

Mode S Consultation
Phase Two – Proposals
Held on Friday 11th April, 2008 at 7.00 p.m.
At Wolds Gliding Club

The aim of the meeting was to raise awareness of the CAA's proposals of using Mode S Transponders in Gliders in U.K. Airspace, and how pilots can respond to the 4 options tendered.

A CD presentation then took place of the implementation of Mode S Transponders, together with the 4 options proposed. (See below).

Option 1: Mandate the carriage and operation of Mode S transponders on all aircraft operating within controlled airspace of classification A to E. The aim of this is to increase the number of aircraft that are electronically visible to ATC radars and safety systems, such as TCAS and Short-Term Conflict Alert, supporting the management of controlled airspace.

Option 2: Implement a formal process for applications for "Transponder Mandatory Zones" (TMZs) outside of controlled airspace. The CAA already has regulatory powers to establish TMZs, which effectively allow specific, notified volumes of airspace to be created where all aircraft have to carry and operate transponders. To date, these powers have been used sparingly and the only current TMZ in the UK is in the Scottish TMA between 6,000 feet and Flight Level 100. Greater use of TMZs may be required to address specific safety and airspace efficiency issues such as in airspace with high levels of infringements.

Option 3: Include gliders within the SSR transponder carriage regulations. The aim is to improve the electronic visibility of gliders by bringing them into line with the transponder carriage requirements that all other aircraft have to meet. Transponders would not be required on gliders flying below Flight Level 100 outside of controlled airspace and TMZs.

The CAA recognises that the equipage of gliders with transponders still presents challenges, particularly with installation, weight, electrical supply and cost. Existing regulatory provisions and specific arrangements could provide means for enabling access to some volumes of mandatory transponder carriage airspace where the risks of non-detection by safety systems can be mitigated. In addition, specific areas of airspace between Flight Level 100 and 195 could be identified as "non-transponder airspace" for gliding activity.

Option 4: Mandate the carriage and operation of Mode S transponders on all powered aircraft conducting international flights. Current international standards specify the need for all powered aircraft conducting international flights to carry and operate pressure-altitude reporting SSR transponders, irrespective of the airspace in which they operate.

The CAA has currently notified a "Difference" with these standards because it might result in a significant increase in the carriage of Mode A/C transponders and large increases in the numbers of Mode A/C transponders could degrade the integrity of the SSR radio frequency environment. However, the CAA fully supports the rationale behind these international obligations and, therefore, proposes working with adjoining European states to enact the standards into UK legislation by employing Mode S technology. This approach would not run the same risk of weakening the integrity of the SSR system.

After the CD presentation the speaker gave the following information:

Option 1 relates to only operating within controlled airspace. It would also still allow ATC to permit aircraft without transponders to access controlled airspace, based on the conditions at the time of the request or through standing Letters of Agreement. If this is the only option that eventually goes forward it would not involve gliders. Option 3 would also have to be recommended for gliders to require transponders in controlled airspace.

Option 2 does not need a regulatory change.

Option 3 would be the one that really affects gliding, because it would bring gliders within transponder carriage, when flying in controlled airspace, when above Flight Level 100, and when in TMZs.

Option 4 affects powered aircraft when flying between countries.

The meeting continued with a Question/Answer session, details below:

Q. Flarm System, Why has it not been investigated?

A. It uses a commercial algorithm that does not have any international standards. It also uses a frequency that is not in the aeronautical radio spectrum and so is not protected from interference. It has been specifically designed to prevent low speed collisions between gliders and is not interoperable with ATC radar. To meet the CAA's interoperability aims, it would need significant modification and international standardisation. It would also need to be installed across the global commercial air transport fleet. If this was technically feasible, it would take many years to accomplish and could not be achieved within the timescales needed to support the aims of the Government's air transport White Paper.

Q. Explain the rationale for excluding gliders from Option 1 and not balloons.

- A. In the Air Navigation Order, only gliders are not required to carry and operate transponders in airspace where they are mandatory. Balloons would need transponders in controlled airspace under Option 1, unless otherwise authorised by ATC.
- Q. Why are transponders so varied re the cost of installation of transponders in gliders?
- A. Dependent of what work is required to fit the transponder and antenna which impacts on the cost of installation.
- Q. Would implementation of Option 3 be a contingent for low power transponder development going ahead?
- A. No, Option 3 requires gliders to only have Mode S transponders when flying in controlled airspace, TMZs, and when above Flight Level 100. Transponder products are available for gliders and they are being installed in gliders in Germany.
- Q. Would Paraglider/Hang gliders need transponders?
- A. It is believed that there is no transponder product currently available that is suitable for these aircraft. Under Option 3, these aircraft would, therefore, need ATC approval to enter airspace where transponders are mandatory.
- Q. Re implementation of Mode S Transponders in the options above, have safety/ risk assessments, values on lives, and the benefits re pounds/life been undertaken?
- A. The aim of the proposals is to increase the number of aircraft that interact with the safety layers provided by ATC, conflict alert tools and TCAS in the airspace where commercial passenger carrying aircraft predominantly operate. The target level of safety when designing an air traffic system is very stringent (i.e. no more than 1 fatal collision in 200 million flight hours). If all the flight hours in UK airspace in 2006 were considered (3.2M), the acceptable fatal collision rate in the air traffic system would be one in every 59 years. Therefore, measuring the actual levels of safety that are being achieved is extremely difficult when collisions are so rare, and the sample size of data is very small. The Department for Transport uses a statistical value of life of £1.43M person when evaluating the economic benefits of road traffic accident prevention schemes. If this economic amount was applied to the CAA's Option 1, the implementation cost equates to just 26 fatalities by 2025 that would need to be prevented for the costs to be justified.
- Q. Freedom of movement for glider pilots is getting worse, putting Mode S Transponders in gliders when they fly 99.9% of the time outside controlled airspace. Why enforce this?
- A. If you are not going into controlled airspace, or above FL 100, or in TMZs, you don't need to have a transponder.
- Q. Why are requests to go through controlled airspace, denied?
- A. The BGA now have a "reporting denied access" report now on line where glider pilots can record these instances. The CAA will be interested in this information so that it can investigate trends.
- Q. Is there a list of approved Mode S Transponders and Equipment?
- A. There is no list or guidance material re transponders. There are 3-4 makes of Mode S Transponders that could be installed in gliders. There is a guide to Transponders for Sailplanes which is available from the United States of America gliding society.
- Q. What Transponder Level/Class do I need?
- A. There are 2 level/classes that are of international standard. Level/Class 1 transponders are suitable for flying above 15,000 feet. Level/Class 2 transponders are only suitable for flying up to 15,000 feet.
- Q. As a parallel, what is happening now and what happened in the last 100 years re "the right to roam" re walking, is now happening to gliding. The same Politicians are trying to stop us flying freely in the skies. Where are our Human Rights?
- A. The CAA aim is to try and maintain access to all airspace for all aircraft operators in the face of significant growth of commercial flights, by improving cooperation with ATC radar and safety net systems.
- Q. It is not just the cost of the Mode S Transponder equipment and installation but the on-going costs which impinge on people's pockets, e.g. £50, £100, £250 a year for annual checks on the transponders. Why does it have to be an annual check, why not do them 5 yearly?
- A. It is the pulse width of the replies, and pressure altitude that need checking on a periodic basis. Other Countries check transponders at different time periods, some do the checks annually, others 2-yearly. EASA material just states that checks must be made periodically.
- Q. Safety Cases/Infringement Issues. Airprox. Reports. Of all airprox reports very few relate to gliders. Figures are disproportionate. Why not look at areas

that could be at risk for gliders and not across the whole country?

A. The US accidents investigation board has just recommended that the exemption for gliders to carry transponders should be removed in the USA after a collision between a glider and a commercial jet in Reno, 2006. This incident was in controlled airspace at 16,000 ft. Last August there was a serious Airprox near Farnborough between a glider and a commercial jet where the aircraft were assessed to have come within 200 ft vertical and 200 yards horizontal separation from each other. ATC would have been able to pass better traffic information if the glider had been operating a transponder and the commercial jet's TCAS would have been able to detect the glider. The UK Airprox Board assessed that safety had been compromised in this instance. The aim of the CAA's proposals is to try and prevent similar incidents in UK controlled airspace, TMZs and above FL 100, where commercial transport predominantly operates.

Q. What about setting up Transponder Free Air Space Zones?

A. Good question, put it in your response. The CAA would consider proposals from the BGA for Transponder Free Zones above FL 100, especially to provide access to TRA(G)s.

Q. What is the benefit of "being seen" at a set height when flying a glider with a transponder?

A. The benefit is that other aircraft/airliners/jets know you are there and they will take avoiding action where necessary. ATC can also gain better awareness and pass on this awareness to aircraft under their control. The risk of collision is much reduced when ATC and safety nets can detect aircraft.

Q. Paraglider pilots present at the meeting. They asked: Transponder Mandatory Zones. Why would someone want one in the first place?

A. Putting buffer zones around controlled airspace could help provide warning of airspace infringements and reduce the number of infringements made by aircraft without transponders. They could be put around wind farms where primary radar is affected. They could be used instead of increasing controlled airspace in some areas. Unlike in other States, UK TMZs will be considered on a case by case basis.

Q. TCAS Collision Avoidance. Who has this system?

A. All aircraft with a maximum take-off mass in excess of 5,700 kg or 19 passenger seats, irrespective of the airspace in which they operate. Many Police air support units and pipeline inspection helicopters will have TCAS. The new RAF Hawk aircraft will have a TCAS system. RAF Tucano training aircraft now have TCAS. The Ministry of Defence has a procurement programme to develop a collision warning system for the Tornado and Harrier aircraft; this will be based on SSR.

Q. What about the possibility of airspace being lowered from Flight Level 195 down to Flight Level 95.

A. There are discussions in Europe about lowering Class C controlled airspace from FL 195 to FL 95 sometime in the future. Firm plans for this are uncertain.

Q. If a transponder belongs to a Club, is it possible to use it on several gliders?

A. The only obstacle for this may be installation/certification issues. However, the rules for assigning Mode S 24-bit technical aircraft addresses permit the addresses to be assigned to transponders or individual aircraft. Therefore, in theory it is possible to use a Mode S transponder on different aircraft.

Q. CAA information in 10 years 1997-2007 give 185 reports re conflict, 26 infringements of airspace. Since 2003 no infringements 15 in the UK in 10 years, or 1.1/2 per year. CAA say 300 by GA. Gliders only represent 1/2% of infringement. We now have moving maps therefore infringements are now fewer, so the figures are not true at present.

A. Good answer. Inform CAA of above in consultation response. In case by case applications for TMZs that are required to address airspace infringement concerns, this issue could be a factor to take into account

Q. Option 4 only applies to powered aircraft, not Gliders?

A. Yes.

Q. You referred to introducing buffer zones. That is fair enough geographically in the United States of America and Germany, there is more space there. Here we have not got large areas of space how could you do this?

A. TMZs would be done on a case by case basis and the CAA would not use rigid criteria to apply them in all locations that meet this criteria.

Question from Andy: TRA(G)s. What are your opinions of these?

A. Discussion took place re TRA(G)s and the problems encountered when attempting to use them. People's experience of using TRA(G)s is that they are difficult to use and people felt they were next to useless.

TRA(G)s affect cross country flights as well as wave flights. If gliders could not fly in large areas above Flight Level 100, cross country in wave would be very difficult.

It was generally felt glider pilots would like to see TRA(G)s much bigger.

Q. Commercial flights only use Flight Level 100 for a short space of time on take

off and landing, so why blanket everywhere, why take airspace from glider pilots?

- A. The historical reason for the Flight Level 100 limit is not clear but there are similar rules in other States, such as the USA. One reason could be that speed is not restricted above FL 100 and 'see and avoid' is not as effective with higher closing speeds. Therefore, greater reliance on ATC radar information and safety nets is needed to help protect commercial passenger carrying aircraft.
- Q. Consultations with Balloonists, paragliders re low powered transponders.
No progress to date?
- A. No interest at the moment from industry in looking at low powered transponders for balloons, paragliders. What aerial could be used, what power will it need, size needs to be small. Potential customers for a low power transponder do not see benefits and are resisting transponder carriage. There is also no international agreement to develop operating and certification standards.
- Q. Mode S. Is there ADSB?
- A. No firm plans to use ADS-B in the UK in the timescales required to meet the aims of the Government air transport White Paper. It will not interact with the TCAS collision avoidance algorithms. The current ADS-B units available in the USA weigh more than a transponder, need more power and cost about the same. Most Mode S transponders with support ADS-B and so the CAA sees Mode S as a future way of delivering ADS-B when it is eventually suitable for UK airspace.
- Q. UAVs Are they to be used in any airspace?
- A. None of the proposals is to do with UAVs. Integration of UAVs outside of segregated airspace is a separate issue.
- Q. Low power units for transponders are used in Germany, how long do batteries last?
- A. There are difficulties in assessing how pilots in Germany are coping as it is believed that transponders are turned on/off when operating around TMZs. The rules in the USA require pilots to turn transponders on permanently. As most transponders in gliders in the USA are Mode A/C, it is believed that pilots are having to turn transponders off to conserve battery life. There are varying reports as to battery life; these vary between 5-10 hours duration. Mode S transponders use much less power than Mode A/C transponders.
- Q. What happens if the battery goes flat in flight?
- A. The current procedure for transponder failures would not change. It is recommended you continue to fly and try and get out of the mandatory transponder carriage airspace as quickly as possible. Transit flights to the nearest repair depot are allowed. If you can tell ATC of a transponder failure by radio then please do so.
- Q. Where do you put a transponder?
- A. An appropriate space in the glider, different transponder models vary in size. Some models have small remote heads that are separate to the main transponder box.
- Q. If the battery power is a problem do they need checking?
- A. There are various battery sizes, it may be necessary to put in a bigger battery if you have the space to store it. The current certification rules for installing batteries would apply.

Andy thanked people for attending the meeting and reported it had been the best meeting to date.
Andy thanked Roy Dell, the BGA and Pocklington for their help and hospitality.

Andy urged people to put their individual consultation reports in a constructive and objective way as soon as possible regarding the consultation.

The meeting closed at 9.10 p.m