

Bristol and Gloucestershire Gliding Club

Flarm Briefing



Introduction

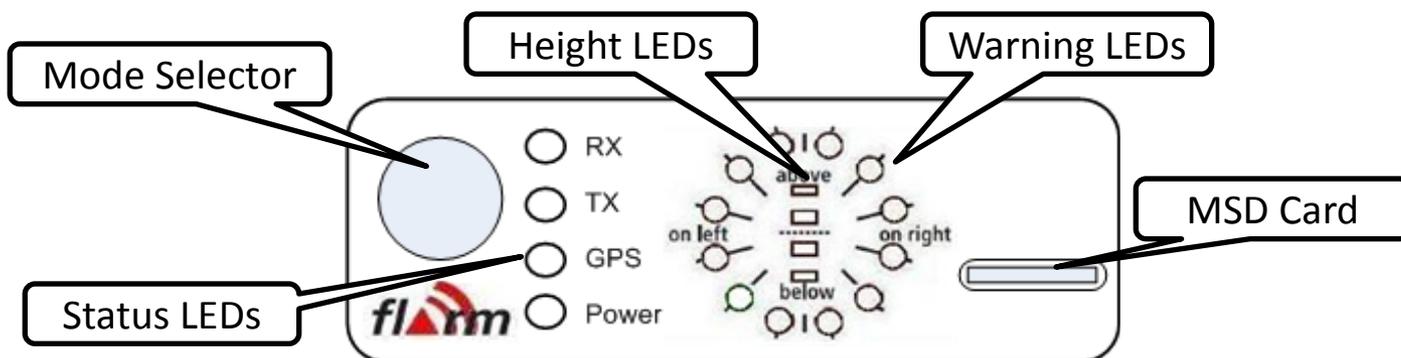
- All BGGC club gliders (and tug) have been fitted with Flarm. This briefing covers basic Flarm principles.
- Two seat gliders have a Swiss Flarm mounted in the rear cockpit and an LX Navigation repeater display mounted in the front cockpit directly in the pilot's line of sight. Single seat gliders have a Swiss Flarm.
- There are slight differences between the integral Swiss Flarm display and the LX repeater display, but the functionality provided by both displays are the same.
- Flarm is a 'situation awareness only' device to support the pilot. It can never be relied on to provide 100% reliable warnings. Under no circumstances should a pilot or crew member adopt different tactics or deviate from the normal principles of safe airmanship.
- Flarm is not a replacement for an effective lookout. It is essential that pilots continue to rely on a good lookout and an effective scanning cycle which includes the Flarm display.
- *All pilots must familiarise themselves with Flarm operations, the Flarm display and Flarm alarm warnings before flying BGGC Flarm equipped gliders.*

Flarm Overview

- Flarm (**F**light **a**larm) is a “situation awareness” device. Its primary function is to alert the pilot to a potential collision threat. It does not give any guidance on avoiding action.
- Flarm uses an internal GPS and barometric chamber to fix its position and low-power radio transmissions to send and receive signals to and from other Flarm equipped aircraft. Flarm uses the information to calculate if there is a collision risk.
- The operating range is dependent upon the aircraft’s antenna installation. The typical range with a correctly mounted antenna is 3 -5 km.
- Flarm includes an IGC logger. The logger will record all flights and download them automatically to the micro SD card, if present. The logger can also be used to declare tasks. Tasks can be declared directly from a PNA/PDA or uploaded using the micro SD card.
- *Refer to the Flarm manual for more detailed technical specifications.*

Swiss Flarm (Rear Seat)

- The integral Swiss Flarm display fitted in the rear seat of club two-seat gliders, and all single seat gliders, uses a 'Clock Face' of **12 Red / Green LEDs** to indicate the position and approximate distance of other Flarm equipped aircraft. The top of the display is track up. Each LED covers an equal-sized horizontal sector of 30°.
- Four additional LEDs in the centre of the clock face are used to show the vertical position of identified aircraft.
- The LED displays are supported by a range of audible warnings.



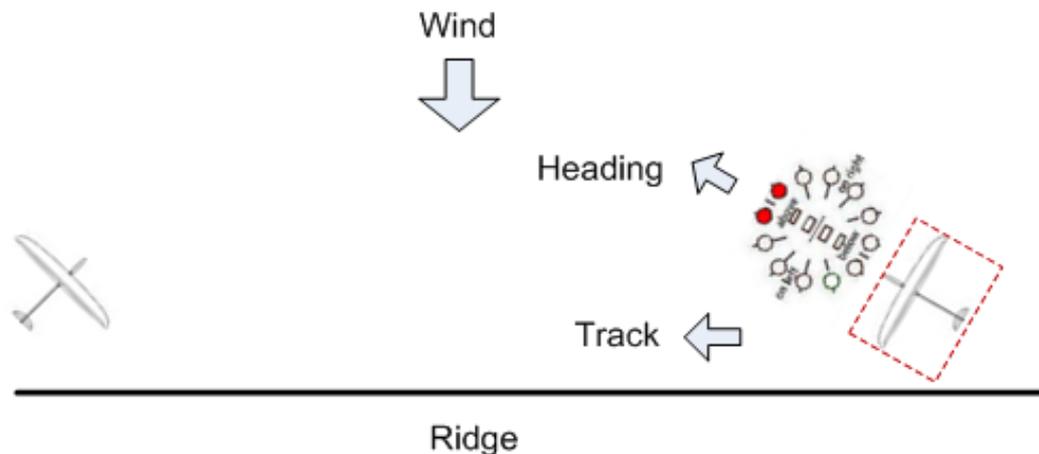
Swiss Flarm Display (not to scale)

Anti-Collision Warnings (1)

- An illuminated red LED indicates the approximate bearing to a **Flarm equipped aircraft** currently posing the biggest threat of collision.
- 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.
- 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 LEDs light up; if the threat is imminent (less than 8 seconds) three LEDs with the threat at the centre of the illuminated block.

Anti-Collision Warnings (2)

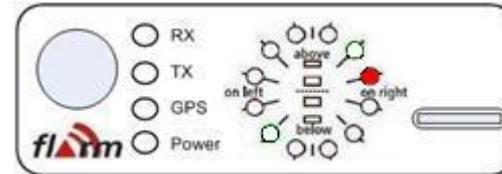
- Flarm LED display alerts are always relative to track. These indications are inaccurate if there is a strong wind, if the aircraft is in a sideways yaw, or if ground speed is very low.
- For example, when ridge soaring the wind can typically be 15-25kts. This can produce a significant track / heading differential. As Flarm only determines track, all alerts are given on the visual display in relation to a track rather than a heading. In the example below Flarm (red glider) shows a medium alert at 12 o'clock, when the true risk is 10-11 o'clock, the glider's track.



Example Display Warnings (1)

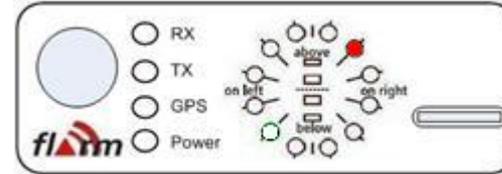
Moderate threat @ 3 o'clock.

Slow Flashing Red + *slow alarm beep!*



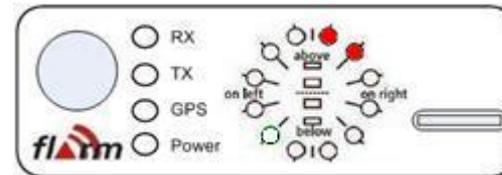
Moderate threat @ 1-2 o'clock.

Slow Flashing Red + *Slow alarm beep!*



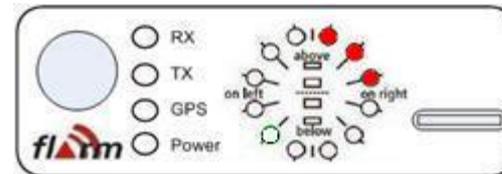
Medium threat @ 1 o'clock.

Medium Flashing Red + *Medium alarm beep!!*



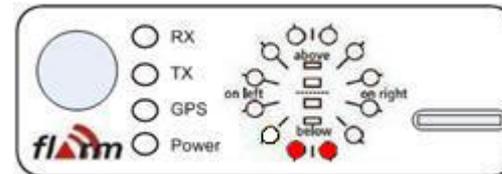
Immediate threat @ 1 to 2 o'clock.

Rapid Flashing Red + *Rapid alarm beep!!!*



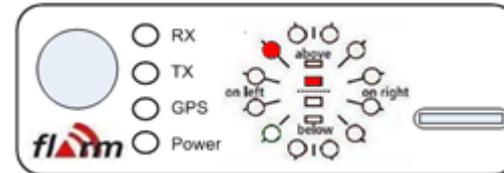
Medium threat @ 6 o'clock.

Medium Flashing Red + *Medium alarm beep!!*

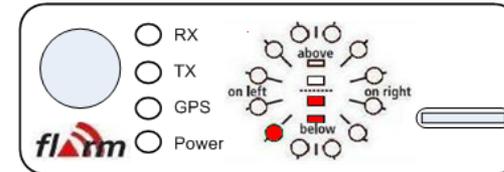


Example Display Warnings (2)

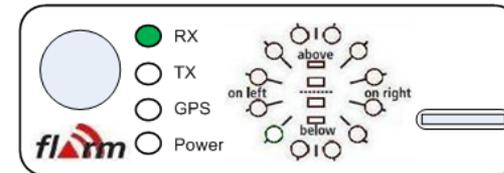
Moderate threat @ 10 o'clock & Above.
Slow Flashing Red + *Slow alarm beep!*



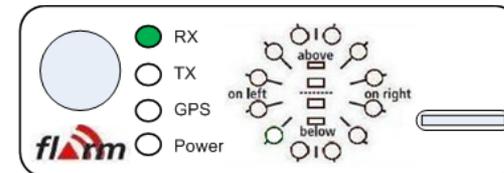
Moderate threat @ 7 o'clock & Below.
Slow Flashing Red + *Slow alarm beep!*



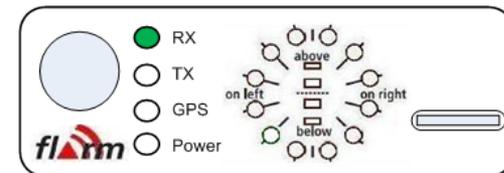
Traffic @ 7 o'clock & Below.
Slow Flashing Red + *Slow alarm beep!*



Traffic Identified @ 7 o'clock.
Steady Green + *No alarm*



Traffic Identified @ 4 o'clock & above.
Steady Green + *No alarm.*



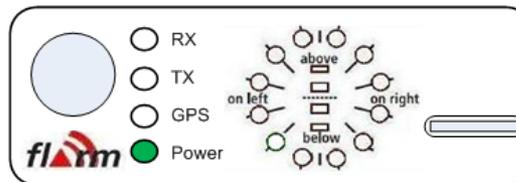
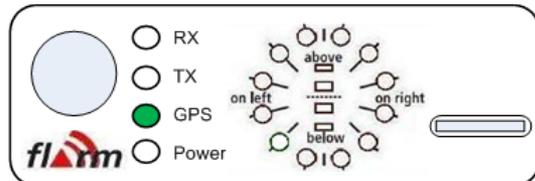
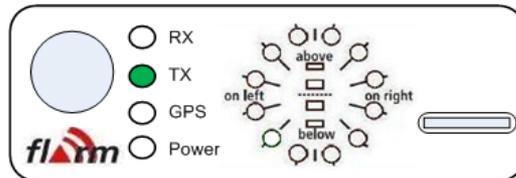
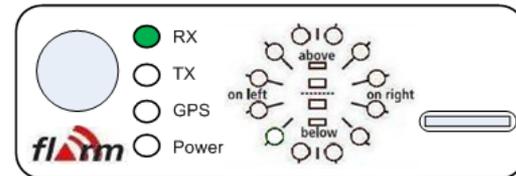
Status LEDs

Receive: Lights when a signal is detected from another aircraft less than 2 km away, with a height separation of less than 500m

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

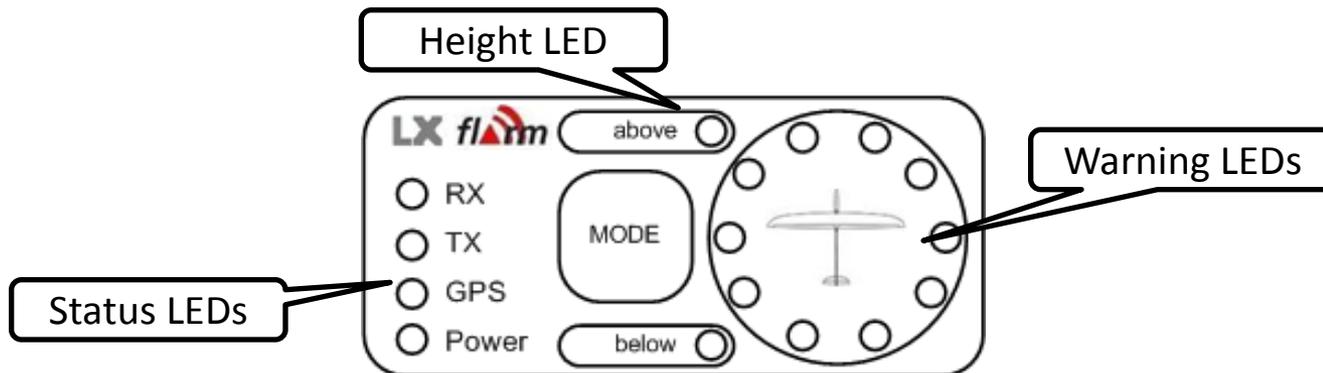
GPS: Lights constantly during operation (brief interruptions once per second). If constantly dark and flashes briefly once per second - no GPS reception.

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



Flarm Display (Front Seat)

- The Flarm display fitted in the front of club two-seat gliders uses a 'Clock Face' of **10 Red / Green LEDs** to indicate the position and approximate distance of other Flarm equipped aircraft. The top of the display is track up.
- Two additional LEDs (labelled above and below) are used to show the vertical position of identified aircraft.
- The LED displays are supported by a range of audible warnings

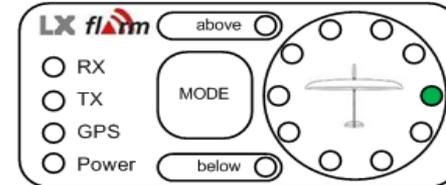


LX Repeater Display (not to scale)

Example Warnings

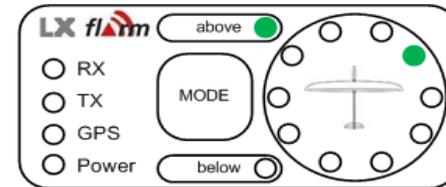
Traffic Identified @ 3 o'clock.

Steady Green. No alarm



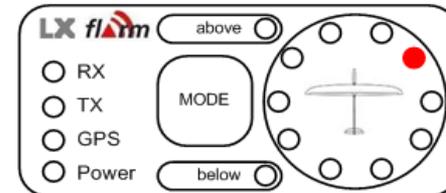
Traffic Identified @ 2 o'clock and above.

Steady Green. No alarm



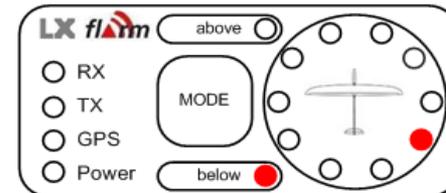
Moderate Threat @ 2 o'clock.

Slow Flashing Red + Slow alarm beep!



Medium Threat @ 4 o'clock and below.

Medium Flashing Reds + Rapid alarm beep!!



Mode Settings

Mode	Action	Description
Adjust Volume	Brief Push (<1s)	Sets volume in steps: <i>Loud, Medium, Quiet, Silent and Loud.</i>
Change Mode	Long Push (2s)	Switches operation mode between: <i>Nearest and Warning.</i>
Suppress Warnings	Double Push	Suppresses visual and audio warnings for five minutes.
Re-boot	Long Push (>8s)	Re-boots the system.
Re-set	Long push (>20s)	Resets factory settings.
Self Test	Ground only Use	Refer to Flarm Manual

Operating Modes

- Flarm has two operating modes.
 - **Nearest mode** will only identify other aircraft within range and display a steady green LED with no warning alarm. The unit will automatically switch to warning mode if an aircraft comes within warning range. The unit will revert to nearest mode when the threat disappears.
 - **Warning mode** will trigger warning LEDs and alarms if an aircraft enters within warning range.
- The default operating mode is **nearest**

Briefing and Training

- **Ground and Theory**
 - Describe the basic principles and purpose of Flarm
 - Demonstrate an understanding of the Flarm LED and alert system using examples to identify various conditions.
 - Explain the different Flarm operating modes.
- **Flying and Operational**
 - Flarm is not a replacement for an effective lookout. It is essential that pilots continue to rely on a good lookout and an effective scanning cycle which includes the Flarm display.
 - Ensure Flarm is included in the regular lookout scan cycle.
 - Ensure Flarm alerts are correctly identified, associated with the initiating aircraft and appropriate avoiding action taken where necessary.