Ellipse-E

External Septentrio GNSS integration

Operating handbook

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This brief document guides you in the process of connecting an external Septentrio GNSS receiver to your Ellipse-E.

Step 1: GNSS and Ellipse-E connections

1. Connect GPS Tx signal(s) to one of the following pins on Ellipse connectors: PORT B, C, D Rx pins. Please also connect Ellipse and GPS ground signals to each other.

2. Connect GPS PPS signal to Sync A, B, C or D input.

> **Note:** Septentrio PPS signal strength is usually very weak (3V pulse with a few microseconds duration). If the PPS cable is too long or split, this signal may require pre-amplification using third party hardware to work properly.

Step 2: GNSS module configuration

Septentrio configuration can be performed using RxControl, or the embedded web interface. The following section details how to access the web interface.

Accessing the Septentrio web interface

In order to access the Septentrio web interface, you will need to know the IP address of the receiver. By default, it is set in DHCP mode and a running DHCP server has to run on the network to let the Septentrio receiver acquire a valid IP address.

A serial connection can be used to retrieve the current IP address of the receiver. Rxtools or command will allow retrieving parameters.

The following command will ask the receiver its current IP configuration.

```
>lif, IPParameters
```

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In case a different IP setup must be entered, you will need to use the following command:

>	sips,	Mode,	IP,	Netmask,	Gateway,	Domain,	DNS1,	DNS2
Details:		static dhcp	192.168.2.2	255.255.255.0	192.168.2.1		8.8.8.8	8.8.4.4

Example:

sips, static, 192.168.1.123, 255.255.255.0, 192.168.1.255, domain.local, 192.168.100.3, 192.168.100.4

Once the IP is defined, and you can access the web interface through your default web browser.

> **Warning:** Septentrio GNSS receivers can't acquire an IP address in DHPC mode without a proper working DHCP server on the Network.
> To connect directly a Septentrio receiver to your computer you first have to setup a static IP address.

Basic Messages output configuration (PVT)

Configure the following outputs and output rates on your GPS receiver:

- **PVTGeodetic** @ 5 Hz
- **PosCovGeodetic** @ 5 Hz
- **VelCovGeodetic** @ 5 Hz
- **AttEuler** @ 5 Hz (if applicable, on dual antenna systems)
- **AttCovEuler** @ 5 Hz (if applicable, on dual antenna systems)
- **ReceiverTime** @ 1Hz
- **AuxAntPosition** @ 1Hz
- **xPPSOffset** @ 1Hz

Configuration for post-processing

The output set "**PostProcess**" must be enabled at 1Hz as well for post-processing operation, It contains the following output:

- **MeasEpoch, MeasExtra** @ 1Hz
- **GEORawL1** @ 1Hz
- **GPSNav, GPSIon, GPSUtc** @ 1Hz
- **GLONav, GLOTime** @ 1Hz
- **GALNav, GALIon, GALUtc, GALGstGps, GALSARRLM** @1 Hz
- **BDSNav** @ 1Hz

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- **QZSNav** @ 1Hz
- **DiffCorrIn** @ 1Hz
- **ReceiverSetup** @ 1Hz
- **Commands** @ 1Hz

Other GNSS Configuration

Datum is set to WGS84.

Receiver dynamics should be set to:

- Acceleration / Jerk: **High**
- Motion: **Unlimited**

Smoothing options must be disabled

PPS Signal

For proper operation, a PPS signal must be provided at 1 Hz to the ELLIPSE-E. Please configure the Septentrio receiver to output a PPS signal at 1 Hz on a rising edge (Low2High).
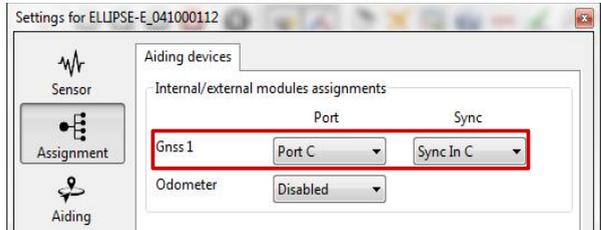
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Step 3: Sensor configuration

In order to configure the Ellipse-E, you need to use the sbgCenter and open the configuration window. Simply follow those instructions:

Set Aiding Assignment

In this window, you just indicate where you connected your GNSS receiver.

Both communication port **and** Sync In pin must be set.

Set correct baudrate and mode for serial port

In our example we configured the GPS to be connected on PORT C in RS-232 mode.

> **Note:** Post Processing messages contain a lot of packets, sufficient baudrate speed should be then selected. We recommend a speed of 460 800 bps in that case.

Configuration for PPS signal

In order to use correctly PPS signal for timing, you must enable the corresponding logic input. Here we configured PPS on Sync C.

Polarity should be set accordingly with the actual GPS signal and in our case rising edge.

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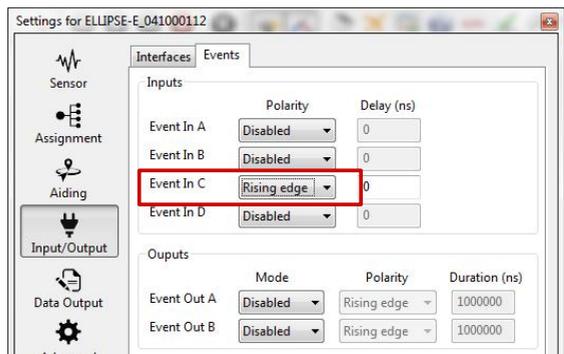
Set correct GPS model and configuration

1. GPS model should be set to Septentrio - External.

2. GPS lever arm is measured within 5 cm FROM the Ellipse, TO the antenna. If the option "The primary antenna lever arm has been measured precisely" is ticked, then the Kalman filter will take these values for granted and not calculate any bias for this Primary antenna lever arm. It should help the system to align faster, but Primary antenna lever arm has to be correct.

3. In case of Dual antenna system, the alignment offset must also be entered. The antenna separation can be entered as well but is not mandatory.

4. Finally, each available measurement (position, velocity, heading if available) should be configured to be used or not.

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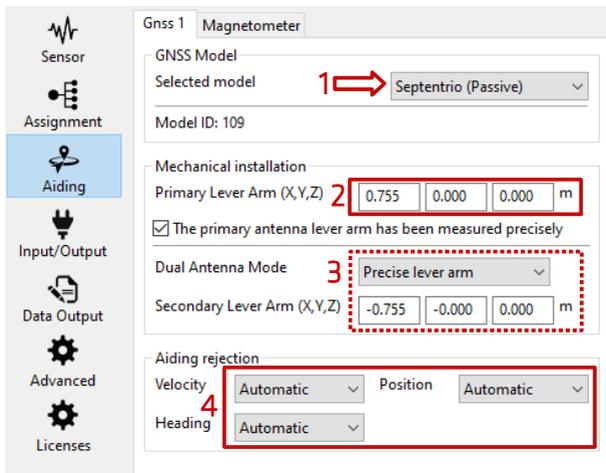
Check Clock alignment

Finally, you check that the time synchronization reference is set to GPS 1 (default configuration).
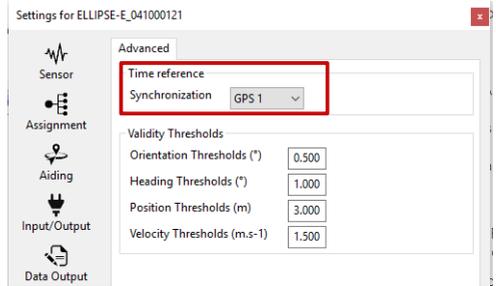
Step 4: Checking status

The status and GPS windows should be checked carefully before going further. These status indicators will give essential hints in case of troubles to get a correct fix.

1. Corresponding COM port must be OK.

2. GNSS 1 frame in "Aiding Inputs" tab must show active data. Not seeing this would mostly imply baudrate or cabling issue.

3. After that, you can check if the GPS solution has been calculated and is consistent.

4. Then you can check at the Clock section. Input clock must be OK and UTC time should be set to valid after a few minutes in steering mode.

5. Once the GPS acquired a solution, the Kalman filter should pass in Full Navigation mode and show active items in the "Used for Solution" field.

Note: The Kalman filter will run into navigation mode once a correct heading is estimated (requires magnetometers, true heading or some accelerations).

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