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## Document status

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## Version control

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

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		Added command termination for \$PFLAC, A, TASK
<b>1.12</b>	2022-01-04	Added introduction date of NMEAOUT versions
<b>1.13</b>	2022-08-22	Added GDL90 as available NMEAOUT option for PowerFLARM Fusion Corrected CLEARLOGS and CLEAROBST description

## 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.

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## 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/>

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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](http://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](mailto:info@flarm.com).

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## 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)

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The following table shows all configuration items.

## General Settings

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

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<b>RM</b>	Removes a settings file from the device
<b>DEF</b>	Resets all settings to factory default
<b>FFS</b>	Forces a flight state

## SSR Transponder & ADS-B Receiver Settings

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

## IGC Device Settings

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



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## Information Items (read-only)

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

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## 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 FFFFFFF 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 FFFFFFF 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
<b>Hexadecimal value</b>	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.
<b>FFFFFF</b>	Constant and unique FLARM-ID.

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<b>0</b>	Random ID; new after each startup and in regular intervals while transmitting. Not available when <code>DEVTYPE = Flarm04</code> .
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### **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:

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

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

### **Default value:**

1

### **3.1.3 BAUD (BAUD1, BAUD2)**

#### **Description:**

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

---

<sup>1</sup> 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

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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
<b>0</b>	4.8 kBaud
<b>1</b>	9.6 kBaud (required for Garmin TIS protocol)
<b>2</b>	19.2 kBaud
<b>3</b>	28.8 kBaud
<b>4</b>	38.4 kBaud
<b>5</b>	57.6 kBaud
<b>6</b>	115.2 kBaud (only PowerFLARM-based devices)
<b>7</b>	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).

each (including start and stop bit), any sentence might take up to 171 ms (at 4.8k Baud), 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.

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

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<b>12</b>	airship
<b>13</b>	unmanned aerial vehicle (UAV)
<b>14</b>	<i>reserved, do not use</i>
<b>15</b>	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

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### **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.



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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
<b>Target ID</b>	Not available	Anonymous ID	Anonymous ID
<b>Relative position</b>	Not available	Available	Available
<b>Relative altitude</b>	Not available	Available with noise	Available
<b>Climb rate</b>	Not available	Not available	Available
<b>Track</b>	Not available	Available	Available
<b>Speed</b>	Not available	Not available	Available

**Devices:**

All

**Values:**

One of the below values:

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

**Default value:**

0

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### 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:

<b>ACFT value</b>	<b>Description</b>	<b>THRE default [m/s]</b>
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

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### 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.

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### 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.

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**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.

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### **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
<b>0</b>	No flags set
<b>1</b>	Disable "INFO Alerts" on some Classic FLARM-based devices only (not on the data port)
<b>2</b>	Enable competition mode (reduced alarm distances and times)
<b>4...255</b>	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

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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



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**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

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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

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**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

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### 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.

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### 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

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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
```

## **3.2 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:

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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

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**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



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**Values:**

One of the below values:

Value	Description
<b>0</b>	Disable alarms and buzzer on non-directional targets
<b>1</b>	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
<b>0</b>	Disable processing of Mode-C targets
<b>1</b>	Enable processing of Mode-C targets

**Default value:**

1

### 3.2.6 OWNMODEC

**Description:**

Selects method for suppressing own Mode-C XPDR.

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### **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

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### **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

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**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)

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### 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.

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<b>1</b>	ADS-R traffic in \$PFLAA is enabled. Requires the ADSR license.
<b>2</b>	TIS-B traffic in \$PFLAA is enabled. Requires the ADSR license.
<b>4..254</b>	Reserved. Do not use.
<b>255</b>	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**<sup>2</sup>, the corresponding offline-version<sup>3</sup>, the free PDA software tools **SeeYou** and **ConnectMe**<sup>4</sup> or **pocket\*StrePla-Connect**<sup>5</sup>, and many of the other products on the market. Note that task declaration only works on IGC-enabled devices.

**Devices:**

All devices with an IGC-approved recorder

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<sup>2</sup> [www.segelflug-software.de/flarmcfg/](http://www.segelflug-software.de/flarmcfg/)

<sup>3</sup> [www.segelflug-software.de/prod\\_flarmcfgtool.html](http://www.segelflug-software.de/prod_flarmcfgtool.html)

<sup>4</sup> [naviter.com/](http://naviter.com/)

<sup>5</sup> [www.strepla.de/StrePla4/english/pS\\_connect/](http://www.strepla.de/StrePla4/english/pS_connect/)

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### **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 (000000N, 000000E). The format closely follows the IGC file specification<sup>6</sup>.

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

$7 + (\text{Number of Waypoints} * 9) + (\text{sum of length of all task and waypoint descriptions})$

#### **Devices:**

All devices with an IGC-approved recorder

#### **Parameters:**

Below parameters must be set:

Parameter	Value	Description
<b>Latitude</b>	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

<sup>6</sup> [www.ukiws.demon.co.uk/GFAC/documents/tech\\_spec\\_gnss.pdf](http://www.ukiws.demon.co.uk/GFAC/documents/tech_spec_gnss.pdf)

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		required and have to be filled with zeros, if applicable. The last character is either "N" for north or "S" for south.
<b>Longitude</b>	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.
<b>Description</b>	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
```





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`$PFLAC, A, ERROR*`

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

### **Example:**

`> $PFLAC, R, IGC SER`

`$PFLAC, A, IGC SER, ADY*`

FLARM is asked to give IGS serial number.

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## 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 ( <code>DEVTYPE</code> )
<b>PowerFLARM-based</b>	PowerFLARM-Core
	PowerFLARM-Portable
	PowerFLARM-AM
	PowerFLARM-Fusion
<b>Classic FLARM-based</b>	Flarm04
	Flarm05



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	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

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**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.

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#### 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
<b>ALL</b>	The device will work everywhere
<b>EUR</b>	SRD860 version. Will operate in Europe, Asia (except Israel), Africa, and New Zealand
<b>USA</b>	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`.

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## Devices:

All

## Parameters:

Below parameters are returned:

Parameter	Value	Description
<b>ID Type</b>	1	ID type: ICAO 24-bit aircraft address
	2	ID type: FLARM ID
<b>ID</b>	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
<b>ADSR</b>	ADS-R/TIS-B reception functionality

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

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## Parameters:

Below parameters are returned:

Parameter	Value	Description
<b>Version</b>	1	Currently always set to 1.
<b>Status of the obstacle subsystem</b>	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
<b>Name</b>	Max. 32 characters	Obstacle database name
<b>Date</b>	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.



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### **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:**

#### **Deprecated**

Returns list of all possible licenses. Licenses which are already installed are indicated by number 1 following the name of the license. Not installed licenses are followed by 0. New licenses may be defined at any time.

### **Devices:**

All PowerFLARM-based devices

### **Parameters:**

The following parameters are returned for each license, separated by a colon. The different licenses are separated by a semicolon.

Parameter	Value	Description
License type	AUD	External Audio connection

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	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
<b>License status</b>	0	License not installed
	1	License installed

### **Example:**

```
> $PFLAC,R,LIC
```

```
$PFLAC,A,LIC,AUD:1;ENL:1;AZN:0;IGC:1;RFB:1;TIS:1;ADSR:0*
```

FLARM is asked to list all available 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

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### **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
<b>Task description</b>	C	C record
	DDMMYY	Declaration date
	HHmmss	Declaration time
	DDMMYY	Flight date
	TTTT	Task number/ID: a 4-character alphanumeric value

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	00	Number of turn points: take-off, start, finish, and landing waypoints are not counted
	TEXT	Task name/description: up to 50 ASCII characters
<b>Waypoint description</b>	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,C010170000000000000000000100Baar*

$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.