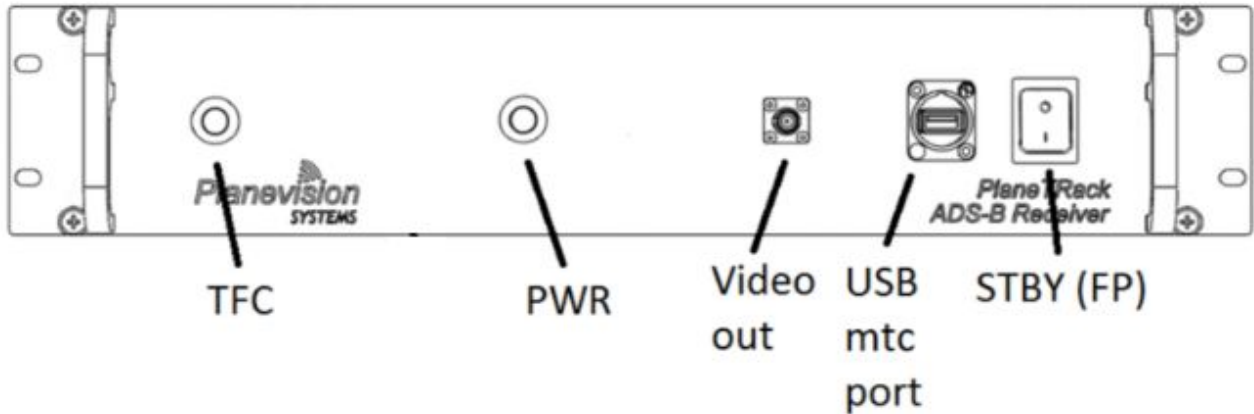


1. Hardware modifications compared to PlaneTRack Type B

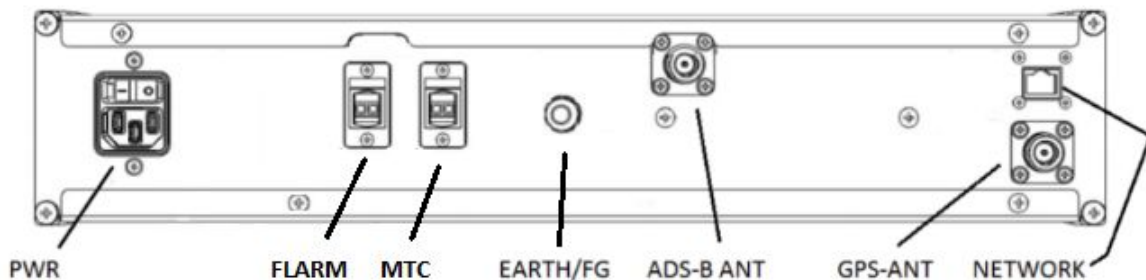
1.1 Front panel USB port (Type A)



Deviation from the manual:

The USB mtc port is used to upgrade the FLARM device and download status reports. It is connected internally to the FLARM USB port. Please see the FLARM documentation for details.

1.2 Rear panel



MTC PROC - USB port (Type B)

This port is the processor maintenance port as described in the operating manual (emergency console).

FLARM antenna connector (N or SMA female)

Connect an active FLARM antenna through this connector. The line has a 5V DC power supply on it. Do not shorten this line.

FLARM control LED

There is no visible control light for the FLARM device on the outside of the receiver. However, operation of the receiver can be checked by software readout (see below). A FLARM control LED is visible inside the device through the cutouts in the top panel. **This LED must be green for normal operations.** If it is not green (i.e. red or yellow) most likely the GPS connection is not correctly established.

IMPORTANT: The FLARM receiver requires a working GPS connection. It will not provide any target data without GPS.

2. Additional software functionality

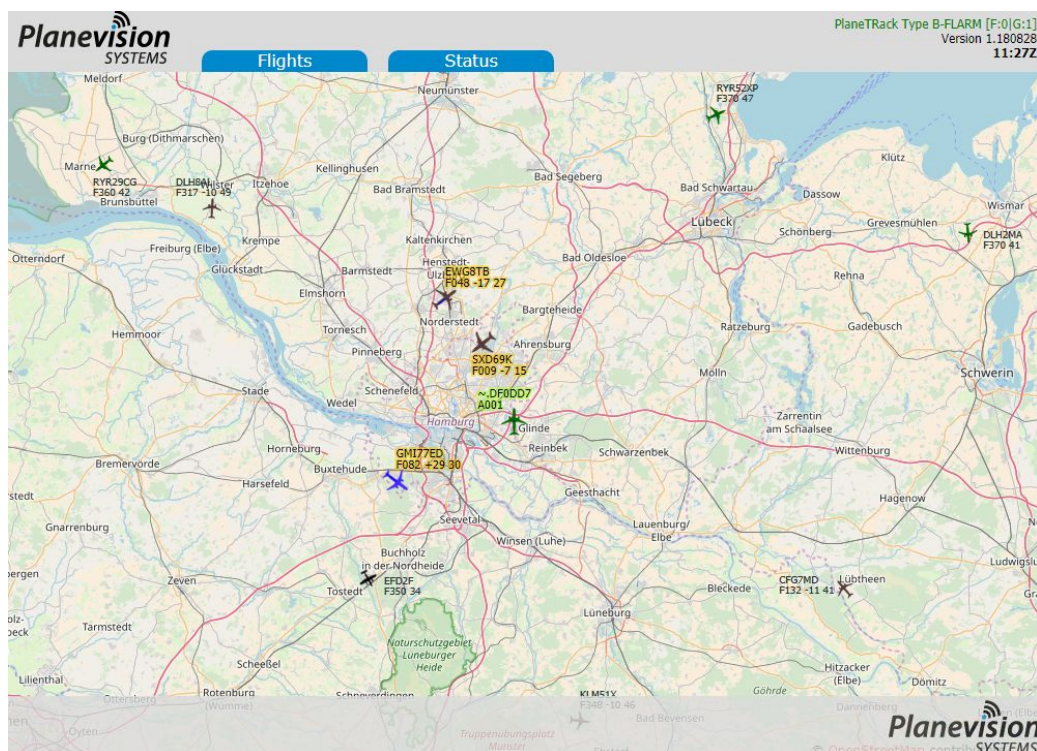
In addition to the functionality as described in sections 6.3, 6.4, 6.5 of the Operating Manual, there are the following interfaces for FLARM:

Surveillance map - <http://<ip>:9090> (Internet required)

Shows all flights, including FLARM flights

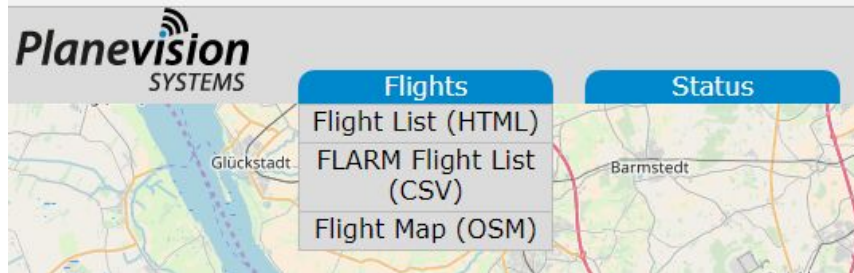
Update rate ca. 2-3 secs; Altitude filter: 10000 feet (targets above are shown smaller)

Please note that the maximum range of the FLARM receiver is 32km West, North, East and South of the receiver.



The top and bottom bar can be hidden when clicking to the bottom bar. FLARM targets are shown in green color.

Menu FLIGHTS



FLIGHTS | Flight List (HTML)

This menu item shows a list of all flights received, including FLARM



FLARM Flight List

Time	ID	Callsign	Latitude	Longitude	Src	Alt	VRate	GndSpd	TrueTrk	Cat	Distance	Packets	Age
10:16:17.536152875	4CA60F	IBK5051	54.42618	11.47845	A	35975	0	394	208	A0	70.3	410	
10:16:18.432204578	4CA7AE	IBK5HM	53.12503	11.02376	A	37000	0	498	19	A3	40.2	4732	
10:16:18.480758640	3C66AD	DLH811	53.42279	10.83454	A	38000	0	418	191	A0	25.3	4247	
10:16:18.467408046	3C6668	DLH7KV	52.66957	10.24316	A	36025	0	406	182	A0	53.0	7277	
10:16:18.029845562	4780A2	SAS88K	54.65703	11.77768	A	40975	0	495	34	A0	87.6	6339	
10:16:18.148591171	3C6497	DLH2LC	53.72529	10.18699	A	2875	-320	204	241	A0	10.6	4364	
10:16:17.799422953	3C6708	DLH477	52.41902	10.46082	A	41000	0	475	156	A5	68.8	7922	
10:16:16	.DF0DD7	~DF0DD7	53.550134	10.158989	FLARM	16	20	0	0	F1	0.0	3140	

FLIGHTS | Flight List (HTML)

This menu item shows a csv list of FLARM flights received

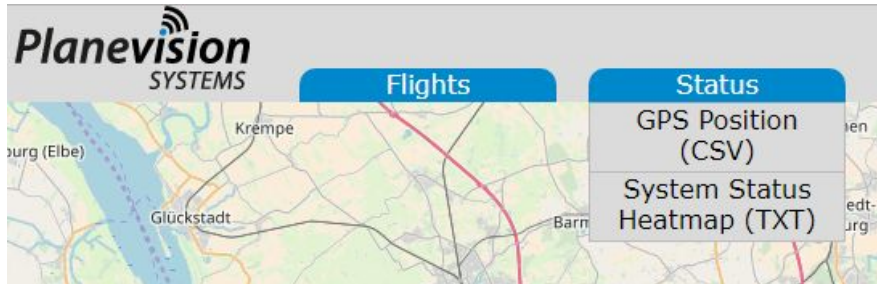
This list can also be directly downloaded from <http://<ip>:9090/flights-csv> or
<http://<ip>:9090/flarm-csv>

```
Planevision Systems PlaneTrack Type B-FLARM,V1.180828,1535624019
1535624019,DF0DD7,,59,0,0,53.550107,10.159065,20,1,2
```

Fields:

- [1] UTC timestamp
- [2] Flarm ID
- [3] Callsign (not available for FLARM)
- [4] Altitude above MSL (in feet)
- [5] Ground speed (in kts)
- [6] Track (in degrees True)
- [7] Position latitude
- [8] Position longitude
- [9] Vertical rate (in ft/min)
- [10] Flarm aircraft type designator
- [11] Flarm ID type designator

Menu STATUS



STATUS | GPS Position (CSV)

This menu item shows a csv list of the 3D position of the receiver

The status messages mean:

F: time in secs since last FLARM control packet received (should not be greater than 3)

G: time in secs since last GPS packet received (should not be greater than 3)

This list can also be directly downloaded from <http://<ip>:9090/position>

```
Planevision Systems PlaneTrack Type B-FLARM,V1.180828,1535628149
53.55017,10.15905,85.3
F:1
G:1
```

STATUS | System Status Heatmap

This menu item shows a txt list of the recent receiver messages and a heat map of the received targets since midnight.

Refer to the FLARM manual for meaning of status messages. In case of a device error the error message can be found in plain message.:

This list can also be directly downloaded from <http://<ip>:9090/status>

If the heatmap is not cleared automatically at midnight (usually because of absence of NTP time) it can be cleared by: <http://<ip>:9090/clear>

```
Planevision Systems PlaneTrack Type B-FLARM,V1.180828,1535623975 ,Thu Aug 30 10:12:55 2018 UTC
planetrack150063
53.55017,10.15905,85.30184
1,1,1
['$PFLAU', '1', '1', '1', '1', '0', '', '0', '', '', '20180830 10:12:55Z']
[]
['$PGRMZ', '45', 'F', '2', '20180830 10:12:55Z']
['$PFLAL', '101204GPS 10 31', '20180830 10:12:05Z']
['$PFLAL', '10082029 RF A CD 1.0 AM 0.8 TX 2.0 RX 2.0 AM/CD 1.00 DROP 0.0', '20180830 10:08:20Z']
['$PFLAL', '10082029 RF B CD 1.6 AM 0.8 TX 0.0 RX 2.0 AM/CD 0.00 DROP 2.0', '20180830 10:08:20Z']
['$PFLAL', '100932AZNSTAT 0 0', '20180830 10:09:33Z']
['$PFLAL', '10082039 PWR STATE 4 LVL 26 BAT 0.00 EXT 12.56 TEMP 30.4', '20180830 10:08:20Z']
['$PFLAL', '09235702iSeYS`YaPZObUcabrcubvcp[r[EM', '20180830 09:23:58Z']
[]
['$PFLAA', '0', '-7', '-5', '-2', '2', 'DF00D7', '0', '', '0', '0.0', '1', '1535623975'],[20180830 10:12:55Z]
Total packets: 2939
IDs (max. 1000) : ['DF00D7']
Heatmap < 100m
32 = . . . . . : . . . . . | . . . . . : . . . . .
31 = . . . . . : . . . . . | . . . . . : . . . . .
30 = . . . . . : . . . . . | . . . . . : . . . . .
29 = . . . . . : . . . . . | . . . . . : . . . . .
28 = . . . . . : . . . . . | . . . . . : . . . . .
27 = . . . . . : . . . . . | . . . . . : . . . . .
26 = . . . . . : . . . . . | . . . . . : . . . . .
```

JSON-formatted flight data

all flights: available from http://<ip>:9090/flarm_flightlist.json

FLARM flights only: available from <http://<ip>:9090/flights-json>

```
[{"uti":1535627761,"dat":"2018-08-30
11:16:01.448430109","tim":"11:16:01.448430109","hex":"3C6598","fli":"DLH3HU","lat":"52.90662","lon":"9.77
815","gda":"A","src":"A","alt":36075,"spd":487,"trk":10,"cat":"A0","org":"","dst":"","opr":"","typ":"","r
eg":"","dis":"41.0","dbm":-81,"cou":"Germ","squ":"3742","tru":44,"tsa":1,"tsm":0,"vrt":0,"lla":2},
{"uti":1535627761,"dat":"2018-08-30
11:16:01.477604546","tim":"11:16:01.477604546","hex":"3C65A8","fli":"DLH452","lat":"52.86142","lon":"10.1
8198","gda":"A","src":"A","alt":34000,"spd":539,"trk":339,"cat":"A5","org":"","dst":"","opr":"","typ":"","r
eg":"","dis":"41.4","dbm":-72,"cou":"Germ","squ":"4160","tru":1526,"tsa":25,"tsm":0,"vrt":0,"lla":0},
{"uti":1535627761,"dat":"2018-08-30
11:16:01.531462125","tim":"11:16:01.531462125","hex":"400980","fli":"BAW992G","lat":"52.71629","lon":"10.
61066","gda":"A","src":"A","alt":33750,"spd":461,"trk":86,"cat":"A0","org":"","dst":"","opr":"","typ":"","r
eg":"","dis":"52.7","dbm":-78,"cou":"U.K.","squ":"3424","tru":3059,"tsa":44,"tsm":0,"vrt":-2560,"lla":0
},
{"uti":1535627761,"dat":"2018-08-30
11:16:01.558598671","tim":"11:16:01.558598671","hex":"3C0A48","fli":"SXD69K","lat":"53.53354","lon":"10.7
4883","gda":"A","src":"A","alt":9925,"spd":280,"trk":312,"cat":"A0","org":"","dst":"","opr":"","typ":"","r
eg":"","dis":"21.1","dbm":-69,"cou":"Germ","squ":"0605","tru":1679,"tsa":48,"tsm":0,"vrt":-960,"lla":0},
{"uti":1535627761,"dat":"2018-08-30
11:16:01.526558484","tim":"11:16:01.526558484","hex":"4CA5BF","fli":"IBK3KF","lat":"53.58926","lon":"10.5
5307","gda":"A","src":"A","alt":36975,"spd":413,"trk":205,"cat":"A0","org":"","dst":"","opr":"","typ":"","r
eg":"","dis":"14.2","dbm":-60,"cou":"Irel","squ":"0762","tru":2821,"tsa":51,"tsm":0,"vrt":0,"lla":0},
{"uti":1535627761,"dat":"2018-08-30
11:16:01.487048875","tim":"11:16:01.487048875","hex":"45AC4F","fli":"SAS52L","lat":"53.27317","lon":"11.2
8078","gda":"A","src":"A","alt":37425,"spd":493,"trk":20,"cat":"A0","org":"","dst":"","opr":"","typ":"","r
eg":"","dis":"43.5","dbm":-86,"cou":"Denm","squ":"5551","tru":3520,"tsa":60,"tsm":0,"vrt":-960,"lla":1},
{"uti":1535627719,"dat":"2018-08-30
11:15:19.297665921","tim":"11:15:19.297665921","hex":"4CC4E1","fli":"WOW7EJ","lat":"54.23848","lon":"10.3
6292","gda":"A","src":"A","alt":34000,"spd":487,"trk":321,"cat":"A0","org":"","dst":"","opr":"","typ":"","r
eg":"","dis":"42.0","dbm":-85,"cou":"Icel","squ":"1361","tru":3338,"tsa":60,"tsm":0,"vrt":-64,"lla":45}
,
{"uti":1535627761,"dat":"2018-08-30
11:16:01.447078156","tim":"11:16:01.447078156","hex":"440992","fli":"EWG7YR","lat":"52.88658","lon":"10.4
8759","gda":"A","src":"A","alt":23000,"spd":391,"trk":161,"cat":"A3","org":"","dst":"","opr":"","typ":"","r
eg":"","dis":"41.6","dbm":-82,"cou":"Aust","squ":"6414","tru":4067,"tsa":60,"tsm":0,"vrt":0,"lla":0},
{"uti":1535627761,"dat":"2018-08-30
11:16:01.426073203","tim":"11:16:01.426073203","hex":"502CB6","fli":"PRI588","lat":"53.24287","lon":"10.9
6961","gda":"A","src":"A","alt":39975,"spd":481,"trk":22,"cat":"A0","org":"","dst":"","opr":"","typ":"","r
eg":"","dis":"34.4","dbm":-72,"cou":"Latv","squ":"1036","tru":6554,"tsa":60,"tsm":0,"vrt":0,"lla":0},
{"uti":1535627760,"tim":"11:16:00","fli":"~DF0DD7","hex":".DF0DD7","reg":"","typ":"","flx":"","lat":"53.5
50152","lon":"10.159005","src":"FLARM","alt":"98","vrt":"20","spd":"0","trk":"0","cat":"F1","dis":"0.0","
tru":"6724","lla":"0"}]
```

Asterix CAT021 V0.23 and V0.26 interface (optional)

An optional Asterix interface is available via UDP. Control of the interface is from the Configuration dialog that controls ADS-B asterix transmissions. Please refer to Application Note AN-101, available in the documentation area.

https://planevision.systems/customer/appnotes/AN101-PlaneTRack_Asterix_formats-ApplicationNote.pdf

3. FLARM ground station software license

Expiry

The FLARM firmware expires after ca. 12 months of operation. To renew the firmware it has to be downloaded from the internet FLARM webpage and saved to an USB stick.

Renewal

Plug the USB stick to the front panel USB jack. Wait ca. 10 minutes for the upgrade to be completed. Do not pull the USB stick before. Unfortunately FLARM does not provide a means to externally detect a successful upgrade. Reset the receiver (on/off). Observe the status page (System Status Heatmap) for normal operations.

Version Control:

V1.0	180828	Initial Release
V1.1	180927	Revised in several paragraphs
V1.2	190308	FLARM N connector added
V1.3	190409	CSV output details added