Survey Grade INS

External Novatel GNSS integration

Operating handbook

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SBG SYSTEMS

This brief document guides you in the process of connecting an external Novatel GNSS receiver to your SBG Device.

Step 1: GNSS and Sensor connections

Connect GPS Tx signal(s) to one of the following pins on device connectors: PORT A, B, C, D, E Rx pins.

You can also use an Ethernet connection if required – not covered by this document.

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

Note 1: Only the physical PORT A is available for the All-in-One Ekinox / Apogee-A. You can still use Eth 1 to Eth 4 virtual serial ports to input GPS data.

Step 2: GNSS module configuration

Basic operation

In addition to set a proper baudrate according to the sensor configuration, the following messages configuration should be done. Any other message should be disabled as the Inertial device expects only binary protocol as input.

LOG COM1 BESTPOSB ONTIME 0.2
LOG COM1 PSRXYZB ONTIME 0.2
LOG COM1 HEADINGB ONNEW
LOG COM1 TIMEB ONTIME 1.0
SAVECONFIG

Adding Post-processing capability

The following message configuration is required for post-processing.

LOG COM1 RANGECMPB ONTIME 1
LOG COM1 RAWEPHEMB ONCHANGED
LOG COM1 GLOEPHEMERISB ONCHANGED
SAVECONFIG

Note: The Novatel Binary protocol must be used as it provides the fastest transfer rate and lowest CPU consumption for data handling.

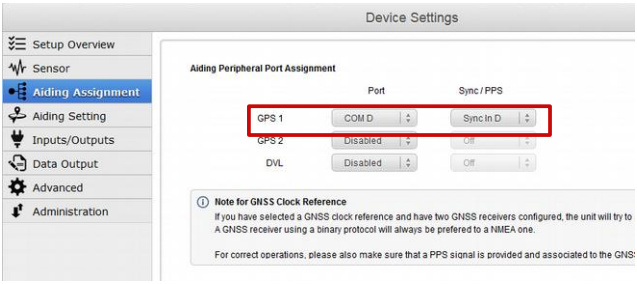
Step 3: Sensor configuration

In order to configure the Sensor, you need to connect to the Web interface and open the configuration window. Simply follow those instructions:

Set Aiding Assignment

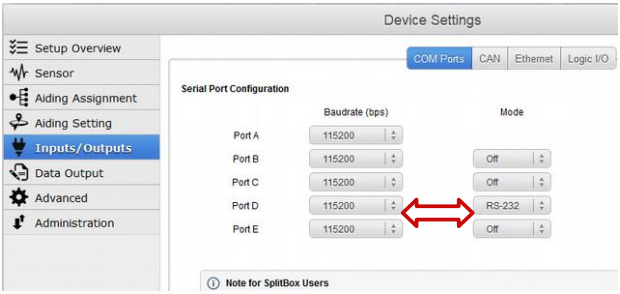
In this window, you just indicate where you connected your GNSS receiver.

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



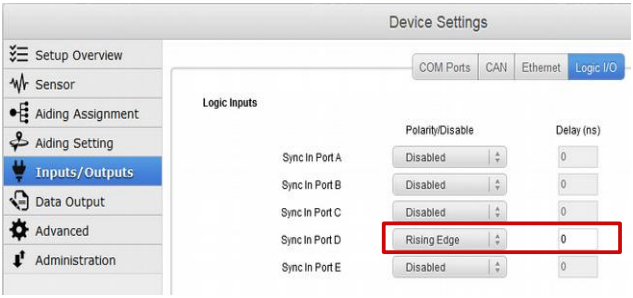
Set correct baudrate and mode for serial port

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



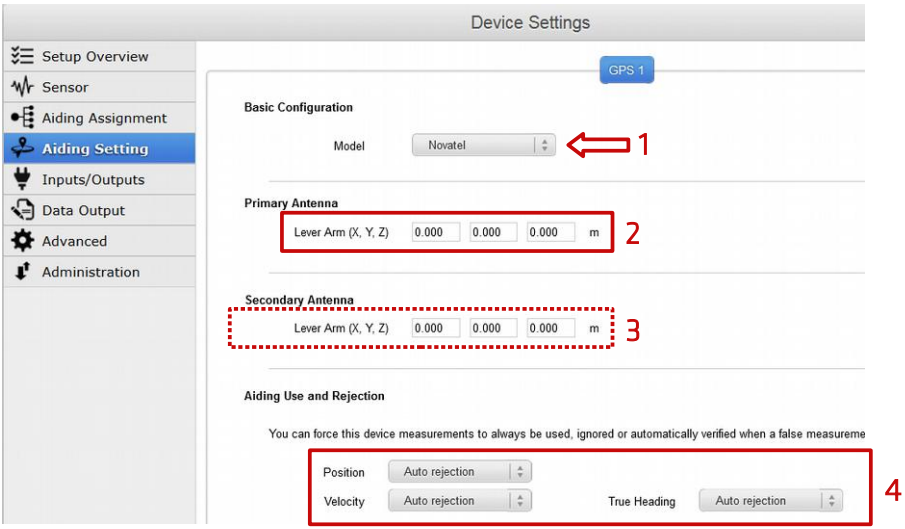
Set Logic input configuration for PPS signal

In order to use correctly PPS signal information, you must enable the corresponding logic input.
Here we configured PPS on Sync D.
Polarity should be set accordingly with the actual GPS signal.



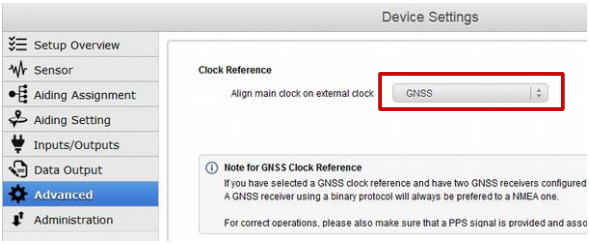
Set correct GPS model and configuration

1. GPS model should be set to Novatel.
2. GPS lever arm is measured within 5cm **FROM** the Sensor, **TO** the antenna.
3. In case of Dual antenna system, offset for the secondary one (providing heading) must also be entered.
4. Finally, each available measurement (position, velocity and true heading if available) should be configured to be used or not. Typically, leave it to Automatic rejection mode.



Set Clock alignment

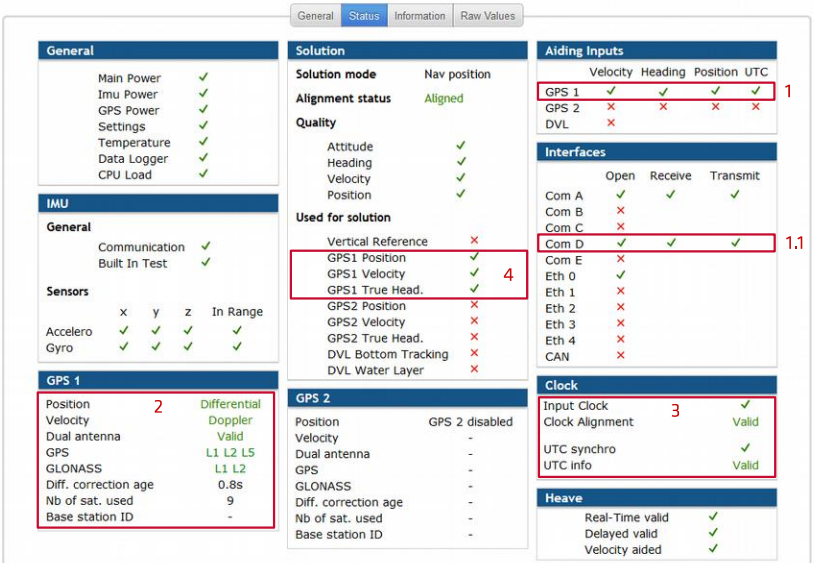
Finally, you should define which GPS should be used to align the internal clock and provide UTC time data. This is done into the advanced settings section:



Note: If you have two connected GPS receivers, the INS doesn't need a PPS signal for the second GPS receiver to accurately time stamp the data.

Step 4: Checking status

Once fully configured, the global status must be checked:



1. GPS 1 or 2 line in "Aiding Inputs" section must show valid data. Check next items otherwise:
   - Check interface configuration (1.1): Corresponding COM port must be opened and Rx flag OK. Baudrate should be the same in the GPS and the SBG unit configuration
   - Check for hardware wiring issues
2. GPS solution is reported in that section. Check if there is a good GPS fix here.
3. 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 alignment mode.
4. 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 could be estimated (requires magnetometers, true heading or some accelerations).

Note 2: Position data should be used in solution in good GNSS environments. In case of RTK fix, the velocity aiding is automatically disabled for optimal performance.