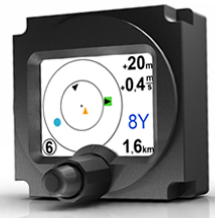
air avionics



Butterfly Displays

Pilot's and Installation Manual

Dokument	B101 / B102-1.0-DE
Version	1.0
Datum	2015/07/30

Telefon: +49 (0) 6224 82 83 87 0 · Fax: +49 (0) 6224 82 83 87 7
Internet: http://www.airavionics.aero · Mail: support@airavionics.aero

Important!

Please read this manual carefully before using the device!

Observe restrictions and safety instructions!

This manual is an essential component of the device and must be kept in a safe place!

Document-Identification and Revision

This manual covers the following product types:

P/N B101 “Butterfly Display External”
P/N T278 “Butterfly Display 57”

Änderungen

Rev.	*Datum*	*Status*	*Autor*	*Änderungen*	*Genehmigt*
3.3	2015/07/30	Release	M. Förderer	Added FLARM Compatiblity Information	–

Inhaltsverzeichnis

1 General

System Description

Butterfly Displays are small and affordable Cockpit Displays for Traffic Information (CDTI).

Butterfly Displays display traffic data from TRX, FLARM, PowerFLARM or ADS-B traffic receivers. Comprehensive position and danger-level information on dangerous traffic is given. Additionally soaring-tactical informations are displayed.

Butterfly Displays feature a sunlight readable transflective TFT display with 2ßcreen size. Two housing versions, 57mm panelmount or external display, are available. Butterfly Displays give audible alerts through integrated warning sounders.

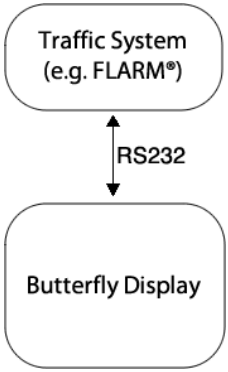


Abbildung 1.1: Typical Installation

Compatibility

Butterfly Display are certified to be FLARM compatible in the category *STANDLONE*.

This manual refers to FLARM software Version 6 and FLARM dataport specification/protocol version 6.

The FLARM end user license agreement applies. A copy of the agreement can be found in the appendix of this document.

Safety instructions and restrictions on use

Installation and operation must be on the basis of non-interference with and no hazard to the existing suite of other equipment necessary for safe flying operation, or installed to comply with official requirements. Installation and operation must comply with official regulations and requirements.

> The pilot is ultimately responsible for all flight decisions and for operating the aircraft safely at all times. For situational awareness only! Restrictions of connected Collision Warning Units (CWU) apply.

Never make safety critical decisions based on displayed information.

> Butterfly Displays do not have an ETSO or FAA-TSO airworthiness certification. Make sure that it is legal to install it in your aircraft.

> Do not use Butterfly Displays if pilot-workload is increased by failure of Butterfly Displays or attached subsystems.

Flights at Night

Butterfly Displays feature a display backlight that is not diammable. Therefore they are not suitable for use at night or in low lighting conditions as flight crew may be distracted.

> Do not use Butterfly Display at night

Intellectual Property and Liability

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development team, suppliers, manufacturers and data suppliers accept no responsibility for any damage or claims that may arise from use of Butterfly Vario.

Trademarks referred to in this document are the property of their respective holders. Any decompiling, disassembly, reverse engineering, or modification of the instrument or firmware are strictly prohibited without specific written permission from Butterfly Avionics GmbH.

Support

World

To get support, please contact your local authorized Butterfly dealer.

Europe

Please contact us via eMail or Phone. Find more information on www.butterfly.aero or +49 (0) 6224 98 96 999

Troubleshooting

If you experience issues installing or using your device, please visit the knowledge base on http://support.air-avionics.com

Please contact us if you can not find answers to your questions. We will help you resolving your issue and post the answers in the knowledge base so that all users can take profit.

Delivered parts and Accessories

Delivered Parts

The following parts are contained in every Butterfly Display delivery.

Item	*Part Number*	*Description*
Butterfly Display	B101 or B102	Butterfly Display main unit
RJ12 cable	-	cable RJ12, FLARM-standard
Installation material	-	4 screws for mounting the device
Short Documentation	-	Printed short manual

Accessories

Following accessories can be obtained from AIR Avionics or authorized dealers.

Item	*Part Number*	*Description*
RAM-Mount for Butterfly Display external	6.1.2.0002	Robust RAM-Mount system
Reduction 80mm/57mm	27.1.0.0001	Reduction from 80mm to 57mm panel cutout
Updatecable	1.1.0.0008	Cable for software updates via PC

Please visit www.air-store.eu to order accessories.

Hardware-Types

Hardware-Types

Two types of Butterfly Displays with identical functionality are available. A 57mm panelmount type and an external type. The following table shows all currently available hardware types.

Hardware Type	*Partnumber /Versio*	*Sold from*	*Rotary Knobs*	*Housing*
57mm Panelmount	B102 / 2	March 2010	2, concentric	Aluminium, powder-coated
57mm Panelmount	B102 / 2.1	August 2012	1	Aluminium, powder-coated
external unit	B101 / 3	April 2011	1	Aluminium, powder-coated

Abbildung 3.1: Hardware Versions: B102 Version 2 / B102 Version 2.1 / B101 Version 3

Discontinued hardware-types

The following table shows old, no longer sold hardware types/versions.

Hardware Type	*Partnumber/ Version*	*Sold from*	*Rotary Knobs*	*Housing*
57mm Panelmount	B102 / 1	November 2007	2, concentric	plastic
57mm Panelmount	B102 / 1.1	June 2008	2, concentric	plastic
external unit	B101 / 1	November 2007	2, concentric	plastic
external unit	B101 / 2	June 2008	2, concentric	plastic

Dimensions

Dimensions 57mm panelmount

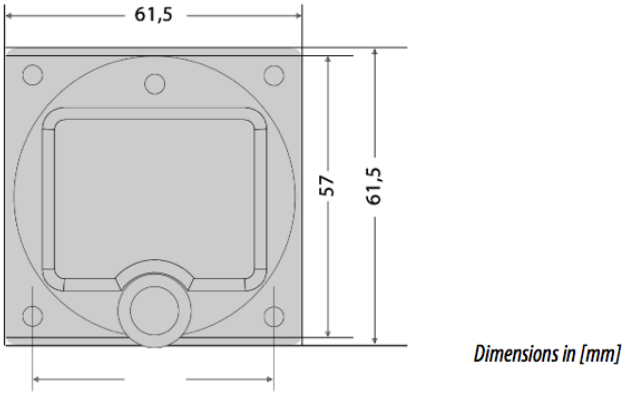
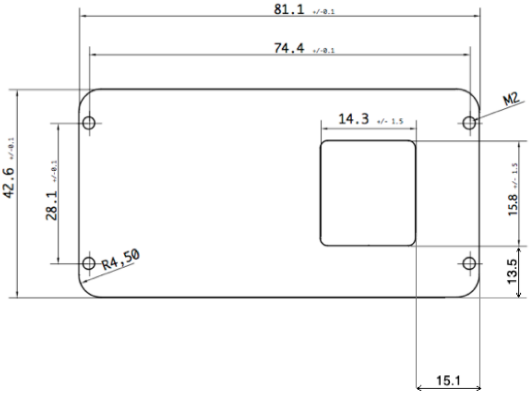


Abbildung 3.2: Mechanical Dimensions 57mm panelmount

Dimensions external unit



Dimensions in [mm], M2 thread depth: 5mm.

Abbildung 3.3: Mechanical Dimensions external unit

Connector and cabling

Power and Data Connector

Butterfly Displays feature one central connector für power and Data with FLARM-Display standard (RJ12) pinout.

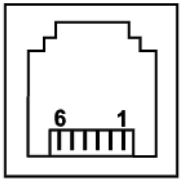


Abbildung 3.4: RJ12 Power/Data Connector

Pin Number RJ12	*Signal/Purpose*
1	not used
2	RS232 TX - Display sends data
3	RS232 RX - Display receives data
4	GND - Ground (minus)
5	3.0V to 3.3V (Power supply)
6	not used

RJ12 cable

An RJ12 to RJ12 Patchcable is included in delivery.

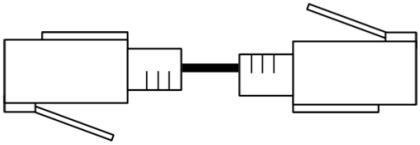


Abbildung 3.5: RJ12 cable

Additional cables are available directly from Butterfly at www.air-store.eu

Butterfly Displays have a supply voltage range of 3.0 to 3.3VDC. Higher voltages permanently destroy Butterfly Displays. All FLARM®-compatible units (FLARM, PowerFLARM, TRX) supply Butterfly Displays with the required voltage.

Technical data

Power supply and consumption

- Input voltage range: 3.0V bis 3.3V DC
- Typical power consumption: 45mA at 3.3V DC
- Recommended Fuse: 0.3A CB (only when supplied externally).
- Typical energy consumtion $<$0.2W at 3.3V DC
- Mass Butterfly Display 57: 125g
- Mass Butterfly Display External: 56g

Environmental Conditions

- moderate vibration
- Operating temperature: -20C to +70C

Additional information about environmental criteria according to RTCA DO-160(G) on request

The electrical installation has to be undertaken according to the guidelines and regulations applicable to the specific aircraft type. When uncertain as to how to perform any aspect of the installation, you should consult with an aeronautical engineer or an aircraft maintenance facility. In all cases the installation is to be performed only with expert advice in accordance with this guidance.

Cabling

> When installing Butterfly Display cables, make sure to comply with basic rules of cabling in aircraft regarding to EMI minimization. Wrong routing may disturb critical systems like e.g. the aircrafts radio system.

Butterfly Displays are directly supplied using the RJ12 connector. Make sure that all requirements regarding power supply are being met. Using aviation grade certified wires is recommended.

> Never flex or crack cables.

> Wrong polarity will permanently destroy the device.

> It is very important that the cable is fixated closely to the display so that no force or vibration can be applied to the display connector. The cable may only be shortened by experts.

Mechanical Installation

> Make sure that the mechanical Installation does not interfere with control movement or emergency procedures . Especially canopy jettison/release must not be constrained.

Butterfly Displays can be installed in the area of the instrument panel of the aircraft. Plan sufficient space for connecting/disconnecting the main power/data cable. Butterfly Displays have to be installed at least in a distance of 30cm to magnetical compasses.

The enclosure is not watertight. The ingress of solid particles or liquids is to be strictly avoided. If the unit gets moist, dry it before further use. If the unit gets wet, please consult an expert / repair facility to adequately clean the unit before further use.

Butterfly Displays do not contain a security glass front. Mechanical force applied to the display will destroy the display.

Installation of the 57mm panelmount version

The device is installed in standard-57mm-panel cutout (2.25") and fixated with four M3 DIN7985 screws (included in delivery).

After installation of the main unit, the supplied rotary knobs have to be checked/installed and the power/data cable is connected.

Installation of the external version

The external display may either be fixated with the supplied M2 screws, with DualLock® tape (not included in delivery) or with mounts (see accessories list). Screen direction and thus installation direction can be modified in 90deg steps.

After installation of the main unit, the power/data cable is connected.

Viewing angle and readability

When installing your display make sure that the viewing angle is as straight as possible. Readability largely depends on the viewing angle.

Polaroid sunglasses may reduce display luminance depending on polarization and screen direction.

Butterfly Display external: The display screen direction can be rotated 90deg-wise for optimal installation. Not only "landscape"but also "portait-modeïs possible.

RS232 interface and compatibility

Butterfly Displays are compatible to systems, that transmit data via TIA-232-F ("RS232") standards using the FLARM-NMEA-Protocol. Butterfly Displays may communicate bidirectionally.

data-rate of RS232 Interface

The data-rate of the RS232-interface is variable. Butterfly Displays automatically adjust to the used data-rate. The minimum data-rate is 19200Bd, the maximum data-rate 57600Bd.

Examples of connections to traffic systems

Classic FLARM devices

Connect the Butterfly Display via an Y-Adapter to the „Power/Data"-Port of classic FLARM devices.

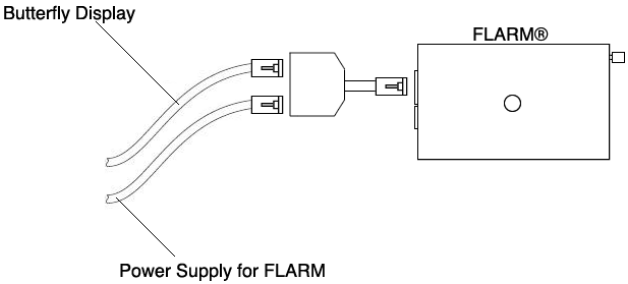


Abbildung 5.1: Classic FLARM® connected via Y-Adapter

PowerFLARM devices

Connect Butterfly Displays to the RJ45-connector of the PowerFLARM device. RJ45 to RJ12 cables are available at www.air-store.eu. If you supply your PowerFLARM over the same connector, use a Y-Adapter or a connection power set available at www.air-store.eu as well.

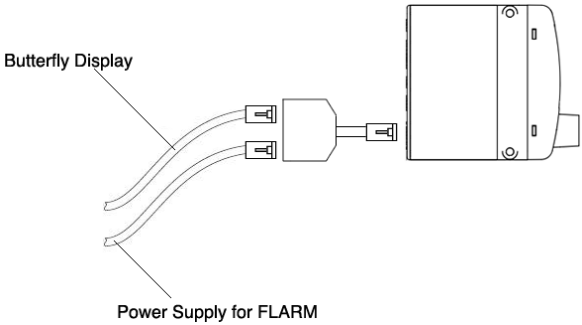


Abbildung 5.2: PowerFLARM® connection via Y-Adapter

TRX-devices

Butterfly Displays can be directly connected to TRX-1090 or TRX-2000 devices on Port 2 (RJ45). RJ45 to RJ12 cables are available at www.air-store.eu.

For connection to TRX1500 devices a special adapter-cable is required. This cable is available as well from Butterfly at www.air-store.eu.

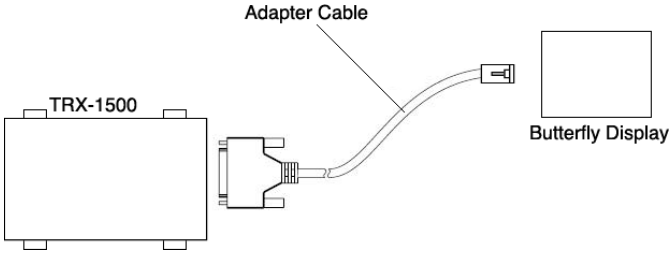


Abbildung 5.3: TRX-1500 Connection via adapter cable

Controls

Butterfly Displays are controlled with a rotary-knob with an integrated push-button.

Controls of different hardware-types and -versions

Hardware Type	*Partnumber /Versio*	*Sold from*	*Rotary Knobs*	*Housing*
57mm Panelmount	B102 / 2	March 2010	2, concentric	Aluminium, powder-coated
57mm Panelmount	B102 / 2.1	August 2012	1	Aluminium, powder-coated
external unit	B101 / 3	April 2011	1	Aluminium, powder-coated

Abbildung 6.1: Different Hardware: B102 Version 2 / B102 Version 2.1 / B101 Version 3

Operation

Possible user actions for hardware with one single rotary knob

Element	*Action*	*Function*
rotary-knob	rotate	Selection of traffic-target or menu item
rotary-knob and pushbutton	push, hold and simultaneously Rotate	Zoom / Display page selection
Push-Button	short push (shorter than 1 second)	Execute a menu item, enter detail-view of traffi
Push-Button	long push (longer than 2 seconds)	Open and close the menu

Possible user actions for hardware with two concentric rotary knobs

Element	*Action*	*Function*
small rotary-knob	rotate	Selection of traffic-target or menu item
big rotary-knob	rotate	Zoom / Display page selection
Push-Button	short push (shorter than 1 second)	Execute a menu item, enter detail-view of traffic-target
Push-Button	long push (longer than 2 seconds)	Open and close the menu

Boot-process, Error Messages and First Use

Switching the unit on / boot process

Butterfly Displays are switched on as soon as power is supplied to the power-supply pin. Normally Butterfly Displays are switched on by the connected collision warning device. During the boot process important system and version information is displayed on a dedicated boot-screen.

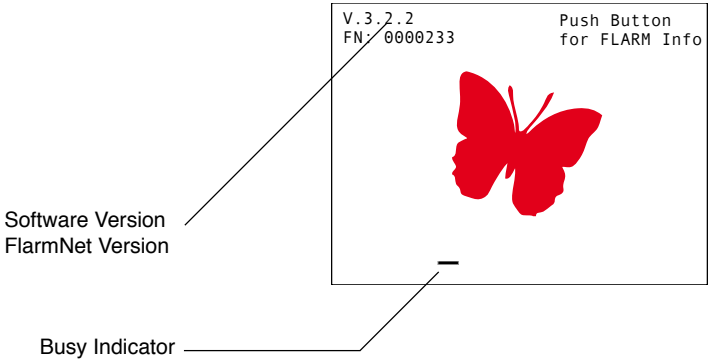
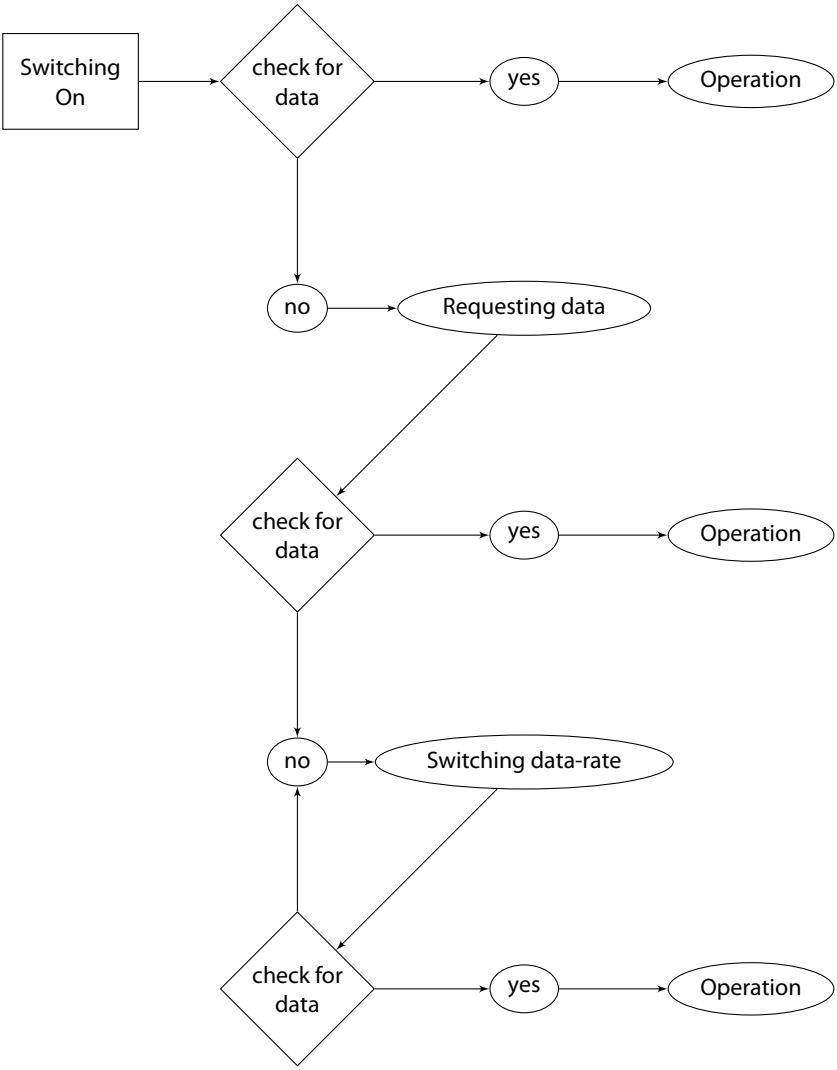


Abbildung 6.2: Boot-Screen.

A small cursor ("busy indicator") shows that the system is working. During booting, the unit trys to establish a data connection to the host collision warning unit. The following diagram shows the process

> If boot process stops without success the busy indicator will stop. This means that your display does not receive data from the host device.



Information about connected FLARM device

During the start/boot sequence, it is possbile to access additional information about the connected FLARM device by pushing the button during the boot phase.

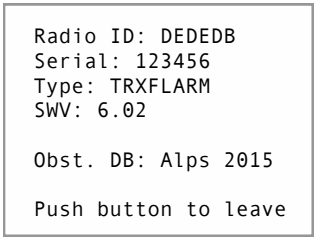


Abbildung 6.3: Info Screen about connected FLARM device.

Error Messages

Whenever an Error is detected in the connected FLARM device, an error message is displayed as a popup window over the screen. Non critical error messages can be quit with a button push, critical error messages can not be quit.

Settings before first flight

- Volume: Open the menu, go to *Volume* and set your desired volume of the alert-buzzer.
- Selection mode or Nearest mode: Open the menu, go to *System* and select your desired mode
- Units: Open the menu, go to *System* and set up your desired units-combination

> Never fly with Butterfly Displays without extensive familiarization on ground!

No traffic received

If there is no traffic in range / received, Butterfly Displays show a special information screen with an UTC Clock and information about GPS and FLARM system status of the connected collision warning unit. Green indicators show normal operation, red ones indicate failures.

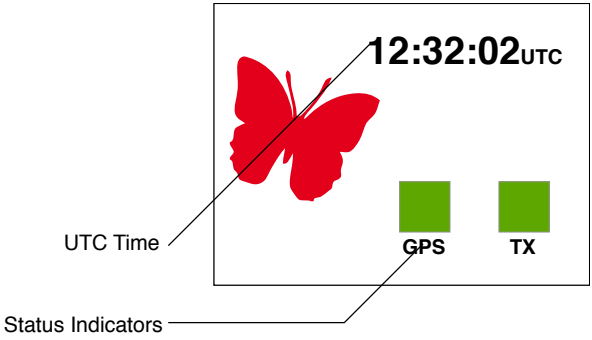


Abbildung 7.1: Info-Screen with status indicators and UTC time

> A red GPS-Indicator means that the connected collision warning unit does not have sufficient GPS reception to determine the current position.

Traffic is received

If traffic is received, the pilot is able to select different views. A radar-like view with different zoom-factors and a list-view are available.

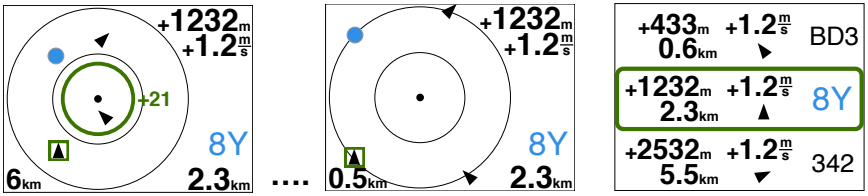


Abbildung 7.2: Different views when traffic is received (not all zoom-scales shown)

NEAREST and SELECT-mode

There are two different modes NEAREST and SELECT-Mode, the current mode can be set up in the menu, *System*.

- In SELECT-Mode (Standard) targets can be selected with the rotary knob
- on NEAREST-Mode targets can be selected with the rotary knob, the selection automatically switches back to the nearest (closest) target after 10 seconds

Radar-View

In the radar-view received traffic is shown on a radar-like display. Traffic is displayer as arrows with the arrow direction depicting the current flight direction. Circling traffic is displayed as blue circles.

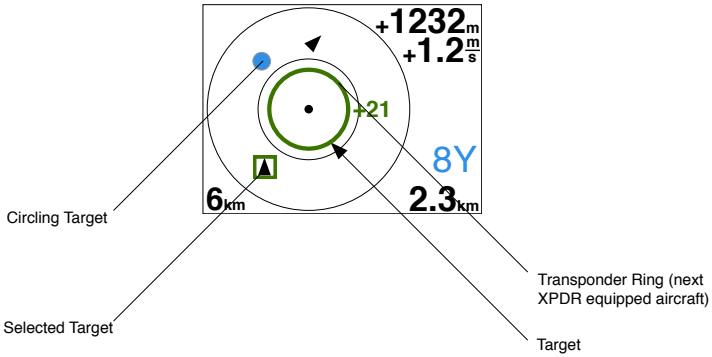


Abbildung 7.3: Radar-view with different symbols

Non directional traffic info (transponders without ADS-B) is displayed as a ring around the own ships position with relative altitude display. The ring diameter - corresponding to the current zoom-scale shows the distance, the relative altitude indicator on the right shows vertical separation. Depending on selected unit vertical separation is displayed in 100m or FL (100ft) steps.

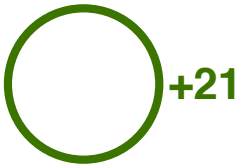


Abbildung 7.4: Transponder-Ring with vertical separation indication in 100ft steps, here 2100m above

On the right side of the display, additional numerical information to the selected target

is shown. If a target is selected, values like relative altitude, distance, climb/sinkrate and identification regarding the selected target are shown. When a target is circling, the circling direction is shown as well. Units of displayed values are user-configurable.

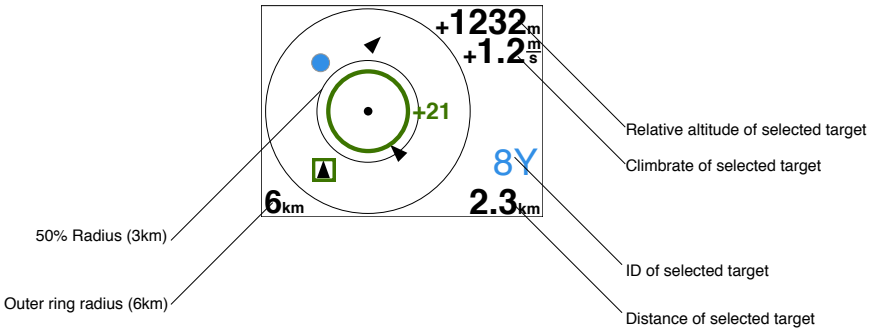


Abbildung 7.5: Radar view: values of selected target

Abbildung 7.6: Circling direction right and left

The current zoom-level of the radar screen (magnification) is shown in the lower left-hand corner. The displayed value corresponds to the outer range-circle of the radar screen. The inner range circle is a half of the outer one. If traffic is outside of the currently set up range, it still is shown on the edge of the radar for better situational awareness at high zoom-scales.

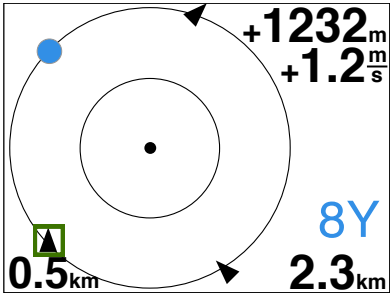


Abbildung 7.7: High zoom scale, targets with larger distance than zoom-scale still are displayed on the edge of the radar screen.

List-view

In addition to the radar-view a scrollable list (sorted after distance) is available.

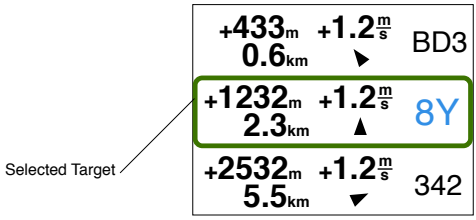


Abbildung 7.8: Listview

Flarmnet-Function

With a single short button-push you can open a FlarmNet detail page where details to the selected target are shown.

> FlarmNet is a free-to-use database of FLARM users. Anybody can participate and add their personal data on http://www.flarmnet.org.

Team-Funktion

Important targets like team-mates can be marked in a special team-color (orange).

Marking a target in team colors:

- Open the Flarmnet detail view with a short button-push
- Push long to mark/unmark a target

Abbildung 7.9: Marked and not marked target

Stealth-Function

In the menu, *FLARM*, *Stealth* you can activate the FLARM-STEALTH mode. Details can be found in the user manual of your connected FLARM device.

Traffic Warnings

If there is a dangerous situation and the connected collision warning unit detects a threat, a dedicated warn-screen appears together with an audible warning. The warning screen may not be quit by the user.

The warning-screen shows the viewing angle to the most dangerous collision threat. A compass-style indicator gives information about the horizontal viewing angle to the threat. The vertical viewing angle is depicted on the right side of the warn screen. Additionally the distance to the most dangerous target is indicated on the right (always in the set up unit, i.e. Kilometer, Nautical Miles or statute Miles).

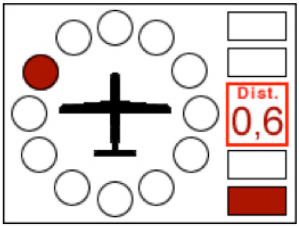


Abbildung 8.1: Warning screen, threat at 10 O'Clock position, below, distance 0.6(km)

Warning-screen vertical viewing angles

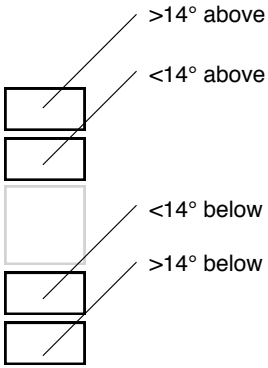


Abbildung 8.2: Vertical Viewing-Angles

Warning-screen distance Indicator

The displayed distance corresponds to the projected horizontal distance, this means not the actual distance (function of relative altitude and horizontal distance) but only the horizontal component.

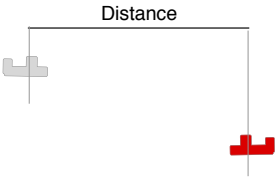


Abbildung 8.3: Distances on the warn-screen

Displayed directions relate to the aircrafts movement relative to ground (GPS-Track). Strong wind may falsify displayed directions significantly.

Depending on your collision warning unit, reception and its set up, the first warning will be given approximately 18 seconds before an eventual collision. When you encounter a warning only take a short look at the display and immediately look outside to find and identify the collision threat. Never try to look inside the cockpit or on the display when planning traffic avoidance maneuvers.

> Carefully read the restrictions of your connected collision warning unit!

> Train on ground on how to react in case of a collision warning before flying!

Special warning-screens

In special cases additional information is displayed on warning-screens.

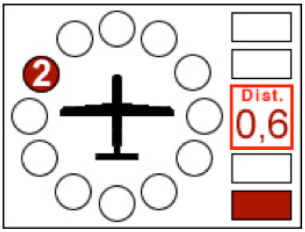


Abbildung 8.4: warning with two threats, the more important of which is at 10 O'Clock position, below, distance 0.6(km)

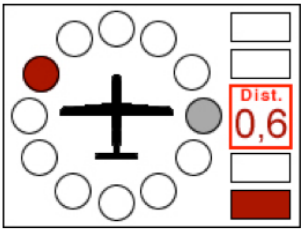


Abbildung 8.5: warning with team-mate/formation-mate that may be dangerously near when turning sharply to the right.

Obsatcle Warnings

In case of a FLARM Obstacle Alert, a special warn screen is shown including an obstacle symbol.

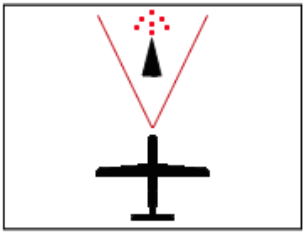


Abbildung 8.6: Obstacle Warning Screen

The installation of a current obstacle database in the connected FLARM device is required for the displa of obstacle warnings. Butterfly Displays do not contain own obstacle data.

In the menu you can access settings that help you adapt Butterfly Displays to your individual requirements. You can access the menu by pushing longer than 2 seconds on the push-button.

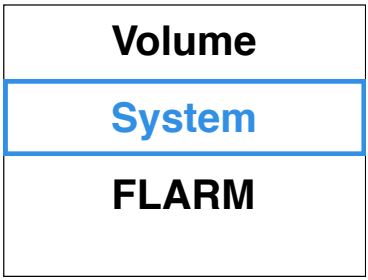


Abbildung 9.1: Menu-Screen

Menu-Diagramme

Main menu:

- Volume: Volume setup
- System: System setup
- FLARM: FLARM setup

Main menu - Volume:

- Volume setup

Main menu - System:

- Units (currently used units are displayed)
- Nearest Mode / Select Mode: Currently used mode is displayed
- XPDR-Alarm: Activates/deactivates XPDR alarms
- Screen Direction: rotates the screen in 90degrees steps (only external version)

Main menu - FLARM:

- Stealth: Activates/deactivates FLARM Stealth Mode
- FLARM UI: Activates/deactivates the userinterface of classic FLARM devices

Updates

Update with PC and Cable

- Download the update-software and run it on your PC.
- Connect the update cable to your pc and supply the cable with power.

> Do not connect the Butterfly Display yet.

- Select the appropriate COM-port and process all dialogues with „OK".
- Push the pushbutton on your display and hold.
- Now connect your display and release the pushbutton after connecting.
- Wait until the update is finished.

> To update your display you need a Butterfly Display update adapter or a similar cable.

Update via PowerFLARM Devices

PowerFLARM CORE:

- Copy Butterfly firmware (.bfw) and/or flarmnet (.bfn) to a USB stick.
- Connect stick to Core.
- Switch on system with BF display knob pressed.
- Verify BF display goes into UPDATE MODE with 'WAITING', then 'LOADING'.
- Wait until BF display restarts (can take up to two minutes).

PowerFLARM Portable:

- Copy Butterfly firmware (.bfw) and/or flarmnet (.bfn) to micro SD card.
- Insert micro SD card into slot.
- Activate menu entry Info -> Disp. update.
- Switch on system with BF display knob pressed.
- Verify BF display goes into UPDATE MODE with 'WAITING', then 'LOADING'.
- Wait until BF display restarts (can take up to two minutes).

Appendix A - FLARM EULA

This appendix contains the End User License Agreement issued by FLARM Technology Ltd., the licensor of FLARM devices.

By purchasing or using a FLARM device or by downloading, installing, copying, accessing, or using any FLARM Technology Ltd. (hereafter "FLARM Technology") software, firmware, license key, or data, you agree to the following terms and conditions. If you do not agree with the terms and conditions do not purchase or use the FLARM device and do not download, install, copy, access, or use the software, firmware, license key, or data. If you are accepting these terms and conditions on behalf of another person, company, or other legal entity, you represent and warrant that you have full authority to bind that person, company, or legal entity to these terms and conditions. If you are purchasing or using a FLARM device, the terms "firmware", "license key", and "data"refer to such items installed or available in the FLARM device at time of purchase or use, as applicable.

1. License and Limitation of use

1.1. License

Subject to the terms and conditions of this Agreement, FLARM Technology hereby grants to you a non-exclusive, non-transferable right to download, install, copy, access, and use the software, firmware, license key, or data in binary executable form solely for your own personal or internal business operations. You acknowledge that the software, firmware, license key, or data and all related information are proprietary to FLARM Technology and its suppliers.

1.2. Limitation of use

Firmware, license keys, and data may only be used as embedded in and for execution on devices manufactured by or under license from FLARM Technology. License keys and data may only be used in the specific devices, by serial number, for which they were sold or intended. Software, firmware, license keys, and data with an expiration date may not be used after the expiration date. Right to download, install, copy, access, or use software, firmware, license key, or data with an expiration date does not imply right to upgrade or extension of the license beyond the expiration date. No other licenses are granted by implication, estoppel or otherwise.

Terms of use of FLARM

2.1.

Every FLARM installation must be approved by licensed Part-66 certifying staff or the national equivalent. A FLARM installation requires an EASA Minor Change Approval or the national equivalent.

2.2.
FLARM must be installed according to the Installation Instructions and the EASA Minor Change Approval, or the national equivalent.

2.3.
FLARM cannot warn in all situations. In particular warnings may be incorrect, late, missing, not being issued at all, show other threats than the most dangerous or distract the pilot's attention. FLARM does not issue resolution advisories. FLARM can only warn of aircraft that are equipped with FLARM, SSR transponders (in specific FLARM devices), or of up-to-date obstacles stored in its database. The use of FLARM does not allow a change of flight tactics or pilot behavior. It is the sole responsibility of the pilot in command to decide upon the use of FLARM.

2.4.
FLARM may not be used for navigation, separation, or under IMC.

2.5.
FLARM does not work if GPS is inoperative, degraded, or unavailable for any reason.

2.6.
The most recent Operating Manual must be read, understood and followed at all times.

2.7.
The firmware must be replaced once per year (every 12 months). The firmware must also be replaced earlier if a Service Bulletin or other information is published with such instruction. Failure to replace the firmware may render the device inoperable or incompatible with other devices, with or without warning or notice thereof.

2.8.
Service Bulletins are published as a Newsletter by FLARM Technology. You are required to sign up for the Newsletter on www.flarm.com to ensure that you are informed of published Service Bulletins. If you are entering into this agreement in a form where your email address is available (e.g. online shop) you may be automatically signed up for the Newsletter.

2.9.
After power-up, FLARM performs a self-test which must be monitored by the pilots. If a malfunction or defect is observed or suspected, FLARM must be disconnected from the aircraft by maintenance before the next flight and the device inspected and repaired, as applicable.

2.10.
The pilot in command is solely responsible to operate FLARM according to applicable national regulations. Regulations might include, but are not limited to, airborne usage of radio frequencies, aircraft installation, safety regulations, or regulations for sports competitions.

3. Intellectual Property

No part of the software, firmware, license keys, data (including obstacle databases), the FLARM radio protocol and messages, and the FLARM hardware and design may be copied, altered, reverse engineered, decompiled or disassembled without an explicit and written approval by FLARM Technology. Software, firmware, license keys, data (including obstacle databases), the FLARM radio protocol and messages, the FLARM hardware and design, and the FLARM logos and name are protected by copyright, trademark and patent laws.

4. Manipulation

It is forbidden to intentionally feed artificially generated signals to the FLARM device, its GPS antenna or the external/internal GPS antenna connections.

5. FLARM Data and Privacy

5.1.

FLARM devices receive, collect, store, use, send, and broadcast data to enable the system to work, improve the system, and to enable troubleshooting. This data may include, but is not limited to, configuration items, aircraft identification, own positions, and such data of other aircraft. FLARM Technology may receive, collect, store, and use this data for said purposes and in addition for Search and Rescue (SAR) purposes.

5.2.

FLARM Technology may share data with its partners for aforementioned purposes. FLARM Technology may in addition publicly make available data from a FLARM device (Flight Tracking), unless the FLARM device in question has been configured to limit tracking. If a FLARM device has been configured to limit tracking, SAR and other services may not be available.

5.3.

Data sent or broadcast by FLARM devices may only be used at own risk and under the same conditions as the FLARM device itself. FLARM Technology is not responsible for any third party device, software, or service receiving, collecting, storing, using, sending, broadcasting, or making publically available data regardless of whether legally or illegally.

6. Warranty, Limitation of Liability, and Indemnification

6.1.

Warranty. FLARM devices, software, firmware, license keys, and data are provided on an äs is"basis without warranty of any kind — either expressed or implied — including, without limitation, any implied warranties of merchantability or fitness for a particular purpose. FLARM Technology does not warrant the performance of the device, software, firmware, license key, or data or that the device, software, firmware, license key, or data will meet your requirements or operate error free.

6.2.

Limitation of Liability. In no event shall FLARM Technology be liable to you or any party related to you for any indirect, incidental, consequential, special, exemplary, or punitive damages (including, without limitation, damages for loss of business profits, business interruption, loss of business information, loss of data or other such pecuniary loss), whether under a theory of contract, warranty, tort (including negligence), products liability, or otherwise, even if FLARM Technology has been advised of the possibility of such damages. In no event will FLARM Technology's total aggregate and cumulative liability to you for any and all claims of any kind arising hereunder exceed the amount of fees actually paid by you for the device, license keys or data giving rise to the claim in the twelve months preceding the claim. The foregoing limitations will apply even if the above stated remedy fails of its essential purpose.

6.3.

Indemnification. You will, at your own expense, indemnify and hold FLARM Technology, and all officers, directors, and employees thereof, harmless from and against any and all claims, actions, liabilities, losses, damages, judgments, grants, costs, and expenses, including reasonable attorneys' fees (collectively, "Claims"), arising out of any use of a FLARM device, software, firmware, license key, or data by you, any party related to you, or any party acting upon your authorization.

7. General terms

7.1.

Governing Law. This Agreement shall be governed by and construed in accordance with the internal law of Switzerland (to the exclusion of Swiss Private International Law and of international treaties, in particular the Vienna Convention on the International Sale of Goods dated April 11, 1980).

7.2.

Severability. If any term or provision of this Agreement is declared void or unenforceable in a particular situation, by any judicial or administrative authority, this declaration shall not affect the validity or enforceability of the remaining terms and provisions hereof or the validity or enforceability of the offending term or provision in any other situation. To the extent possible the provision will be interpreted and enforced to the greatest extent legally permissible in order to effectuate the original intent, and if no such interpretation or enforcement is legally permissible, shall be deemed severed from the Agreement.

7.3.

Headings. The Article and Section headings contained in this Agreement are included for reference purposes only and shall not affect the meaning or interpretation of this Agreement.

7.4.

No Waiver. The failure of either party to enforce any rights granted hereunder or to take action against the other party in the event of any breach hereunder shall not be deemed a

waiver by that party as to subsequent enforcement of rights or subsequent actions in the event of future breaches.

7.5.

Amendments. FLARM Technology reserves the right, in its sole discretion, to amend this Agreement from time to time by posting an updated version of the Agreement on www.flarm.com, provided that disputes arising hereunder will be resolved in accordance with the terms of the Agreement in effect at the time the dispute arose. We encourage you to review the published Agreement from time to time to make yourself aware of changes. Material changes to these terms will be effective upon the earlier of (i) your first use of the FLARM device, software, firmware, license key, or data with actual knowledge of such change, or (ii) 30 days from publishing the amended Agreement on www.flarm.com. If there is a conflict between this Agreement and the most current version of this Agreement, posted at www.flarm.com, the most current version will prevail. Your use of the FLARM device, software, firmware, license key, or data after the amended Agreement becomes effective constitutes your acceptance of the amended Agreement. If you do not accept amendments made to this Agreement, then it is your responsibility to stop using the FLARM device, software, firmware, license key, and data.

7.6.

Governing Language. Any translation of this Agreement is done for local requirements and in the event of a dispute between the English and any non-English versions, the English version of this Agreement shall govern.