FLARM BRIEFING FOR SOUTH WALES GLIDING CLUB PILOTS

Purpose

Is to explain how FLARM works, how to operate and understand the displays on the club gliders that are equipped with FLARM.

How Does FLARM Work?

Each FLARM device determines its position and altitude with a highly sensitive state of the art GPS receiver. Based on speed, acceleration, heading, track, turn radius, wind, altitude, vertical speed, configured aircraft type, and other parameters, a very precise projected flight path can be calculated. The flight path is encoded and sent over an encrypted radio channel to all nearby aircraft at least once per second.

At the same time, the FLARM device receives the same encoded flight path from all surrounding aircraft. Using a combination of own and received flight paths, an intelligent motion prediction algorithm calculates a collision risk for each received aircraft based on an integrated risk model. The FLARM device communicates this, together with the direction and altitude difference to the intruding aircraft, to the connected FLARM display. The pilots are then given visual and aural warnings and can take resolutive action.

So, you will only get an audible alarm if there is a real risk of a collision. A lesser risk will give a visual display but with no audible alarm.

All FLARM equipped aircraft operating from our site are able to be tracked by a system known as "Spot the Gliders" (http://live.glidernet.org) unless the FLARM owner has opted out of tracking.

The K13's, Astir and Tug are all equipped with FLARM and are all tracked.

Operating the FLARM units.

The K13's and Astir will FLARM units will turn on as soon as the battery is connected. Hence, it is important that the battery is unplugged at the end of the day. A FLARM takes around 60ma and so a fully charged glider battery would power a FLARM for around 5 days continuously. Leaving it on during the day is not a problem and will not cause audible alarms in gliders flying near the site. The FLARM in the tug will come on with the master switch.

Main FLARM unit – horizontal indicator
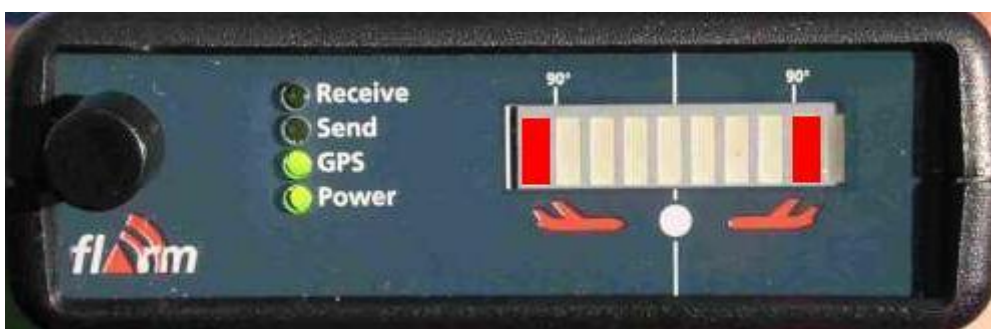
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The device will go through a startup procedure and then after a few minutes the GPS, power and send lights should be on continuously. If there are any other devices nearby the receive light may also come on to indicate another FLARM is being received. The horizontal display will be blank.

Anti-Collision Warnings - horizontal indicator

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.

Each red LED is allocated to a sector of sky around the aircraft horizontal plane in a side view. The aircraft centerline is indicated by a white line above and below the mid point (between LED4 and LED5). A short white line is located above LED1 and LED8, marking 90° le ft and right.

• LED 0 ~210° quadrant rear left

• LED 1 270° hard left 9 o'clock

• LED 2 296° left 10 o'clock

• LED 3 321° left 10-11 o'clock

• LED 4 347° front left 11-12 o'clock

• LED 5 13° front right 12-1 o'clock

• LED 6 39° right 1-2 o'clock

• LED 7 64° right 2 o'clock

• LED 8 90° hard right 3 o'clock

• LED 9 ~150° quadrant rear right

Push Button – horizontal display

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>.

• Longer Push (5 - 8 s, only on the ground) activates the receiver self-test: Two seconds after the button is released, FLARM will show how many other FLARM are received with reduced sensitivity (50% of the normal range). It will then emit a long beep and light one vertical LED for every 10 and a short beep and one horizontal LED for every single received aircraft (e.g. 14 received FLARM is: "beeeeep bep bep bep bep", with one vertical and 4 horizontal LED's). After the self-test, FLARM switches back to normal operations. Note that for other units to be displayed these must be running.

• 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.

Remote Display – Compass Rose
The front seats of the K13's have a different display which looks like this:-

Anti-Collision Warnings - compass indicator
The Collision-LEDs show the horizontal bearing to the most threatening moving object relative to one's own track over the ground. The circle is divided by these LEDs in segments of 36°, the first LED being situated at 018° and the last one at 342°. Corresponding to the level of threat one LED will flash at 2 Hz (low threat), at 4 Hz (medium threat) or at 6 Hz (immediate threat), accompanied by an acoustic warning signal. In Mode "nearest" the LED will be illuminated constantly and no acoustic warning signal is given as long as no danger of collision exists. The 2 LEDs "above" and "below" shows the vertical bearing to the most threatening moving object relative to one's own height as long as the angle exceeds about 7°. The change to Mode "Nearest" is indicated by 2 Collision-LEDs which move symmetrically from top to bottom.

Please do not "play" with the mode button, it is used to configure the remote display or to reset both the remote display and the main unit.

How should I use FLARM?
Basically forget it's there if it's not making any noises!

If it does start beeping and flashing then hopefully you will already have seen the threat and the FLARM is just confirming it. If not, a QUICK glance at the FLARM display will give you an idea of where the threat may be. Now you can use the extra information to look again and find and avoid the threat if there is one.

This is only a quick guide and if you would like any further information about FLARM please request this via the CFI and we will arrange an evening FLARM briefing session at the club.