

Flarm and the case for modified “Stealth” protocol

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What’s the problem

Range of Flarm now gives competitors the opportunity of identifying, locating and assessing the climb rate of competitors over 20km away. This has evolved with the production of better Flarm electronics (Powerflarm) and a better understanding of influence and importance of antenna location and design. Whilst the improved performance is most welcome as it now ensures that all installations are seeing and being seen at the important 2km range with much reduced blind spots(2km required for effective collision avoidance head to head), it has dramatically increased the tactical use by competition pilots.

Tactical benefits on task include being able to assess climb rate of others and identify where important pilots are in order to make improved strategic decisions. Even if the targets in view are not “tagged” they give important information for gliders behind to optimise routing and to ensure that if required a follower may ensure they fly the same route. Tactical benefit prior to start is even greater as it allows a full view of the start line area so it is clear where all the start gaggles are located, where key competitors are, whether they have started and sometimes what rate of climb is achieved in the first thermal on task.

It is arguable whether this sort of tactical assistance diminishes the art of racing gliders. I believe it does but this is not the main thrust of this paper. Flarm in isolation is a great safety device that has rightly been encouraged to the position we find ourselves today where it is mandatory in all FAI Cat 1 events. However, it is now very clear from feedback from International competition pilots that the workload in gleaning the “necessary” tactical data from the Flarm device is diminishing or eliminating the apparent added safety that the underlying Flarm provides.

What are pilots doing:-

- 1 Spending way too much time scanning moving maps for tactical contact detail instead of look out
- 2 Spending way too much time “tagging” competitors instead of look out to improve tactical content
- 3 Turning their Flarm units on and off at will to avoid tactical benefit accruing to others
- 4 Blanking antennas to reduce or eliminate range to avoid tactical benefit accruing to others
- 5 Installing amplifiers to increase range even further
- 6 Utilising two port Flarm units with one send/receive and one receive only antenna to maximise the range received but eliminate or restrict transmit range.

7 Changing backwards and forwards from “stealth” to full ON mode to minimize tactical benefit accruing to others but maximising own benefit as required.

Whats the effect

1 Safety is significantly diminished due to significant head in cockpit time inputting and viewing the Flarm for maximum tactical benefit.

2 Following or “leaching” is much easier so the eternal problem of gagging is further encouraged at the possible cost of safety.

3 It is much easier for pilots of lower skill level to fly at the same XC speed as the best pilots.

What’s the solution

When Flarm protocol was invented, it was thought that tactical advantage as described above may not be desirable in competition. So Flarm was designed with a “Stealth” protocol which degrades the information available to the pilot setting the mode and also to the pilot receiving that signal. So pilots can opt in or out of the tactical benefit and additionally the setting adopted is recorded on the IGC flight recorder. It was thought that this setting choice would be chosen at will by the pilot or prescribed by the competition ruling authority. Currently, IGC rules allow free choice of settings of Flarm unit.

One solution might be to mandate current Stealth mode for all events. This would certainly have a very significant effect and indeed was trialled by the BGA two years ago to fix all of the issues detailed above. However, it quickly became apparent that the current stealth mode, whilst eliminating the tactical benefit of Flarm, also reduces situational awareness in that targets that are not yet regarded as a threat do not appear on displays even if they are close by. The Flarm unit manufacturers themselves specifically do not recommend Stealth mode for this very reason although they comment in their literature that it is certainly better than pilots switching off their Flarm units. The BGA stealth trial was abandoned due to the forced situational awareness loss factor even though it was otherwise seen to be highly successful in restricting tactical benefit.

What is needed is a revised “IGC Stealth” protocol that has all the benefits and more but none off the pitfalls of the current stealth mode. Such a protocol would then be suitable for mandating by IGC and as required by all aero-clubs for National events.

In order to understand what is required, it is necessary to first understand what data is restricted to pilots when the current stealth mode is set – see table below.

Current stealth mode

	more than	Ahead less than 45 degrees	ALERT
	2km horizontal	and 2km horizontal	
		and +/- 300m.	
ID	not available	available	available
2d position	not available	available	available
Relative altitude	not available	available with noise	available
Climb rate	not available	not available	not available
Track	not available	not available	not available
Speed	not available	not available	not available
Turn-rate	not available	not available	not available

Current stealth mode reduces situational awareness because all three factors in the amber column need to be true before 2d position, ID and Relative altitude with noise is available. This is why gliders very close to one another may not appear on displays but they can still very quickly become a threat – eg – a glider in the blind spot behind will not appear on the display of the pilot in front when both gliders are on similar track. Eg. Other gliders circling in same thermal will not always appear on display. Note that non of the basic audible and LED Flarm warnings are impaired if these are fitted.

Possible revised IGC stealth mode

A revised “IGC stealth mode” if implemented might look something like the table below:-

	more than	less than	ALERT
	2km horizontal	2km horizontal	
		and +/- 300m.	
ID	not available	not available	not available
2d position	not available	available	available
Relative altitude	not available	available	available
Climb rate	not available	not available	not available
Track	not available	not available	not available
Speed	not available	not available	not available
Turn-rate	not available	not available	not available

Here the ID is never available so it will never be possible to identify specific gliders so there will no longer be the requirement to attempt to “tag” other competitors thus reducing head down time and hence increasing safety. Also gliders remain unidentified from other competitors electronically at least thus satisfying the sporting argument too. With ID not being transmitted to others, pilots will be happier with the concept of the organisation possibly insisting on them being “tagged” for use by the competition organisation for purposes of glider competition tracking.

The 2d position and accurate relative altitude is available to all aircraft within 2km and 300m relative altitude. This allows all aircraft in the 600m x 2km disc to be visible at all times on graphic displays with accurate data for height so they may be monitored accurately. As the

“ahead less than 45 degrees to track” requirement has been removed, situational awareness will be complete within the cylinder.

As no position or climb data is available outside the amber cylinder then the tactical benefit of seeing climb rates will be reduced but not eliminated. Also it will still be possible to follow other gliders provided any follower stays within 2km but it will be easier for trail-blazer to “escape” due to the relatively short distance and the lack of ID.

GLIDERS IN THE AMBER CYLINDER RETAIN FULL SITUATIONAL AWARENESS
AT ALL TIMES

Conclusion and way forward

It is envisaged that the revised stealth parameters here should be checked for validity to achieve the desired result and then a dialogue be set up with Flarm to further check and implement.

Once available, the revised stealth mode should be made mandatory in all events.