Document status

Published status		**Confidentiality status**	
☐	Draft	☐	Internal
☒	Published	☐	NDA
☐	Canceled	☒	Public

Version control

Ver.	Date	Summary of changes
1.00	2015-07-23	Initial version
1.01	2015-07-27	Minor editorial changes
1.02	2015-08-04	Added missing `AUDIOOUT`
1.03	2015-12-16	Changed Classic FLARM default range Added `ADSBWARNINGS` item Corrected track information in stealth mode Added Note to `ADSBRANGE` item
1.04	2017-03-08	Corrected `PCASBEEP` description Added `TASK` item Separated information items from configuration items Added `BRIGHTNESS` and `BATTERYTYPE` items
1.05	2017-08-24	Removed restriction for the maximum number of characters in `$PFLAC,R,LIC` `THRE`, `ID`, `CAP`, `LIC`, `DEVTYPE`, and `ADSBRANGE` description and values changed `HWVER` and `LIC` deprecated Added new information item `SWEXP` Editorial changes
1.06	2018-07-11	Added `FFS` (force flight state) functionality Changed `THRE` values and defaults Added protocol version 8
1.07	2019-07-08	Added protocol version 9 Added `DEVICEID`
1.08	2019-07-31	Editorial changes
1.09	2020-03-02	Updated `XPDR` and `MODESALT` description Added `ADSR` license to `LIC` Added additional baud rates
1.10	2020-10-23	Fix maximum length of IGC fields Added `REBROADCASTSERVICES` Editorial changes
1.11	2021-05-10	Baud rate must be manually set for Garmin TIS protocol Added command termination for `$PFLAC,A,TASK`

1.12	2022-01-04	Added introduction date of NMEAOUT versions
1.13	2022-08-22	Added GDL90 as available NMEAOUT option for PowerFLARM Fusion Corrected CLEARLOGS and CLEAROBST description
1.14	2023-05-10	Undeprecated and modified description of LIC
1.15	2023-11-16	Correct description of FLARMVER
1.16	2024-04-30	Added MSG item Added ADSL item
1.17	2024-07-03	Added ROLLOVER item for FLARM Classic

Scope and summary

The scope of this document is to provide a complete reference to the various configuration settings that can be applied to FLARM devices. It is primarily intended for developers integrating FLARM into their products (e.g. display manufacturers). It is not intended as a manual for end users. End users should instead use the configuration options offered by the respective manufacturer.

Table of Contents

1   Document Overview

The scope of this document is to provide a complete reference to the various configuration settings that can be applied to FLARM devices. It is primarily intended for developers integrating FLARM into their products. It is not intended as a manual for end users. End users should instead use the configuration options offered by each manufacturer, e.g. the online configuration tool:

https://flarm.com/support/tools-software/flarm-configuration-tool/

FLARM uses for the radio communication between devices a proprietary, patented and copyright protected protocol in regionally different frequency bands. The radio communication is protected against unauthorized access. The design is protected by several patents. The radio communication protocol is not public. Any non-licensed use, dissemination, copying, implementation, or reverse engineering or decompilation of the FLARM radio communication protocol, the FLARM hardware and software or parts thereof is forbidden by law and will be prosecuted. FLARM is an internationally registered trademark and cannot be used without a license, except as provided in the document "FLARM Logo Usage and Branding Guidelines". Technical specifications are subject to change at any time without notice.

The document assumes prior knowledge of the NMEA 0183 version 2.0 protocol.

The document applies to PowerFLARM- and Classic FLARM-based devices with firmware version 7.04 or later.

Update to the latest firmware version before making configuration changes.

The most recent version of this document can be requested on www.flarm.com. On the website you can also subscribe to the FLARM newsletter in order to receive the latest news and important firmware updates.

Suggestions to improve this document may be sent to info@flarm.com.

2   Configuration Overview

All configuration settings are organized as key-value pairs where the key is a string and the value either a string, a number (integer or real), or a hexadecimal number represented as a string. The key is not case-sensitive. The applicable range of valid values depends on the key and the target device. While most items can be both written and read, some are read-only (e.g. the serial number). Not all items are valid on all devices; e.g. if a transponder receiver is not present, the PCAS settings are invalid.

The canonical format to set and request configuration settings is the $PFLAC format as described in FTD-12 FLARM Data Port Specification. In short, the format to set a configuration is:

```
> $PFLAC,S,<key>,<value>\r\n
```

```
$PFLAC,A,<key>,<value>*XX\r\n
```

Where XX is the checksum according to the NMEA 0183 standard, "\r\n" the newline sequence as used on Windows operating systems (0x0D0A) and ">" denotes the user input and is not part of the format. To request the current setting, issue:

```
> $PFLAC,R,<key>\r\n
```

```
$PFLAC,A,<key>,<current value>*XX\r\n
```

On most FLARM devices, the $PFLAC format can be applied either on one of the serial ports or by means of a configuration file on the attached mass storage (SD card, USB) drive. Refer to the installation and operating manuals of the respective products for further details.

The value type and range for each item are specified separately. Values outside the given range should be ignored. The following naming is used:

- Integer: number which is written without a fractional component
- Fixed point: real number with a fixed number of digits after the radix point (dot)
- Decimal: number which has ten as its base (e.g. 123)
- Hexadecimal: integer number which has sixteen as its base (e.g. AF)
- String: a sequence of ASCII characters without NULL at the end
- Floating point: real number with an arbitrary number of digits (within limits as specified) after the radix point (dot)

The following table shows all configuration items.

General Settings

ID	Sets the 24-bit ICAO aircraft address
NMEAOUT `(NMEAOUT1, NMEAOUT2)`	Configures which sentences are sent by FLARM on the data ports
BAUD `(BAUD1, BAUD2)`	Sets data port baud rate
ACFT	Sets aircraft type
RANGE	Sets maximum horizontal distance of received aircraft
VRANGE	Sets maximum vertical distance of received aircraft
PRIV	Disables/Enables stealth mode
NOTRACK	Disables/Enables opt-out option for ground tracking
THRE	Sets speed threshold below which the aircraft is treated as on ground
LOGINT	Sets flight recording interval
PILOT	Sets pilot name (IGC flight recording header information)
COPIL	Sets co-pilot name (IGC flight recording header information)
GLIDERID	Sets aircraft registration (IGC flight recording header information)
GLIDERTYPE	Sets aircraft type (IGC flight recording header information)
COMPID	Sets competition ID (IGC flight recording header information)
COMPCLASS	Sets competition class (IGC flight recording header information)
CFLAGS	Set special flags
UI	Disables/Enables integrated display and buzzer
AUDIOOUT	Disables/Enables audio output
AUDIOVOLUME	Sets volume on Audio Out connection
VOL	Sets volume on internal buzzer on PowerFLARM Portable
BATTERYTYPE	Sets the used battery chemistry/type.
BRIGHTNESS	Sets the brightness of the PowerFLARM Portable display.
CLEARMEM	Removes the obstacle database and IGC files from the device
CLEARLOGS	Removes all IGC files from the device
CLEAROBST	Removes the obstacle database from the device
SAVE	Saves current settings to a file in the device
LOAD	Loads settings from a file saved in the device

RM	Removes a settings file from the device
DEF	Resets all settings to factory default
FFS	Forces a flight state
MSG	Messaging settings
ADSL	ADS-L Transmission settings

SSR Transponder & ADS-B Receiver Settings

XPDR	Configures the type of transponder that is installed in the aircraft
PCASPFLAU (PCASPFLAU1, PCASPFLAU2)	Disables/Enables output of non-directional targets as PFLAU
PCASCALIBRATION	Sets the 1090 antenna amplification (calibration) value
PCASBEEP	Disables/Enables alarms and buzzer for non-directional targets
MODEC	Enables/Disables processing of Mode-C targets
OWNMODEC	Selects method for suppressing own Mode-C XPDR
MODESALT	Enables/Disables the use of the barometric altitude received from the own Mode-S transponder
PCASRANGE	Sets max horizontal range of non-directional targets
PCASVRANGE	Sets max vertical range of non-directional targets
ADSBRANGE	Sets max horizontal range of ADS-B targets
ADSBVRANGE	Sets max vertical range of ADS-B targets
ADSBWARNINGS	Enables/Disables ADS-B warnings
REBROADCASTSERVICES	Selects which ground-based rebroadcast service to process.

IGC Device Settings

NEWTASK	New task declaration (flight recoding header information)
ADDWP	Add to task declaration (flight recoding header information)
IGCSER	Sets IGC serial number

Information Items (read-only)

HWVER	Returns hardware version of the device
DEVTYPE	Returns hardware version of the device. More information than `HWVER`.
DEVICEID	Returns the device identifier
SWVER	Returns the firmware version
SWEXP	Returns the firmware expiration date
FLARMVER	Returns the bootloader version
BUILD	Returns software build number
SER	Returns the serial number of the device
REGION	Returns the region code for the region in which the device can be used
RADIOID	Returns the ID type and ID used in the FLARM radio broadcast
CAP	Returns a list of features for the device
OBSTDB	Returns obstacle subsystem status
OBSTEXP	Returns obstacle database expiry date
LIC	Returns a list of installed and not installed licenses
LS	Returns a list of configuration files saved in memory
TASK	Returns information about the declared task

3   Configuration Items

3.1   General Settings

3.1.1   ID

Description:

Read or set the ICAO 24-bit aircraft address which uniquely identifies the device. The ID cannot be changed when airborne, i.e. when moving. This is part of the radio broadcast data. It can also be set to FFFFFF for automatic mode or to 0 for random mode.

The ICAO 24-bit address is available in the aircraft registration documents, and/or on the website of the local aircraft registration authority. If the aircraft does not have a Mode-S transponder, set it to FFFFFF for automatic mode.

In automatic mode, the ID is related to the serial number of the device. This 24-bit number is built up similarly to the ICAO aircraft address system described in chapter 9 of ICAO Annex 10 Volume III.

In case of random mode, the ID will change at each startup and in regular intervals while transmitting. Note that this setting diminishes or disables tracking and search-and-rescue (SAR) capabilities. Should be used only with caution and when all the consequences are understood.

Devices:

All

Values:

One of the below values is possible:

Value	Description
Hexadecimal value	6 hexadecimal characters for official ICAO 24-bit aircraft address. Never set a value if not certain. The value must correspond to the aircraft in which FLARM is installed. Values in an unassigned hex range will return an error.
FFFFFF	Constant and unique FLARM-ID.

0	Random ID; new after each startup and in regular intervals while transmitting. Not available when `DEVTYPE = Flarm04`.

Default value:

FFFFFF

3.1.2   NMEAOUT (NMEAOUT1, NMEAOUT2)

Description:

Configure which sentences are sent by FLARM on the data ports. Do not change this setting unless really required, as multiple devices may be connected to the same port.

As specified in the table, adding 40, 60, 70, 80, or 90 to `<value>` selects the protocol version.

`NMEAOUT` configures the data port on which the command is received.

Additionally, on PowerFLARM-based devices with two data ports, items `NMEAOUT1` and `NMEAOUT2` work like `NMEAOUT` but configure a specific data port (No. 1 or No. 2).

Devices:

All

Values:

One of the below values:

Value	Description
0	no output
1	`GPRMC`, `GPGGA`, `GPGSA` plus FLARM proprietary sentences (incl. `PGRMZ`)
2	Only `GPRMC`, `GPGGA`, `GPGSA` but no FLARM proprietary sentences (incl. `PGRMZ`)
3	Only FLARM-proprietary sentence (incl. `PGRMZ`), but no `GPRMC`, `GPGGA`, `GPGSA`

4	Garmin TIS (binary data; no other sentences). TIS license may be required on some devices. **Note:** When selecting Garmin TIS, the baud rate must be set to 9600.
5	GDL90 (binary data; no other sentences). GDL90 is available only for PowerFLARM Fusion on NMEAOUT2 data port. **Note:** When selecting GDL90, the baud rate must be set to 38400.
40-44	Like 0-4 but selects version 4/5 of the protocol. Introduced in 2008.
60-64	Like 0-4 but selects version 6 of the protocol. Introduced in 2012.
70-74	Like 0-4 but selects version 7 of the protocol. Introduced in 2014.
80-84	Like 0-4 but selects version 8 of the protocol. Introduced in 2017 (firmware ≥ 6.40).
90-94	Like 0-4 but selects version 9 of the protocol. Introduced in 2019 (firmware ≥ 6.80).

Default value:

1

3.1.3 BAUD (BAUD1, BAUD2)

Description:

Sets the baud rate of the data[1] port. FLARM will first send the acknowledge sentence and then switch immediately to the new rate. Note that when this

---

[1] Note that the standard NMEA 0183 baud rate is only 4.8 kBaud. Nevertheless, a lot of NMEA-compatible devices can properly work with higher transmission speeds, especially at 9.6 and 19.2 kBaud. As any sentence can consist of 82 characters maximum with 10 bit each (including start and stop bit), any sentence might take up to 171 ms (at 4.8k Baud),

sentence is used on an SD card or USB stick, the baud rate is changed only after a restart.

`BAUD` configures the data port on which the command is received.

Additionally, on PowerFLARM-based devices with two data ports, items `BAUD1` and `BAUD2` work like `BAUD` but configure a specific data port (No. 1 or No. 2).

Devices:

All

Values:

One of the below values:

Value	Description
0	4.8 kBaud
1	9.6 kBaud (required for Garmin TIS protocol)
2	19.2 kBaud
3	28.8 kBaud
4	38.4 kBaud
5	57.6 kBaud
6	115.2 kBaud (only PowerFLARM-based devices)
7	230.4 kBaud (only PowerFLARM-based devices)

Default value:

Default value is 2 (19.2kBaud), except when `DEVTYPE = Flarm04`, where default is 0 (4.8kBaud).

---

85 ms (at 9.6 kBaud) or 43 ms (at 19.2 kBaud). This limits the overall channel capacity to 5 sentences per second (at 4.8k Baud), 11 msg/s (at 9.6 kBaud) or 23 msg/s (at 19.2 kBaud). If too many sentences are produced with regard to the available transmission speed, some sentences might be lost or truncated.

3.1.4 ACFT

Description:

Configures the aircraft type used by FLARM. This setting will affect the internal algorithms, as FLARM's motion prediction is aircraft type specific. This is also part of the broadcast data. The aircraft type configuration in FLARM must be set appropriately for tow planes. The setting "tow plane" results in a different warning behavior for gliders as long as a glider being towed is detected.

Warning: Contrary to the hexadecimal convention in `PFLAA`, the aircraft type is given as a decimal value here.

Devices:

All

Values:

One of the below values:

Value	Description
0	*reserved, do not use*
1	glider/motor glider
2	tow plane
3	helicopter/rotorcraft
4	skydiver
5	drop plane for skydivers
6	hang glider (hard)
7	paraglider (soft)
8	aircraft with reciprocating engine(s)
9	aircraft with jet/turboprop engine(s)
10	*reserved, do not use*
11	balloon
12	airship

13	unmanned aerial vehicle (UAV)
14	*reserved, do not use*
15	static object

Default value:

In PowerFLARM-based devices, the default value is 8 (aircraft with reciprocating engines). In Classic FLARM-based devices, the default value is 1 (glider/motor glider).

3.1.5 RANGE

Description:

Maximum horizontal distance of aircraft to be shown, in meters. This affects aircraft shown on displays, as well as `PFLAU`/`PFLAA` messages over the data port.

Devices:

All

Values:

For PowerFLARM-based devices, unsigned decimal values between 2000 and 65535 (unlimited) are allowed. For Classic FLARM-based devices, unsigned decimal values between 2000 and 25500 are allowed.

Default value:

For PowerFLARM-based devices, the default value is 65535. For Classic FLARM-based devices, the default value is 25500.

3.1.6 VRANGE

Description:

Maximum vertical distance of aircraft to be shown, in meters.

Devices:

PowerFLARM-based devices

Values:

Values between 500 and 2000 are possible.

Default value:

500

3.1.7 PRIV

Description:

Stealth mode. Instructs all receiving FLARM devices that the received data must not be made accessible in real-time full precision, except for the purpose of collision warning. Real-time is understood to be within less than 10 minutes. With the option set, not all information is forwarded to connected displays to prevent abuse in competitions. An activated stealth mode results in PFLAA sentences not carrying specific climb and cruise data while some random noise is applied to altitude data. It is recommended NOT to activate stealth mode! To apply full reciprocity, a pilot who enables stealth mode will only get information as if all other aircraft had enabled stealth mode, independent of their actual setting.

The status and changes to the stealth mode are recorded in the IGC file. Consequently, a competition authority can easily enforce the use (or non-use) if desirable. The table below presents the limitations in PFLAA sentences when stealth mode is enabled.

Stealth mode cannot be changed during flight.

PFLAA parameter	Target when more than 2 km horizontal or 300 m vertical away	Target when closer than 2 km horizontal and 300 m vertical away	Target is very close or collision warning active
Target ID	Not available	Anonymous ID	Anonymous ID
Relative position	Not available	Available	Available
Relative altitude	Not available	Available with noise	Available
Climb rate	Not available	Not available	Available
Track	Not available	Available	Available
Speed	Not available	Not available	Available

Devices:

All

Values:

One of the below values:

Value	Description
0	Normal mode
1	Stealth mode activated Not recommended to use during normal flight!

Default value:

0

3.1.8   NOTRACK

Description:

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.

Devices:

All

Values:

One of the below values:

Value	Description
0	Option is disabled
1	Option is enabled

Default value:

0

3.1.9   THRE

Description:

Sets speed threshold in m/sec. The aircraft is treated as on ground if its horizontal velocity is below this value. In ground mode, no warnings are given, and other aircraft are not warned about the own aircraft.

Devices:

All

Values:

Decimal integer values from 0 to 20 are allowed.

PowerFLARM-based devices also support an automatic setting (value 255) where the threshold is based on the configured aircraft type (ACFT setting), see the table below for values.

Default value:

On PowerFLARM-based devices, the default is 255 (automatic). On Classic FLARM-based devices, the default is 1 (glider).

If set to automatic, the following values are used for THRE depending on the configured aircraft type:

ACFT value	Description	THRE default [m/s]
1	glider/motor glider	2
2	tow plane	10
3	helicopter/rotorcraft	2
4	skydiver	5
5	drop plane for skydivers	10

6	hang glider (hard)	2
7	paraglider (soft)	2
8	aircraft with reciprocating engine(s)	10
9	aircraft with jet/turboprop engine(s)	10
11	balloon	0
12	airship	0
13	unmanned aerial vehicle (UAV)	2
15	static object	0

3.1.10   LOGINT

Description:

The value indicates the time interval in seconds between two data points in the flight recording. The longer the time interval is between two data points, the lower is the resolution of the recorded flight. For gliders and when a high resolution is required, do not use settings higher than 4s. FLARM should not be switched off immediately after landing to ensure that the whole flight is recorded.

The interval between two data points affects the recording capacity in terms of flight duration. The memory in FLARM devices is shared between the obstacle database and the flight recorder.

Devices:

All

Values:

Decimal integer values from 1 to 8 are possible.

Default value:

On PowerFLARM-based devices, the default is 4. On Classic FLARM-based devices, the default is 2.

3.1.11   PILOT

Description:

The case-sensitive string defines header information (pilot name) for the flight recording.

Devices:

All

Values:

Maximum 47 ASCII characters.

Default value:

Empty on Classic FLARM-based devices and the string "undefined" on PowerFLARM-based devices.

3.1.12   COPIL

Description:

The case-sensitive string defines header information (co-pilot name) for the flight recording.

Devices:

All

Values:

Maximum 47 ASCII characters.

Default value:

Empty on Classic FLARM-based devices and the string "undefined" on PowerFLARM-based devices.

3.1.13   GLIDERID

Description:

The case-sensitive string defines header information (aircraft registration) for the flight recording.

Devices:

All

Values:

Maximum 15 ASCII characters.

Default value:

Empty on Classic FLARM-based devices and the string "undefined" on PowerFLARM-based devices.

3.1.14   GLIDERTYPE

Description:

The case-sensitive string defines header information (aircraft type) for the flight recording.

Devices:

All

Values:

Maximum 31 ASCII characters.

Default value:

Empty on Classic FLARM-based devices and the string "undefined" on PowerFLARM-based devices.

3.1.15   COMPID

Description:

The case-sensitive string defines header information (competition ID) for the flight recording.

Devices:

All

Values:

Maximum 15 ASCII characters.

Default value:

Empty on Classic FLARM-based devices and the string "undefined" on PowerFLARM-based devices.

3.1.16   COMPCLASS

Description:

The case-sensitive string defines header information (competition class) for the flight recording.

Devices:

All

Values:

Maximum 15 ASCII characters.

Default value:

Empty on Classic FLARM-based devices and the string "undefined" on PowerFLARM-based devices.

3.1.17   CFLAGS

Description:

Configures special modes via bit flags. Make sure to read this setting before modifying it, as otherwise previously set configuration flags could be overwritten. If you do not understand the concept of bit flags, do not use this command!

Devices:

All

Values:

The sum of one or several of the below values:

Value	Description
0	No flags set
1	Disable "INFO Alerts" on some Classic FLARM-based devices only (not on the data port)
2	Enable competition mode (reduced alarm distances and times)
4...255	Reserved. Do not use.

Default value:

0

3.1.18   UI

Description:

Deactivation of visual and/or aural output. Use only when a connected device handles the deactivated functionality. This value is not saved, i.e. it is lost after each restart. Note that no mode information is communicated from FLARM to connected devices (e.g. warning vs. nearest mode, sound volume, suppression modes), i.e. connected devices must maintain an own user dialogue for these settings.

Devices:

Classic FLARM devices with an integrated user interface.

Values:

One of the below values:

Value	Description
0	Normal
1	FLARM to switch off LEDs and buzzer
2	FLARM to switch off LEDs only
3	FLARM to switch off buzzer only

Default value:

0

3.1.19   AUDIOOUT

Description:

Enables/Disables audio output.

Devices:

All devices with Audio output.

Values:

Value	Description
0	Disable audio output
1	Enable audio output

Default value:

0

3.1.20   AUDIOVOLUME

Description:

Set volume on Audio output to the given percentage. Does not apply to the built-in buzzer in PowerFLARM Portable (use VOL instead). In addition, AUDIOOUT has to be set to 1 for AUDIOVOLUME to be valid.

Devices:

All devices with Audio output.

Values:

Decimal integer values from 0 to 100.

Default value:

100

3.1.21   VOL

Description:

Set volume on the internal buzzer in PowerFLARM Portable. 0 turns off the buzzer.

Devices:

PowerFLARM Portable

Values:

Decimal integer values from 0 to 3.

Default value:

3

3.1.22   BATTERYTYPE

Description:

Set the used battery chemistry/type. The device should not be operated with conjunction with any type of battery not listed here; other types may damage the device. If non-rechargeable batteries are used, do not connect the device to the charger.

Devices:

PowerFLARM Portable

Values:

Value	Description
0	Alkaline
1	Rechargeable

Default value:

0

3.1.23   BRIGHTNESS

Description:

Set the brightness of the display.

Devices:

PowerFLARM Portable

Values:

Decimal integer values from 0 to 100.

Default value:

100

3.1.24   CLEARMEM

Description:

Removes the obstacles database and IGC files from the device

Devices:

Classic FLARM-based devices

Values:

No values

Example:

```
> $PFLAC,S,CLEARMEM

$PFLAC,A,CLEARMEM,0

$PFLAC,A,CLEARMEM,1

$PFLAC,A,CLEARMEM,4

…
```

FLARM is asked to clear memory and it confirms that by sending response sentences with progress in percent and reboots at the end.

3.1.25   CLEARLOGS

Description:

Clears all IGC flight logs on the device.

Devices:

All PowerFLARM-based devices

Values:

No values

3.1.26   CLEAROBST

Description:

Removes the obstacle database (if installed).

Devices:

All PowerFLARM-based devices

Values:

No values

3.1.27 SAVE

Description:

Saves all settings to a file under `<name>`. A maximum of 40 settings files are supported.

Devices:

All PowerFLARM-based devices

Values:

Name of the file. The `<name>` may have a maximum of 10 ASCII characters. Allowed characters: Upper case letters A-Z, numbers, blank, hyphen and underscore.

Example:

`> $PFLAC,S,SAVE,Settings01`

`$FILE,A,SAVE,OK*`

FLARM device is asked to save settings to file and does so.

3.1.28 LOAD

Description:

Loads all settings from the file `<name>`.

Devices:

All PowerFLARM-based devices

Values:

Name of the file. The `<name>` may have a maximum of 10 characters. Allowed characters: Upper case letters A-Z, numbers, blank, hyphen and underscore.

Example:

> `$PFLAC,S,LOAD,Settings01`

`$PFLAC,A,LOAD,OK*`

FLARM device is asked to load settings from the file and does so.

3.1.29 RM

Description:

Removes settings file `<name>`.

Devices:

All PowerFLARM-based devices

Values:

Name of the file. The `<name>` may have a maximum of 10 characters. Allowed characters: Upper case letters A-Z, numbers, blank, hyphen and underscore.

Example:

> `$PFLAC,RM,Settings01`

`$PFLAC,A,RM,OK*`

FLARM device is asked to remove file and does so.

3.1.30 DEF

Description:

Resets all device settings to default and restarts the device. Do not use data from the output.

Devices:

All

Values:

None

3.1.31 FFS

Description:

Force flight state, overriding automatic detection. The override remains active for 20 seconds after which normal operation resumes.

In normal operation, flight state is automatically determined from horizontal velocity, see THRE. The aircraft is considered flying only if the horizontal velocity exceeds the selected threshold. In some applications, however, aircraft may be airborne with a horizontal velocity below the threshold (e.g. helicopters, UAS). In such instances, FFS can be used to force the flight state, e.g. by using other sensor data such as weight-on-wheels.

A forced flight state expires after 20 seconds, so it must be repeatedly applied to maintain it.

Devices:

All

Values:

Value	Description
0	Invalidate any force flight state, resume normal operation
1	Forces the device to be on the ground. Expires after 20 seconds.
2	Forces the device to be in flight. Expires after 20 seconds.

Example:

```
> $PFLAC,S,FFS,2

$PFLAC,A,FFS,2*54
```

The device is now forced to flight state for the next 20 seconds.

In the case of Classic FLARM-based devices, it is required to append a valid NMEA checksum to every FFS command.

```
> $PFLAC,S,FFS,2*46

$PFLAC,A,FFS,2*54
```

3.1.32   MSG

Description:

Configures the exchange of various types of data between aircraft and/or ground stations. This information can be received by other units and then e.g., be used by displays or other accessories to show additional information about an aircraft or its pilot.

Reception requires a license to be installed.

By default, periodic transmission of PILOT, GLIDERID, GLIDERTYPE and COMPID values is enabled.

More details can be found in the FTD-109 FLARM Messaging Interface Control Document.

Devices:

All[2]

Values:

Value is a bitfield consisting of following items:

Value	Description
1	Enable transmission and reception of periodic messages.
2	Enable reception of standard messages.
4	Enable reception of open messages.

Default value is 1.

Configured value is a sum of selected options.

Example:

> $PFLAC,S,MSG,0

---

[2] FLARM Classic devices are capable of periodic messages transmission only - reception is not supported.

```
$PFLAC,A,MSG,0*5C
```

Messaging feature disabled - PILOT, GLIDERID, GLIDERTYPE and COMPID values are not transmitted.

```
> $PFLAC,S,MSG,1
```

```
$PFLAC,A,MSG,1*5D
```

Periodic messages containing values of PILOT, GLIDERID, GLIDERTYPE and COMPID are enabled.

```
> $PFLAC,S,MSG,7
```

```
$PFLAC,A,MSG,7*5B
```

All message types are enabled.

3.1.33 ADSL

Description:

Feature requires a license to be installed on the device.

Enables periodic transmission of ADS-L frames in addition to standard FLARM anti-collision communication (ADS-L Out).

Devices:

All PowerFLARM-based devices

Values:

One of the below values:

Value	Description
0	ADS-L transmission disabled
1	ADS-L transmission enabled

Example:

```
> $PFLAC,S,ADSL,0
```

```
$PFLAC,A,ADSL,0*1F
```

ADS-L transmission is disabled.

```
> $PFLAC,S,ADSL,1
```

```
$PFLAC,A,ADSL,1*1E
```

ADS-L transmission is enabled.

3.1.34   ROLLOVER

Description:

Legacy FLARM devices with old GPS receivers suffer from the week-rollover issue[3], resulting in a date around 19.6 years in the past. Problem manifests in an incorrect date being reported by $GPRMC NMEA messages and emission of incorrect FLARM signals.

The ROLLOVER parameter specifies how many times these 19.6 years need to be added to the date reported by the GPS receiver.

While FLARM devices heuristically try to select a correct rollover number, manual setting is possible using this configuration parameter.

Devices:

Classic FLARM-based devices.

Values:

Decimal integer values from 0 to 4.

Setting incorrect rollover number will yield the device inoperable. Always ensure correct date is reported by the FLARM device when this configuration value is adjusted.

---

[3] https://en.wikipedia.org/wiki/GPS_week_number_rollover

3.2 SSR Transponder & ADS-B Receiver Settings

3.2.1 XPDR

Description:

Sets the type of transponder that is installed in the aircraft. This setting influences the processing of transponder data:

1. Suppression of the own transponder: If set to 0, no suppression is performed. The own transponder (if installed) will show up as a ghost target.
2. Setting to 2 (Mode-S) allows using the encoded altitude from the transponder (see MODESALT).

If this is set to 2 (Mode-S), a valid ICAO 24-bit address must be configured (see ID). Setting a random or FLARM ID will yield a configuration error. This is to allow inter-source correlation.

Devices:

All devices with SSR/ADS-B module

Values:

One of the below values:

Value	Description
0	No transponder is installed
1	Mode-C
2	Mode-S

Default value:

0

3.2.2 PCASPFLAU (PCASPFLAU1, PCASPFLAU2)

Description:

Disables/Enables output of non-directional targets as PFLAU. See PFLAU message description in Data Port Specification for more information.

PCASPFLAU configures the data port on which the command is received.

PCASPFLAU1 and PCASPFLAU2 work like PCASPFLAU but configure a specific data port (No. 1 or No. 2).

Devices:

All devices with SSR/ADS-B module

Values:

One of the below values:

Value	Description
0	Output of non-directional targets is disabled
1	Output of non-directional targets is enabled

Default value:

0

3.2.3   PCASCALIBRATION

Description:

Sets the 1090 antenna amplification (calibration) value. A higher value makes non-directional targets appear closer, in other words, compensates for low antenna gain and/or a long cable.

Devices:

All devices with SSR/ADS-B module

Values:

Decimal integer values from 0 to 100.

Default value:

30

3.2.4   PCASBEEP

Description:

Disables/Enables alarms and buzzer if non-directional targets cross certain danger thresholds. Applies to the PowerFLARM Portable internal buzzer and Audio Out.

Devices:

All devices with SSR/ADS-B module

Values:

One of the below values:

Value	Description
0	Disable alarms and buzzer on non-directional targets
1	Enable alarms and buzzer on non-directional targets

Default value:

1

3.2.5   MODEC

Description:

Enables or disables processing of Mode-C targets.

Devices:

All devices with a Mode-C–enabled SSR/ADS-B module

Values:

One of the below values:

Value	Description
0	Disable processing of Mode-C targets
1	Enable processing of Mode-C targets

Default value:

1

3.2.6   OWNMODEC

Description:

Selects method for suppressing own Mode-C XPDR.

Devices:

All devices with a Mode-C–enabled SSR/ADS-B module

Values:

One of the below values:

Value	Description
0	Aggressive. May suppress other Mode-C targets on the same altitude.
1	Less aggressive. May cause warnings from own Mode-C XPDR in case of e.g. reflected signals.

Default value:

0

3.2.7   MODESALT

Description:

Enables or disables the use of the barometric altitude received from the own Mode-S transponder.

If enabled and a Mode-S transponder is correctly configured (XPDR set to Mode-S and ID set to the correct aircraft address), PowerFLARM uses the altitude received from this transponder (external static) as a reference for vertical altitude differences.

If disabled or no altitude has been received for more than 5 seconds, PowerFLARM uses the internal barometric sensor (cabin static).

A correctly configured Mode-S transponder must be used in aircraft with pressure cabins, and in case there is a significant difference between cabin and external static pressure.

Devices:

All devices with SSR/ADS-B module

Values:

One of the below values:

Value	Description
0	Disables use of Mode-S altitude
1	Enables use of Modes-S altitude

Default value:

1

3.2.8 PCASRANGE

Description:

Sets the maximum horizontal range of transponder-only equipped targets in meters.

Note: A `PCASRANGE` value of 0 will disable outputting transponder-only traffic as `PFLAA` sentences. To switch off transponder-only warnings, use `PCASPFLAU` setting.

Devices:

All devices with SSR/ADS-B module

Values:

Decimal integer values from 0 to 9260.

Default value:

7408 meters.

3.2.9 PCASVRANGE

Description:

Sets the maximum vertical range of transponder-only equipped targets in meters.

Devices:

All devices with SSR/ADS-B module

Values:

Decimal integer values from 100 to 65535 (unlimited).

Default value:

610 meters

3.2.10 ADSBRANGE

Description:

Sets the maximum ADS-B horizontal range in meters.

Note: An `ADSBRANGE` value of zero will disable outputting ADS-B traffic as `PFLAA` sentences. To switch off ADS-B warnings, use `ADSBWARNINGS` setting.

Devices:

All devices with SSR/ADS-B module

Values:

Decimal integer values from 0 to 65535 (unlimited).

Default value:

65535 (unlimited)

3.2.11 ADSBVRANGE

Description:

Sets the maximum ADS-B vertical range in meters.

Devices:

All devices with SSR/ADS-B module

Values:

Decimal integer values from 100 to 65535 (unlimited).

Default value:

65535 (unlimited)

3.2.12   ADSBWARNINGS

Description:

Enables or disables ADS-B warnings. When disabled, ADS-B targets will still be received and output on the data port, depending on the `ADSBRANGE` setting.

Devices:

All devices with SSR/ADS-B module

Values:

One of the below values:

Value	Description
0	ADS-B warnings are disabled.
1	ADS-B warnings are enabled.

Default value:

1

3.2.13   REBROADCASTSERVICES

Description:

Selects which ground-based rebroadcast service to process via bit flags. Make sure to read this setting before modifying it, as otherwise previously set configuration flags could be overwritten. If you do not understand the concept of bit flags, do not use this command!

Devices:

All devices with SSR/ADS-B module

Values:

One of the below values:

Value	Description
0	No ground-based rebroadcast services will be used.
1	ADS-R traffic in $PFLAA is enabled. Requires the ADSR license.
2	TIS-B traffic in $PFLAA is enabled. Requires the ADSR license.
4..254	Reserved. Do not use.
255	All ground-based rebroadcast services are enabled.

Default value:

255

3.3   IGC Device Settings

3.3.1   NEWTASK

Description:

Starts a new task declaration. Any old task declaration will be cleared by this command. Take-off location, waypoints, and landing location have to be added by consequently issuing "ADDWP" commands. To activate a new task declaration, the device must be power-cycled.

Note: For easy task declaration, use the free online-tool **FlarmCfg[4]**, the corresponding offline-version[5], the free PDA software tools **SeeYou** and **ConnectMe[6]** or **pocket*StrePla-Connect[7]**, and many of the other

---

[4] www.segelflug-software.de/flarmcfg/

[5] www.segelflug-software.de/prod_flarmcfgtool.html

[6] naviter.com/

[7] www.strepla.de/StrePla4/english/pS_connect/

products on the market. Note that task declaration only works on IGC-enabled devices.

Devices:

All devices with an IGC-approved recorder

Values:

Text description of the task, e.g. "500 km triangle". Can be the empty string. Maximum 50 ASCII characters.

Example:

```
> $PFLAC,S,NEWTASK,My Task

$PFLAC,A,NEWTASK,My Task*
```

New task "My task" was declared.

3.3.2 ADDWP

Description:

Adds a waypoint to the current task declaration. The first and the last waypoint added will be treated as takeoff and landing location, respectively. If no takeoff or landing location is to be given, zero coordinates should be entered (0000000N, 00000000E). The format closely follows the IGC file specification[8].

The total data size entered through this command may not surpass 192 bytes when calculated as follows:

7+(Number of Waypoints * 9) + (sum of length of all task and waypoint descriptions)

Devices:

All devices with an IGC-approved recorder

Parameters:

Below parameters must be set:

---

[8] www.ukiws.demon.co.uk/GFAC/documents/tech_spec_gnss.pdf

Parameter	Value	Description
Latitude	7-digit decimal integer ending with N (north) or S (south)	Latitude of waypoint. Must be given the format "DDMMmmmN", where DD designates degrees, MM minutes and mmm 1/1000 minutes. All digits are required and have to be filled with zeros, if applicable. The last character is either "N" for north or "S" for south.
Longitude	8-digit decimal integer ending with E (east) or W (west)	Longitude of waypoint. Must be given the format "DDDMMmmmE", where DDD designates degrees, MM minutes and mmm 1/1000 minutes. All digits are required and have to be filled with zeros, if applicable. The last character is either "E" for east or "W" for west.
Description	Waypoint Description	Arbitrary text description of waypoint. Max 50 characters.

Example:

> $PFLAC,S,ADDWP, 5024200N,00631440E,Some Airport

$PFLAC,A,ADDWP,5024200N,00631440E,Some Airport*

> $PFLAC,S,ADDWP,495900N,00631440E,My Start Line

$PFLAC,ERROR*

The second request causes FLARM to issue an error, since the number format is invalid.

3.3.3   IGCSER

Description:

IGC serial number. The IGC serial can be set on Classic FLARM-based devices only, and only once.

Devices:

Classic FLARM-based devices that are IGC approved

Values:

IGC serial number. Max. 3 characters.

Example:

> `$PFLAC,S,IGCSER,27`

`$PFLAC,A,ERROR*`

FLARM is asked to set IGS serial but FLARM cannot do it because it was already programmed.

Example:

> `$PFLAC,R,IGCSER`

`$PFLAC,A,IGCSER,ADY*`

FLARM is asked to give IGS serial number.

4   Information Items (read-only)

4.1.1   HWVER

Description:

Deprecated

Returns the hardware type of the device. Gives less information than DEVTYPE (doesn't distinguish between various PowerFLARM-based devices).

Devices:

All

Values:

String. Maximum 18 ASCII characters.

4.1.2   DEVTYPE

Description:

Returns the hardware type of the device. In comparison to HWVER, DEVTYPE distinguishes between different PowerFLARM-based devices.

Devices:

All

Values:

String. Maximum 30 ASCII characters.

The following table shows which device types are currently available, and to which device category they belong.

Device Category	Device Type (DEVTYPE)
PowerFLARM-based	PowerFLARM-Core
	PowerFLARM-Portable
	PowerFLARM-AM
	PowerFLARM-Fusion
Classic FLARM-based	Flarm04
	Flarm05
	Flarm06

	`Flarm-IGC05`
	`Flarm-IGC06`
	`FLYTEC`
	`LX_IGC08`
	`LX06`
	`LX06_FR`
	`LXV`
	`LXV_FM`
	`LXV_FM_IGC`
	`OZ06`
	`OZ_IGC`
	`TRXFLM`
	`SOMAX`

4.1.3   DEVICEID

Description:

Returns the device identifier that can be used for feature license and obstacle database purchases. Consists of the part number/identifier concatenated with the 6-digit serial number.

Devices:

All PowerFLARM-based devices

Values:

String. Example: *FLANGA10W-004711*.

4.1.4   SWVER

Description:

Returns the firmware version of the device.

Devices:

All

Values:

Decimal floating-point value. Maximum two digits before radix point (dot) and maximum 4 digits after.

4.1.5 SWEXP

Description:

Returns the firmware expiration date.

Devices:

All except when DEVTYPE = Flarm04

Values:

String. Format: dd.mm.yyyy

4.1.6 FLARMVER

Description:

Returns the bootloader version.

Devices:

All

Values:

Decimal floating-point value. Maximum one digit before radix point (dot) and maximum 2 digits after.

4.1.7 BUILD

Description:

Returns the build number of the firmware.

Devices:

All

Values:

Maximum 20-character alphanumeric string.

4.1.8   SER

Description:

Returns the serial number of the device.

Devices:

All

Values:

On PowerFLARM-based devices, maximum 6-digit decimal integer. On Classic FLARM-based devices, maximum 10-digit decimal integer.

4.1.9   REGION

Description:

Returns the region code for the region in which the device can be used.

Devices:

All except when `DEVTYPE = Flarm04`

Values:

String. The following values are currently possible:

Value	Description
ALL	The device will work everywhere
EUR	SRD860 version. Will operate in Europe, Asia (except Israel), Africa, and New Zealand
USA	ISM version. Will operate in North America, South America, Israel, and Australia.

4.1.10   RADIOID

Description:

Returns the ID type and ID used in the FLARM radio broadcast. The ID type is defined as in `PFLAA`.

Devices:

All

Parameters:

Below parameters are returned:

Parameter	Value	Description
ID Type	1	ID type: ICAO 24-bit aircraft address
	2	ID type: FLARM ID
ID	6 hexadecimal characters	ID used for radio communication

Example:

> $PFLAC,R,RADIOID

$PFLAC,A,RADIOID,1,A832ED*

FLARM is asked about the ID used for communication and answers that the type is 1 and ID is A832ED.

4.1.11 CAP

Description:

Returns a list of features available in the device. Some features are optional and may require a license. New features may be defined at any time. Feature capability codes are separated by a semicolon (';').

Devices:

All except DEVTYPE = Flarm04

Values:

String with ASCII characters. Individual capability strings are limited to 4 characters and separated by a semicolon. Currently, possible features are:

Value	Description
ADSR	ADS-R/TIS-B reception functionality

AUD	Audio output connection
AZN	Alert Zone Generator
BARO	Barometric sensor
BAT	Battery compartment or built-in batteries
DLED	The device has one or more LEDs
DP2	Second Data Port
ENL	Engine noise level sensor
GND	The device operates as a receive-only ground station
IGC	The device is or can be IGC approved
OBST	The device can issue obstacle collision warnings if a database is installed and the license is valid
RFB	Second radio transceiver for antenna diversity
SD	Slot for SD card
TIS	Interface for Garmin TIS protocol
UI	Built-in user interface (display, possibly button/knob)
USBH	Slot for USB stick
XPDR	SSR transponder/ADS-B receiver

Example:

```
> $PFLAC,R,CAP
```

```
$PFLAC,A,CAP,OBST;IGC;SD;BARO*
```

FLARM device has an obstacle database installed, IGC-approved recorder, SD card slot, and barometric sensor.

4.1.12   OBSTDB

Description:

Returns obstacle subsystem status

Devices:

All

Parameters:

Below parameters are returned:

Parameter	Value	Description
Version	1	Currently always set to 1.
Status of the obstacle subsystem	0	Disabled
	1	Normal operation
	2	Failure
	3	No database installed
	4	Internal database inconsistency
	8	No license
	9	Invalid license
	16	Wrong database version
Name	Max. 32 characters	Obstacle database name
Date	Max. 32 characters	Obstacle database creation date

Example:

```
> $PFLAC,R,OBSTDB

$PFLAC,A,OBSTDB,1,1,alps20110919_,28.09.2011*
```

FLARM is asked about obstacle database information and responses with obstacle database name and creation date.

4.1.13 OBSTEXP

Description:

Returns the obstacle database expiry date if a database is available. Otherwise, it returns an error.

Devices:

All except when `DEVTYPE = Flarm04`

Values:

Expiration date in the following format: YYYY-MM-DD

Example:

> `$PFLAC,R,OBSTEXP`

`$PFLAC,A,ERROR *`

FLARM is asked about the expiration date of the obstacle database but the database is not installed on this device.

Example:

> `$PFLAC,R,OBSTEXP`

`$PFLAC,A,2014-03-31*`

FLARM is asked about the expiration date of the obstacle database and answers with the expiration date.

4.1.14 LIC

Description:

Returns list of all installed licenses. Each licence name is followed the number 1. Items are separated by a semicolon (`;`).

The table below contains a non-exhaustive list of possible license names and their meaning. New licenses may be defined at any time.

Note: The output has been changed with PowerFLARM Release 7.21. This item has been undeprecated. In previous releases, a list of all licenses, with an indication of installed or not, was returned. To align the output with `CAP`, this behaviour has been modified.
For backwards compatibility, the syntax of an installed licence being followed by "`:1`" has been kept.

Devices:

All PowerFLARM-based devices.

Parameters:

License Name	Description

FLARM Technology AG
Industriestrasse 49
CH-6300 Zug

FLARM CONFIGURATION SPECIFICATION

Date: 2022-06-06
Version: 1.1
Page: 52 of 54

Document Number:
FTD-014

AUD	External Audio connection
ENL	Engine noise level sensing
AZN	Alert Zone Ground Station
IGC	IGC approved flight recording
RFB	Activation of the second antenna
TIS	Garmin TIS protocol output
GND	Receive-only Ground Station
SD	Activation of SD card functionality
USBH	Activation of USB functionality
PRE	Activation of pressure sensor functionality
L6S	Activation of LEA-6S GPS module
EXG	Activation of external GPS connection
ADSR	Activation of ADS-R/TIS-B reception functionality

Example:

```
> $PFLAC,R,LIC

$PFLAC,A,LIC,AUD:1;ENL:1;IGC:1;RFB:1;TIS:1*
```

FLARM is asked to list all active licenses. Audio, engine noise level, IGC recording, second antenna, and Garmin TIS protocol licenses are installed.

4.1.15   LS

Description:

Lists all saved settings files.

Devices:

All PowerFLARM-based devices

Values:

Name of the file. The name may have a maximum of 10 characters. Allowed characters: Upper case letters A-Z, numbers, blank, hyphen and underscore.

Example:

> $PFLAC,R,LS

$PFLAC,A,LS,0,Settings01*

$PFLAC,A,LS,1,Settings02*

$PFLAC,A,LS,2,Settings03*

FLARM is asked to list all saved files and does so.

4.1.16   TASK

Description:

Returns information about the declared task.

Devices:

All PowerFLARM-based devices

Values:

The answer spans multiple lines. It will always contain the task declaration as the first line, and the command termination (`$PFLAC,A,TASK`) as the last one. In between, there can be a variable number of waypoints (between 0 and 20), each on one line.

Parameter	Value	Description
Task description	C	C record
	DDMMYY	Declaration date
	HHmmss	Declaration time
	DDMMYY	Flight date
	TTTT	Task number/ID: a 4-character alphanumeric value

	00	Number of turn points: take-off, start, finish, and landing waypoints are not counted
	TEXT	Task name/description: up to 50 ASCII characters
Waypoint description	C	C record
	DDMMmmmN	Waypoint latitude: in degrees, minutes, and decimal minutes. Can either be N (north) or S (south)
	DDDMMmmmE	Waypoint longitude: in degrees, minutes, and decimal minutes. Can either be E (east) or W (west)
	TEXT	Waypoint name/description: up to 50 ASCII characters

Example:

> $PFLAC,R,TASK

$PFLAC,A,TASK,C01017000000000000000100Baar*

$PFLAC,A,TASK,C0000000N00000000E*

$PFLAC,A,TASK,C5024200N00631440EZug*

$PFLAC,A,TASK,C473385N00829142ERigi*

$PFLAC,A,TASK,C5014200N00631540EAirport*

$PFLAC,A,TASK,C0000000N00000000E*

$PFLAC,A,TASK*

FLARM is asked to output the declared task information and does so. Note the default take-off and landing, the start and finish, and one turn point.