eBee RTK Setup with Leica Captivate

In this workflow we will focus on the RTK configuration between eMotion and Leica GS sensor using Leica Captivate for an eBee X. Note: Ensure to have the latest version of senseFly's eMotion as found on my.senseFly.com.

1. Base Station field setup:

- Setup base station over station point. This station point can be either known or unknown before flight (We will need to known coordinates for post processing in eMotion.)

- A typical set up would are using a Tripod, tribrach and offset pole for the base setup. - Record the height of the base station from the ground. A height hook may be used, but needs to be accounted for. This will be needed for post processing the base station in eMotion.

Connect the GEV269 cable lemo connection to GS sensor. - Switch on GS Sensor.

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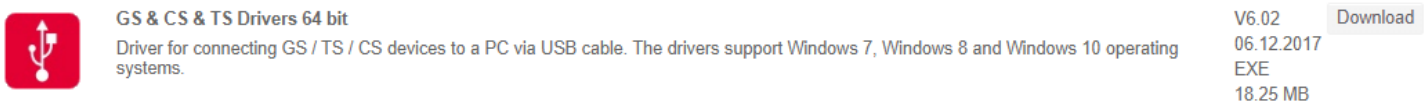
2. Connection to computer

Connect and plug the GEV269 cable USB into the computer. Make a note of the COM port number that the base is using.

Notes:
- To ensure proper functionality of the cable, please make sure to download all the necessary driver software. This can be found on Leica MyWorld:

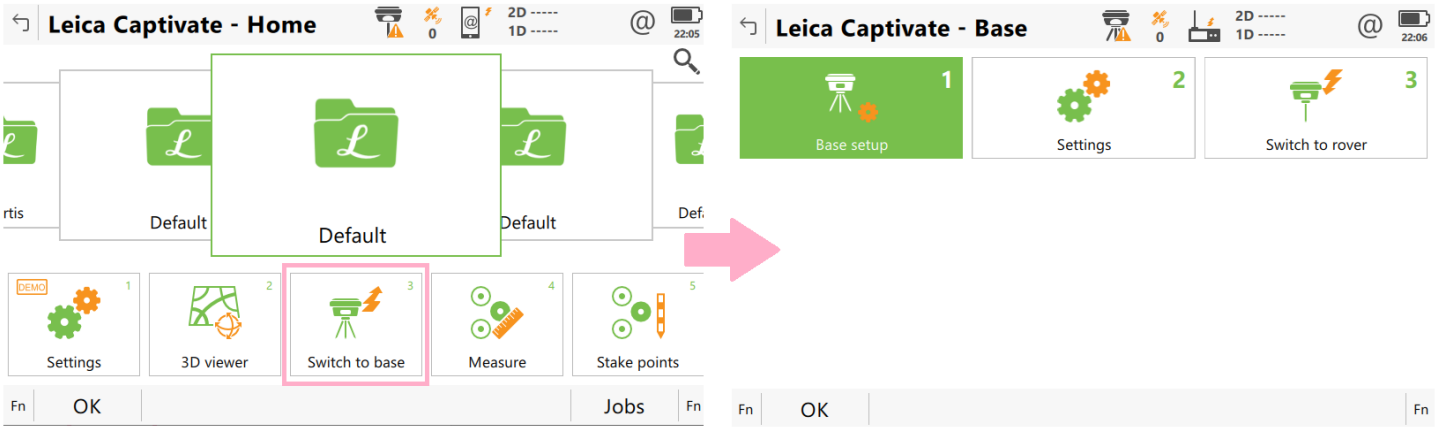


- Other compatible Leica cable connection from base to laptop may also be available. Refer to the Leica Accessory Guide for more information or contact your local Leica support for more information.

3. Base station configuration (Field controller)

- Unlike other base station configurations, eMotion is unable to send or receive commands to or from the Leica GS Sensor, as such a field controller will used to setup the GS senor. The Leica controller can run on Leica Captivate or Leica SmartWorx Viva. Other software may also work, this article only refers

Turn on Leica field controller and in the main menu, select the option <Switch to base>. The controller will then be in the Base mode, as indicated by "**Leica Captivate – Base**"



To connect to the GS sensor in base mode, select <Settings>, <Connections> , <Connect to GS Base>. Press F4 *Search* to search the GS sensor, then F1 OK to accept the GS sensor found.

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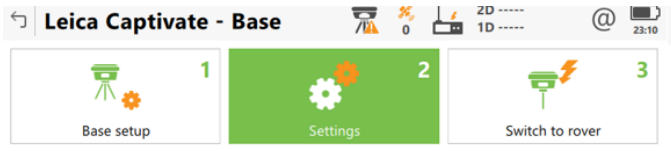

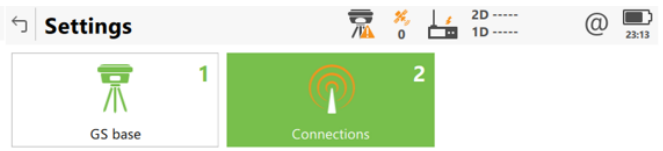

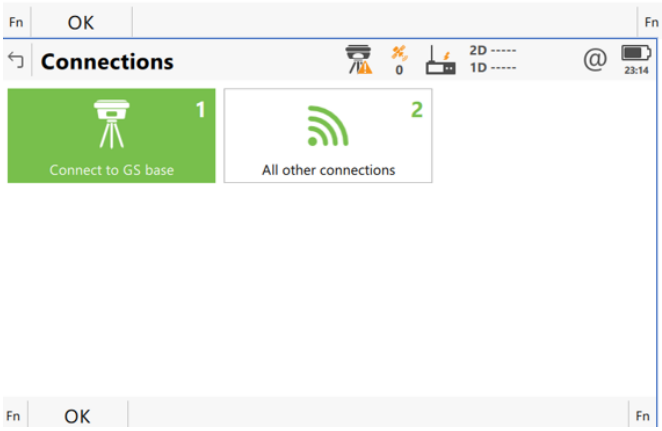

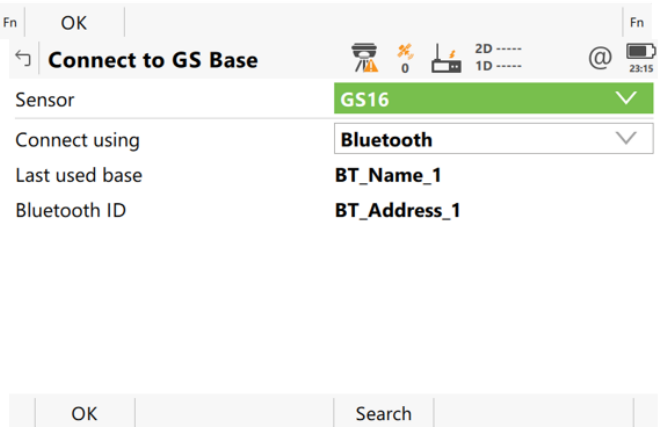

Once the CS controller is connected via Bluetooth to the GS sensor, this will be indicated at the top Toolbar of the Base menu.

Syncing  Synced 

The GS sensor will only start logging data and transmit RTK correction information if there is sufficient GNSS coverage to get an autonomous position.

NOTE: It is import to make sure that GS sensor is connected to the CS20 controller and is tracking and receiving satellites

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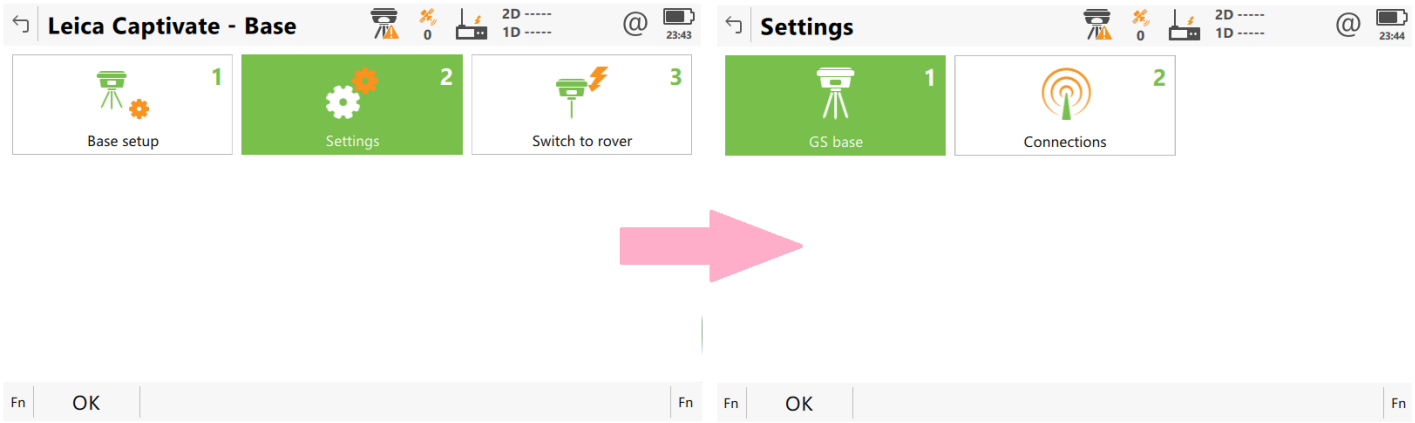
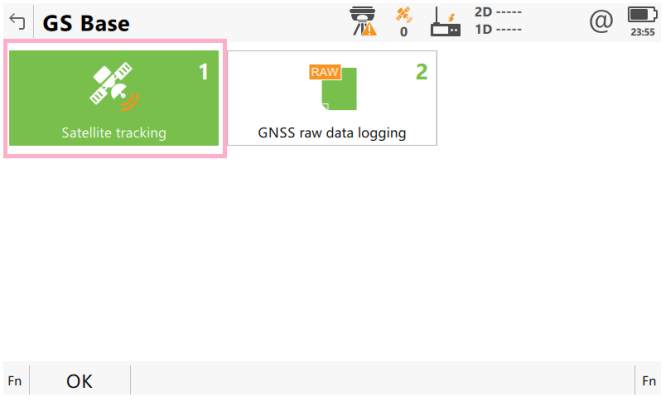
4. Base setup Workflow:

From Leica Captivate - Base Menu, select <Settings>, <GS Base>:



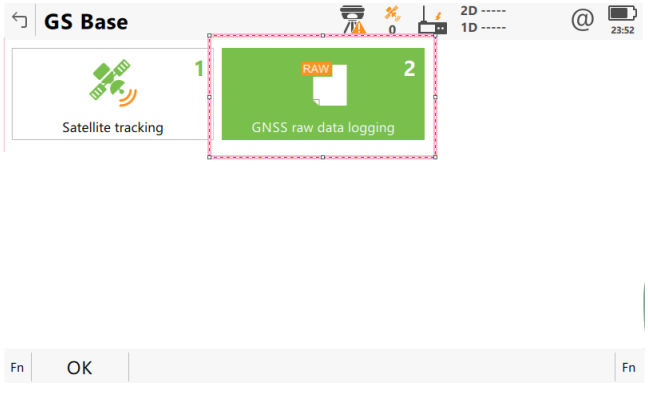
In the GS Base menu select and make the following two options are set:

1 <Satellite Tracking> :



Ensure the tick box GPS, and Glonass are checked

2 <GNSS raw data logging>



Make sure the Log GNSS raw data is checked Log data every: **1.0 s,** Log data to Leica MDB format

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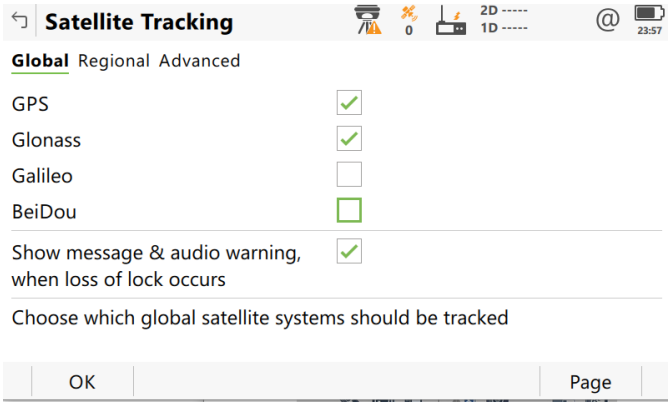
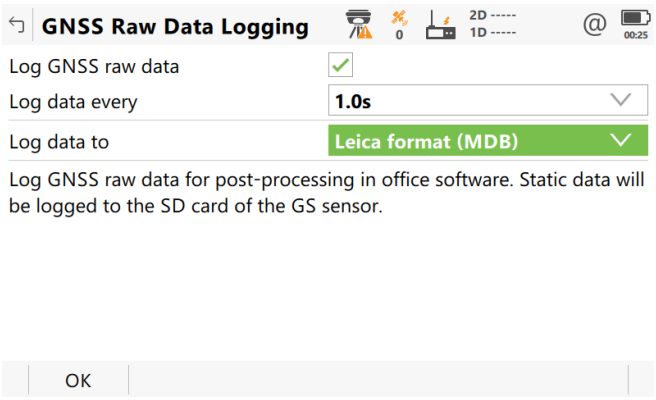
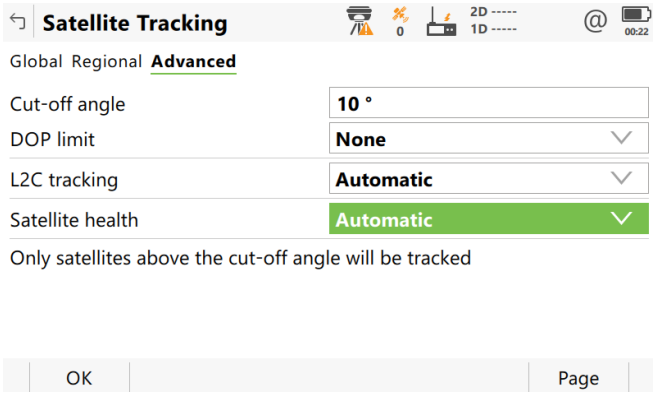
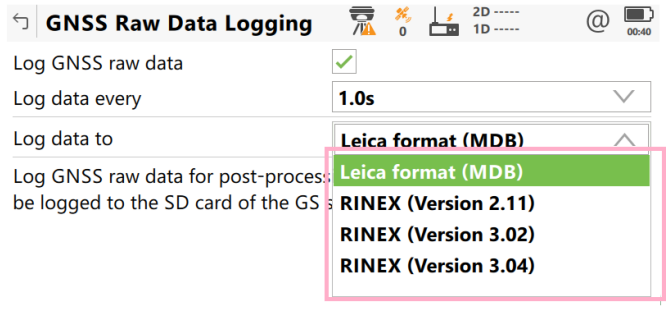




In Advanced tab, set:
Cut-off angle: 10°
DOP limit: *None*
L2C tracking: *Automatic*
Satellite health: *Automatic*



Note:
Logging in Leica MDB format will require the usage of Leica Infinity software to export Leica MDB format to RINEX. If the receiver has the appropriate paid option, it may allow for direct RINEX format.



Once the settings are made, press F1 to accept and save the changes.

Interface Settings/USBserial port setup

In the base menu, select <Settings>, <Connections>, <All Other Connections>, highlight **Base RTK 1,** and press **F3** ***Edit***

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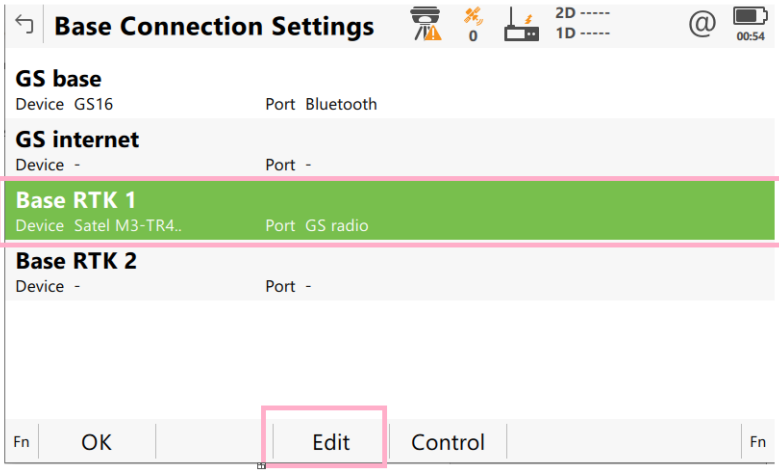
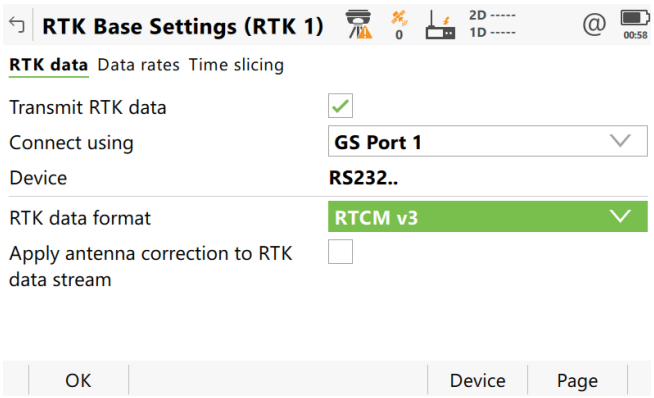


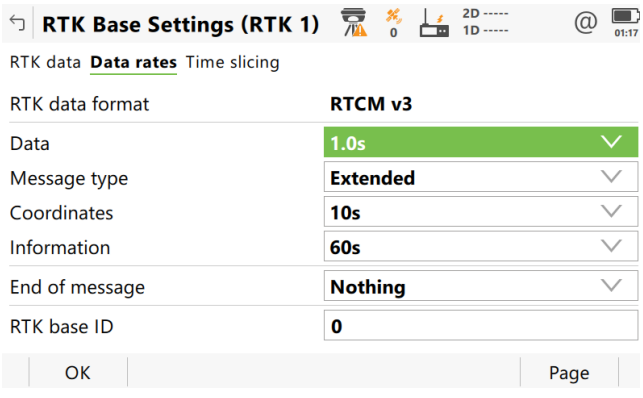
In the RTK Base Settings, under the *General* tab:

- Transmit RTK data: ***checked***
- Connect using: ***GS Port 1***
- Device: ***RS232***
- RTK data format: **RTCMV3**
- Apply antenna correction to RTK data stream: ***Unchecked***



In the RTK Base Settings, under the *Data rates* tab:

- Data: *1.0s*
- Message type: *Extended*
- Coords: *10s*
- Info: *60s*
- End of message: Nothing
- RTK base ID: **0**



Press F1 OK to sure the settings are saved

Setting up Base over either a Known and Unknown Point:

Depending on the point's origin, one may choose to set up over a known coordinate. This can be manually inputted or selected during the Base setup by choosing *Over Known Point* to set up base. However, eMotion Post Flight will allow for the point to be input during the FDM process. Hence, using the unknown point (Over any point) option is recommended at this point.

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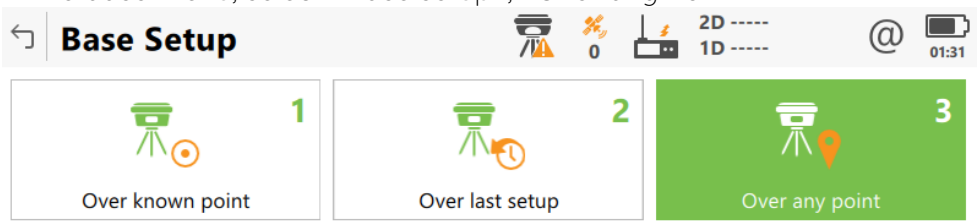
In the base menu, select <Base setup>, <Over any Point>:



From the Over Any Point:

- Antenna height: Enter the antenna height. (if using a height hook, enter the measurement found on the hook)
- Base antenna: If using height hook with a Leica carrier, make sure to select the specific antenna **with tripod** as there is a 36cm offset when using the height hook with a Leica carrier. If a height hook is NOT used, select GS(X) on a Pillar as this will remove the Vertical offset.
- Note: Vertical offset 0.36m if using a *GSxx Tripod antenna*

Press F6 Next to continue

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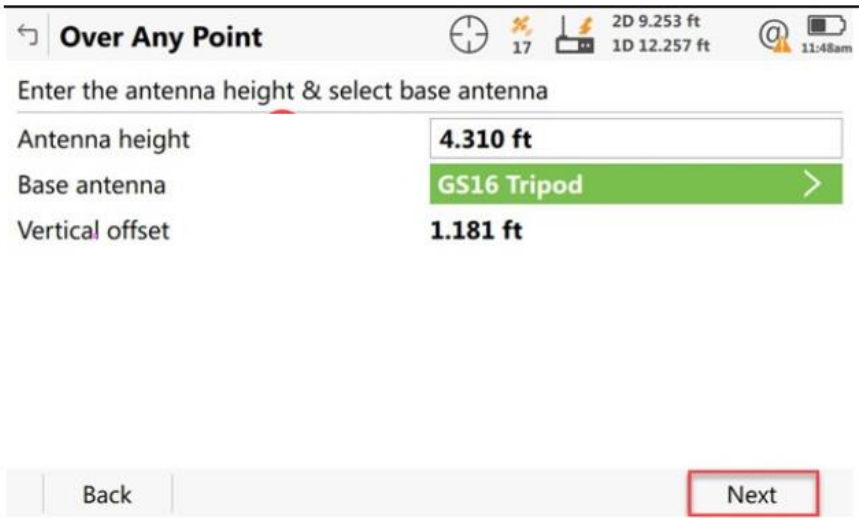
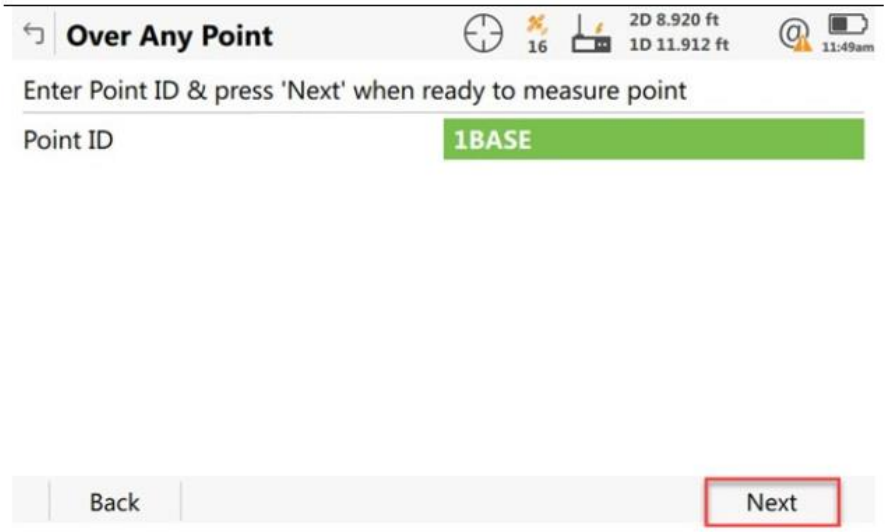
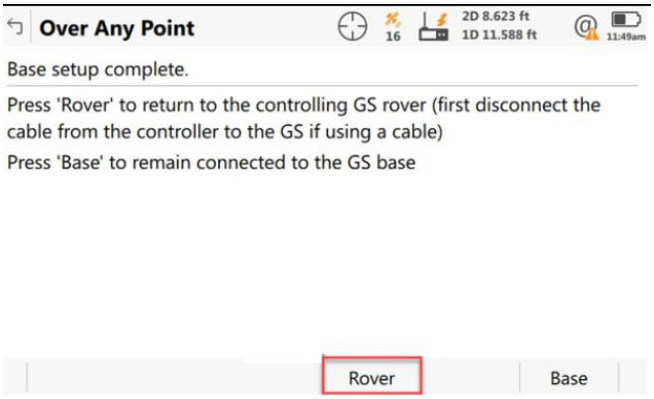


Enter the name of the Base Point ID , and press F6 Next to continue:



The Base setup is complete, select F6 Base to return to main menu.

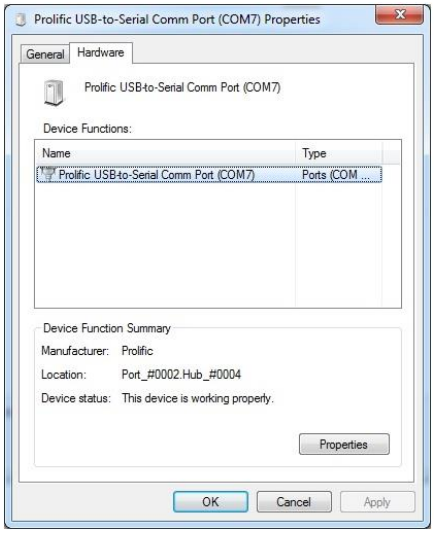


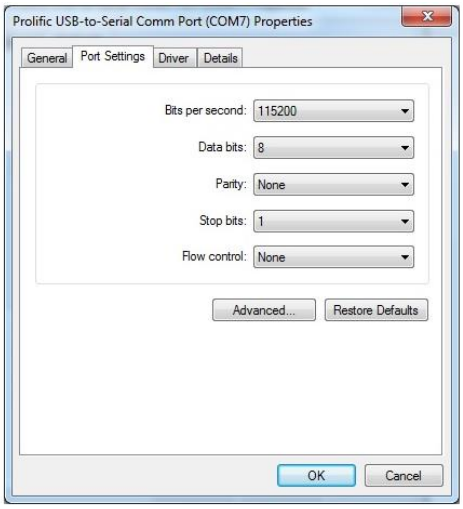
5. eMotion Flight computer Laptop setup Procedures:

Port Settings on Computer:
In Windows, open the Control Panel and click Device and printers.

In Device and printers, go to Ports- Expand Unspecified Ports entry and double-click Leica USB-to-Serial Comm Port: (COM number appears differently for other users). Be sure to note the correct COM port number to be used for the base connection in eMotion.

Right click on Leica USB to Serial Comm port and select properties. In Prolific Comm port Properties-Page to Hardware. Double click on Comm Port will open advance tab. Page to Port settings. On the Comm Port Properties dialog, set the following properties





Press ok.

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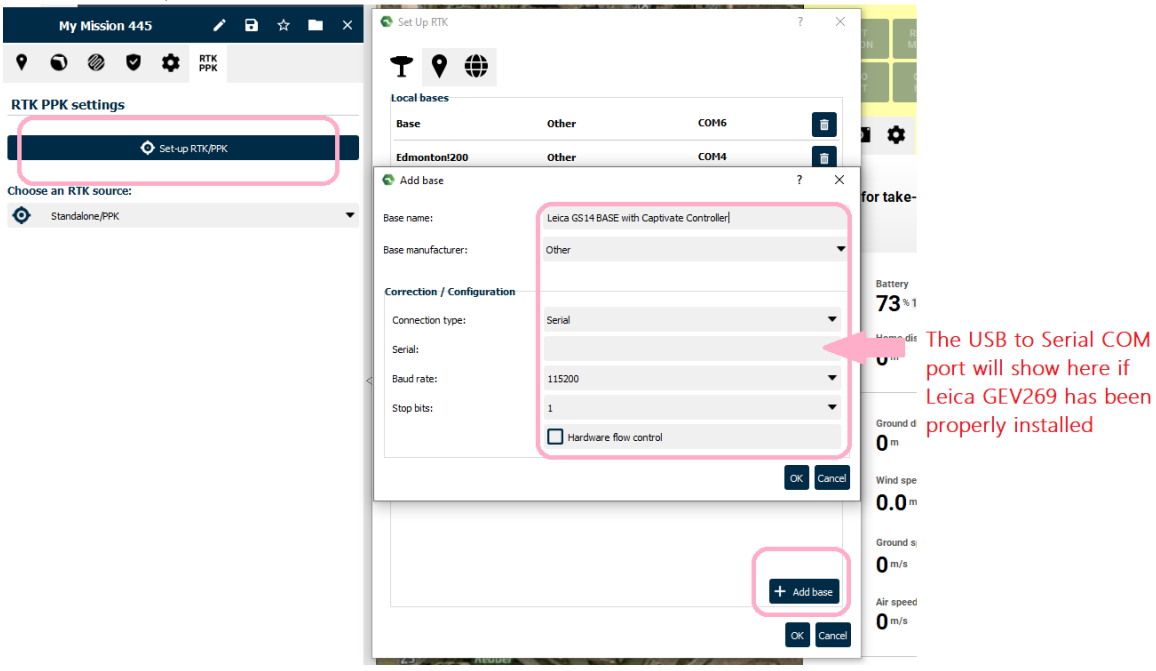
6. eMotion Procedures, Prepare your eBee for flight

Have the eBee RTK, eBee Plus RTK or eBee X placed on a flat, stable surface in an area with good exposure to the sky. This will maximize the number of GNSS satellite signals it receives.

- Connect the eBee battery and allow it to start up.
- Launch eMotion, load or create a mission, and connect to the eBee/
- In the RTK/PPK tab on eMotion's left-hand Mission panel, click on Set up RTK/PPK then click Add base.

Base settings in eMotion:

- Enter the following settings. You may give your base a custom name. Using a serial connection, choose the correct COM port.



Configure RTK source

From the Choose RTK Source menu, choose your base station setup that was just created. This will launch the Setup Local Base window. Select On unknown point and then click on **Open base-drone** datastream. eMotion will connect to the base and populate all fields as shown. Once complete, click OK.

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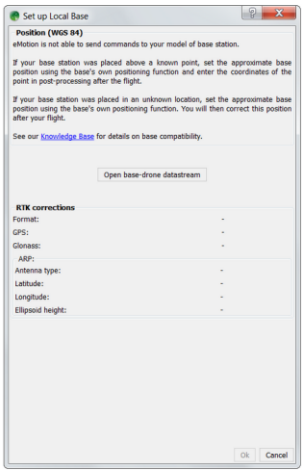
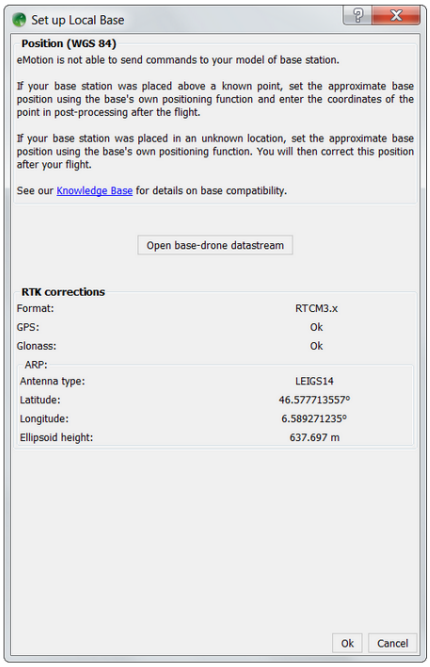


- If all the settings are correct the Open base downstream will populate all the fields below. Examine each field to ensure accuracy. Press Ok to accept.



In the RTK menu, RTK corrections status for both GPS and GLONASS should be OK and the GNSS status in your drone's Status Panel should be RTK Fixed. The location of the station appears on the map and the drone is ready to fly:

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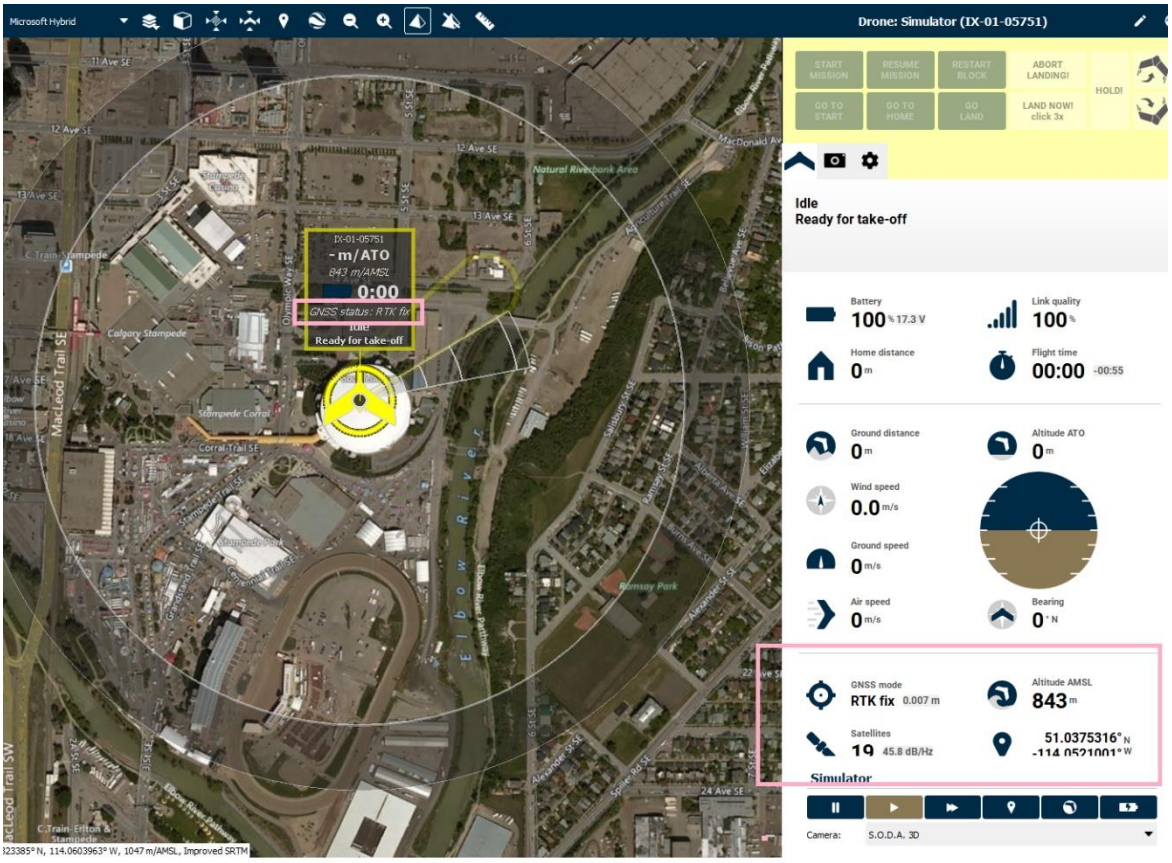
7. eBee In Flight Status

In Flight, monitor that the RTK remains fixed for the entire flight. The RTK may float when the eBee is in a bank turn, this is normal, otherwise the RTK should remain fixed. If loss of RTK is constant throughout flight please check serial connection and all the steps have been correctly followed above.



Important Note:

- Don't turn off or move the base station between flights if you will be flying multiple flights from the same location (the longer the base station log, the more accurate the post-processing).
- When the mission is finished, turn the base station off before moving it.