

# OnFlight Hub User Manual

Firmware v1.0

Document Revision 1.0

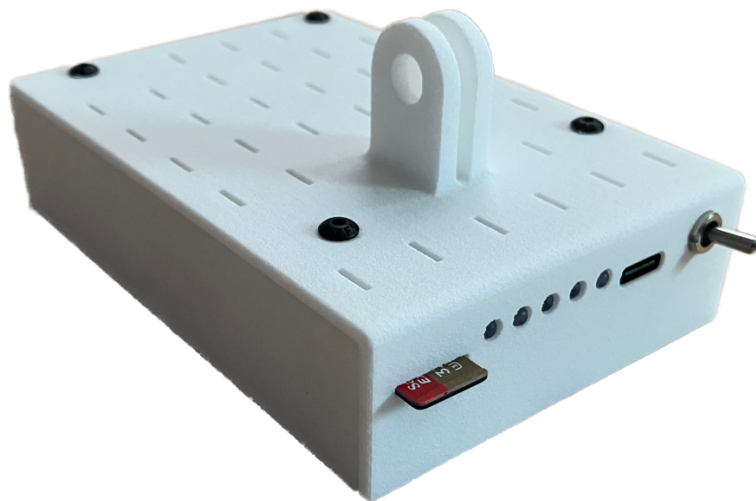


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## 1 Technical Documentation

The following documentation and support software are included with OnFlight and available from our [website](#):

- **User Manual (this document):** describes the OnFlight Hub, specifications, and operations.
- **CSV Data Log Description:** describes the fields available in the CSV formatted data logs.
- **Data Converter:** application for Windows or MacOS, which converts the data from OnFlight to CSV format.

## 2 Support

If you have technical problems or cannot find the information you need in the provided documents, please contact our technical support team by email at: [support@bolderflight.com](mailto:support@bolderflight.com). Our team is committed to providing the support necessary to ensure that you are successful using our products.

## 3 Introduction

The OnFlight Hub is a portable, high-performance, low-cost Inertial Navigation System (INS) and data logger for General Aviation aircraft. It is designed to be quickly mounted in a GA cockpit and log data to support pilot training, pilot proficiency, and reviewing previous flights. It is especially well-suited for student pilots, CFIs, and pilots conducting aerobatics, backcountry, glider, and ultra-light flights.

In addition to logging data, OnFlight Hub streams real-time data using the GDL 90 specification to *ForeFlight* and other GDL 90 compatible applications to provide position information and act as a backup AHRS. A webpage is hosted by the OnFlight Hub to enable pilots to quickly view its operation and configure the device.

OnFlight Hub fuses data from an integrated IMU, GPS receiver, and static pressure sensor at a rate of 50 samples per second while estimating and removing sensor biases in real-time.

An integrated battery provides over 13 hours of run-time and a USB-C port enables fully charging the OnFlight Hub in approximately 2.5 hours. GoPro and tripod mounts along with a flat bottom to the case enable a variety of mounting options. The size of the OnFlight Hub is 4 x 2.75 x 1 inches and it weighs 5 oz.

## 4 Operations

### 4.1 Mounting

Mount the OnFlight Hub in the orientation shown in Figure 1. Note the location of the GPS antenna and try to ensure that it has clear view of the sky through the windscreen.

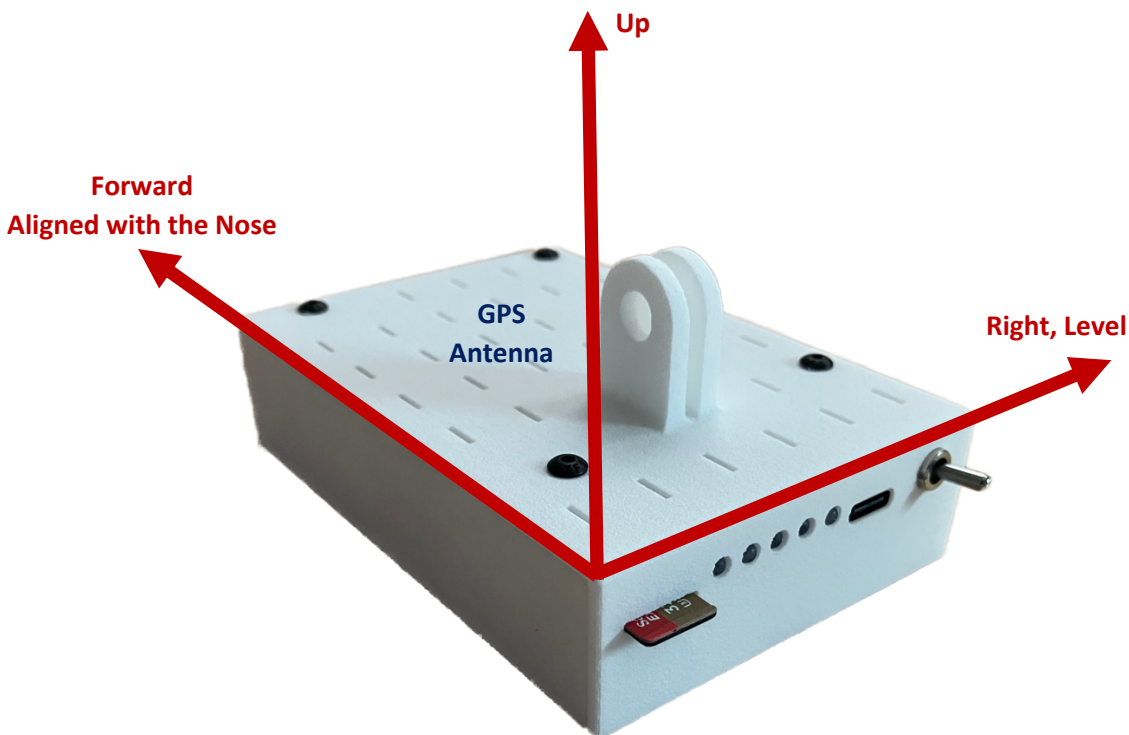


Figure 1: OnFlight Hub orientation

The OnFlight Hub can be mounted with a suction cup to the windscreen via a GoPro style mount or to the glareshield via a tripod mount on the bottom of the device. The bottom of OnFlight Hub is flat to enable the use of Velcro for mounting as well. Note that the OnFlight Hub is designed to only be mounted inside of the cockpit.

The attitude can be zeroed via the configuration webpage.

## 4.2 Power and status

Figure 2 shows the power switch, USB-C charging port, LED status indicators, and micro-SD slot on the OnFlight Hub.

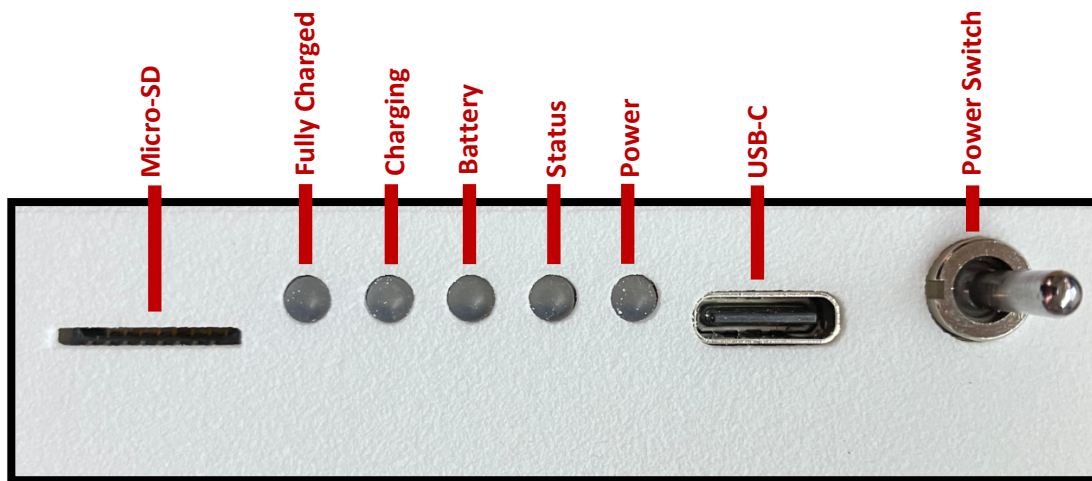


Figure 2: OnFlight Hub interfaces

Descriptions of the LED indicators are in Table 1.

Table 1: LED indicator descriptions.

Name	Illumination Description		
	On	Off	Flashing
Power	OnFlight Hub is on	OnFlight Hub is off	N/A
Status	INS is initialized and healthy	INS is either not initialized or has a poor GPS fix	Fault occurred during initialization, contact Bolder Flight Systems
Battery	Battery is below 3.4V	Battery is above 3.6V	Battery is between 3.6V and 3.4V
Charging	Battery is charging	Battery is not charging	N/A
Fully Charged	Battery is fully charged	Battery is not fully charged	N/A

The *Power LED* indicates whether the OnFlight Hub is powered on or not. The power switch is a mechanical switch and power draw of OnFlight Hub should be minimal when it is powered off.

The *Status LED* is used to indicate the health and status of the OnFlight Hub. The OnFlight Hub performs self-tests during initialization – if the *Status LED* is flashing at 1 Hz, this indicates that a fault occurred during initialization, and you should contact Bolder Flight Systems. If the *Status LED* is off, this indicates that the INS has not yet initialized, probably due to not receiving a strong enough GPS signal. If the *Status LED* was on and is now off, this indicates that the INS initialized, but now is no longer receiving a strong enough GPS signal and the INS data may be unreliable. If the *Status LED* is illuminated, the INS is initialized, healthy, and the INS data can be trusted.

The *Battery LED* is used to indicate the battery voltage level, which gives a rough estimation of run time remaining. The *Battery LED* will start flashing when the battery voltage is between 3.4V and 3.6V. The *Battery LED* will fully illuminate when the battery voltage is below 3.4V.

The *Charging LED* illuminates when the OnFlight Hub is charging and the *Fully Charged LED* will illuminate when the OnFlight Hub is fully charged.

### 4.3 Configuration

Connect to the wireless network called “OnFlight Hub”. There is no password required to connect. If you would like to view the status of the OnFlight Hub or change its configuration, navigate to **192.168.23.1** in a web browser. The configuration webpage is shown in Figure 3.

Real-time data from OnFlight is shown on this page. The GDL 90 port is set to 4000 by default; however, if *ForeFlight* changes this in the future, or you would like to use an application that uses a different port, set the desired GDL 90 port, and press the *Update Config* button.

The pitch and roll attitude can be zeroed by pressing the *Zero Attitude* button.

If you would like to reset the configuration back to defaults, you can accomplish this by pressing the *Restore Defaults* button.

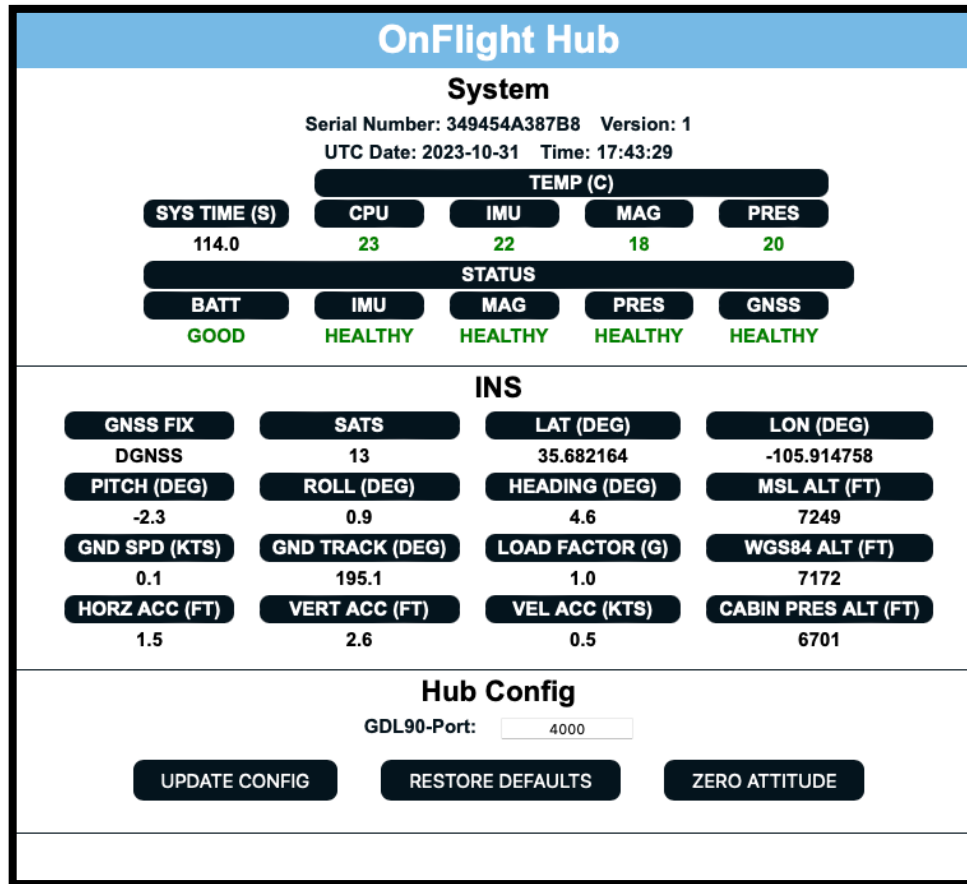


Figure 3: OnFlight Hub configuration webpage

## 4.4 Initialization

For the first 5 seconds after it is powered on, OnFlight Hub estimates initial biases for the IMU. It is recommended to not move the OnFlight Hub during this time.

OnFlight Hub requires a 3D GPS fix with at least 6 satellites to initialize the INS data fusion algorithms. Once these are initialized, you will start to see good position, attitude, speed, and accuracy estimation data. Note that ground track and flight path angle will not be valid until you have some forward speed. Additionally, heading will likely be inaccurate at speeds of less than 10 knots.

## 4.5 GDL 90 Streaming

Data is broadcast using the GDL 90 specification over the configured port. Heartbeat and ForeFlight ID are sent 1 time per second. Position data (i.e. ownship), GPS altitude, and attitude are sent 5 times per second.

Simply connect to the OnFlight Hub wireless network and launch *ForeFlight* or another GDL 90 application. *ForeFlight* will display the device name, serial number, estimated position accuracy, along with position and AHRS data.

## 4.6 Data Conversion

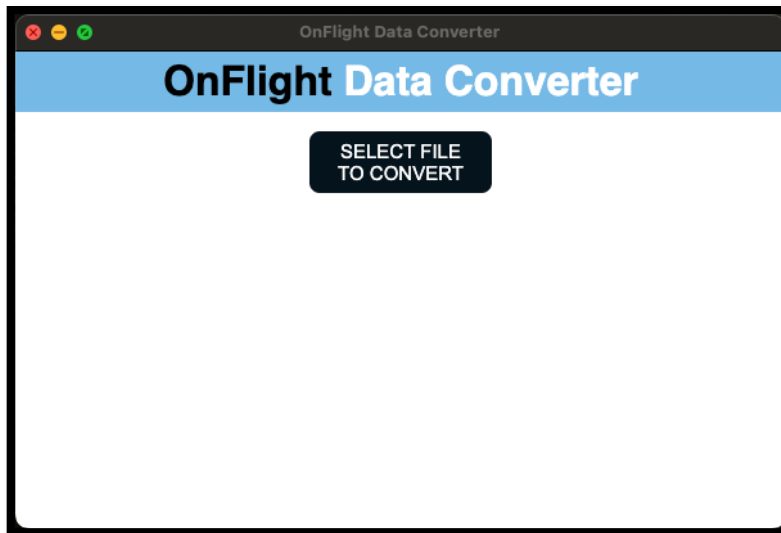
A micro-SD card must be inserted into the OnFlight Hub to record data. The card should be inserted prior to turning on the OnFlight Hub. It is recommended to format the micro-SD card as FAT32 or exFAT formats. We recommend using a high-speed card – a list of cards tested to work well with the OnFlight Hub is below:

- SanDisk Extreme 32 GB

- SanDisk Extreme Plus 32 GB
- Delkin 64 GB

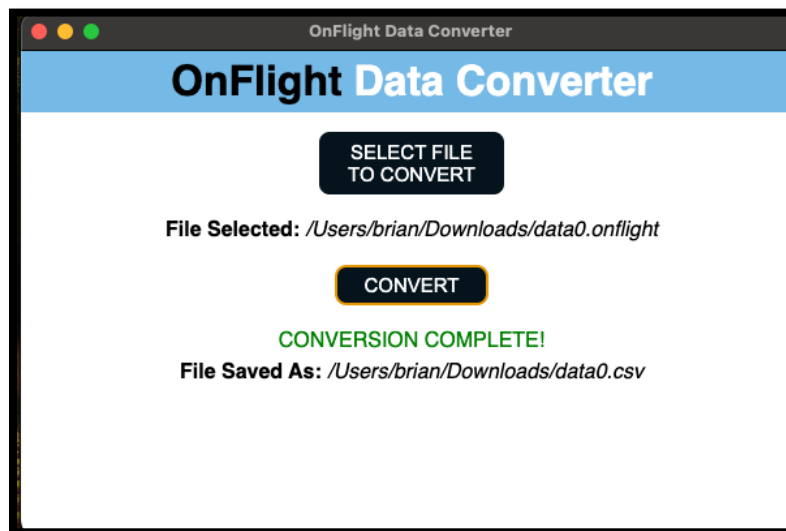
After the flight, the micro-SD card can be inserted into your computer to view the data files. Data files are named sequentially, based on the files present on the micro-SD card to avoid overwriting older files. These data files start with *data0.onflight*.

A data converter application is available for download for use with Windows and MacOS operating systems. On MacOS, drag and drop the downloaded application into your Applications folder. On Windows, run the downloaded installed. A screenshot of the OnFlight Data Converter application is in Figure 4.



*Figure 4: OnFlight Data Converter application*

Use the button to select the data file to convert, which will display a file selection dialog box to browse to the file's location. Once an OnFlight data log file is selected, this is confirmed on the application screen. Press the Convert button to convert the data log to a CSV file, which is confirmed when the conversion process is complete, Figure 5.



*Figure 5: OnFlight Hub Data Converter process complete*

The items included in the data log are described in more detail in the *CSV Data Log Description* document.

## 5 Specifications

**Size:** 4 x 2.75 x 1 inches

**Weight:** 5 oz.

**USB-C Input Voltage:** 5V

**Acceleration Range:** +/- 16 G

**Rotational Rate Range:** +/- 2,000 deg/s

**Velocity Range:** 0 to 650 knots

**Climb Rate Range:** +/- 3,275 ft/min

**Altitude Range:** -10,000 ft to +55,000 ft

**Temperature Range:** -40 to +80 C chip die temperature