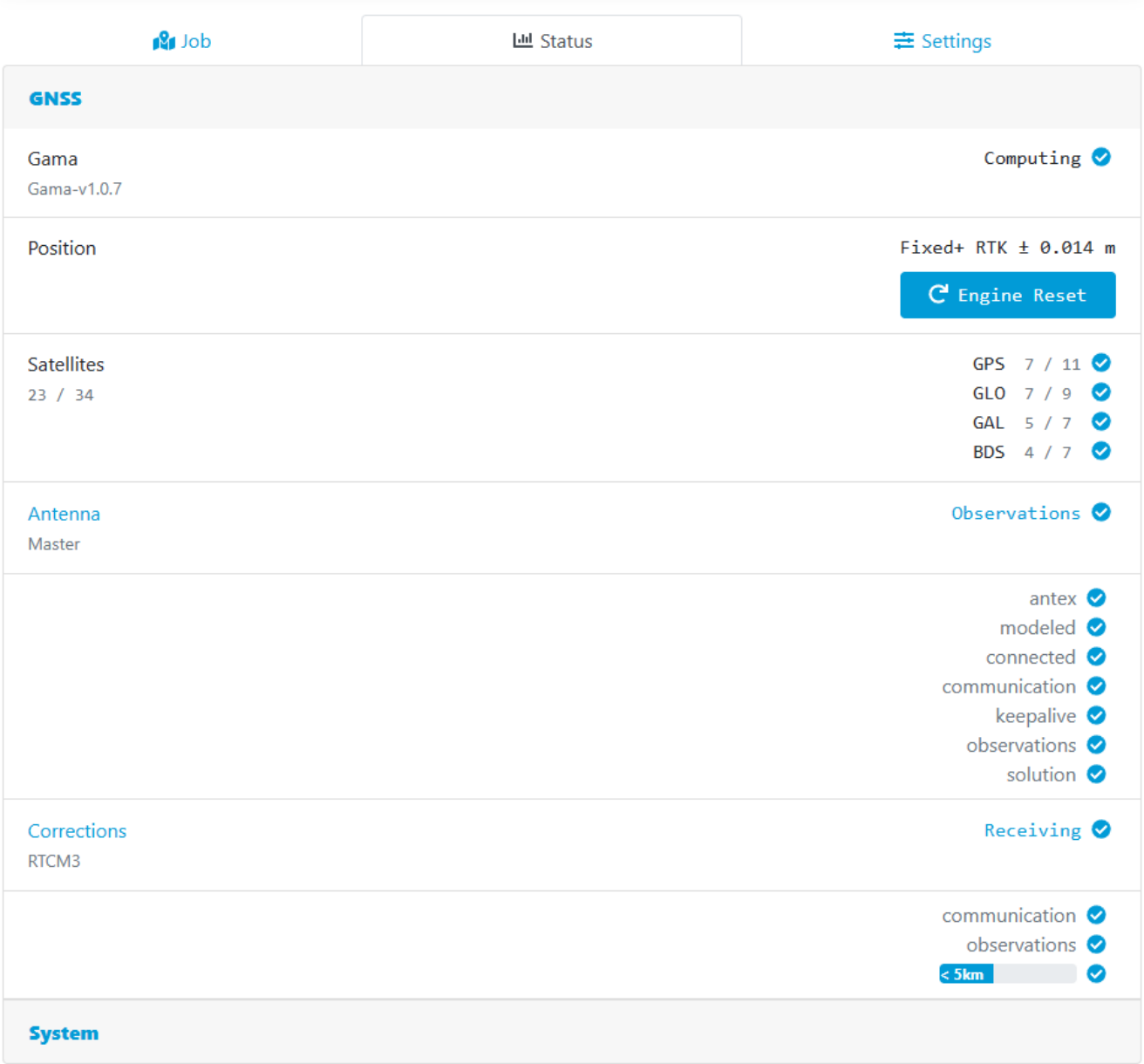
8 Troubleshooting

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.

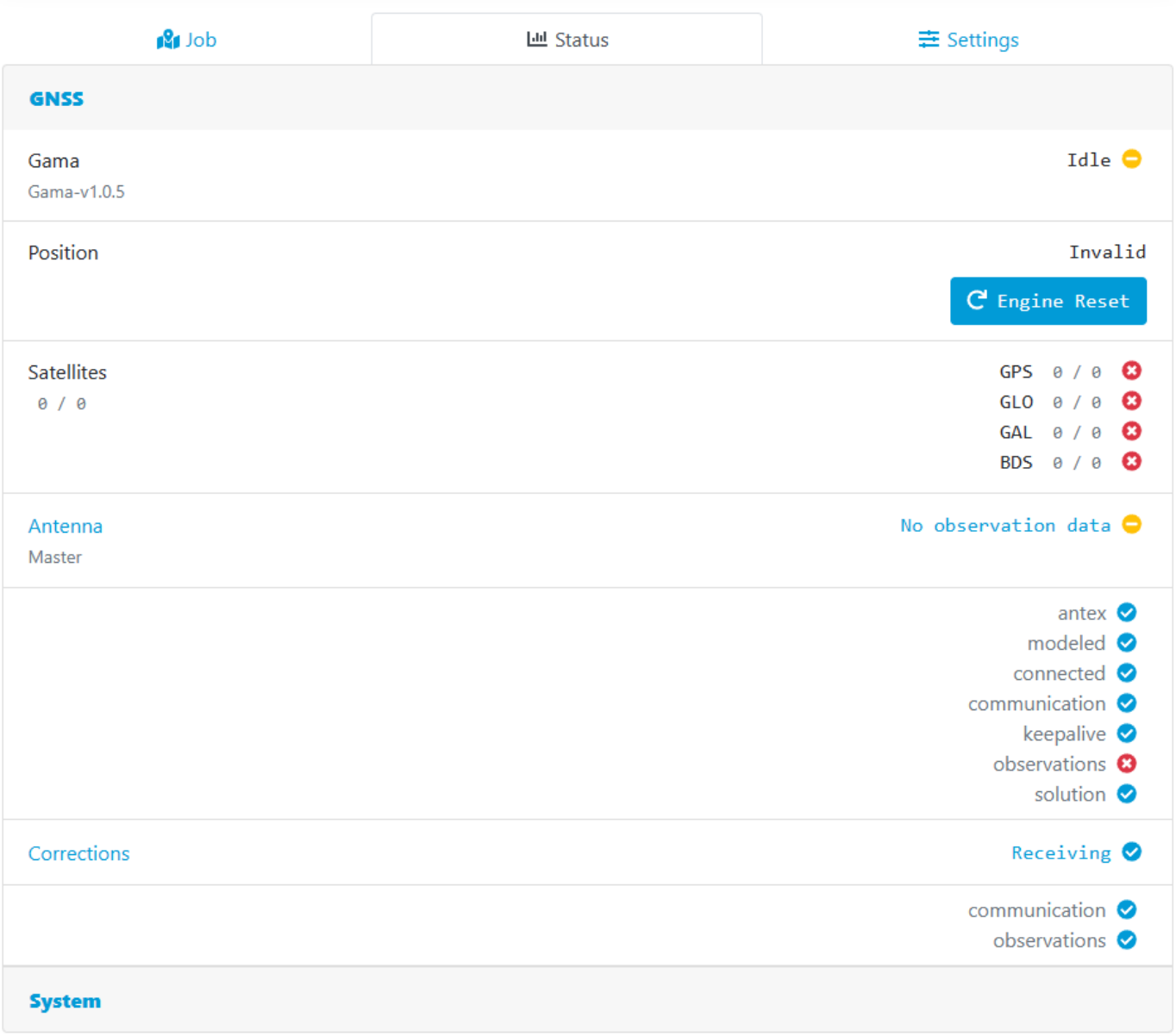
Normally, all status be in blue colour as shown below. You see any item in red continue reading below for troubleshooting.



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

8.1 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.



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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

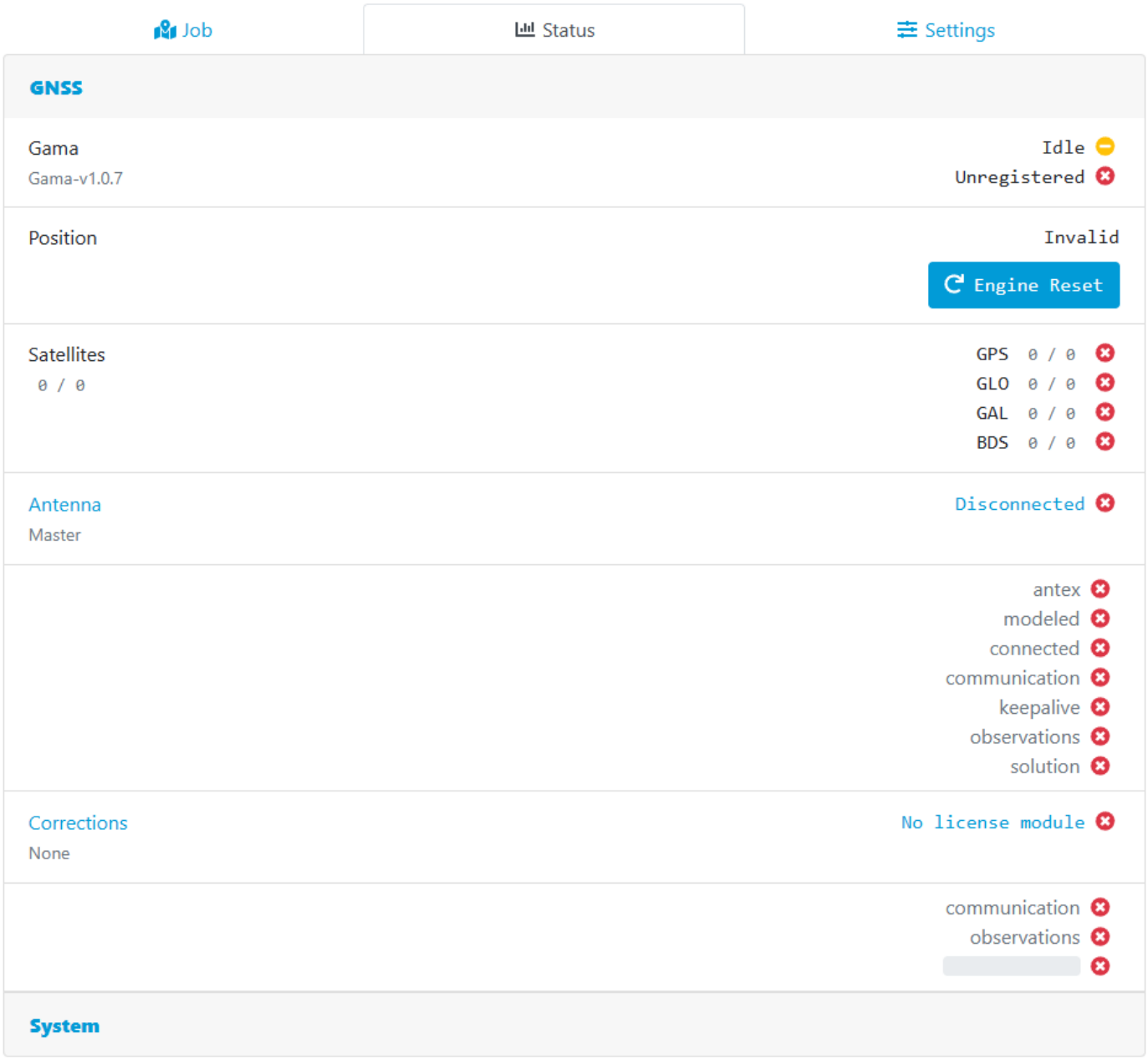
Harxon HXC_CHX602A

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

8.2 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.

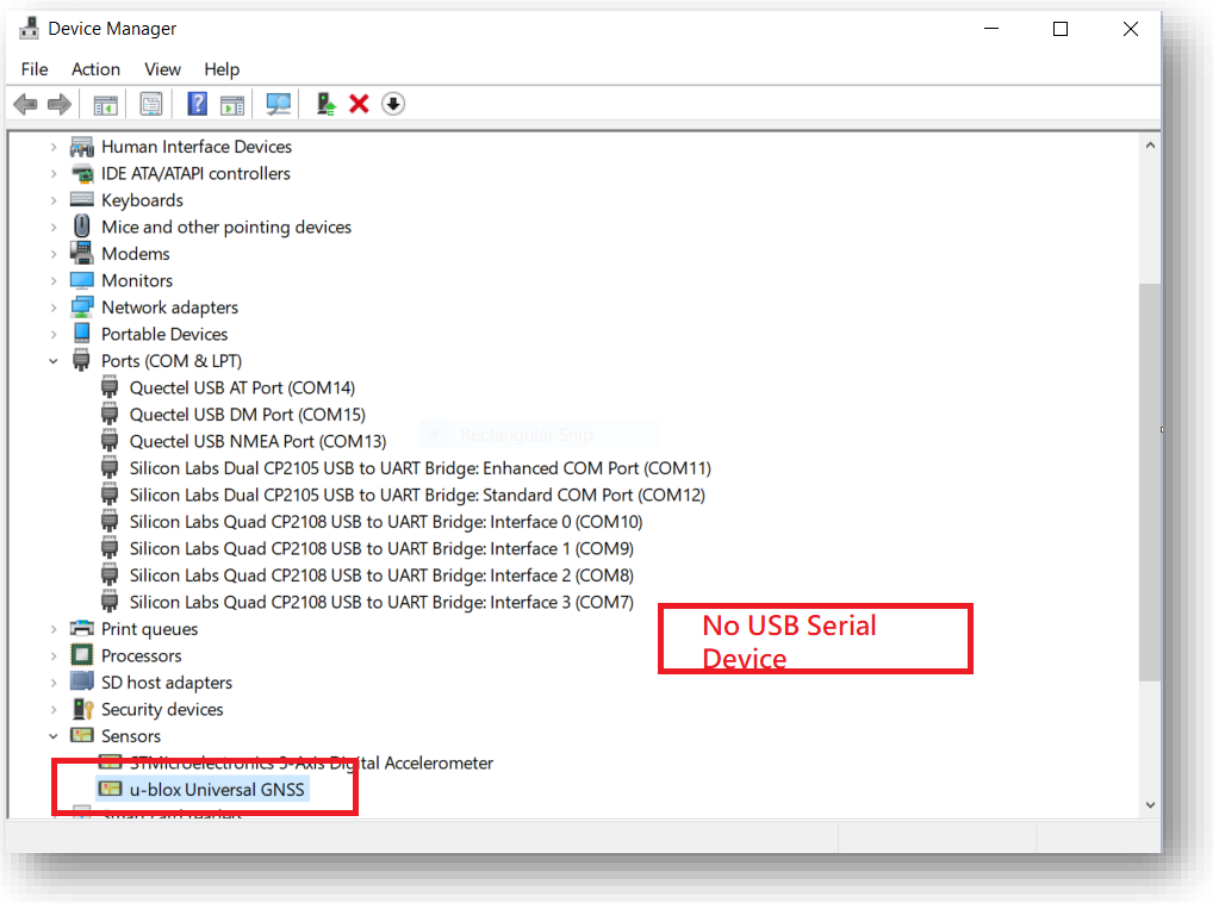
In this case, the “Antenna” field will show the “Disconnected” status. Please follow these steps to identify and resolve this problem.



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

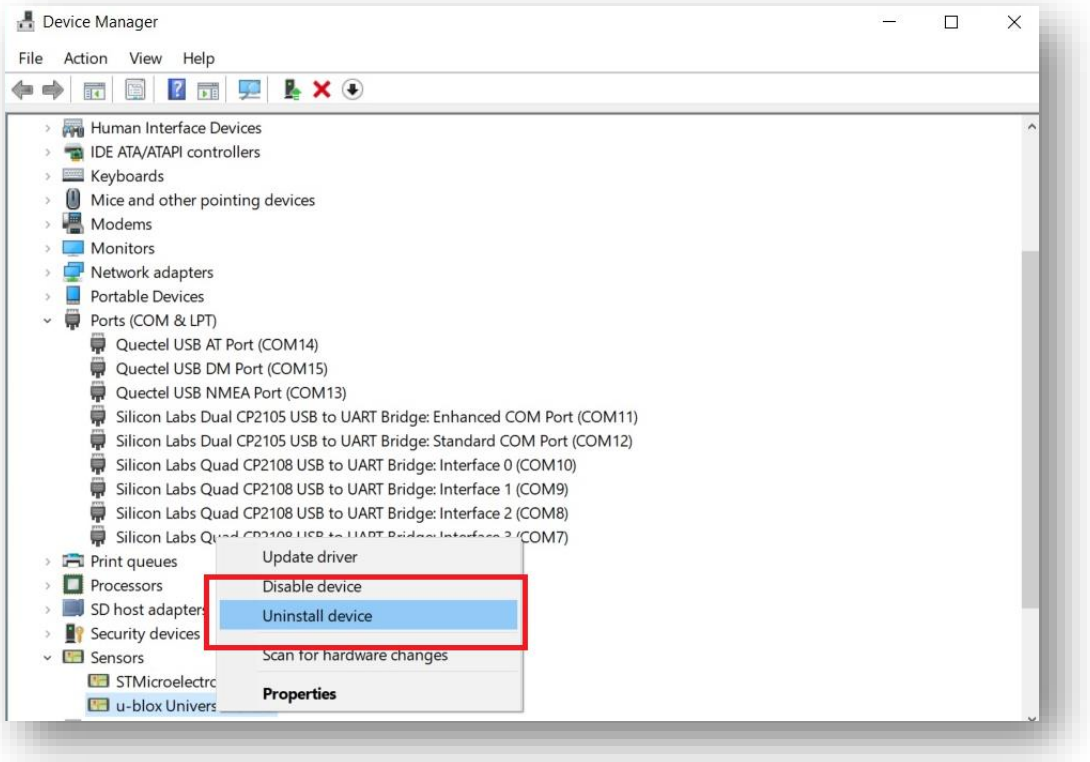
Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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.

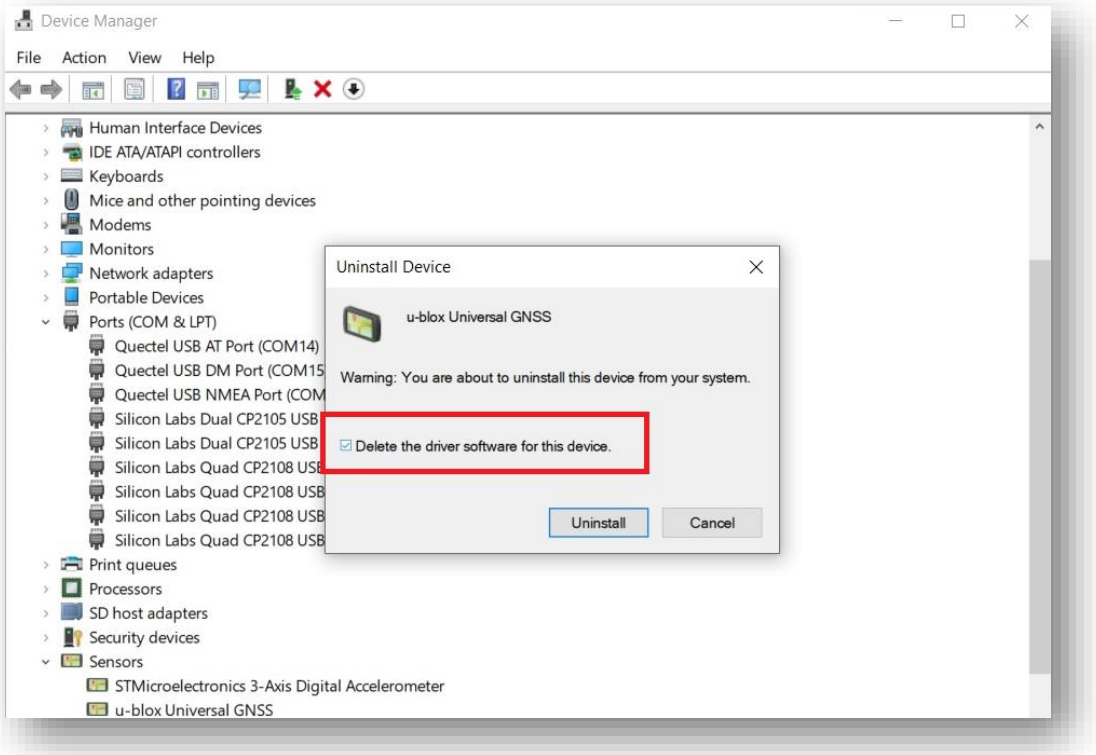


Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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



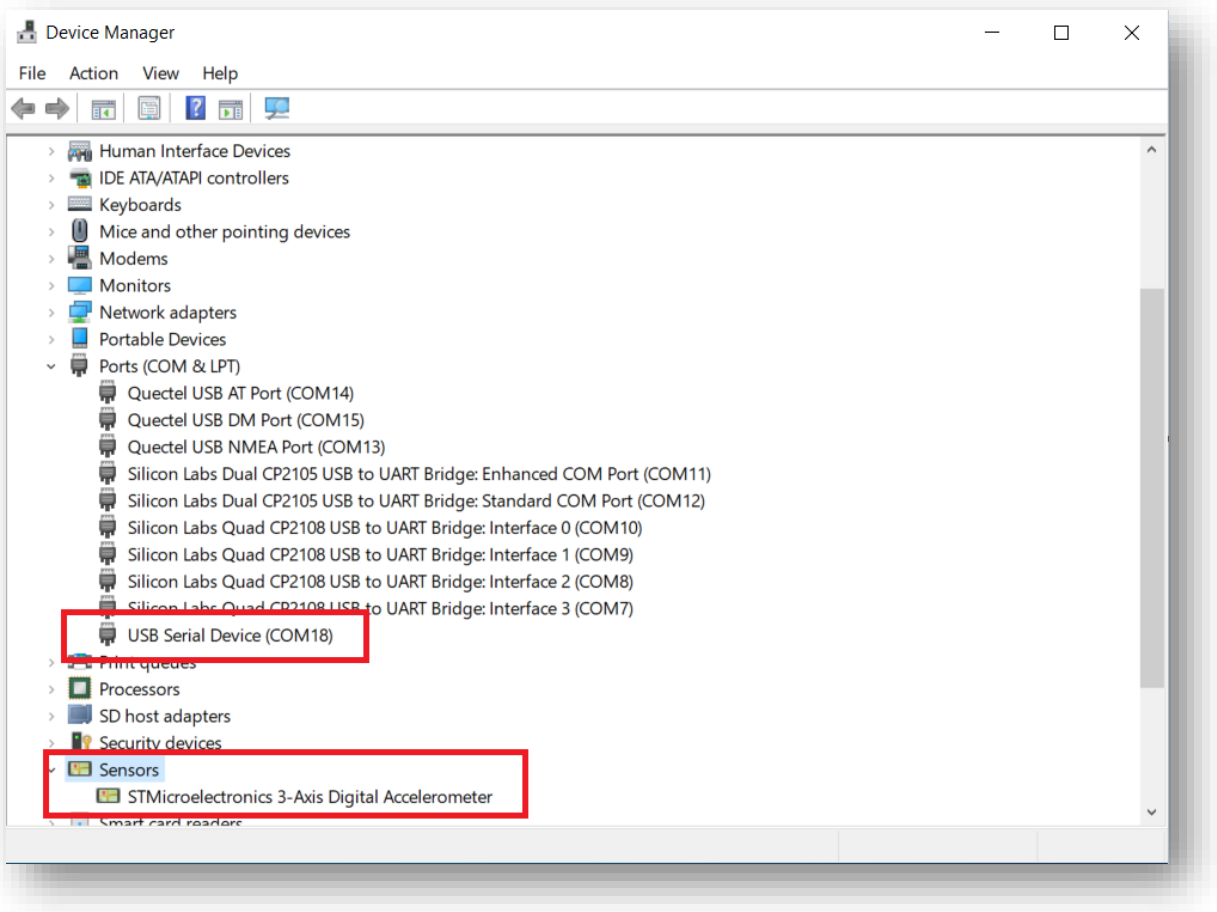
2) Click “Uninstall” to confirm.



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

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

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

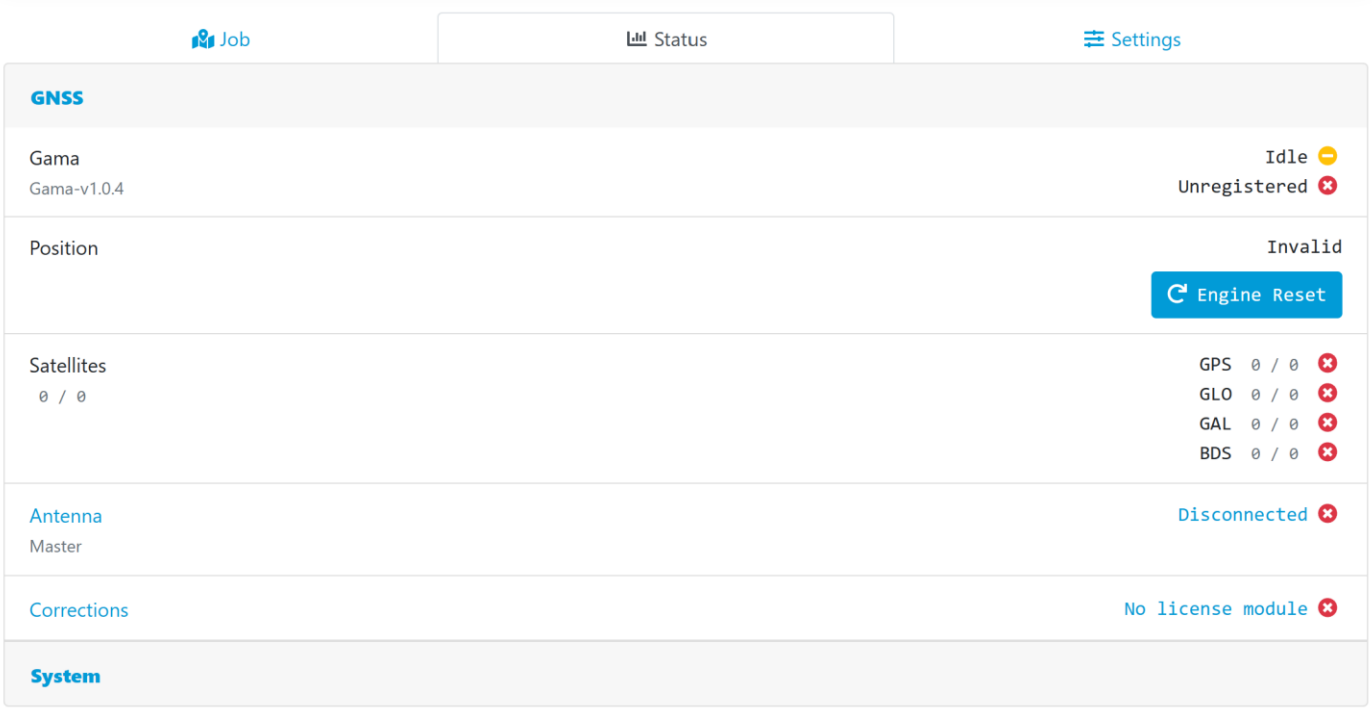


Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

8.3 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.

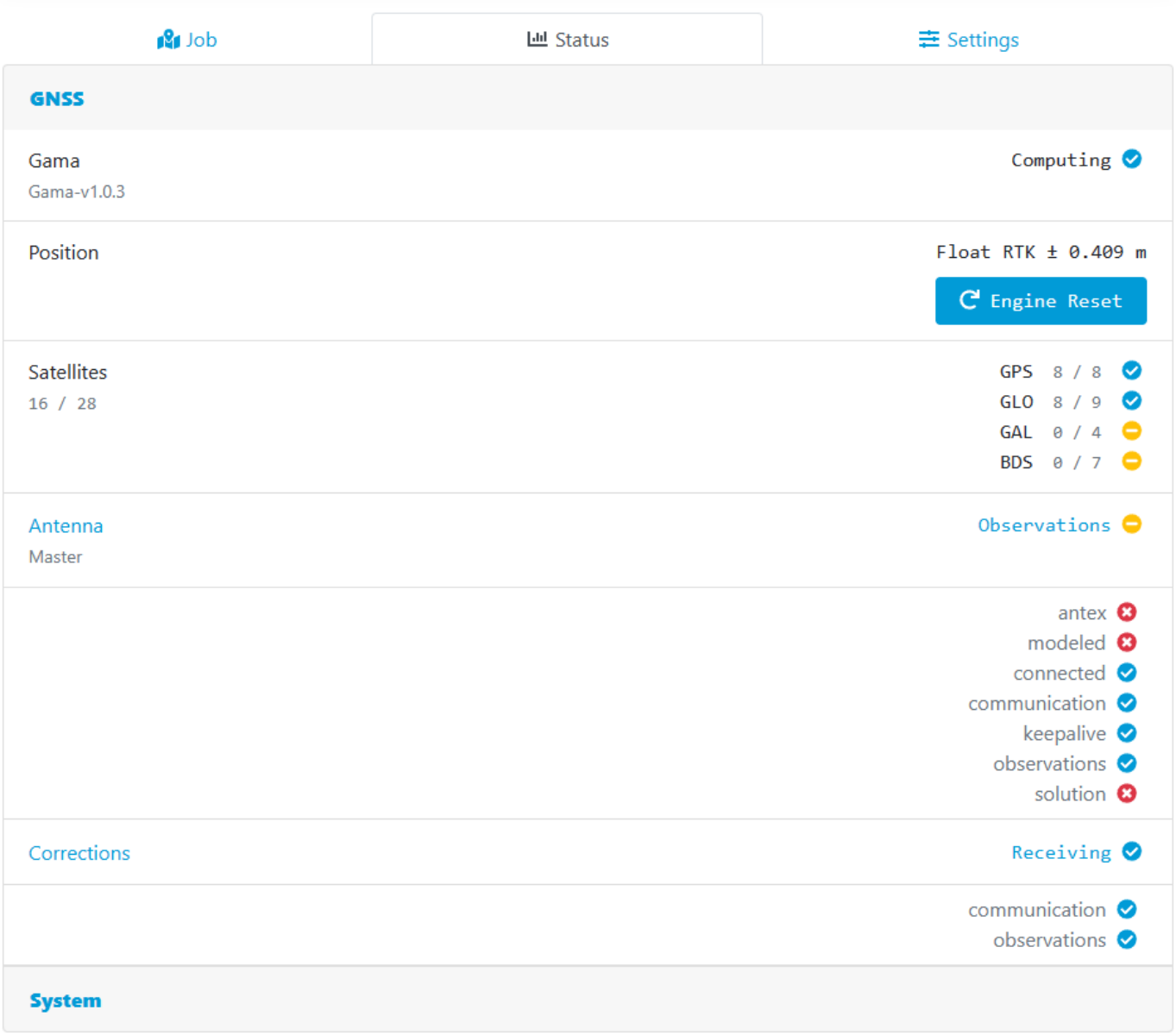
Note that Gama may become unregistered due to data corruption or by executing the Fresh Installation procedure on an existing install of Gama, which will delete the active registration from the device.



Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

8.4 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).



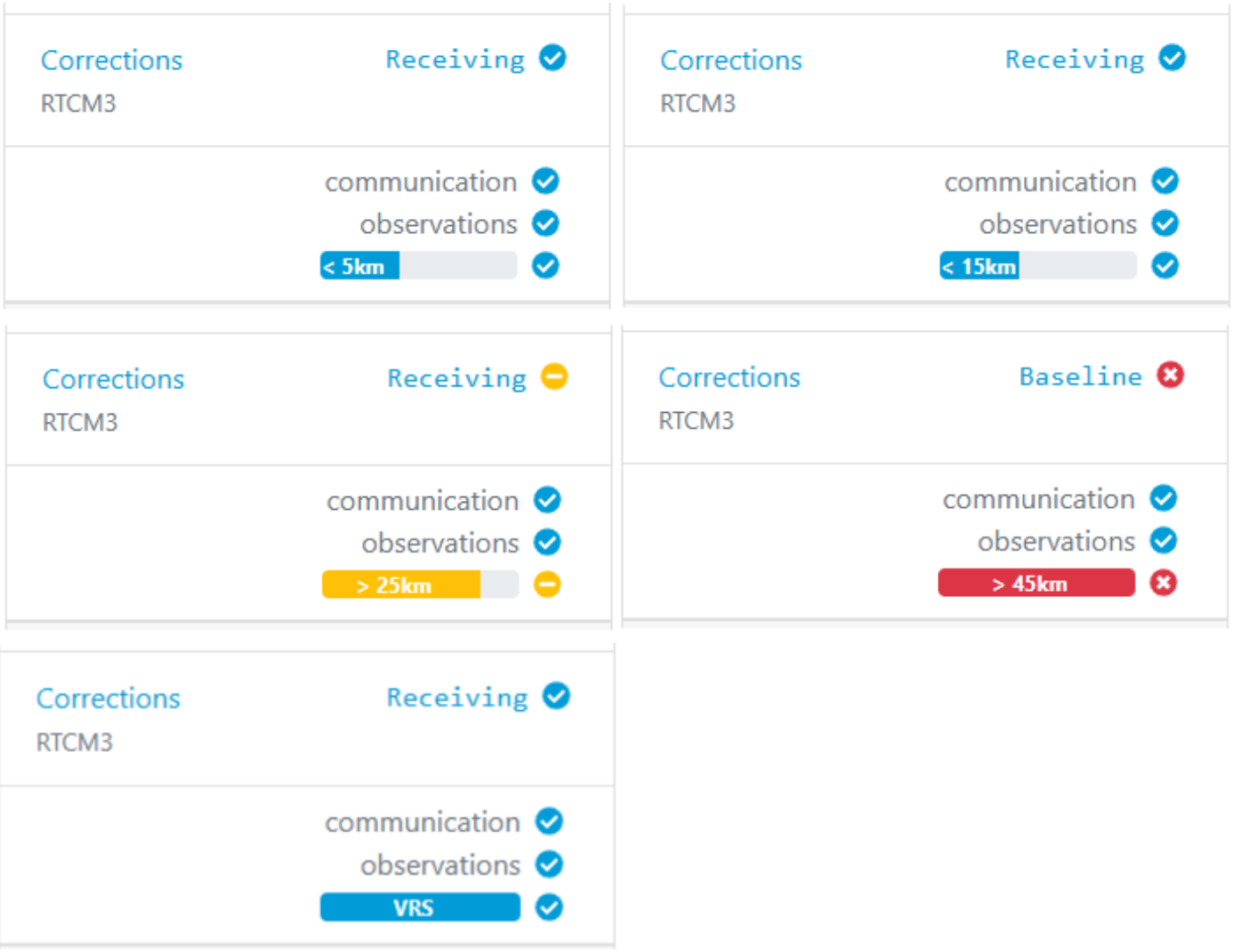
If you confirm you did select the right antenna type but still observe a red indicator for “antex” or “model” then you may be using a new type of antenna that is not yet fully supported by Gama. In this case please reach out to your Carlson Software Support point of contact.

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

8.5 Baseline degrading performance

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

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

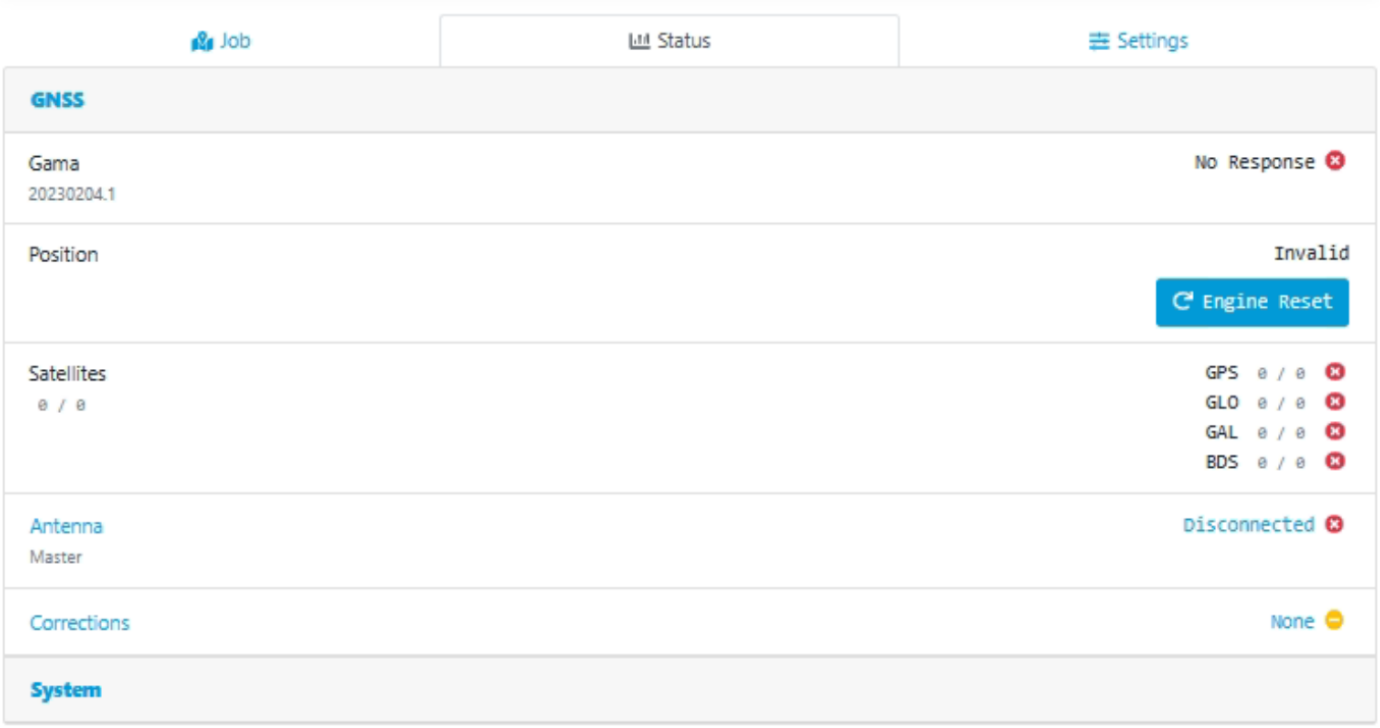


Review the selected Base and ensure the distance is an appropriate length.

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

8.6 Hard crash

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



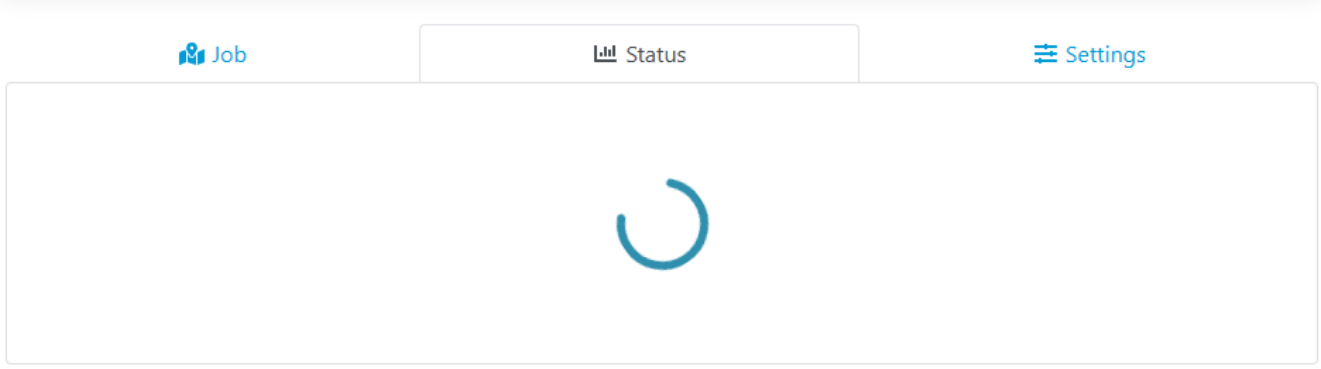
Follow these steps:

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.

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

8.7 Web UI unresponsive

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



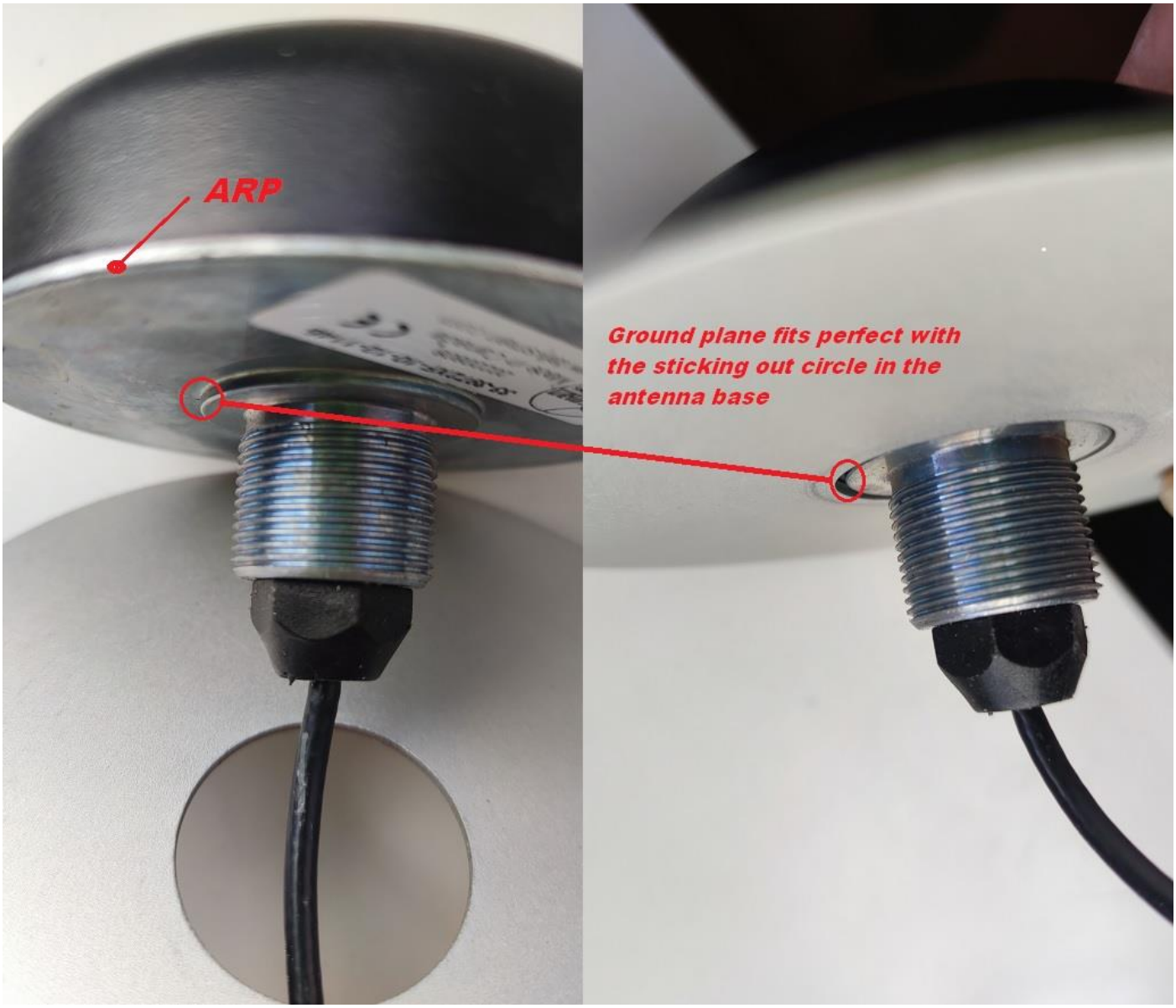
This is expected behaviour after updating Gama. Please wait and refresh (press F5).
If the Web UI continues unresponsive, follow these steps:

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.

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

8.8 Installing Tallysman antenna

The Tallysman TWI3972XF antenna is screwed directly to the pole. There is no need for bolts, neither rubber, only the ground plate is in between the antenna and the pole. Then, you just pick the right antenna from the SurvPC library (TWI3972XF).

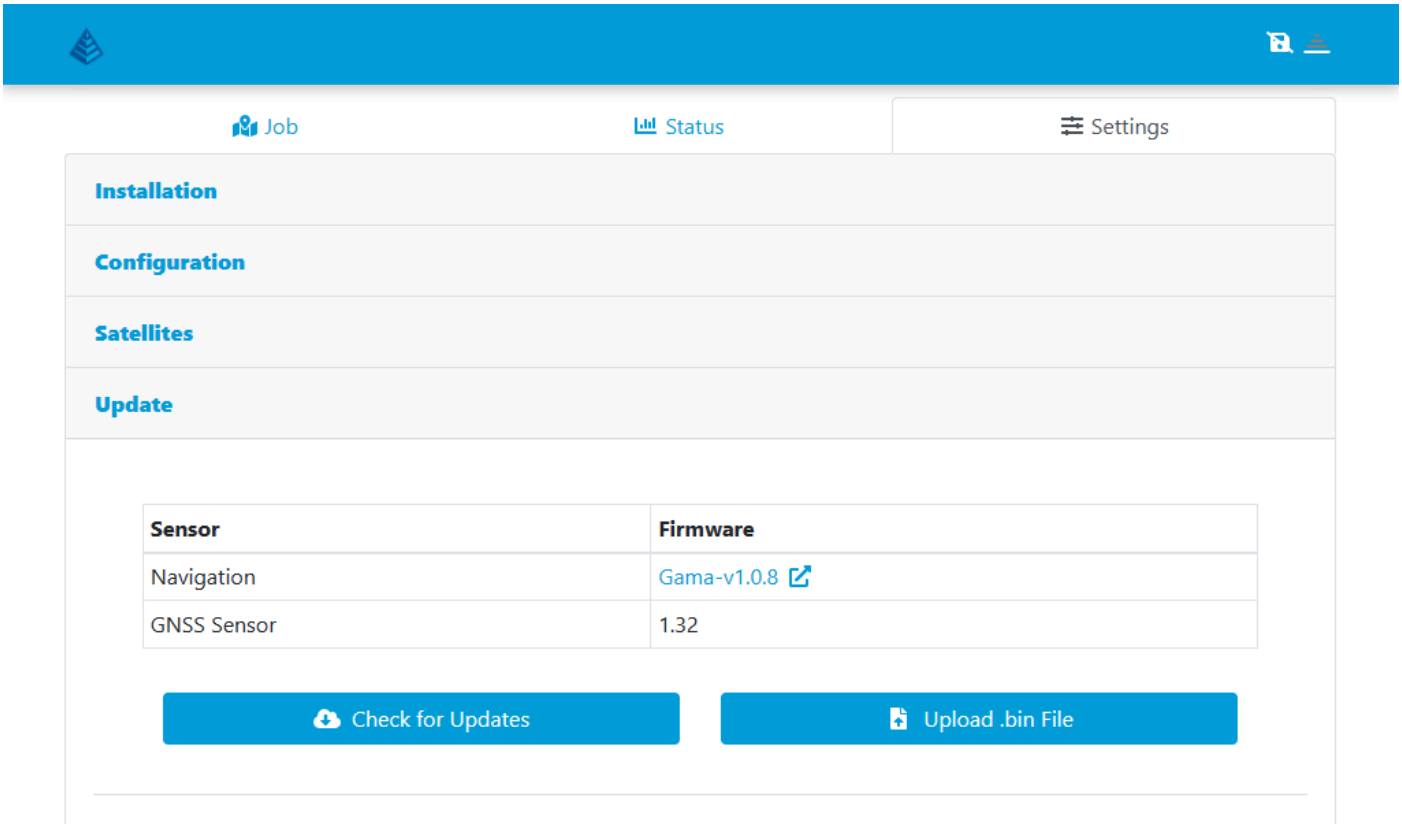


Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

8.9 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.



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.

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com

Carlson Software, Inc.
33 East Second Street
Maysville, KY, USA 41056
www.carlsonsw.com