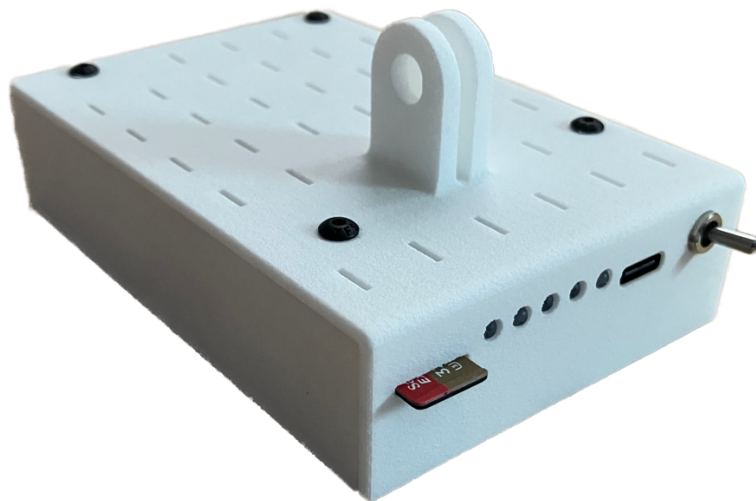


# OnFlight Hub CSV Data Log Description

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:** describes the OnFlight Hub, specifications, and operations.
- **CSV Data Log Description (this document):** 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

One of the available data formats for converting OnFlight data logs is Comma Separated Values (CSV). CSV is a text format that uses commas to separate values. The first row in the CSV file are short data field names and the following rows are the data records. The advantage of CSV is that it can be opened by a wide variety of open-source and proprietary programs to read and analyze the data.

## 4 Data Fields

The following table provides the column number, data field names, and a brief description of each of the data fields.

### 4.1 System Status

These fields give OnFlight Hub system and subsystem status information. The CPU, IMU, magnetometer, and static pressure sensors all report their internal temperature. These components all have internal temperature limits of -40 C to +80 C and the temperature is reported as ok if the measured temperature falls within -30 C to +70 C.

Flags are used to indicate whether new data is read from the IMU, magnetometer, GNSS, and static pressure sensor for each frame. These sensors are considered unhealthy if no data is read for the previous 5 frames in a row at the expected data rate. The GNSS data should be available at a 10 Hz rate. For example, data should be read from the GNSS receiver at every 100 ms. If no data is read for over 500 ms, then this sensor is no longer considered healthy.

Column	Field Name	Description
1	hub_sys_time_s	Time since boot, seconds.
	hub_input_volt	Input voltage to the OnFlight Hub, this will be the USB voltage if the OnFlight Hub USB is plugged into a power source, otherwise it will be battery voltage.
2	hub_batt_status	OnFlight Hub battery status, 0 = battery voltage above 3.6V, 1 = battery voltage between 3.4V and 3.6V, and 2 = battery voltage below 3.4V.
3	hub_temp_status_ok	True if all of the subsystem temperatures are ok.
4	hub_cpu_die_temp_c	OnFlight Hub CPU die temperature, degrees C.
5	hub_cpu_die_temp_ok	True if the CPU die temperature is within -30 C to + 70 C.
6	hub_imu_die_temp_c	OnFlight Hub IMU die temperature, degrees C.
7	hub_imu_die_temp_ok	True if the IMU die temperature is within -30 C to + 70 C.
8	hub_imu_new_data	True if new data was read from the IMU this frame.
9	hub_imu_healthy	False if no new data was read from the IMU for the previous 5 frames in a row.
10	hub_mag_die_temp_c	OnFlight Hub magnetometer die temperature, degrees C.
11	hub_mag_die_temp_ok	True if the magnetometer die temperature is within -30 C to + 70 C.
12	hub_mag_new_data	True if new data was read from the magnetometer this frame.

13	hub_mag_healthy	False if no new data was read from the magnetometer for the previous 5 frames in a row.
14	hub_pres_die_temp_c	OnFlight Hub static pressure sensor die temperature, degrees C.
15	hub_pres_die_temp_ok	True if the static pressure sensor die temperature is within -30 C to +70 C.
16	hub_pres_new_data	True if new data was read from the static pressure sensor this frame.
17	hub_pres_healthy	False if no new data was read from the static pressure sensor for the previous 5 frames in a row.
18	hub_gnss_new_data	True if new data was received from the GNSS receiver.
19	hub_gnss_healthy	False if no new data was received from the GNSS receiver for over 500 ms.

## 4.2 Global Navigation Satellite System (GNSS)

OnFlight Hub utilizes a GNSS-aided Inertial Navigation System (INS) for estimating attitude and inertial position, velocity, and acceleration data. These fields give the GNSS status, UTC time, and measurement accuracy.

Column	Field Name	Description
20	hub_gnss_fix	GNSS fix status, 0 = no fix, 2 = 2D fix, 3 = 3D fix, 4 = differential GNSS.
21	hub_gnss_num_sv	Number of GNSS satellites used in the solution.
22	hub_gnss_utc_year	UTC year.
23	hub_gnss_utc_month	UTC month.
24	hub_gnss_utc_day	UTC day.
25	hub_gnss_utc_hour	UTC hour.
26	hub_gnss_utc_min	UTC min.
27	hub_gnss_utc_sec	UTC second.
28	hub_gnss_horz_pos_acc_ft	Estimated horizontal position accuracy, ft.
29	hub_gnss_vert_pos_acc_ft	Estimated vertical position accuracy, ft.
30	hub_gnss_vel_acc_kts	Estimated velocity accuracy, knots.

## 4.3 Inertial Navigation System

These fields give the INS status and state estimation results. The INS will initialize when new data is received from the IMU, magnetometer, and GNSS and the GNSS has at least a 3D solution with 10 or more satellites. The INS is considered healthy if the IMU and GNSS are healthy with at least a 3D GNSS fix and a solution using 10 or more satellites. The heading, track, and flight path angle are considered inaccurate at speeds below about 10 knots.

Column	Field Name	Description
31	hub_ins_initialized	True if the INS has been initialized.
32	hub_ins_healthy	True if the INS is healthy.
33	hub_pitch_deg	Pitch, positive nose up, deg.
34	hub_roll_deg	Roll, positive roll right, deg.
35	hub_mag_var_deg	Magnetic variation, +/-180, deg (positive east).
36	hub_true_heading_deg	Heading (true), 0 – 360, deg.
37	hub_mag_heading_deg	Heading (mag), 0 – 360, deg.
38	hub_gnd_spd_kts	Ground speed, knots.
39	hub_true_gnd_track_deg	Ground track (true), 0 – 360, deg.
40	hub_mag_gnd_track_deg	Ground track (mag), 0 – 360, deg.
41	hub_flight_path_deg	Flight path angle, positive up, deg.
42	hub_climb_rate_ftpm	Climb rate, ft/min.
43	hub_load_factor	Load factor.

44	hub_pitch_rate_dps	Pitch rate, positive nose up, deg/s.
45	hub_roll_rate_dps	Roll rate, positive roll right, deg/s.
46	hub_yaw_rate_dps	Yaw rate, positive yaw right, deg/s.
47	hub_accel_x_g	Acceleration, positive forward, g.
48	hub_accel_y_g	Acceleration, positive right, g.
49	hub_accel_z_g	Acceleration, positive up, g.
50	hub_alt_wgs84_ft	Height above the WGS84 ellipsoid, ft.
51	hub_alt_msl_ft	Height above Mean Sea Level, ft.
52	hub_lat_deg	Latitude, deg.
53	hub_lon_deg	Longitude, deg.

#### 4.4 Air Data Computer

An onboard Air Data Computer (ADC) filters the static pressure sensor data and uses that to estimate the cabin pressure altitude. The ADC is considered healthy when the static pressure sensor is healthy.

Column	Field Name	Description
54	hub_adc_healthy	True if the ADC is healthy.
55	hub_cabin_pres_alt_ft	Cabin pressure altitude, ft.
56	hub_cabin_pres_pa	Cabin pressure, Pa.