



PlaneTRack^(tm) Type BDM

ADS-B Surveillance Receiver (19" insert)



Operating Manual

SAMPLE ONLY - NOT FOR OPERATIONAL USE

Effectivity: s/n

Customer area	http://customers.plane.vision
Series master device login	.....
Web customer area password	.....

All rights reserved (c) 2015

1. General Section

1.1 Table of contents

- [1. General Section](#)
 - [1.1 Table of contents](#)
 - [1.1.1 About this manual](#)
 - [1.1.2 About documentation updates](#)
 - [1.2 Purpose Disclaimer](#)
 - [1.3 Publication Disclaimer](#)
 - [1.5 Copyright](#)
 - [1.6 Software License](#)
 - [1.7 Trademark Acknowledgments](#)
- [2. Safety Instructions](#)
- [3. Quick Start Guide](#)
- [4. ADS-B Services description](#)
- [5. System overview and description](#)
 - [5.1 Overview](#)
 - [5.2 Panel and Interior overview \(Type BDM\)](#)
 - [5.2.1 Front panel \(Type BDM\)](#)
 - [5.2.2 Rear panel \(Type BDM\)](#)
 - [5.3 Functional interior overview \(Type BDM\)](#)
 - [5.4 Legend of panel user interfaces \(Type BDM\)](#)
 - [5.5 Block diagrams](#)
 - [5.5.1 19" ADS-B Receiver insert - Type BDM](#)
 - [5.5.2 ADS-B receiver module p/n 66006](#)
 - [5.5.3 Bill of Material](#)
 - [5.6 Technical and interface parameters](#)
 - [5.7 Environmental specification](#)
- [6. Device and output format configuration](#)
 - [6.1 Network configuration](#)
 - [6.1.1 SSH connection](#)
 - [6.1.2 DHCP configuration](#)
 - [6.1.3 Fixed IP address and mask](#)
 - [6.2 SNMP configuration](#)
 - [6.2.1 Overview](#)
 - [6.2.2 Public MIBs](#)
 - [6.2.3 Vendor MIB "PLANEVISION-MIB"](#)
 - [6.2.4 SNMP Traps](#)
 - [6.3 Data interfaces and formats](#)
 - [6.3.1 Aircraft List](#)
 - [6.3.2 Live 2D Map Output](#)

- [6.3.3 Port 30003 data](#)
- [6.3.3bis Port 30003 NMEA pseudo format* \(optional\)](#)
- [6.3.4 "deltadb.txt" CSV file](#)
- [6.3.4bis CSV NMEA pseudo format* \(optional\)](#)
- [6.3.5 JSON file \(aircraftlist.json\)](#)
- [6.4 Raw data formats](#)
 - [6.4.1 TCP port 10002](#)
 - [6.4.2 TCP port 10003](#)
 - [6.4.3 TCP port 10004](#)
 - [6.4.4 TCP port 10005*](#)
 - [6.4.5 Raw data formats](#)
- [6.5 Graphical User Interface \(GUI\)](#)
- [6.6 Antenna configuration](#)
- [7. Maintenance and Repair Instructions](#)
 - [7.1 Troubleshooting or module exchange instructions](#)
 - [7.2 Quick initial troubleshooting guide](#)
 - [7.3 Advanced troubleshooting and check instructions](#)
 - [7.4 Advanced troubleshooting/module exchange actions](#)
 - [7.4.1 Disconnecting and unmounting the device](#)
 - [7.4.2 Opening the device](#)
 - [7.4.3 Closing, mounting and re-connecting the device](#)
 - [7.5 Test procedure](#)
- [8. Declaration of Conformity](#)
- [9. Contact information](#)
- [Annex A - Device configuration map](#)
- [Annex B - Antenna Information Sheet](#)
 - [B.1 Important installation instructions](#)
 - [B.2 ADS-B antenna](#)
 - [B.3 GPS antenna](#)
- [Record of Revisions](#)

1.1.1 About this manual

THIS EDITION OF THE OPERATING MANUAL IS A SAMPLE ONLY. IT IS NOT INTENDED FOR OPERATIONAL USE. IT IS SUITABLE FOR SALES, MARKETING AND GENERAL TRAINING ONLY.

The PlaneTRack receiver assembly configuration will be customized according to customer requirements. The configuration is valid for a specific serial number or range of serial numbers only (the "effectivity"). As such this documentation is valid for the serial number(s) as indicated on the front page of this documentation only. The specific configuration that underlies this documentation is listed in Annex A.

1.1.2 About documentation updates

This manual is subject to change without prior notice. For updates of this manual visit the manufacturer's website at <http://customers.plane.vision>. Please have the master device serial number and password at hand to access the correct documentation update.



Customer area

Please enter the serial number of your device to proceed to your private area (without dots, e.g. "123.456" becomes "123456" as login)

In the subsequent password dialog re-enter your serial number as user name and the password of your device.
You will find the password on the rear panel nameplate of your device or the frontpage of the operating manual

ENTER

The password of your device is printed on the front page of this manual. It can be found on the type/serial number plate of the device on the rear panel, too.

Your device may belong to a series of equal devices. Use the master device serial number and password for web access only.

1.2 Purpose Disclaimer

Planevision Systems PlaneTRack ADS-B equipment is not intended and not certified for air traffic control, navigational purposes, other essential aircraft on-board services or other life critical services and in no case may be used for any other but sole information purposes.

1.3 Publication Disclaimer

Planevision Systems GmbH assumes no responsibility for errors or omissions that may appear in this document. We reserve the right to change this document at any time without notice. This document is not to be construed as conferring by implication, estoppel, or otherwise any license or right under any copyright or patent, whether or not the use of any information in this document employs an invention claimed in any existing or later issued patent.

1.4 Liability Disclaimer

IN NO EVENT SHALL PLANEVISION SYSTEMS GMBH. BE LIABLE TO ANY PARTY OR ANY PERSON, EXCEPT FOR REPLACEMENT OR REASONABLE MAINTENANCE OF THE PRODUCT, FOR THE CASES, INCLUDING BUT NOT LIMITED TO BELOW:

- (1) ANY DAMAGE AND LOSS, INCLUDING WITHOUT LIMITATION, DIRECT OR INDIRECT, SPECIAL, CONSEQUENTIAL OR EXEMPLARY, ARISING OUT OF OR RELATING TO THE PRODUCT;
- (2) PERSONAL INJURY OR ANY DAMAGE CAUSED BY INAPPROPRIATE OR UNAPPROVED USE OR NEGLIGENT OPERATION OF THE USER;
- (3) UNAUTHORIZED DISASSEMBLY, REPAIR OR MODIFICATION OF THE PRODUCT BY THE USER

1.5 Copyright

© 2015 Planevision Systems GmbH - All rights reserved.

Information in this document is subject to change without notice. No part of this document may be reproduced or transmitted in any form, by photocopy, microfilm, xerography, or any other means, or incorporated into any information retrieval system, electronic or mechanical, for any purpose, without the express permission of Planevision Systems GmbH.

1.6 Software License

Any software inside the PlaneTRack ADS-B Receiver and described in this document is furnished under a license agreement. You can obtain a copy of that license by visiting <http://plane.vision/software-license>. The software may not be reverse assembled and may be used or copied only in accordance with the terms of the license agreement. It is against the law to copy the software on any medium except as specifically allowed in the license agreement.

THE SOFTWARE IS PROVIDED "AS-IS" AND WITHOUT WARRANTY OF ANY KIND, EXPRESS, IMPLIED OR OTHERWISE, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL PLANEVISION SYSTEMS GMBH BE LIABLE FOR ANY SPECIAL, INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES OF ANY KIND, OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER OR NOT ADVISED OF THE POSSIBILITY OF DAMAGE, AND ON ANY THEORY OF LIABILITY, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SOFTWARE.

1.7 Trademark Acknowledgments

Planevision, PlaneTRack, jetvision.de and its logos are trademarks of Planevision Systems GmbH.






Third party trademarks mentioned in this document are the property of their respective owners.

2. Safety Instructions

This product complies with international safety and design standards. Observe all safety procedures that appear throughout this manual and the safety symbols that are affixed to this product.

If circumstances impair the safe operation of this product, stop operation immediately and secure this product against further operation.

Avoid personal injury and product damage! Do not proceed beyond any symbol until you fully understand the indicated conditions!

	<p>You may find this symbol <u>in this document</u>. This symbol indicates important operating or maintenance instructions.</p>
	<p>You <u>may find this symbol affixed to the product</u> and in this document. This symbol indicates a live terminal where a dangerous voltage may be present that constitutes a risk of electrical shock and a life hazard; the tip of the flash points to the terminal device.</p>
	<p>You <u>may find this symbol affixed to the product</u>. This symbol indicates a protective ground terminal.</p>
	<p>You <u>may find this symbol affixed to the product</u>. This symbol indicates a chassis terminal (normally used for equipotential bonding).</p>
	<p>You <u>may find this symbol affixed to the product</u>. This symbol warns of a potentially hot surface.</p>

Please read this Operating Manual before starting to use the PlaneTRack ADS-B Receiver Type B/BDM. Please read this entire manual. If this manual provides installation or operation instructions, give particular attention to all safety statements included in this manual.

To operate the ADS-B Receiver follow the instructions in the Operating Manual and the Quick Start Guide section 3.

To service the receiver follow the instructions in Section 7. Spare parts used on the ADS-B Receiver Type B/BDM must be approved by Planevision Systems GmbH.

Important Safety Instructions








Handling

- Cables damaged through crushing or cracking can be dangerous if used and must be replaced immediately.
- Always pull on the plug or the connector to disconnect a cable. Never pull on the cable itself.
- Do not walk on or place stress on cables or plugs
- Do not allow moisture to enter this product.
- Do not open the enclosure of this product unless otherwise specified or instructed.
- Do not push objects through openings in the enclosure of this product
- Do not connect the receiver to an unearthed (PROTECTIVE GROUND) socket.
- Do not operate the receiver in an unearthed configuration.

Service

- Both the ON/OFF switch(es) on the front AND rear panel must be switched to OFF and the mains cable(s) must be removed from the mains socket when carrying out maintenance work.
- Refer service only to qualified service personnel who are authorized by Planevision Systems.

3. Quick Start Guide

Action	Type B	Type BDM	
<p>Insert and mount the device mechanically safe and secure inside the 19" rack according to the mounting instructions provided by the rack operator. (For test purposes per Section 7.5 only the device may be operated as an unmounted desktop device) As instructed by the rack operator provide an ground/earth connection between the 19" rack and the device protective earth bolt-.</p>			
<p>Check PWR ON/OFF switch(es) on rear panel is/are switched OFF</p>	1 switch PWR	2 switches PWR A/B	
<p>Check ON/OFF (FP) switch on front panel is switched OFF</p>	1 switch	1 switch	
<p>Connect antenna cable to ADS-B ANT connector - DANGER OF DEVICE DAMAGE: DO NOT CONNECT GPS ANT CABLE TO THIS CONNECTOR</p>			
<p>Connect antenna cable to GPS ANT connector* - DANGER OF DEVICE DAMAGE: DO NOT CONNECT ADS-B ANT CABLE TO THIS CONNECTOR</p>	*option	*option	
<p>Connect ethernet cable to NETWORK connector</p>			
<p>Connect alarm cable to ALARM connector*</p>	*option	*option	
<p>Connect an approved and PE grounded mains cable to PWR IEC connector(s) on rear panel</p>	1 cable PWR	2 cables PWR-A/B	
<p>Switch PWR ON/OFF switch(es) on rear panel to ON</p>	1 switch PWR	2 switches PWR A/B	
<p>Switch ON/OFF (FP) switch on front panel to ON</p>	1 switch	1 switch	
<p>Check green LED(s) on front panel are ON permanently</p>	PWR LED	PWR-A LED PWR-B LED	
<p>After ca. 30 secs: check blue TFC LED blinking</p>	TFC LED	TFC LED	

<p>After ca. 40 secs: check blue TFC LED flickering at least 1/sec (heartbeat) If ADS-B traffic is present: check blue TFC LED flickering faster than 1/sec</p>			
<p>Continue with Test Procedure per Section 7.5</p>			

Power Cables and Connectors
Danger of Electrical Shock and Non-Conformal Operations



Due to the variety of international sockets, connectors and cable types please observe:

- This device is designated as VDE Class I (unisolated).
- To avoid a safety hazard the case of the device **MUST** be connected to Protective Earth at any time of operation.
- It is **NOT PERMISSABLE** to operate the device at any time with a mains power plug in an unearthed socket.
- The device is delivered with mains cables of
 - plug type IEC C13 on the device side and
 - plug Schuko type (CEE 7/7) on the mains side

These cables can be plugged into certain socket types that **DO NOT ESTABLISH** a Protective Earth connection, i.e. among others

- DS 60884-2-D1 (Type K), used in e.g. Bangla Desh, Denmark, Greenland, Färöer Is., Guinea, Madagascar, Maledives, Senegal, St. Vincent
- BS 546/5A (Type D), used in e.g. India, Nigeria, Pakistan, South Africa
- various types in the Russian Federation and the CIS

It is NOT PERMISSABLE to operate the device in such a configuration. Such configuration constitutes an unapproved use of the device with regard to section 1.4 . The user MUST PROVIDE a conformal configuration by means of adequate and approved power cables or adaptors.

4. ADS-B Services description

Automatic Dependent Surveillance – Broadcast (ADS–B)

ADS-B transmits periodic information about altitude, airspeed, location and other parameters from an equipped aircraft to ground stations and to other equipped aircraft in the vicinity.

ADS–B is "automatic" in that it requires no pilot or external input. It is "dependent" in that it depends on data from the aircraft's navigation system.

ADS–B is an element of the US Next Generation Air Transportation System (NextGen), the Single European Sky ATM Research (SESAR) and several other regional programs.

ADS–B equipment is currently mandatory in several portions of the global airspace. The U.S.A. requires some aircraft to be equipped by 2020 and the equipment will be mandatory for some aircraft in Europe from 2017. Canada is already using ADS-B for Air Traffic Control in portions of its remote airspace.

Required ADS-B Airborne Equipment

The PlaneTRack ADS-B receiver can process and decode ADS-B messages only, if the aircraft is equipped with a suitable installation, i.e. an ADS-B transponder and other necessary equipment. Mode A/C only and Mode A/C/S only transponders are not suitable unless they have been upgraded to an ADS-B installation.

For an interim period the authorities allow to operate certain transponder/aircraft type combinations that do not comply with the full spectrum of formats as required under the regulations. Amongst other non compliant data these airplanes may respond with

- false or a lack of position data
- a lack of track, speed or vertical rate or other data

Planevision Systems GmbH is not responsible for these non compliances and the associated falsifications or omissions of data.

Scope of ADS-B Services received, processed and decoded

The PlaneTRack ADS-B receiver can receive, process and decode all relevant ADS-B formats as specified in RTCA DO-260/A/B and ICAO Doc 9871. These are the unified and standardized ADS-B services and formats in use by civil airplanes worldwide.

The receiver is not capable of receiving and decoding ADS-B messages of military formats DF19 and DF22, as these formats have not been disclosed to the public.

The receiver is not capable of receiving and decoding other somewhat regional or private types of transmissions that are sometimes referred to as ADS-B, too, e.g. UAT (978 MHz), УВД-М (740 MHz), Flarm (868 MHz).

The receiver is not capable of receiving ADS-C messages which are routed through VHF radio, satellite or HF links.

The receiver has limited capability of processing ADS-R messages from ADS-B ground repeaters in the U.S.A.

Mode-S Radar and TCAS System Responses

In certain airspaces air traffic control may interrogate aircraft by an Mode-S radar ground installation according to ICAO Annex 10 Chapter IV.

The PlaneTRack ADS-B receiver can receive, process and decode Mode-S aircraft response messages. It can also receive and decode some ACAS/TCAS aircraft emissions. The following limitations apply:

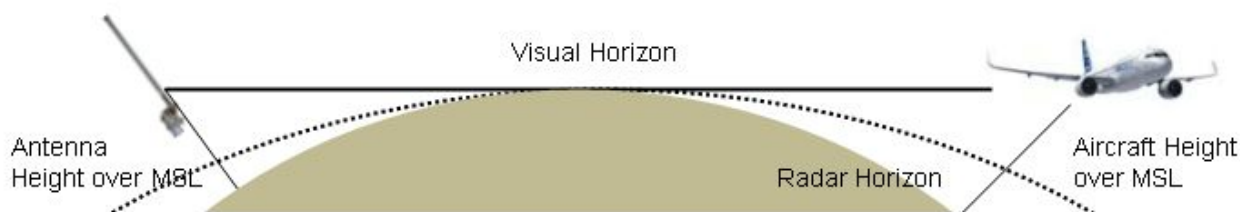
- Mode-S interrogations must be present from a ground radar head; or TCAS interrogations or squitter transmissions must be present
- no position data are available from any of these responses
- messages may be discarded inside the decoder because no positive identification of the responding source is possible

The receiver is not capable of receiving any Mode-S or TCAS uplink interrogation messages on 1030 MHz.

Range consideration of ADS-B downlink transmissions

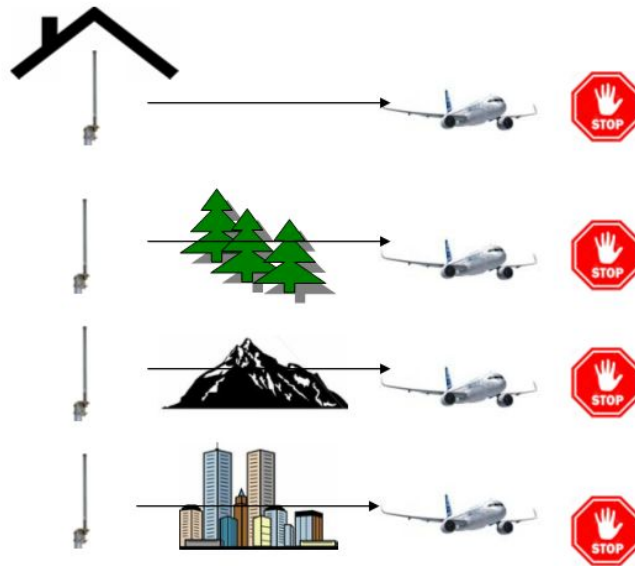
ADS-B links are transmitted in the UHF band of 1.09 GHz. The propagation range of these radio waves is almost line-of-sight, when there are no obstructions in the propagation path. Obstructions attenuate the signal significantly and will reduce the range of transmissions.

The actual radar horizon of an ADS-B ground station is slightly farther (about 15%) away than line-of-sight Visual Horizon. Since the pressure and content in water vapor of the atmosphere varies with height, the path used by the radio waves is **refracted** by the change in density. With a standard atmosphere, electromagnetic waves are generally bent or refracted downward. Furthermore, layers with inverse trend of temperature or humidity cause **atmospheric ducting** which bend further downward the beam or even trap radio waves so that they do not spread out vertically.



Aircraft Height over MSL (Antenna Height = MSL)	Visual Horizon	typical Radar Horizon
5,000 ft	75 NM	87 NM
10,000 ft	106 NM	123 NM
35,000 ft	200 NM	230 NM

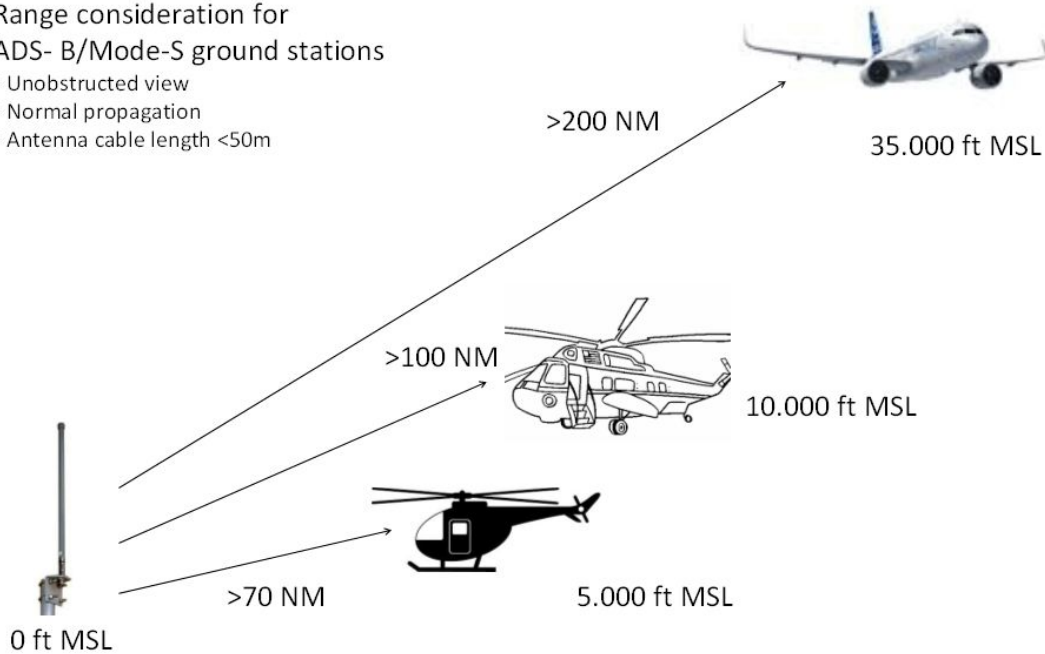
Obstructions attenuate the ADS-B signal significantly and will reduce the range of transmissions. Therefore please observe the **DON'T DOS OF ANTENNA PLACEMENT**:



In average with an optimal antenna placement and a suitable ADS-B 1090 MHz antenna the following range of transmissions can be expected:

Range consideration for
ADS- B/Mode-S ground stations

- Unobstructed view
- Normal propagation
- Antenna cable length <50m



Technical data of ADS-B downlink transmissions

Transmission frequency: 1090 MHz

Modulation: PPM, manchester coding

Bit rate: 1 MBit/s

Packet length: Preamble + 56 or 112 bit

References:

ICAO Annex 10 Part IV

RTCA DO-260/A/B

ICAO DOC 9871

5. System overview and description

The PlaneTRack ADS-B receiver Type B/BDM is a complete and autonomous receiver, processor and decoder assembly that comes as an insert for 19" racks.

The receiver module receives 1090 MHz RF data and amplifies and digitizes them. From the continuous stream of noise and data a processor filters and assembles ADS-B data packets. The decoder module converts these packets into machine or human readable data and sends them over an network interface to the user.

Several output data formats are available according to user requirements.

A built-in web server provides a GUI with configuration parameters and a quick reference aircraft list and map that displays the position of received flights.

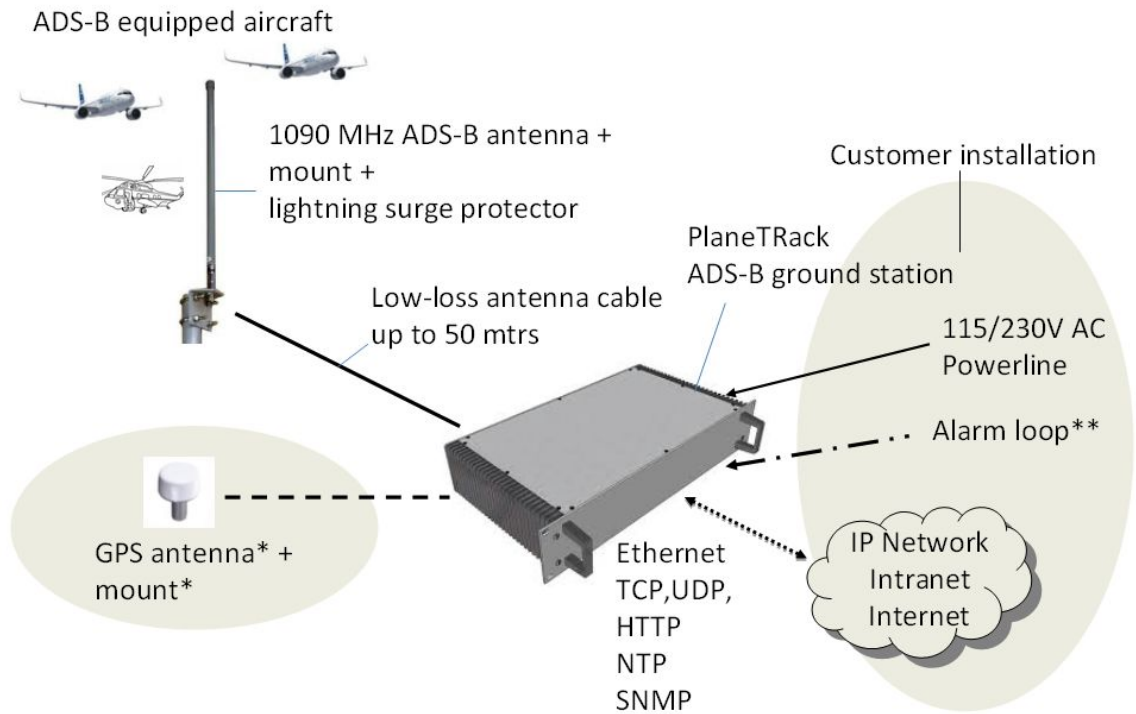
Basic device parameters can be interrogated from the device via SNMP v2c.

Type BDM receivers have a dual mains supply (PSU) of which one PSU is required only to provide operating power. Should one power line or PSU fail then the other PSU will supply the device without delay. As long as at least one power line/PSU is supplying operating power a potential free alarm contact* remains closed. If both power supplies or power lines fail the alarm contact* will remain open.

The PlaneTRack receiver assembly will be connected to an adequate ADS-B receiving antenna and an active GPS antenna by two 50 Ohms N-connectorx. The selection of the antenna type and cable is subject to the location and environmental constraints.

The PlaneTRack receiver assembly configuration will be customized according to customer requirements. The configuration is valid for a specific serial number of range of serial numbers only. As such this documentation is valid for the serial number(s) as indicated on the front page of this documentation only. The specific configuration that underlies this documentation is listed in ANNEX A.

5.1 Overview

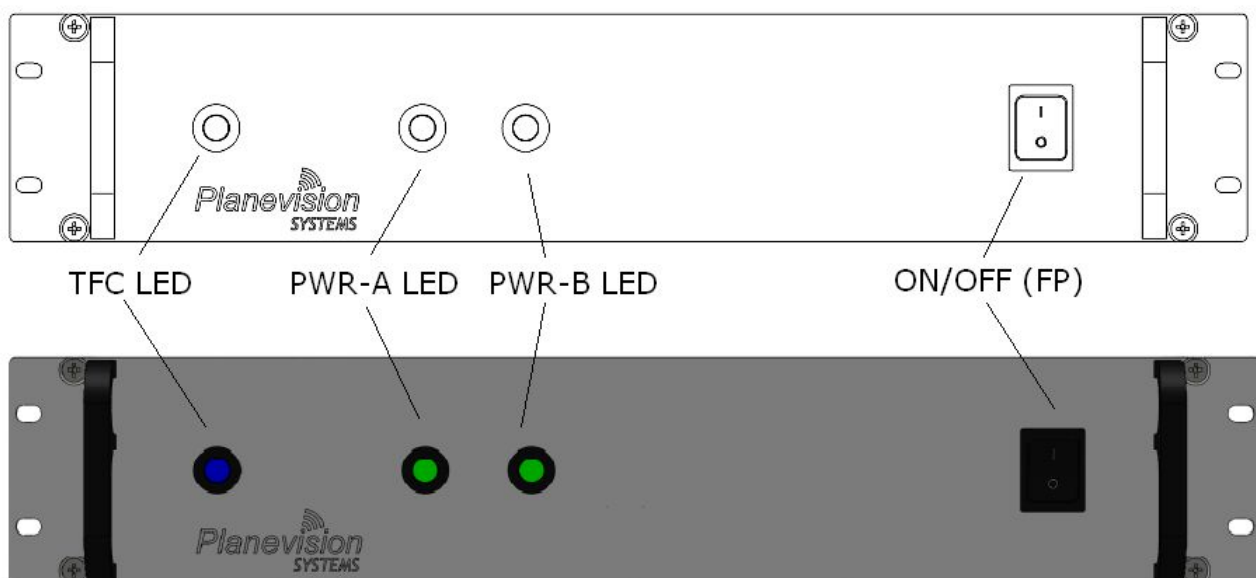


* MLAT option only

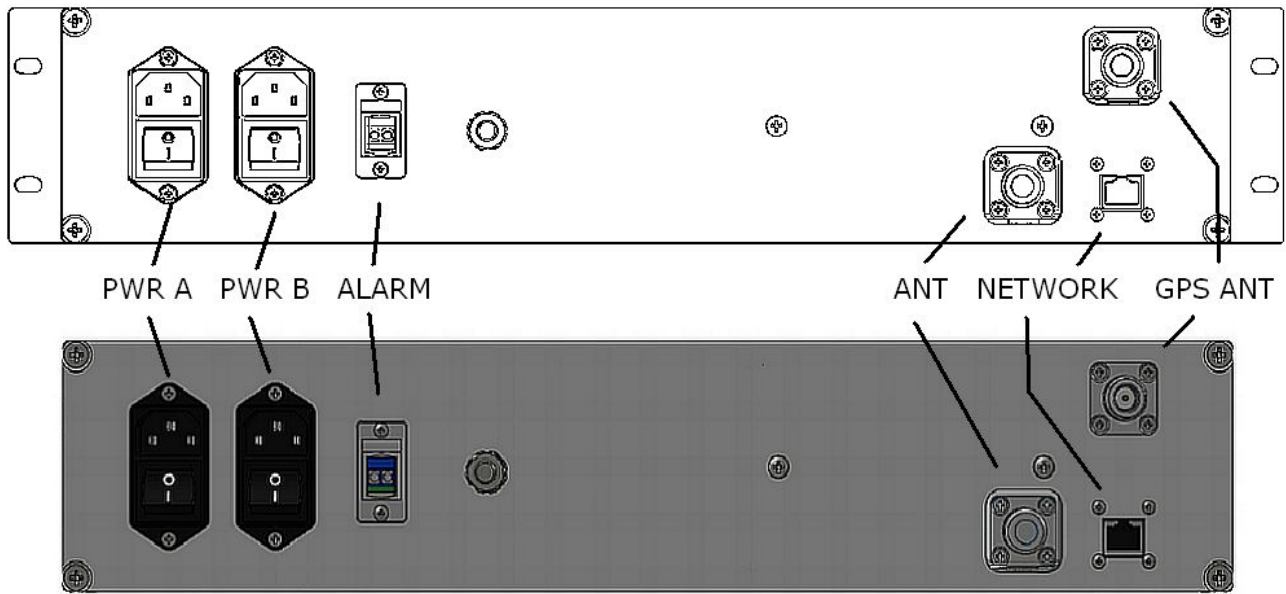
** Option only

5.2 Panel and Interior overview (Type BDM)

5.2.1 Front panel (Type BDM)



5.2.2 Rear panel (Type BDM)



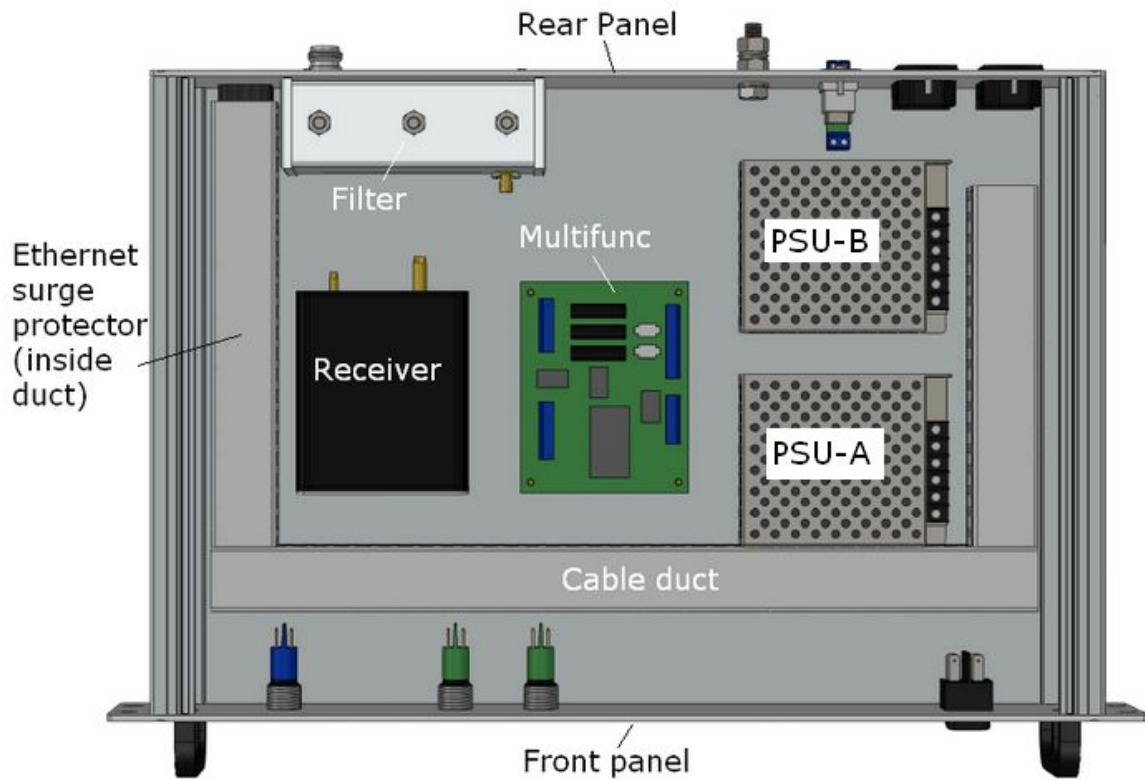
5.3 Functional interior overview (Type BDM)

Please note: this device is maintenance free and does not contain any serviceable components.





**Open the device only when instructed and when qualified.
Refer to Section 7.4 for instructions.**



This drawing is not detailed, not to scale and for overview information purposes only.

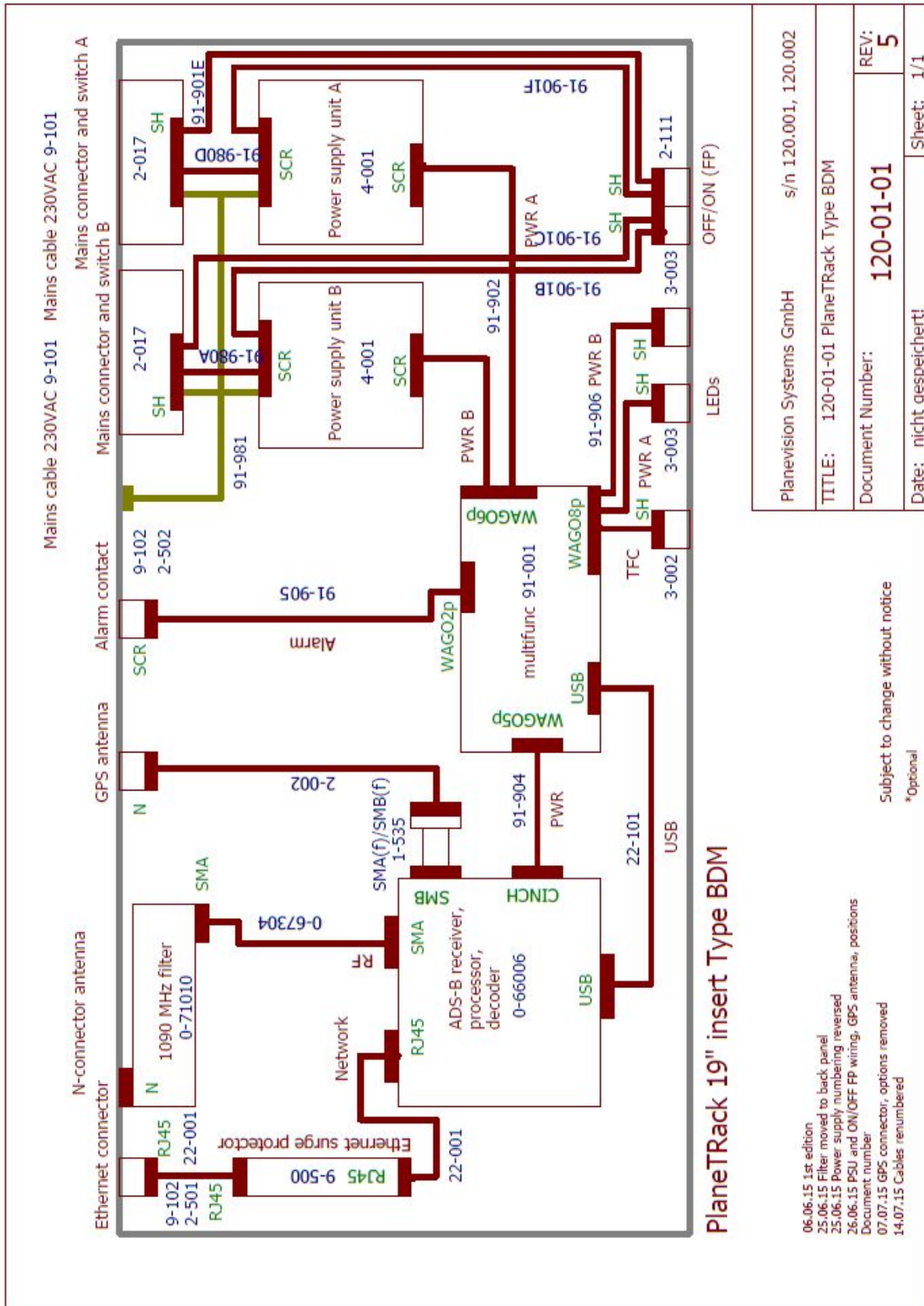


5.4 Legend of panel user interfaces (Type BDM)

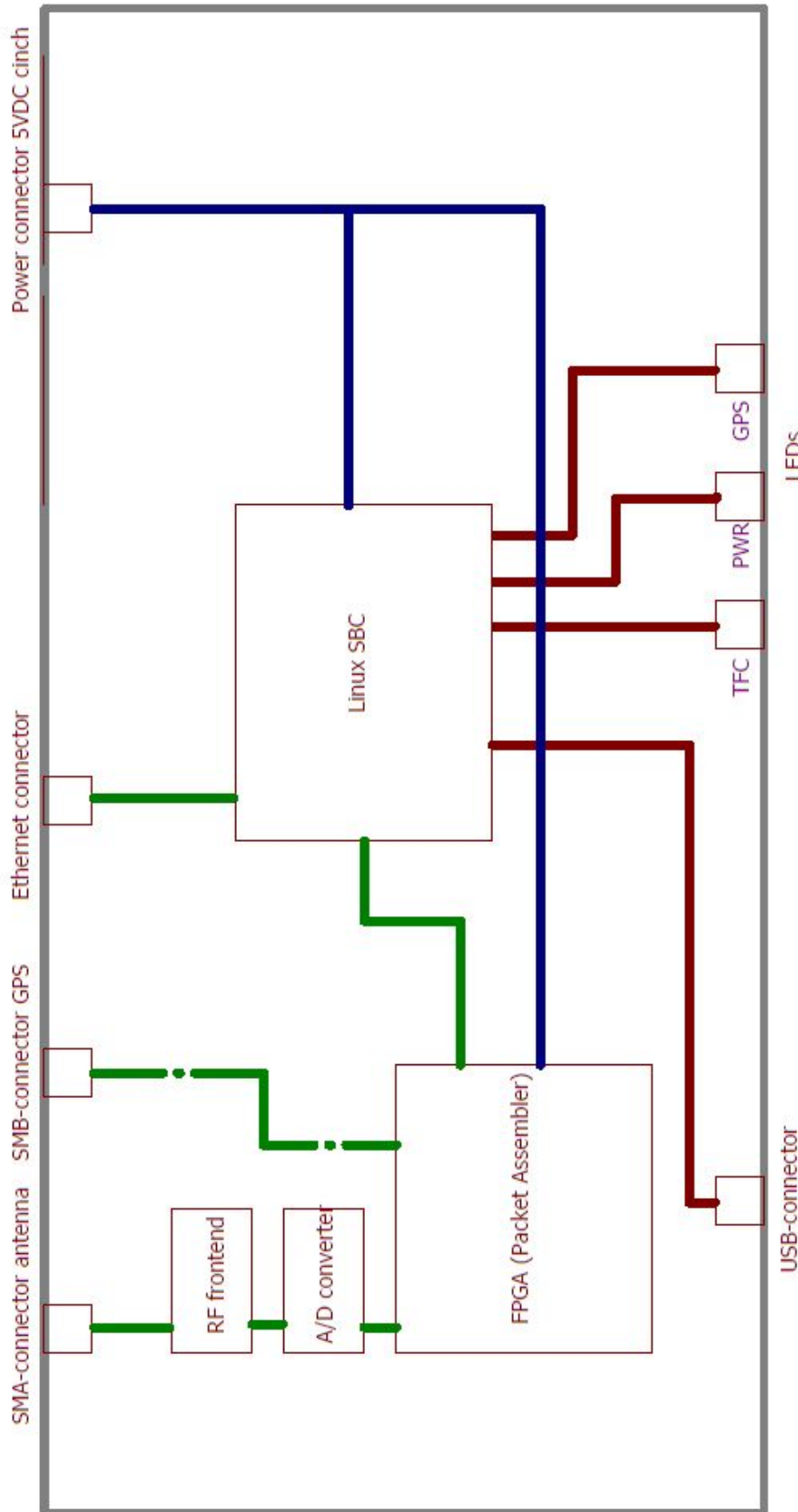
Item	Panel	Description	
PWR-A LED	FP	Green when operating power is provided from PSU-A	
PWR-B LED	FP	Green when operating power is provided from PSU-B	
TFC LED	FP	Blue and blinking when receiver is booting (after ca. 30 sec) Blue and short flicker 1/sec when receive ris operative (heartbeat) Blue and flickering when ADS-B data are received	
ON/OFF FP	FP	Front panel ON/OFF switch. This is a service switch only that does not fully isolate mains from the PSUs. To isolate mains from the PSUs, switch OFF both PWR-A and PWR-B switches on the rear panel and disconnect the mains cables.	
PWR-A	RP	Mains connector and ON/OFF switch for PWR-A.	
PWR-B	RP	Mains connector and ON/OFF switch for PWR-B.	
ALARM	RP	Potential-free contact for an alarm loop. DO NOT CONNECT DEVICES EXCEEDING POSTED MAX. LOAD 24V/1A.	
ADS-B ANT	RP	Antenna connector type N female. DO NOT MISCONNECT THE GPS ANTENNA CABLE TO THIS CONNECTOR. DANGER OF DEVICE DAMAGE.	
GPS ANT	RP	Antenna connector type N female. DO NOT MISCONNECT THE ADS-B ANTENNA CABLE TO THIS CONNECTOR. DANGER OF DEVICE DAMAGE.	
NETWORK	RP	Ethernet RJ-45 jack	

5.5 Block diagrams

5.5.1 19" ADS-B Receiver insert - Type BDM



5.5.2 ADS-B receiver module p/n 66006



Planevision Systems GmbH	
TITLE: Radarcape pn 66006	REV:
Document Number: 0-66006-01	Sheet: 1/1
Date: 06.06.2015 16:34:33	

Subject to change without notice

5.5.3 Bill of Material

19" ADS-B receiver - Type B/BDM

Bill of Material		BDM
PlaneTRack ADS-B receiver		Basic dual mains NO MLAT
General		
1-001	19" case, top, bottom panels, 2 side panels, 8 profiles, 2 handles	1
1-416	DIN7500 4x16 screws Z2	8
1-002	Frontpanel	1
1-003	Backpanel	1
1-011	Bracket	1
1-990	Name plate	1
1-991	Attention plate	1
1-992	GPS ANT plate	1
1-993	ANT plate	1
GPS connector (optional)		
2-002	N (f) Flange - SMB male	1
1-535	Adapter - SMA (f) - SMB (f)	1
Mains connector and switch		
9-101	Cable IEC 230V 1,8m	2
2-017	Combined socket/switch (230V), all lines, flat plug 4.8 mm	2
2-111	Mains switch, 2 lines, front panel, flat plug 6.3 mm	1
Network connector		
9-102	Mount	1
2-501	Feedthrough RJ45 Jack > RJ45 Jack Cat.5e	1
9-500	Ethernet Surge Protector	1
Alarm connector (optional)		
9-102	Mount	1
2-502	Terminalblock > Terminalblock	1
Control lights		
3-002	Control light TFC blue, flat plug 2.8 mm	1
3-003	Control light PWR green, flat plug 2.8 mm	2
ADS-B receiver		
0-66006	ADS-B receiver/processor	1
0-71010	Filter 1090 MHz	1

Bill of Material		BDM
PlaneTRack ADS-B receiver		Basic
		dual mains
		NO MLAT
Power Supply		
4-001	Power supply unit	2
Multifunc		
91-001	Multifunc Controller Board	1
Antenna cables		
0-67304	Filter (SMA m)- RC (SMA m)	1
Network cables		
22-001	RC (RJ45) - ETH	1
Power cables		
High voltage (230V)		
91-901A-F	IEC connector/switch - Mains switch front panel	6 wires
91-903A-C	IEC connector/switch - Mains switch front panel	
91-911	Mains switch front panel - power supply	2 (1 wire)
91-913	Mains switch front panel - power supply	
Low voltage (5/12V)		
91-902	PSU - Multifunc Wago 6p/6p	1 (6 wires)
91-904	Multifunc Wago 5p/5p - RC	1 (2 wires)
91-905	Multifunc - Alarm contact Wago 5p/2p	1 (2 wires)
Frame Ground		
91-980	Ground/Earth wire IEC - PSU	2
91-981	Ground/Earth wire IEC to Case	multiple
Other cables		
22-101	RC USB Type A- Multifunc USB Type B	1
91-906	Multifunc (Wago 8p) - Control LEDs TFC / PWR	1 (6 wires)
Revised:	14.07.2015	

5.6 Technical and interface parameters

Power Supply		
Input voltage	88 ~ 264VAC	IEC60320 connector type C-14
Surge withstand	300VAC surge for 5sec	
Input frequency	47 ~ 63Hz	
Power Consumption		
Type B	typ. 230VAC / 17 W	
Type BDM	typ: 230VAC / 25 W	
RF receiver		
Antenna input impedance	50 Ohms	N type connector (female)
Input filter passband attenuation	< 0.5 dB	
Input filter bandwidth	< 9 MHZ @ -3 dB	
Sensitivity at antenna port	better than -93 dBm	
Lightning protection	DC short inside filter	
Number of receivers	1	
Receiver center frequency	1090 MHz	
Data processor and decoder		
Hardware platform	Linux SBC Beaglebone Black Rev. C	
Processor	32-bit Cortex A8, Texas Instruments AM3358 Sitara	
CPU speed	1 GHz	
On board Flash memory	4 GB eMMC	
On board RAM	512 MB DDR3L	
Operating System	Linux Debian 8 Kernel 4.1 or similar	
Power up boot delay	ca. 30 secs	

ADS-B message formats processed and decoded	DF17, DF18, DF19*	DO-260/A/B, ICAO Doc 9871 (*DF19 not decoded)
Mode-S message formats processed and decoded	DF4, DF5, DF20, DF21	ICAO Annex 10 Part IV, ICAO Doc 9871
ACAS/TCAS message formats processed and decoded	DF0, DF16*	ICAO Annex 10 Part IV, ICAO Doc 9871 (*DF16 altitude decoded only)
Decoder output formats	Raw data, ASTERIX Cat 021 V0.23*, Cat 247*, ASCII CSV, ASCII JSON, KML, KMZ, customized	(*requires Software Option)
Decoder latency to output	< 10 ms	
Packet throughput	> 2.500 packets/sec	
GPS receiver*		(*Option MLAT only)
Antenna/power supply	Active antenna with 5VDC power	N type connector (female)
Network connection		
Ethernet type	Cat. 5e, 10/100BaseTX	RJ45 connector
Surge protection clamping voltage	7.5V / 70V	IEC 61643-21
Max. surge discharge current	10 kA (8/20 μ s)	
Peak pulse current	100 A (10/1000 μ s)	
Cable length	< 100 meters	
Data protocols	TCP/IP, UDP/IP, HTTP	
Configuration protocols	HTTP/HTML, SSH	
IP address	Fixed or DHCP	
Alarm contact		
Contact type	Potential free	2 screw clamps
max. switchable power	24W / 24VA	
max. switchable voltage	24V / 1A	
SNMP interface		
Device base object id	1.3.6.1.4.1.45919.1.120.1	

Specification	V2c	
Dimensions		
Type of enclosure	19" rack insert, 2 U	EIA 310-D, IEC 60297, DIN 41494
Front panel width	480.0 mm	
Front panel height	88.3 mm	
Enclosure width	ca. 444.8 mm	
Enclosure height	ca. 88 mm	
Enclosure length	ca. 300 mm	without handles
Gross Weight	ca. 4.5 kgs receiver only; ca. 6.5 kgs all components	

5.7 Environmental specification



Ambient temperature	0° to +40°C	32°F to 104°F
Relative humidity	<= 80%	
Cooling	natural convection, no fan	
Enclosure ingress classification	IP52	

6. Device and output format configuration

6.1 Network configuration

6.1.1 SSH connection

The device can be accessed through a console/terminal via SSH protocol and port 22. Access through this port and associated protocols as SFTP allow complete modification of the receiver software. Be aware that warranty may expire when unapproved software modifications are made.

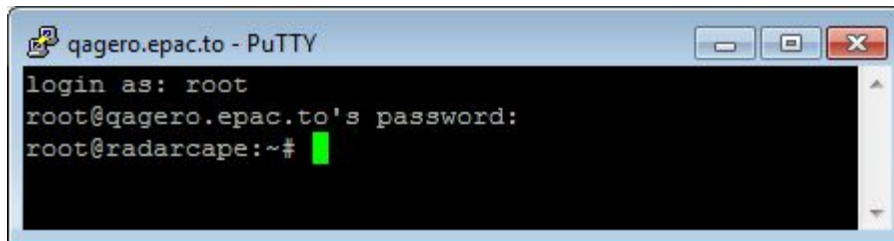
<p>Do not provide SSH access to unauthorized and/or unqualified personnel. Danger of damage of device.</p>	
<p>Secure SSH password in a safe place. SSH access is permanently disabled if password is lost.</p>	

Open a console program (as PuTTY) and link to the device at port 22.

A login and a password prompt will appear.

For login enter username: root

For password enter: see ANNEX A



```

qagero.epac.to - PuTTY
login as: root
root@qagero.epac.to's password:
root@radarcape:~#
    
```

To change the SSH password enter the command "passwd" and follow the on-screen instructions.

<p>It is not recommended to change the SSH password from the factory setting in ANNEX A. If a changed password is lost then SSH access to the device is permanently disabled.</p>	
--	---

6.1.2 DHCP configuration

This setting requires advanced knowledge of access to and editing of files on Linux OS. In case of a misconfiguration access to the device may be permanently lost.



The DHCP configuration is configured in file `/etc/network/interfaces`. To establish a DHCP configuration the following lines must be present:

```
auto eth0
iface eth0 inet dhcp
```

Reboot the device after changing and saving these values to file.

6.1.3 Fixed IP address and mask

This setting requires advanced knowledge of access to and editing of files on Linux OS. In case of a misconfiguration access to the device may be permanently lost.



The Fixed IP address and mask are configured in file `/etc/network/interfaces`. Set the required values with the following lines:

```
auto eth0
iface eth0 inet static
#sample of device IP address
address 10.10.10.45
#sample of network mask
netmask 255.255.255.0
#sample of gateway IP address
gateway 10.10.10.1
```

Reboot the device after changing and saving these values to file.

6.2 SNMP configuration

6.2.1 Overview

The device implements a long running SNMP daemon implemented that supports SNMP Version 2c.

6.2.2 Public MIBs

There are a high number of default MIBs available from the device. These can be found on the web customer area in folder /snmp/public.

From the SNMPv2-MIB and DISMAN-EVENT-MIB the following items are customized and available:

sysDescr	1.3.6.1.2.1.1.1	Type of receiver
sysObjectID	1.3.6.1.2.1.1.2	Basic object ID
sysUpTimeInstance	1.3.6.1.2.1.1.3	Uptime of SNMP client
sysContact	1.3.6.1.2.1.1.4	Manufacturer contact
sysName	1.3.6.1.2.1.1.5	Type of receiver
sysLocation	1.3.6.1.2.1.1.6	Type of receiver
sysServices	1.3.6.1.2.1.1.7	72

6.2.3 Vendor MIB "PLANEVISION-MIB"

A vendor MIB PLANEVISION-MIB is configured with the following data under

```
iso.org.dod.internet.private.enterprises.  
Planevision.PlaneTRack.TypeBDMSeries120
```

sDevType	1.3.6.1.4.1.45919.1.120.1	Type of device	string
sMacAddress	1.3.6.1.4.1.45919.1.120.2	MAC address of device	string
sLatitude	1.3.6.1.4.1.45919.1.120.3	WGS-84 latitude of receiver	string
sLongitude	1.3.6.1.4.1.45919.1.120.4	WGS-84 longitude of receiver	string
sSerialNo	1.3.6.1.4.1.45919.1.120.5	Serial no of device	string

sPWRAStat	1.3.6.1.4.1.45919.1.120.6	PWR A status ("UNKNOWN", "DOWN", "UP")	string
sPWRBStat	1.3.6.1.4.1.45919.1.120.7	PWR B status ("UNKNOWN", "DOWN", "UP")	string
sAltitudeMSL	1.3.6.1.4.1.45919.1.120.8	GPS altitude MSL of receiver (m)	string
sOSVersion	1.3.6.1.4.1.45919.1.120.9	OS version of the receiver	string
sRCDVersion	1.3.6.1.4.1.45919.1.120.10	RCD version of the receiver	string
sDBpresent	1.3.6.1.4.1.45919.1.120.11	Support databases present on the receiver.	string

NOTE: The SNMP output can be tested from the SSH command line with the command `./pt-snmptest`

6.2.4 SNMP Traps

The following SNMP traps are configured in PLANEVISION-MIB under

```
iso.org.dod.internet.private.enterprises.  
Planevision.PlaneTRack.TypeBDMSeries120.tsTraps
```

tsRestart	1.3.6.1.4.1.45919.1.120.99.1	Restart of ADS-B receiver
tsPWRAfail	1.3.6.1.4.1.45919.1.120.99.2	Power supply A failed
tsPWRArestore	1.3.6.1.4.1.45919.1.120.99.3	Power supply A restored**
tsPWRBfail	1.3.6.1.4.1.45919.1.120.99.4	Power supply B failed
tsPWRBrestore	1.3.6.1.4.1.45919.1.120.99.5	Power supply B restored**

**REMARK: will only be sent if the other PWR supply remains available

The host destination of the Planevision SNMP trap service is stored in variable `trap2sink` in file `/usr/local/bin/planetrack.cfg`, which is accessible via SSH.

Please note that the following default traps are executed by the system:

System restart	1.3.6.1.6.3.1.1.5.1	SNMPv2-MIB::coldStart
System shutdown	1.3.6.1.4.1.8072.4.0.2	NET-SNMP-AGENT-MIB:: nsNotifyShutdown REMARK: this trap will work only when the SNMP agent is orderly shutdown by a termination or reboot command. It will not work when the unit is switched off by the last power switch.

The host destination of the default SNMP trap service is stored in variable `trap2sink` in file `/etc/snmp/snmpd.conf`, which is accessible via SSH.

6.3 Data interfaces and formats

The PlaneTRack ADS-Receiver provides a variety of output formats to its users. All formats can be used concurrently and mixed and are only limited by excessive processor load. However, it is recommended to limit the use of streaming raw data formats (ports 100xx, 30003) to the necessary and prefer predecoded and formatted formats especially over long distance WAN lines.

All formats are summarized in Table 6-1.

6.3.1 Aircraft List

Table accessible via web browser. The table can be sorted by any column, ascending or descending. It refreshes itself after a configurable time (GUI :: Configuration | Range and Time Settings)

Aircraft List

Time ▲▼	ICAO ▲▼	Flight ▲▼	Lon	Lat	Src	Ground ▲▼	Alt ▲▼	VRate ▲▼	Speed ▲▼	True Track ▲▼	Cat ▲▼	Orig ▲▼	Dest ▲▼	Oper ▲▼	Type ▲▼	Reg ▲▼	Squawk ▲▼	Country ▲▼	Dist(km) ▲▼	Trust ▲▼	Track Size
07:51:50.634405500	3D1BBC	DEITG	0.00000	0.00000	A	A	0	0	0	0								Germ	0.0	62	0
07:51:48.949634296	3D1EC4	DEJXC	0.00000	0.00000	A	A	2700	0	0	0	A2						7000	Germ	0.0	435	0
07:51:51.067977625	3D4920	PTO3E	0.00000	0.00000	A	A	3700	0	0	0	A1						7757	Germ	0.0	1711	0
07:51:50.121362234	3D1B45	DEIOR	0.00000	0.00000	A	A	3800	0	0	0	A1						7746	Germ	0.0	29	0
07:51:51.356938125	4B1698	SWR105V	9.81299	53.54539	A	A	4050	2880	256	232	A0			SWR	A321	HB-IOM	1101	Swit	12.6	752	27
07:51:51.577038968	3D349A	DESEC	0.00000	0.00000	A	A	8000	0	0	0							5012	Germ	0.0	507	0
07:51:51.429013265	3944E5	AFR041J	9.92222	53.83553	A	A	9050	-576	274	93	A0			AFR	A319	F-GRHF	7554	Fran	19.5	6766	60
07:51:51.590946343	45AB43	SAS646	10.17940	53.82249	A	A	11275	832	197	44	A0			SAS	AT76	OY-JZC	7264	Denm	16.7	3511	60
07:51:51.491430468	3C720A	BER7420	11.99425	52.93959	A	A	18775	1664	401	326	A0			BER	A332	D-ALPJ	1360	Germ	75.1	518	24
07:51:51.535492859	4B1784	SWR96P	12.16877	51.89550	A	A	20025	1152	380	201	A0			SWR	RJ1H	HB-IXO	1110	Swit	122.9	368	17
07:51:11.687226953	484F80	KLM27G	0.00000	0.00000	A	A	21275	0	0	0				KLC	E190	PH-EZX	1000	Neth	0.0	220	0
07:51:48.788985125	4010EE	EZY98MJ	10.47563	55.14676	A	A	23725	-2304	401	65	A0			EZY	A319	G-EZBZ	0576	U.K.	96.8	11765	60
07:51:49.161759453	501DD1	CTN480	0.00000	0.00000	A	A	24000	0	0	0				CTN	DH8D	9A-CQF	7635	Croa	0.0	2272	0
07:51:51.606523687	502C97	BTI92E	0.00000	0.00000	A	A	24000	0	0	0				BTI	DH8D	YL-BBU	1000	Latv	0.0	10202	0
07:51:51.521578921	47878E	NAX21Z	13.27375	53.14143	A	A	25225	1600	433	2	A0			NAX	B738	LN-NIA	7271	Norw	114.0	511	12

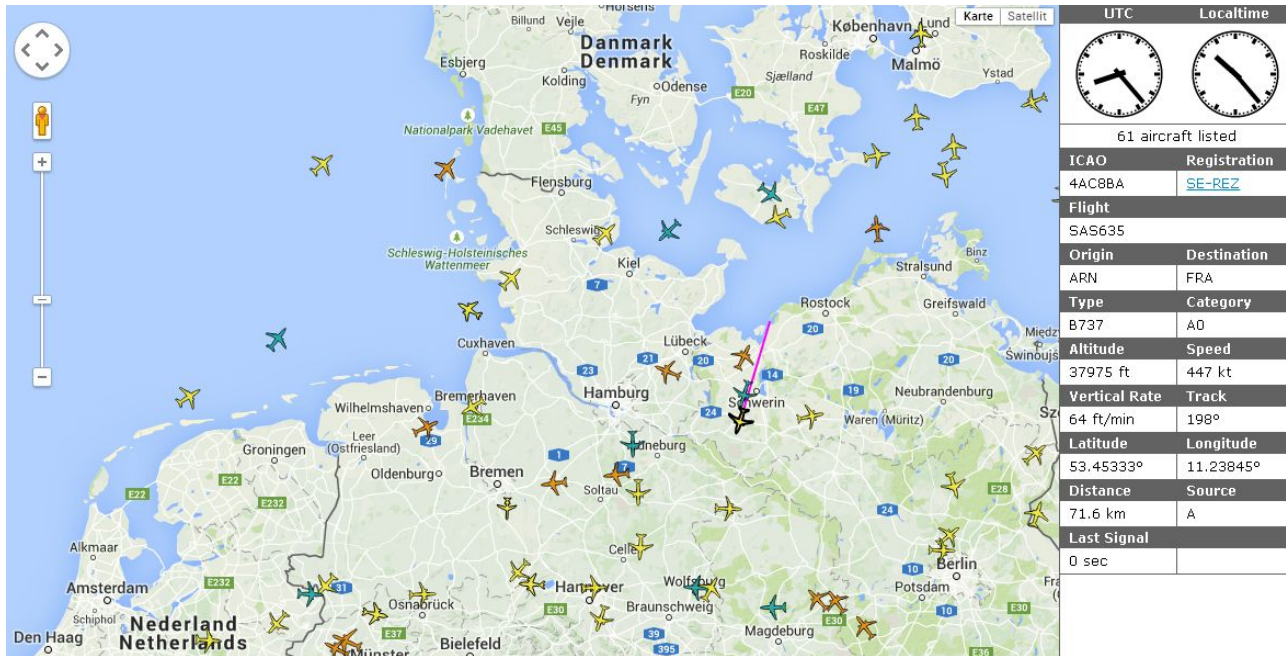
Legend

Name	Description	Notes
Time (hh:mm:ss:ns)	Time of last message received from the aircraft	
ICAO	24 bit ICAO hex ID unique identification of aircraft	
Flight	Flight Call Sign as it is transmitted from the aircraft	
Lon	Longitude (WGS-84)	
Lat	Latitude (WGS-84)	
Src	Source of Lat/Lon: A=ADS-B M=MLAT	
GndAir	Aircraft is on ground (G) or airborne (A)	
Alt	Altitude (feet) at 1013 mb standard atmosphere	
VRate	Vertical rate in feet/min	

Speed	Ground Speed in knots	
Track	Course in degrees true	
Cat	Aircraft category	
Orig	Origin of flight	provided by public domain database, perform GUI :: Configuration | Software Maintenance -> Update flight routes database
Destin	Destination of flight	provided by public domain database, perform GUI :: Configuration | Software Maintenance -> Update flight routes database
Oper	Flight operator	provided by public domain database, perform GUI :: Configuration | Software Maintenance -> Update basestation database
Type	Aircraft Type	provided by public domain database, perform GUI :: Configuration | Software Maintenance -> Update basestation database
Reg	Registration of aircraft	provided by public domain database, perform GUI :: Configuration | Software Maintenance -> Update basestation database
Squawk	Mode A SSR code	
Country	Country that the aircraft is registered for, indicated through the upper bits in the ICAO hex id	
Distance	Distance to the observer if its Lat, Lon is either entered manual in GUI :: Configuration | Settings | Location or determined by GPS* (MLAT option)	
Trust	Number of highly trustable DF-11 or DF-17/18 messages per aircraft.	
Track Size	Length of the track in 2D display in 5 sec sequence track points	

6.3.2 Live 2D Map Output

A web browser and an internet connection are required in order to display 2D maps. This display is ideal for testing purposes and quick surveillance.



Legend of Target Color: Yellow - Level flight, Brown - descending, Cyan - climbing

6.3.3 Port 30003 data

Port 30003 is a decoded interface in comma separated format. As the encoding of Mode-S and ADS-B messages is not trivial, this is the easiest way how second level software can access flight data. However, as this is a streaming format it replicates every ADS-B and Mode-S message at the device's output. Therefore this format is not recommended to be used in WAN operations with slow or loaded data lines.

Output sample:

```
STA,,5,179,400AE7,10103,2008/11/28,14:58:51.153,2008/11/28,14:58:51.153,RM
MSG,4,5,211,4CA2D6,10057,2008/11/28,14:53:49.986,2008/11/28,14:58:51.153,,,,408.3,146.4,,,
64,,,,
MSG,8,5,211,4CA2D6,10057,2008/11/28,14:53:50.391,2008/11/28,14:58:51.153,,,,,,,,,,,,,0
MSG,4,5,211,4CA2D6,10057,2008/11/28,14:53:50.391,2008/11/28,14:58:51.153,,,,408.3,146.4,,,
64,,,,
MSG,3,5,211,4CA2D6,10057,2008/11/28,14:53:50.594,2008/11/28,14:58:51.153,,37000,,51.4573
5,-1.02826,,,0,0,0,0
```

Legend

Token	Type	Description
ID	NEW ID MESSAGE	Generated when an aircraft being tracked sets or changes its callsign.

AIR	NEW AIRCRAFT MESSAGE	Generated when the device picks up a signal for an aircraft that it isn't currently tracking.
STA	STATUS CHANGE MESSAGE	Generated when an aircraft's status changes according to the timeout values set in the GUI :: Configuration menu.
MSG	TRANSMISSION MESSAGE	Generated by the aircraft. There are eight different MSG types.

Token	Type	Source	Description
MSG,1	ES Identification and Category	DF17 BDS 0,8	
MSG,2	ES Surface Position Message	DF17 BDS 0,6	
MSG,3	ES Airborne Position Message	DF17 BDS 0,5	
MSG,4	ES Airborne Velocity Message	DF17 BDS 0,9	
MSG,5	Surveillance Alt Message	DF4, DF20	Triggered by ground radar. Not CRC secured. MSG,5 will only be output if the aircraft has previously sent a MSG,1, 2, 3, 4 or 8 signal.
MSG,6	Surveillance ID Message	DF5, DF21	Triggered by ground radar. Not CRC secured. MSG,6 will only be output if the aircraft has previously sent a MSG,1, 2, 3, 4 or 8 signal.
MSG,7	Air To Air Message	DF0, DF16	Triggered from TCAS.
MSG,8	All Call Reply	DF11	Broadcast but triggered by ground radar

6.3.3bis Port 30003 NMEA pseudo format* (optional)

To simulate a NMEA format the port 30003 output of section 6.3.3 packets may be immediately preceded by \$PPVS3 identifier.

Output sample:

```
$PPVS3MSG,4,5,211,4CA2D6,10057,2008/11/28,14:53:49.986,2008/11/28,14:58:51.153,,,408.3,146.4,,,64,,,,,
```

6.3.4 "deltadb.txt" CSV file

Similar to Port 30003 the deltabd.txt file can deliver pre-decoded and comma delimited data for ease of further processing. It is serviced by the internal web server, so requests

will be responded by a list of changes of the aircraft list which have either occurred since the last request or a time that can be provided as caller parameter.

Output sample:

```
1435478409,3F7B3C,GA642,25725,445,73,52.393,10.9649,-1088,5026
```

Legend of data fields:

UNIX Time, ICAO aircraft id, Callsign, Altitude, Ground Speed (kts), Track (degrees true), Latitude (WGS-84), Longitude (WGS-84), Vertical rate (ft/min), SSR code (squawk)

6.3.4bis CSV NMEA pseudo format* (optional)

To simulate a NMEA format the CSV output of section 6.3.4 files may be preceded by \$PPVS1 identifier.

Output sample:

```
$PPVS1,1435478409,3F7B3C,GA642,25725,445,73,52.393,10.9649,-1088,5026
```

6.3.5 JSON file (aircraftlist.json)

The JSON output format can be used to facilitate interfacing with second level software. It provides a table of fully decoded data that can be interrogated at any time and concurrently from several clients.

Output sample:

```
[{"uti":1435477011,"dat":"2015-07-26 07:36:51.657189000",
"tim":"07:36:51.657189000","hex":"47A7BC","fli":"","lat":"55.76912","lon":"13.35588",
"gda":"A","src":"A","alt":34850,"spd":497,"trk":153,"cat":"","org":"","dst":"","opr":"NAX",
"typ":"B738","reg":"LN-NGJ","dis":"173.5","cou":"Norw","squ":"4522","tru":19,
"tsa":1,"tsm":0,"vrt":832,"lla":0},
{ ... },
{ ... }]
```

Legend

Token	Description	Remark
uti	Linux timestamp of last message (contains date)	"uti":1435477011
dat	ESRI formatted timestamp of last message	"dat":"2015-07-26 07:36:51.657189000"
tim	Time of last message (contains nanoseconds)	"tim":"07:36:51.657189000"
hex	ICAO Aircraft Hex ID	
fli	Flight Identification/Call Sign	
lat	Latitude (WGS-84)	in decimal degrees
lon	Longitude (WGS-84)	in decimal degrees
gda	Ground/Air status	A=Air G=GND
src	Source of position*	A=ADS/B M=MLAT (*MLAT option only)
alt	Altitude (Flight level)	in ft 1013 hPa Standard Atmosphere
spd	Ground Speed	in kts

trk	True track	in degrees
cat	Category (A0-C7)	
org	Origin	Requires flight routes database being loaded
des	Destination	Requires flight routes database being loaded
opr	Operator	Requires base station database being loaded
typ	Type	Requires base station database being loaded
reg	Registration	Requires base station database being loaded
squ	Squawk	SSR Mode A code
cou	Country	
dis	Distance	from station position
tru	Trust Level	
vert	Vertical Rate	in ft/min
mch	MACH*	in MACH x 100 optional
ias	IAS*	in kts optional
tas	TAS*	in kts optional
rol	Roll angle*	in degrees/sec optional
tra	Turn rate*	in degrees/sec optional
sfl	Sel FL*	in ft Flight Level optional
qnh	QNH*	in hPa optional
shd	Sel Heading*	in degrees magnetic optional
hgt	Height difference*	between FL and GPS ellipsoid optional
mop	MOPS*	Transponder standard optional
flg	Alert, SPI, Emerg.,IC*	Transponder flags optional
tcs	TCAS alert*	TCAS alert optional
nic	NIC + NACV*	Transponder precision data optional
apm	autopilot mode*	optional
rec	record number	internal
lla	LatLon_Age	Age of ADS-B last position packet in sec
lpa	LastPacket_Age*	Age of last ADS-B or Mode-S packet in sec optional
tss	Track Size ADS-B	internal
tms	Track Size MLAT	internal

6.4 Raw data formats

Raw data formats are streamed from the built-in TCP server of the device to a TCP client. These undecoded data require a processing/decoding software at the remote end of the connection. Be aware that in high traffic environments there can be significant data rates of these links, exceeding 1 MBit/s.

6.4.1 TCP port 10002

Raw data as it is received by the ADS-B receiver from the packet assembler. It includes all errors, broken frames etc.. DF-11,DF-17 and DF-18 are CRC pre checked if selected in the configuration.

6.4.2 TCP port 10003

Mode-S and ADS-B raw data, but all frame types in Mode-S/ADS-B have passed CRC checking. This is the recommended port if you want to route full data through a slow speed network connection, thus eliminating bandwidth requirements for erroneous data or broken frames.

6.4.3 TCP port 10004

DF-11, DF-17 and DF-18 only, all frame types CRC pre checked. This is recommended in case of interest of aircraft positions only, but no Mode-S or TCAS data.

6.4.4 TCP port 10005*

Mode-S frames only. This is a special port for streaming multilateration clients (*optional).

6.4.5 Raw data formats

There are two raw data formats available that can be selected from the GUI :: Configuration menu

AVR format (ASCII)

Samples:

*02E99619FACDAE;

*8D3C5EE69901BD9540078D37335F;

Legend

ASCII representation of 56-bit or 112-bit raw data packets

AVR format (ASCII) with Option MLAT*

Samples:

@016CE3671C7423FFE7AB7BFCAB;

@016CE3671AA8A800199A8BB80030A8000628F400;

Legend

ASCII representation of 48-bit MLAT timer and 56-bit or 112-bit raw data packets

Binary format (14 or 21 bytes, without escaped characters)

0x1a,0x32 : 6 byte MLAT timer, 1 byte signal level, 7 byte Mode-S short frame

0x1a,0x33: 6 byte MLAT timer, 1 byte signal level, 14 byte Mode-S/ADS-B long frame

0x1a,0x1a : true 0x1a (escaped)

Table 6-1

PlaneTRack data formats and protocols (two pages)

Due to size and embedded links please refer to document "PlaneTRack data formats and protocols" in your web customer area.

6.5 Graphical User Interface (GUI)

The GUI is a convenient way to access the device configuration menus and display traffic status of the device.

The GUI can be reached on port 80 of the device IP, e.g. <http://10.10.10.45>

In networks where a zero config client is available the device may also be reached at <http://radarcape> or <http://radarcape.local>

Throughout this document referrals to the GUI are marked by the token "GUI:." followed by the relevant menu and menu items.



GUI :: Aircraft Data | Aircraft List

see Section 6.3.1

GUI :: Aircraft Data | Live 2D Output

see Section 6.3.2

The following GUI items are locked by a user name and password. Please refer to Annex A.

GUI :: Status | GPS Status*

*Option MLAT only

Status report of the GPS receiver and error log

Sample:

```
Status
Date: 21.05.2015
Time: 17:50:14 [UTC]
Latitude: 52.5446
Longitude: 11.4669
Altitude: 123.9091
Temperature: 25.4271 deg C
Fix Mode: auto
Fix Dimension: OD clock fix
Self Survey: complete
Survey Progress: 100%
Rcvr Mode: Over determined clock
GPS Status: doing fixes
Dynamics Code: unknown (0xff)
HardwareId: Resolution SMTx
Firmware version: 2.2 Build 0
SwBuildDate: 17.01.2013
Software Version: 2.2 build 17.01.1913
Product Name: Resolution SMTx
```


Antenna open: connected
 Antenna short: operating
 Tracking Sats: true
 Position stored: true
 Position questionable: false
 AMU mask: 0
 PDOP mask: -1
 PDOP switch: -1
 Almanach: complete
 PPS not generated: false
 Number of SVs in Fix: 9

PRN	Chan	Az	Elev	Sig	Aquire	Ephem	Age	Old	Bad	DataColl.
26	6	181.0	17.0	23.0	aquired	inv.	0	-	-	in progress
30	9	328.0	11.0	36.0	aquired	inv.	-1	-	-	in progress
18	2	88.0	53.0	33.0	aquired	inv.	0	-	-	in progress
21	5	73.0	28.0	36.0	aquired	inv.	0	-	-	in progress
22	3	153.0	51.0	18.0	aquired	inv.	0	-	-	in progress
7	8	298.0	13.0	26.0	aquired	inv.	-1	-	-	in progress
27	1	270.0	81.0	35.0	aquired	inv.	0	-	-	in progress
15	7	43.0	14.0	40.0	aquired	inv.	0	-	-	in progress
19	4	292.0	48.0	26.0	aquired	inv.	0	-	-	in progress

Supervision results: (28.06.2015 17:49:44)
 Time reference: UTC
 PPS reference: UTC
 PPS pulse: on
 PPS polarity: positive
 PPS output option: always on

GUI :: Status | Port Connection Status

Status report and connection history of the data ports

Sample:

Port Connection Status

Port 10002 (unchecked true raw data)
 Port 10003 (all data formats, including Mode-AC, CRC checked)
 Port 10004 (DF11/DF17 CRC checked)
 Port 10005 (non ADS-B frames, CRC checked)
 Port 10006 (all data formats, no Mode-AC, CRC checked)
 20.03.2015 16:19:56(G) Port 10006: established #1 from 127.0.0.1:50821
 26.03.2015 18:10:21(G) Port 10006: established #1 from 127.0.0.1:51330

27.03.2015 18:47:20 (G) Port 10006: established #1 from 127.0.0.1:51497
Port 30003

GUI :: Configuration | Settings

Do not provide GUI access to unauthorized and/or unqualified personnel. Danger of damage of device.



Location of device

This setting is required for tracking of ground traffic. Setting is not required for airborne traffic.

If a GPS receiver or Option MLAT is present only: data will be filled out by GPS.

Latitude Longitude Altitude m
Decimal values, southern latitude and western longitude as negative values. Will become overwritten after GPS fix.

Enable range rings on 2D map (50, 100, 150 and 200 [NM]):

disabled
 enabled

Configuration of Live 2D Map

Aircraft distance unit km nm

Omit aircraft after [min] 1 5 10 30 60 120 300

Delete aircraft after [min] 1 5 10 30 60 120 300

KML output refresh time [s] 10 15 30 60 120 300 600
 auto refresh off

KML output track length [s] 5 10 30 60 120 300
 all database elements

GPS status refresh time [s] 1 5 10 30 300
 auto refresh off

It is required to enter the GUI password to save changed values.

GUI :: Configuration | Software Maintenance

The flights routes and aircraft databases reside in the public domain and must be downloaded by the user.

When an updated receiver software is available it can be downloaded from this menu, too.

Update flight routes database

Get the latest link from the [PP Routes Yahoo Forum](#) (zip file link, not short link)

Update basestation database

[PlaneBaseNG](#) - Exec and Airlines
 [PlaneBaseNG](#) - Full European
 Download from custom URL:

Upgrade Radarcape Software

Default is latest available version

GUI :: Configuration | Change Password

The initial device GUI password is posted in ANNEX A.

<p>Secure GUI password in a safe place. Change of configuration is permanently disabled if password is lost.</p>	
---	---

Enter old password
 Enter new password
 Repeat new password

[Cancel](#)

6.6 Antenna configuration

The antenna configuration is specific to the customization of the device. For details see ANNEX B.

7. Maintenance and Repair Instructions

The PlaneTRack 19" ADS-B receiver device does not require any maintenance.


The PlaneTrack 19" ADS-B receiver device does not contain any field repairable or serviceable components.


For module exchange or repair it is strongly recommended to return the device to the manufacturer.

For any field module exchange request a manufacturer approval before proceeding.

Be aware that unapproved opening of the device and/or module exchange may affect the warranty state of the device.

7.1 Troubleshooting or module exchange instructions

<p>Troubleshooting or module exchange must be exercised by qualified and authorized personnel only. Contact the manufacturer for service authorization.</p>	
---	--

<p>In exceptional cases and only when instructed by the manufacturer the device may be opened for troubleshooting. Carefully follow disconnecting, unmounting and opening instructions as provided by the manufacturer and in Section 7.4. If you have any questions contact the manufacturer first.</p>	
---	---

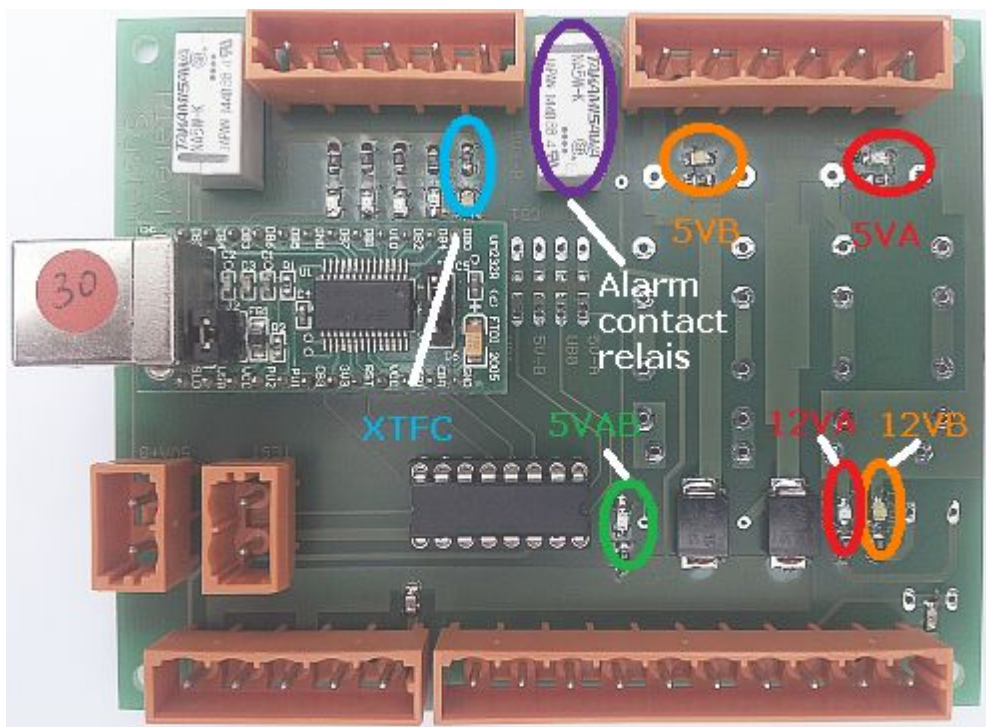
7.2 Quick initial troubleshooting guide

Failure	Check action	Category
PWR-A LED off (only)	Toggle ON/OFF (FP) switch for 30 secs. Check mains cable A connected and power line A operative, rear panel ON/OFF switch(es) ON	#1.1
PWR-B LED off (only)	Toggle ON/OFF (FP) switch for 30 secs. Check mains cable B connected and power line B operative, rear panel ON/OFF switch(es) ON	#1.1
Both PWR LEDs off	Toggle ON/OFF (FP) switch for 30 secs. Check mains cables A/B connected and power lines A/B operative, ON/OFF switches ON	#1.1
Alarm contact opened	Toggle ON/OFF (FP) switch for 30 secs. Check all PWR LED(s) are GREEN	#4.1

Network access to user GUI not possible, but all PWR LED(s) are GREEN	Toggle ON/OFF (FP) switch for 30 secs. Allow receiver >30 sec to restart. Check network connection cable.	#5.1
Network access via SSH not possible, but all PWR LED(s) are GREEN	Toggle ON/OFF (FP) switch for 30 secs. Allow receiver >30 sec to restart. Check network connection cable.	#5.1
TFC LED not blinking after 30 secs on startup, but all PWR LED(s) are GREEN	Toggle ON/OFF (FP) switch for 30 secs. Allow receiver >30 sec to restart.	#7.1
TFC LED not flickering for traffic, but all PWR LED(s) are GREEN	Toggle ON/OFF (FP) switch for 30 secs. Allow receiver >30 sec to restart. Check GUI for traffic present in list or on map	#8.1
Range degraded on output and GUI map, but TFC LED flickering	Check ADS-B antenna and surge protector state, cable and connection	#8.1
Time not correct in data output	Check GPS antenna, cable and connection	#9.1

7.3 Advanced troubleshooting and check instructions

Multifunc Controller Board troubleshooting LEDs and Relay locations



Note: the component placement on the individual device may be different.

Table 7-1

Required front panel labels for continued operation without harm when failure exist(s)

Failure code	Failure	Front panel label	Restrictions
#1101	Both PWR LEDs defunct	<u>"PWR LEDs u/s, chk ON/OFF switch for state"</u>	
#1102	PWR LED A defunct	<u>"PWR LED A u/s, chk ON/OFF switch for state"</u>	
#1103	PWR LED B defunct	<u>"PWR LED B u/s, chk ON/OFF switch for state"</u>	
#1131	PSU-A 5V branch defunct	<u>"PSU A supply u/s, no pwr backup"</u>	No power backup
#1132	PSU-A 12V branch defunct	<u>"PWR LED A u/s, chk ON/OFF switch for state"</u>	
#1133	PSU-B 5V branch defunct	<u>"PSU B supply u/s, no pwr backup"</u>	No power backup
#1134	PSU-B 12V branch defunct	<u>"PWR LED B u/s, chk ON/OFF switch for state"</u>	
#1135	PSU-A defunct	<u>"PSU A supply u/s, no pwr backup"</u>	No power backup
#1136	PSU-B defunct	<u>"PSU B supply u/s, no pwr backup"</u>	No power backup
#1141	Failure of the Multifunc Controller Board power supply combiner section		No operation possible
#1155	PWR LED A and PSU B defunct	<u>"PWR LED A u/s, chk ON/OFF switch for state"</u> <u>"PSU B supply u/s, no pwr backup"</u>	No power backup
#1156	PWR LED B and PSU A defunct	<u>"PWR LED B u/s, chk ON/OFF switch for state"</u> <u>"PSU A supply u/s, no pwr backup"</u>	No power backup
#4101	Failure of the Alarm Contact Relay on the Multifunc controller board	<u>"ALARM CONTACT u/s"</u>	Remove device from alarm loop
#7101	Failure of the Multifunc Controller Board TFC LED driver section	<u>"TFC LED u/s"</u>	
#7102	Failure of the Multifunc Controller Board TFC LED	<u>"TFC LED u/s"</u>	
#7103	Failure of the Multifunc Controller Board power supply combiner section		No operation possible
#7198	Failure of the Receiver module or		No operation possible

	the Ethernet surge protector (no network access)		
#7199	Failure of the Receiver module (device does not start)		No operation possible
#8101	Antenna failure		Degraded operation possible
#8102	Antenna surge protector failure		Operation strongly discouraged due to lack of lightning protection
#9101	GPS antenna failure	<u>"Timestamps n/a"</u>	Degraded operation possible without correct timestamps
#9102	GPS antenna surge protector failure		Operation strongly discouraged due to lack of lightning protection


Table 7-1

Required front panel labels for continued operation without harm when failure exist(s)

7.4 Advanced troubleshooting/module exchange actions


7.4.1 Disconnecting and unmounting the device

- Switch to OFF:
 - ON/OFF (FP) switch
 - PWR-A ON/OFF switch
 - PWR-B ON/OFF switch
- Disconnect all cables from rear panel

<p>Before unmounting the device</p> <ul style="list-style-type: none"> ● assure that ALL mains cables are disconnected from the device and from mains ● assure that the ALARM contact cable is disconnected ● assure that the ANT cable is disconnected ● assure that the GPS ANT cable is disconnected ● assure that the NETWORK cable is disconnected 	
--	---

- Unmount the device from the 19" rack according to rack operator's instructions

7.4.2 Opening the device

<p>POTENTIAL RISK OF ELECTRICAL SHOCK AND LIFE HAZARD: To isolate the device from mains it is not sufficient to switch the ON/OFF (FP) switch to OFF! The ON/OFF switches on the rear panel must be switched off, too! The mains cables must be disconnected, too!</p>	
---	---

- The device must be opened by qualified and authorized personnel only. Contact the manufacturer for instructions.

7.4.3 Closing, mounting and re-connecting the device

- Contact the manufacturer for instructions to close the device.
- Mount the device to a 19" rack and proceed per Quick Start Guide Section 3.

7.5 Test procedure

- Execute all items from the Quick Start Guide Section 3
- The device cannot be tested for functionality without proper antenna setup and ADS-B transmitting aircraft in range
- For a new device check ANNEX A for configuration "DHCP" or "FIXED IP"
 - for a FIXED IP configuration note down the IP from ANNEX A, e.g. 10.10.10.45
- For a new device check ANNEX A for SNMP target configuration
- Power up a computer and a router connected to each other by Ethernet or WLAN
- Setup the router
 - if device is configured for DHCP
 - for configuration DHCP (Note: connection may be lost from computer to router after DHCP is set)
 - if device is configured for a FIXED IP
 - for a Fixed IP from the same range as the device
 - e.g. device IP is 10.10.10.45, then setup router as 10.10.10.1 (Note: connection may be lost from computer to router after IP is set)
- Set up the computer network interface
 - if device is configured for DHCP
 - for network configuration DHCP
 - if device is configured for FIXED IP
 - for a Fixed IP from the same range as the device
 - e.g. device IP is 10.10.10.45, then setup computer as 10.10.10.2
- Connect the device to the router with an Ethernet cable
- If device is configured for DHCP:
 - Open a web browser on the computer
 - Open the router configuration page, e.g. <http://10.10.10.1>
 - Access the "DHCP client page" (or similar name) and extract the IP for client "Radarcape", note down the IP (e.g. 10.10.10.45)
- Open a web browser on the computer
- Open an SNMP manager client on the computer
- Call the GUI URL from the web browser, e.g. <http://10.10.10.45>, thence ...

Check items	
Check the Aircraft List for flight entries, check distance/altitude for appropriate values	PASS
Open the GUI :: Aircraft Data | Live 2D Output and check for presence and appropriate distance/altitude of flights on the map (internet access required to display the map) Typical distance/altitude. values to be observed with optimal antenna placement and connection and ADS-B traffic in range: <ul style="list-style-type: none"> ● FL350 / 200 NM / 360 km ● FL200 / 100 NM / 180 km ● FL100 / 70 NM / 130 km 	PASS
Open the GUI :: Status | GPS Status and check for GPS data valid* (*MLAT option only)	PASS

- Execute the SNMP Manager client with SNMP GET calls to the relevant MIB items from section 6.3.1 and 6.3.2, thence...

Check items	
Switch OFF PWR A and execute a SNMP GET to PLANEVISION-MIB::sPWRAStat	DOWN
Switch ON PWR A and execute a SNMP GET to PLANEVISION-MIB::sPWRAStat	UP
Switch OFF PWR B and execute a SNMP GET to PLANEVISION-MIB::sPWRBStat	DOWN
Switch ON PWR B and execute a SNMP GET to PLANEVISION-MIB::sPWRBStat	UP

- Setup the SNMP Manager client to receive traps, thence...

Check items	
Switch OFF PWR A and observe reception of PLANEVISION-MIB::tsPWRAfail	PASS
Switch ON PWR A and observe reception of PLANEVISION-MIB::tsPWRArestore	PASS
Switch OFF PWR B and observe reception of PLANEVISION-MIB::tsPWRBfail	PASS
Switch ON PWR A and observe reception of PLANEVISION-MIB::tsPWRBrestore	PASS

8. Declaration of Conformity

9. Contact information

Planevision Systems GmbH
Grellkamp 6b
22113 Oststeinbek

mailto: info@planevision.de

www: <http://plane.vision>

Tel. +49-40-713 1040

Fax: +49-40-6558 4005

Legal corporate information:

AG Lübeck, HRB 14050HL

Managing Directors: Günter Köllner, Gunther Kruse

Annex A - Device configuration map

Effectivity: s/n

Customer area	http://customers.plane.vision
Series master device login	.....
Web customer area password	.....

Ethernet adapter

.....	MAC address	.....
.....	MAC address	.....

Receiver hardware

.....	Serial No.	.....
.....	Serial No.	.....

ADS-B antenna hardware

.....	Serial No.	.....
.....	Serial No.	.....

GPS antenna hardware

.....	Serial No.	.....
.....	Serial No.	.....

Network configuration

.....	IP configuration	.....
.....	IP configuration	.....

Other

Hardware	Alarm contact	.....
	GPS antenna	.....
	MLAT option	.....
Software	OS version	.....
	RCD version	.....
	Home position	.....
	SNMP target address	.....
	SNMP community name	.....
Passwords	SSH	user: root password:
	GUI	user: password:

Annex B - Antenna Information Sheet

B.1 Important installation instructions

	<p style="text-align: center;">CAUTION!</p> <p>When connecting the ADS-B and GPS antennas be careful to make correct cable connections according to the signage only!</p> <p><u>Misconnecting may damage the ADS-B Receiver.</u></p>	
--	---	--

B.2 ADS-B antenna

B.3 GPS antenna

Record of Revisions
