
PowerFLARM Tips



Paul Remde

www.cumulus-soaring.com

paul@remde.us

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Safety Equipment Requires Care and Maintenance

- Install and configure according to product-specific instructions. Configure your assigned aircraft address, type, and privacy needs.
- Verify the effectiveness of the installation and configuration after flight using the online range analyzer, then improve if required. Repeat this annually.
- Update at least every 365 days to avoid firmware and/or obstacle database expiration.
- FLARM requires good GPS reception to operate. Install the GPS antenna with unobstructed view of the sky in all flight attitudes and at least 30 cm away from any other antenna.
- Radio range is key for early traffic warnings and depends on a good installation of radio antennas and cables. Radio signals require unobstructed line of sight; thus avoid conducting materials (metal, carbon) in any direction you want FLARM to be effective. Nearby antennas, conducting material, or cables may cause interference and/or reduce effectiveness. Keep your antennas at least 30 cm away from any other antenna, and without direct contact to your canopy. Do not use splitters for FLARM radio antennas.
- Do not shorten antenna cables, and do not bend them below specified minimal radius. Replace defective cables and antennas.
- Ensure that your FLARM display communicates correctly with the FLARM device.
- Use PowerFLARM for better range and radio diversity.
- Familiarize yourself prior to the flight with your device and the technology in detail, to operate in a safe and efficient manner and know the limitations.

Configuration

The PowerFLARM **must** be configured before use! An incorrect setting may lead to false alarms, not only to you, but also to surrounding aircraft.

The best way to create a configuration file is to use the online configuration tools available here:

PowerFLARM Online Configuration Tool:

<http://flarm.com/support/tools-software/flarm-configuration-tool/>

or

<http://www.flarm.com> - Then click on "Support", "Tools & Software", "FLARM Configuration Tool"

I recommend the following settings:

- Device Part No.: (Printed on the product label that is attached to the PowerFLARM unit.)
 - FLAPFC11A (or similar) (PowerFLARM Core)
 - FLAPFP24A (or similar) (PowerFLARM Portable)
- Configuration Method: Manual
- Show Advanced Settings: Checked
- Data Sentences (for all serial ports): “GPS and FLARM”
- Data Sentences Protocol (for all serial ports): “Version 7”
- Baudrates (for all serial ports): 19200
- FLARM horizontal range: Unlimited
- FLARM vertical range: 2000 m
- ADS-B horizontal range:
 - Initial Setup: Unlimited (to verify it is working well)
 - After initial testing: 5 km
- ADS-B vertical range:
 - Initial Setup: Unlimited (to verify it is working well)
 - After initial testing: 1000 m
- PCAS (Mode-S/C) horizontal range:
 - Initial Setup: 10 km (to verify it is working well)
 - After initial testing: 5 km
- PCAS (Mode-S/C) vertical range:
 - Initial Setup: Unlimited (to verify it is working well)
 - After initial testing: 1000 m
- Process Mode-C targets: **YES**
- Mode-C filtering method:
 - If you have a Mode C transponder: Aggressive
 - If you have no transponder or a Mode S transponder: Less aggressive
- PCAS antenna calibration value:
 - PowerFLARM Core: 30?
 - PowerFLARM Portable: 40?
- Transponder Type: (set to match the transponder in your glider)
- Use barometric altitude from Mode-S transponder:
 - If you have a Mode-S transponder: YES
 - If you don’t have a Mode-S transponder: NO
- Beep on PCAS alarms: YES (unless you are getting too many transponder alarms, then: NO)
- PCAS targets as PFLAU on RJ45: NO
- PCAS targets as PFLAU on D-sub: NO
- Enable Audio:
 - If your setup is wired to send audio alerts to your aviation headset: YES
 - Otherwise: NO
- Audio Volume (%): 100
- Remove obstacle database: NO
- Remove all IGC files: NO
- ICAO 24-bit address, hexadecimal: (six character Mode-S address available from FAA web site below)
- Aircraft type: Glider/motor glider
- Logging interval (seconds): 1
- Glide ID: (N number in the USA)
- Competition ID: (number on tail fin – if applicable)
- Stealth mode: Disable

- No-Track mode: Disable

Please refer to the PowerFLARM Manual for instructions for loading the configuration file into the PowerFLARM unit.

Manuals

The latest PowerFLARM manuals are available here:

<http://flarm.com/support/manuals-documents/>

Firmware Upgrades

The latest PowerFLARM Firmware Updates are available here:

<http://flarm.com/support/firmware-updates/>

Resources for Finding Your Sailplane's Mode S Address - to be entered in the PowerFLARM

USA: http://registry.faa.gov/aircraftinquiry/NNum_Inquiry.aspx or <http://www.airframes.org/>

Canada: <http://wwwapps.tc.gc.ca/saf-sec-sur/2/ccarcs-riacc/RchSimp.aspx>

FLARM Range Analysis Tool

This is a great resource. It allows you to upload a flight log that was recorded with any FLARM unit. The tool creates a top-view range analysis plot showing the maximum distance to FLARM targets in all directions. The flight log contains data location of other FLARM units received during the flight. Flights to be analyzed must have at least a duration of 30 minutes and contact with 5+ other FLARM equipped aircraft during the flight. Only FLARM traffic data is analyzed. ADS-B and Mode C/S transponder traffic is not analyzed.

<http://flarm.com/support/tools-software/flarm-range-analyzer/>

USB Flash Drive Compatibility

I get phone calls very often from customers having a tough time transferring firmware or configuration files from a USB flash drive to a PowerFLARM Core or transferring flight logs from the Core to the USB flash drive.

The PowerFLARM Core manual states that any USB flash drive in version USB 1.0 or USB 2.0 (not USB 3.0) and with up to 32 GB of memory should work fine. They also recommend that the USB flash drive be formatted in the FAT file system.

In my testing, a **Sony Micro Vault Click 4 GB USB 2.0 flash drive (Model #: USM4GL)**, formatted for either FAT or FAT32 works great with all soaring instruments. I like this model because it has a built-in LED which indicates when data transfer is occurring. You may be able to find these at Amazon.com by searching for "USM4GL."

It is easy to use Windows to format a USB flash. Connect it to a PC and go to Windows Explorer (My Computer) and right-click on the drive and select "Format" from the pop-up menu. Set the File System to

“FAT” and the Allocation Unit Size to “Default allocation size” and uncheck the “Quick Format” check box (may not be necessary). Then click the “Start” button.

Note: If you find a USB flash drive that is able to get files off of the PowerFLARM Core, it is very likely that it will also work to transfer files to the PowerFLARM Core.

To transfer data between the USB flash drive and the PowerFLARM Core:

- Turn-off the PowerFLARM Core
- Plug the USB flash drive into the USB port on the PowerFLARM Core or into a USB extension cable that is connected to the Core.
- Power-up the PowerFLARM Core
- Wait 3 minutes. When the LED on the PowerFLARM
- Remove the USB flash drive

Never plug anything into the PowerFLARM Core’s USB port other than a USB flash drive. I have received a few PowerFLARM Core units with damaged USB ports. I sometimes suspect that the customer had a USB extension port mounted in the instrument panel and plugged their phone USB charging cable into it in an attempt to charge the phone. That would likely draw much more 5V current than the PowerFLARM Core’s USB port could provide.

Another common issue is files downloaded incorrectly which get the wrong file extension. Firmware files should have the “.fw” extension and the filename should look something like this: “powerflarm_6_07_5a5905f.fw”. The part of the filename before the “.fw” isn’t important. The PowerFLARM will see the file even if the part of the filename before “.fw” has been changed. License upgrade files should have the “.lic” file extension. Windows does not display filename extensions by default. To enable the display of file extensions In Windows 10, in Windows File Explorer, select the “View” tab and then **check** the “File name extensions” checkbox. In older versions of Windows, press and release the Alt key on the keyboard to show the menu, then go to Tools, View Tab, and **uncheck** “Hide extensions for known file types”.

FlarmNet.org

After you have configured your FLARM, I very highly recommend that you register your FLARM unit and glider at FlarmNet.org, and download and install the latest FlarmNet file into your FLARM traffic displays. FlarmNet is a great resource which makes it easy to identify your friends and competitors in flight. It is a database which connects FLARM unit ID numbers with the glider contest numbers. For example, when flying in a competition or soaring get-together, if you have registered your FLARM unit at FlarmNet.org and your friends and competitors are using the latest FlarmNet file, they will see your contest number on their FLARM displays and flight computers, instead of your FLARM’s internal ID number. Likewise, if you download and install the latest FlarmNet file into your FLARM traffic display units (LXNAV FlarmView, Naviter Oudie, LXNAV LX9000, etc.), and your friends have registered at FlarmNet.org, you will see their contest number rather than their FLARM’s ID number. Note: The FlarmNet file is not loaded into the PowerFLARM Core, it is loaded into the FLARM traffic display.

<http://www.flarmnet.org>

Antennas

Be very careful to you look at the antenna connectors very closely to ensure that you connect them to the correct ports on the FLARM unit. The longer antenna is the FLARM antenna. It should be connected to the FLARM A port. The shorter antenna is the ADS-B antenna and should be connected to the ADS-B port. **The FLARM and ADS-B antennas must be mounted oriented vertically.**

PowerFLARM Application Note RF Antennas

This is a great resource with tips for getting maximum range with your PowerFLARM antennas.

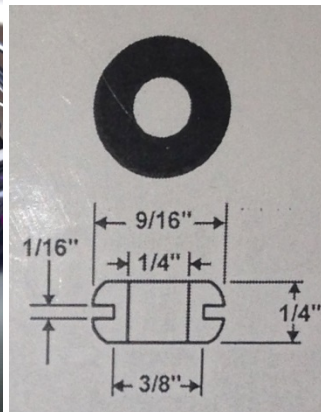
<http://flarm.com/wp-content/uploads/man/FTD-041-Application-Note-FLARM-Antenna-Installation.pdf>

or

<http://www.cumulus-soaring.com/flarm.htm> - Then click on the link near the top of the page.

FLARM Antenna Grommet Mount Solution

A customer suggested this approach to mounting the PowerFLARM Core ADS-B and FLARM dipole antennas. It is clever, simple and makes for a clean looking installation. 3 or 4 simple rubber grommets are used. I found the grommets at a local hardware store. The grommets have a hole diameter of $\frac{1}{4}$ " and fit in a $\frac{3}{8}$ " hole. They seem to hold the antennas quite securely. If I find that they are not tight enough I'll put some shrink tubing on the end of the antenna to make the fit more snug. The installation was very easy. The only slightly tough part was getting the 2 SMA connectors through the center grommet (before it was installed). After the first SMA connector was pushed through the grommet its cable made it more difficult to get the 2nd SMA connector through. Another approach would be to use a total of 4 grommets so each cable would go through its own grommet. The PowerFLARM Core's GPS antenna is mounted just under the instrument panel cover – on top of a variometer.



PowerFLARM Logger IGC Approval

The PowerFLARM has been **approved by the IGC for badge flights up to and including the three diamond badges**. It is not approved by the IGC for world records or national records. However, in **October, 2015, the SSA approved the use of products like the PowerFLARM for National and State Records** (see below).

From the FLARM IGC Approval Document

(i-ii) IGC-approval Level. This is for badge flights up to and including the three Diamonds. This type of recorder can also be used in gliding competitions in which the organizers allow this level of IGC-

approval. The Levels of IGC-approval are listed in Annex B to the Sporting Code for Gliding, para 1.1.3.3.

(Download full document here: [IGC-approval powerFlarm-IGC 2013-2-28a.pdf](http://www.fai.org/component/phocadownload/category/?download=6600:igc-approvalpowerflarm-igc2013-2-28a) or here: <http://www.fai.org/component/phocadownload/category/?download=6600:igc-approvalpowerflarm-igc2013-2-28a>)

From the IGC Sporting Code, Section 3, Annex B

1.1.3.3.3 IGC - approval for badge flights up to Diamonds . This approval level applies to Flight Recorders that may be used only for evidence for FAI/IGC Silver, Gold and Diamond badge flights, although for competition flights, see 1.1.3.3.6. This level may be used for recording systems that have significantly lower standards of security and other characteristics compared to those with higher levels of approval. For instance, this level includes systems that use a separate off-the-shelf GNSS unit (for the design and security of which, IGC has no influence) connected to the Flight Recorder unit by cable. These assessments will be at the discretion of the IGC GFA Committee (GFAC). (AL1)

US National & State Record Rules - Revised October 1, 2015 - Sections 6.2 and 6.3

http://www.ssa.org/files/member/USN&StateRulesFinal_October%201-2015.pdf or less directly, here: <http://www.ssa.org/BadgesAndRecords?show=blog&id=938>

(Only relevant parts included here)

6.2. For National Records: b. Documentation must be provided by a Flight Recorder IGC-approved at the “All Flights”, “All Badges” or “**Up to Diamonds**” level
(The PowerFLARM meets the "Up to Diamonds" level.)

6.3. For State Records: a. Documentation may be provided by any means acceptable for FAI Silver badge flights.
(The PowerFLARM exceeds that level.)

IGC Enable

PowerFLARM units have an optional "IGC Enable" license which determines whether or not that particular PowerFLARM is enabled with IGC Approval for badge flights.

Early PowerFLARM units all had the "IGC Enable" set. Then for a few years the IGC Enable license was an extra cost option. All PowerFLARM units sold after February, 2016 have the IGC Enable License included by default.

If the IGC enable is not set, flight logs from the unit can be used for the Online Contest (OLC), but not for badges. If the IGC Enable is set, then the flight logs can be used for both OLC and IGC badge flights.

Below are some notes on how to determine whether the IGC enable has been set in a particular PowerFLARM.

“IGC Enable License” **not** enabled

- Not IGC Approved for badge flights
- OK for OLC (Online Contest) flights
- File still validates OK in the IGC Shell program
- FLARMDEV.CSV diagnostic file shows “LIC=AUD:0;ENL:0;AZN:0;**IGC:0**;RFB:0;TIS:0” (or similar)
- Flight log file header first line: “AXFLxxx” (where xxx is the unit’s IGC serial number)

- Flight log file header contains: "HFFTYFRType:PowerFLARM"
- Flight log file header contains: "LFLA00103307LIC AUD:0;ENL:0;AZN:0;IGC:0;RFB:0;TIS:0" (or similar)

"IGC Enable License" enabled

- IGC Approved for badge flights up to and including the three Diamonds
- Not IGC approved for record flights
- Some U.S. National soaring contests require that the IGC Enable be set.
- FLARMDEV.CSV diagnostic file shows "LIC=AUD:0;ENL:0;AZN:0;IGC:1;RFB:0;TIS:0" (or similar)
- Flight log file header first line: "AFLAxxx" (where xxx is the unit's IGC serial number)
- Flight log file header contains: "HFFTYFRType:PowerFLARM-IGC"
- Flight log file header contains: "LFLA00103307LIC AUD:0;ENL:0;AZN:0;IGC:1;RFB:0;TIS:0" (or similar)

PowerFLARM Configuration File Deciphering Key

Customer sometimes send their PowerFLARM Configuration File to me to "verify it looks OK". That is a tall order, because the data in the file is somewhat cryptic and decoding the settings requires a lot of page-flipping in the PowerFLARM Configuration Specification document. The edited PowerFLARM configuration file below includes many comment lines which explain each setting and the acceptable values. It is a nice quick-reference for the many settings in the file. I very highly recommend using the online FLARM Configuration Tool at www.flarm.com to create the configuration file for your PowerFLARM, but the data below may be handy for checking the settings in an existing configuration file.

```
#####
# PowerFLARM Configuration Key by Paul Remde of Cumulus Soaring, Inc.
#####
# This configuration file must be text only and reside in the top directory
# of the USB stick, SD card or FLARM Tool.
# This configuration file must be named FLARMCFG.TXT
# If you wish to change the settings, you can revisit the online
# configuration tool at any time: http://www.flarm.com/
#####
#
$PFLAC,S,DEF
# DEF: Reset all settings to factory default
#
$PFLAC,S,NMEAOUT2,71
# NMEAOUT2: PowerFLARM Core DB-9 Connector,
# 71 = Version 7 FLARM and GPS data (recommended)
#
$PFLAC,S,BAUD2,2
# BAUD2: PowerFLARM Core DB-9 Connector Baudrate,
# 0=4800, 1=9600, 2=19200 (recommended), 3=28800, 4=38400, 5=57600
#
$PFLAC,S,NMEAOUT1,71
# NMEAOUT2: PowerFLARM Core RJ45 Connector,
# 71 = Version 7 FLARM and GPS data (recommended)
#
$PFLAC,S,BAUD1,2
# BAUD1: PowerFLARM Core RJ45 Connector Baudrate,
# 0=4800, 1=9600, 2=19200 (recommended), 3=28800, 4=38400, 5=57600
#
$PFLAC,S,RANGE,65535
# RANGE: FLARM horizontal range in meters,
# Acceptable: 2000 to 65535 (unlimited, recommended)
# Traffic outside this range will not be forwarded to the FLARM display.
```

```

#
$PFLAC,S,VRANGE,2000
# VRANGE: FLARM vertical range in meters, Acceptable: 500 and 2000 (recommended)
#
$PFLAC,S,ADSBRANGE,65535
# ADSBRANGE: ADS-B horizontal range in meters, Acceptable: 2000 to 65535 (unlimited)
# 65535 (unlimited) recommended for initial testing, 2000 recommended for contests.
# ADS-B traffic outside this range will not be forwarded to the FLARM display.
#
$PFLAC,S,ADSBVRANGE,65535
# ADSBVRANGE: ADS-B vertical range in meters, Acceptable: 100 to 65535 (unlimited)
# 65535 (unlimited) recommended for initial testing, 1000 recommended for contests.
#
$PFLAC,S,PCASRANGE,9260
# PCASRANGE: PCAS (transponder, non-directional) horizontal range in meters,
# Acceptable: 0 (OFF) to 9260
# 9260 recommended for initial testing, 1000 recommended for contests
#
$PFLAC,S,PCASVRANGE,65535
# PCASVRANGE: PCAS (transponder, non-directional) vertical range in meters,
# Acceptable: 100 to 65535 (unlimited)
# 65535 recommended for initial testing, 500 recommended for contests
#
$PFLAC,S,MODEC,1
# MODEC: Enables or disables processing of Mode-C transponder targets.
# 0=disabled, 1=Enabled
# In the U.S. we have a lot of small aircraft with Mode C transponders.
# I highly recommend enabled.
#
$PFLAC,S,OWNMODEC,1
# OWNMODEC: Selects method for suppressing the Mode-C transponder in your aircraft.
# 0=Aggressive (recommended, May suppress other Mode-C targets at same altitude.),
# 1=Less aggressive (May cause warnings from your own aircraft's Mode-C transponder.)
#
$PFLAC,S,PCASCALIBRATION,30
# PCASCALIBRATION: Sets PCAS antenna calibration value.
# A higher value makes PCAS targets appear closer,
# in other words, it compensates for low antenna gain and/or a long cable.
# Acceptable: 0 to 100, Default (recommended): 30
#
$PFLAC,S,XPDR,2
# XPDR: Type of transponder in your aircraft,
# 0=No transponder, 1=Mode-C transponder, 2=Mode-S transponder
# This parameter is very important.
# If it is not correct, your FLARM could display your own glider's
# transponder as a traffic target.
#
$PFLAC,S,MODESALT,1
# MODESALT: If enabled (1), the altitude from the aircraft's Mode-S transponder
# is used as a reference for vertical separation from traffic.
# 0=Disabled (recommended for aircraft with no transponder, or a Mode-C transponder)
# 1=Enabled (recommended for aircraft with a Mode-S transponder)
# This parameter is very important for aircraft with Mode-S transponders.
# If it is not correct, your FLARM could display your own glider's transponder
# as a traffic target.
#
$PFLAC,S,PCASBEEP,1
# PCASBEEP: Disables/Enables alarms and buzzer if non-directional (Mode-C/S)
# targets cross certain danger thresholds.
# Applies to the PowerFLARM Portable internal buzzer, and the Audio Output on
# PowerFLARM Portable, and PowerFLARM Core
# to aviation headsets.
# This feature only works if the Audio Output Enable (extra cost option) has been set

```



```

# and the audio output wires are connected to an aviation headset.
# 0=Disabled, 1=Enabled (recommended)
#
$PFLAC,S,PCASPFLAU1,0
# PCASPFLAU1: Output non-directional transponder traffic warnings as directional
# traffic on the RJ45 port.
# Useful only for old FLARM displays.
# 0=Disabled (recommended),
# 1=Enabled (recommended only for devices like the Aboba.ch Swiss-bat displays.)
#
$PFLAC,S,PCASPFLAU2,0
# PCASPFLAU2: Output non-directional transponder traffic warnings as directional
# traffic on DB-9 port.
# Useful only for old FLARM displays.
# 0=Disabled (recommended),
# 1=Enabled (recommended only for devices like the Aboba.ch Swiss-bat displays.)
#
$PFLAC,S,AUDIOOUT,0
# AUDIOOUT: Enables audio output on pins for beeps in aviation headsets - useful in
# motorgliders.
# 0=Disabled (recommended for most sailplanes), 1=Enable (recommended for motorgliders)
# This feature only works if the Audio Output Enable (extra cost option) has been set
# and the audio output wires are connected to an aviation headset.
#
$PFLAC,S,AUDIOVOLUME,100
# AUDIOVOLUME: Sets the volume percentage (0=quiet,100=loud) for the optional
# Audio Out connection.
# This feature only works if the Audio Output Enable (extra cost option) has been set
# and the audio output wires are connected to an aviation headset.
# This features only works if the AUDIOOUT has been set to 1.
#
$PFLAC,S,ID,A51D93
# ID: ICAO 6 character (base 16 / hex) Mode-S aircraft ID/Code.
# This parameter is very important for all aircraft, but especially for aircraft
# with Mode-S transponders.
# It is also very important to correctly enter your aircraft's Mode-S ID into your
# Mode-S transponder.
# If it is not correct, your FLARM could display your own glider's transponder as
# a traffic target.
# All aircraft have a unique government assigned Mode-S aircraft ID - even aircraft
# without a transponder.
# Find yours here:
#   USA: http://registry.faa.gov/aircraftinquiry/NNum\_Inquiry.aspx
#   Canada: http://wwwapps.tc.gc.ca/saf-sec-sur/2/ccarcs-riacc/RchSimp.aspx
#
$PFLAC,S,ACFT,1
# ACFT: Aircraft Type, 1=glider/motorglider,2=towplane, 3=helicopter,
# 4=skydiver, 5=skydiver drop plane, 6=hang glider, 7=paraglider,
# 8=aircraft with reciprocating engine(s), 9=aircraft with jet/turboprop engine(s)
#
$PFLAC,S,PILOT,Paul Remde
# PILOT: Pilot name, used in the flight log header, maximum of 48 characters
#
$PFLAC,S,LOGINT,1
# LOGINT: Logging interval in seconds for built-in GPS flight recorder,
# Acceptable: 1 (recommended) to 8
#
$PFLAC,S,GLIDERID,N700PR
# GLIDERID: Glider ID (N# in the USA), used in the flight log header
#
$PFLAC,S,GLIDERTYPE,Binder EB29D
# GLIDERTYPE: Glider Type (make and model), used in the flight log header,
# maximum of 16 characters

```

```
#
$PFLAC,S,COMPCLASS,Open
# COMPCLASS: Competition Class, (Open, 15m, 18m, Std, etc.),
# used in the flight log header, maximum of 16 characters
#
$PFLAC,S,COMPID,PR
# COMPID: Competition ID, "Contest ID" on tail of aircraft,
# used in the flight log header, maximum of 16 characters
#
$PFLAC,S,PRIV,0
# PRIV: Stealth Mode: Reduces safety by reducing provided information,
# See PowerFLARM manual and Configuration Specification
# 0=Normal Mode (highly recommended for safety), 1=Stealth Mode
#
$PFLAC,S,NOTRACK,0
# NOTRACK, Instructs third party receiving stations that (regardless of stealth mode
# setting) the received ID and position data must neither be stored nor made accessible
# in any time dimension (real-time, delayed, or archived) for any purpose.
# It is recommended NOT to enable this option!
# If enabled, it will impair logging service functionality and make Search and
# Rescue (SAR) impossible.
# 0=Option is Disabled (recommended, tracking is OK),
# 1=Option is enabled (tracking is not OK)
```