

This is a unofficial user guide for the LGS installed Flarms. For the official guide go to the Swiss Flarm website and download it there.

How Lasham have installed them in the K13 fleet

The rear Cockpit has the entire Swiss Flarm unit on top of the rear instrument panel cover. Please note this is not water proof so do not let it get wet! The front cockpit uses an LX repeater that has the same functionality as the rear Swiss Flarm. The Flarm will turn on whenever it is plugged into the normal glider battery. There is a panel mounted fuse that can be removed to turn off the Flarm if ever required.

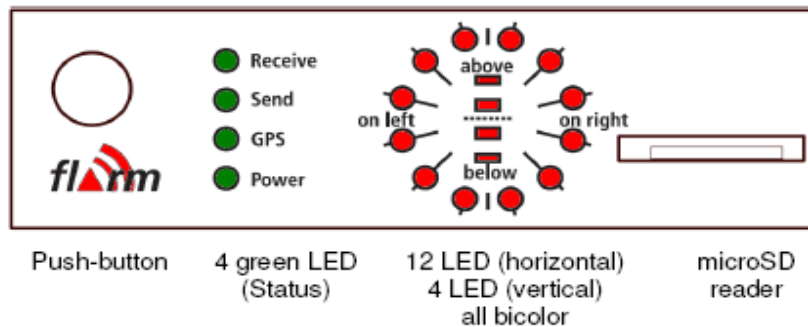
How it works

Flarm has a onboard GPS and barometric chamber, these record height and position. This information is transmitted to any other Flarm units in range (aprox 2km). The onboard software then calculates if there is a collision risk. If there is a risk it goes into collision mode and issues an audio warning (beep!) and the threat is displayed on the Flarm unit in red. If another Flarm equipped glider is detected but not considered a risk then it goes into nearest mode and there is no audio warning and the visual display of the other flarm is green.

The pilot can **suppress the display and the acoustic warning**: after a double push of the button FLARM will suppress all visual and acoustic signals. The act of selecting suppression is followed by a descending tone. A further double-push reinstates the *Collision* mode at once and is followed by a rising tone. While warnings are suppressed, FLARM nevertheless continues to transmit signals for reception by other aircraft.

FLARM Display

The display has a push-button, four green Status-LED, twelve bicolour LED for horizontal and four bicolour LED for vertical position indication. Depending on the threat caused by other aircraft or obstacles the LEDs show up red or green. Also included (on the rear panel only) is a microSD-reader which can be used for updates, downloads and configurations.



Start-Up

FLARM is always switched on if the unit is connected to an adequate power supply. Immediately after it has been switched on there follows a one-second long beep while a start-up pattern might be shown on the LED, followed by a binary presentation of the Hardware-Version installed during the system self-test. The self-test mode lasts from two to 20 seconds, depending upon the size of the obstacle data bank. The June 2007 data bank takes about twelve seconds. The 2 green lights indicate as below.



Then FLARM shifts to normal operation and waits until it has acquired an adequate GPS position fix. When switching on, this procedure can take *several minutes*. Without a proper GPS position fix, the unit is not ready for operation. **Before departure the pilot must ensure that at least the Power-, GPS- and Send- LED are all continuously on.** This state must be preserved during the whole flight to ensure correct operation.

Fault Finding

If a fault should occur during start-up self-test or subsequent operation, then all four green status LEDs will flash in unison for 30 seconds, while the red collision LEDs will give a binary indication of the most serious fault. The fault display can be stopped before 30 seconds has elapsed by pushing the button. For safety reasons FLARM will not start up if there is a fault. FLARM may not be used if a fault has been reported or indicated.

Aircraft Anti-Collision Warnings

An illuminated red LED indicates the approximate bearing to an aircraft currently posing the biggest threat of collision. The bearing is *relative to the track*. This indication is inaccurate if there is a strong wind, if the aircraft is in a sideways yaw, or if ground speed is very low (e.g. when a helicopter is in the hover). The display is refreshed every second. The unit emits an audio warning (beep) tone at the same time as the flashing red optical warning. The time between the warning and possible collision is brief, just a few seconds. Warnings of fixed obstacles are given slightly earlier.

Horizontal bearing indicated

The twelve bicolour LED show a compass rose, i.e. the birds view on the traffic situation. 'Top' is track-up according to your own aircraft. Each LED covers an equal-sized horizontal sector of 30°.

Danger from the front or side

If the threat of collision with another aircraft is from the front or side, but not from the rear, then the threat level will be flagged up by the display. If the threat is moderate (less than 18 seconds to possible collision), a single LED lights up; in the case of a medium threat (less than 13 seconds) then two diodes light up; if the threat is imminent (less than 8 seconds) three LEDs. The threat is at the centre of the illuminated block. The flash frequency increases with the threat.

Moderate threat from ca. 3 o'clock
(less than 18 seconds to calculated collision)

Slow flash at 2Hz



Moderate threat from 1 to 2 o'clock
(less than 18 seconds)

Slow flash at 2Hz



Medium threat from 1 o'clock
(less than 13 seconds)

Medium flash at 4Hz



Immediate threat from 1 to 2 o'clock
(less than 8 seconds)

Rapid flash at 6Hz



Danger from the rear

If the threat is from behind, then the threat level on Hardware Version 1 and 2 is given only by the frequency of LED flashes, not the number of LEDs activated.

Danger from the rear, 5 to 7 o'clock

Flashing
(H/W Version 3 example shows
medium threat from 6 o'clock)



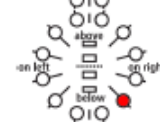
Danger from the rear left, 8 to 7 o'clock

Flashing



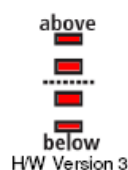
Danger from the rear right, 4 to 5 o'clock

Flashing



Vertical indication

The vertical bearing is indicated by a vertical line of four red LEDs and show the bearing relative to a horizontal plane. This is independent of the aircraft's climb angle. The uppermost or lowest LEDs illuminate when the bearing exceeds 14°. The LED flash frequency is identical and synchronous with that of the horizontal display.



Traffic indication (only in Nearest-mode)

In Nearest-mode the closest aircraft is shown as long as no warning is necessary. Traffic indications don't flash, there is no sound and the distance is not shown. Hardware Version 3 and higher show traffic indications in green.

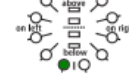
Traffic around 2 o'clock

No flashing



Traffic around 7 o'clock

No flashing



Status-Display

The green Status Display LEDs operate as follows:

Receive: Lights up when a signal is detected from another aircraft less than 2 km away, with a height separation of less than 500 m; otherwise the LED is dark. If the warning is temporarily suppressed (see below) but signals are still received from other aircraft, then the LED flashes.

Send: Lights constantly during operation and indicates that the on-board FLARM is transmitting. Transmission requires GPS reception.

GPS: Lights constantly during operation (with very brief interruptions once per second). If the LED is constantly dark and flashes briefly once per second, then there is no GPS reception. When switching on this condition can take several minutes.

Power: Lights constantly during operation. If the LED flashes, then the power supply has dropped below 8 V. FLARM will not operate below 8 V DC.

The 'Receive' and 'Send' LEDs give no indication of FLARM's transceiver range.

Push Button

The push button can be used to select the following functions:

Brief Push (<0.8 s) changes the volume from *<loud>* to *<medium>* to *<quiet>* to *<silent>* (and *<loud>* again). A short sound is emitted at the new volume selected. The default setting is *<loud>*.

Longer Push (2 s) changes mode between *<Nearest>* and *<Collision>* when airborne. Visual confirmation. Default setting *<Nearest>*. Note that on the ground, this longer push is used for the receiver self-test: Two seconds after the button is pressed

Double Push suppresses optical and acoustic warnings for five minutes. Suppression is followed by declining melody, normal setting followed by a rising melody. A double push terminates the suppressed operation at once.

Long Push (>8 s): Re-boot. This procedure is recommended if a fault is apparent. No confirmatory sound signal.

Very long push (>20 s) brings FLARM back to the factory settings. The very long push deletes all configurations that have been loaded by the user. No confirmatory sound signal.

Operating Limitations

FLARM is designed and built as a non-essential 'situation awareness only' unit to support the pilot, and cannot always provide reliable warnings. In particular, FLARM does not give any guidance on avoiding action. Under no circumstances should a pilot or crewmember adopt different tactics or deviate from the normal principles of safe airmanship. The use of FLARM is solely at the discretion of the commander and his delegated crew member. Operation must be preceded by thorough familiarization by the commander or his delegated crew member with the Operating Manual.

FLARM will only give warnings of other aircraft that are likewise equipped with a compatible unit. FLARM does not communicate with Mode A/C/S transponders and is not detected by ACAS/TCAS/TPAS or Air Traffic Control. Warnings are given at very short notice, i.e. the warning is given within a time frame of from a few seconds to 18 seconds, depending upon the closest predicted proximity, as calculated. The threat intensity (pitch of the warning tone, LED block width, flash interval) flags up the threat (collision time point), but not the geometric distance. FLARM only issues a warning if the calculation forecasts a considerable threat. For this reason, it is usual - depending upon the mode selected - that no warning is given about the presence of other aircraft, in spite of the fact that signals have been correctly received.