

Mode S

REPORT OF THE MEETING AT TURWESTON 17TH NOVEMBER

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You will no doubt remember that in 2006 the CAA put out a consultation document on its plans for the introduction of Mode S for all aerial vehicles in all UK airspace by March 2008. The resulting outcry concerning the costs and practicality of the proposals, forced the CAA to think again.

The CAA Mode S team has subsequently held seminars with representatives from the main GA organisations to help them gain further insight into their activities and concerns, and with this information to hand have now prepared a Phase 2 consultation document.

PFA, BGA and BMAA members were invited to attend a meeting at Turweston on 17th November to hear a presentation by the CAA on Phase 2, and to have an opportunity to respond and ask questions. A packed conference room of over 90 members were in attendance for what was certainly the most lucid and well presented Mode S presentation that I have heard to date. Rather than attempt to précis the presentation, Andy Greenwood, the consultant ex-military fighter controller, employed by the CAA to work on the consultation exercise, and who gave the presentation, has kindly written the following piece on the current CAA policy.

CAA SETS OUT PROPOSALS ON MODE S EXPANSION

By Andy Greenwood

Following the 2006 public consultation on improving the interoperability of aircraft in UK airspace, the Civil Aviation Authority (CAA) has since set out a proposed strategy for a phased expansion of the use of Secondary Surveillance Radar (SSR) Mode Select (Mode S) outside of the London Terminal Manoeuvring Area (TMA). This strategy does not seek to take forward last year's all encompassing proposals for Mode S transponder carriage on all aircraft in all airspace.

In the first phase, the CAA has recommended that, from 31 March 2008, Mode S should be the minimum standard of compliance for all circumstances where SSR transponders are mandatory and those operators who need to carry them will have until 2012 to replace their Mode A/C equipment. Voluntary carriage of transponders is not affected by this proposal.

Mode S Expansion - Phase 2

Forthcoming CAA proposals for a second phase of Mode S expansion seek to support the aims of the Government White Paper on 'The Future of Air Transport'. The number of commercial flights is set to increase by a further 50-90% by 2025 compared to 2005 levels.

interoperable with ATC radars and automatic anti-collision 'safety nets' could find it increasingly difficult to access airspace where commercial flights operate.

Growth Capability

One key area to improve ATC capacity is to phase out SSR Mode A/C technology on the ground

aircraft and providing height information to support ATC procedures, ground based conflict warning tools and TCAS; these 'safety layers' are effectively 'blind' to aircraft not carrying transponders. Primary Surveillance Radars only provide distance and bearing to controllers and even this is only possible if the aircraft is large enough or has suitable 'radar reflective' surfaces. A modern SSR system must be phased in and the CAA believes that Mode S is the only suitable, fully interoperable solution available by 2012.

A Second Public Consultation

Throughout 2007, the CAA has been liaising with GA stakeholder associations and NATS to prepare for another public consultation on expanding Mode S. The CAA will be seeking information on the likely impact of the following specific proposals, which could be brought in from 31 March 2009:

- Mode S transponder carriage on all aircraft operating in controlled airspace unless otherwise authorised by an

CAA - "The fact that there have been no fatal collisions between light aircraft and commercial passenger aircraft in the UK in living memory does not necessarily justify maintaining the status quo."

To accommodate this growth in an environmentally sound way and maintain safety levels, improvements to airport capacity, airspace use and ATC capacity need to be introduced. Controlled airspace will become busier and will have to support reduced 'track miles' flown by commercial aircraft. Operations from regional airports will inevitably continue to increase. In order to maintain safety levels, aircraft that are not

and in the air, as it is now over 50 years old and has no growth capability. It suffers from radio frequency interference, degraded detection, track 'swapping' and limited track handling capacity.

Individual Mode A/C transponders can reply up to 12 times on every rotation of all the Mode A/C radars that can 'see' them and this will 'saturate' the radar frequency in the future. SSR is essential for identifying

ATC unit through temporary clearances or standing Letters of Agreement. Mode A/C would continue to be allowed until 2012;

- A formal mechanism to process and assess applications for 'Transponder Mandatory Zones' in areas outside of controlled airspace;
- An international obligation, which the UK has not yet enacted, for all powered aircraft conducting international flights to be equipped with height reporting SSR transponders. Mode A/C would be acceptable until 2012 and the rule may need to be matched with requirements in neighbouring countries;
- Gliders to be brought within the same transponder carriage rules as all other aircraft.

Popular Misconceptions

The proposals are not designed to increase the number of public transport flights using Class G airspace and the CAA policy remains that these should be contained within controlled airspace wherever possible. However, interoperability can assist in preventing the creation of isolated pockets of Class G airspace, which could be restrictive to GA. Other topics, which have been the cause of popular misconceptions, are hampering the CAA's efforts to elicit genuine information on the potential impact of its proposals. These are addressed below:

- The CAA will not 'ground' those light aircraft in 2008 that are unable to fit Mode S transponders;
- Mode S is not being implemented to extract charges for VFR flights, and the current rules for the carriage of radios are not affected by the proposals;

- Mode S transponders on light aircraft will not saturate ATC systems and TCAS, and controllers will not 'filter out' Mode S information on their screens if they have an operational need to see it. 'Filtering' on controller displays is an established ATC practice and it does not stop transponders being detected by TCAS or radars;
- A Health Protection



Agency report has indicated to the CAA that appropriately installed Mode S transponders will not cause radiological hazards in light aircraft;

- The Ministry of Defence has a programme to fit Mode S capable SSR transponders to many of its military aircraft to help protect freedom of movement;
- The fact that there have been no fatal collisions between light aircraft and commercial passenger aircraft in the UK in living memory does not necessarily justify maintaining the status quo. The CAA must take into account the forecast traffic growth and relevant recommendations from the UK Airprox Board and the Air Accidents Investigation Branch. It believes that a proactive approach must be taken to maintain the UK's excellent safety record on mid-air collisions of this type. Just one collision would seriously undermine public confidence and the ramifications for sporting and recreational flying of just a single incident could be highly damaging;

- Automatic Dependent Surveillance – Broadcast (ADS-B) technologies do not currently provide the required interoperability with anti-collision safety nets, such as TCAS. Also, the current cost of a properly certified ADS-B system for VFR flights is not significantly cheaper than Mode S and most currently available Mode S transponders already provide the ADS-B data link facility, making it consistent with FAA aims for the future implementation of ADS-B;
- The CAA has not already made its mind up. It has an overall aspiration to improve interoperability as a way of trying to protect freedom of movement for all airspace users, rather than segregating aircraft to maintain safety levels as airspace becomes busier. The CAA is convinced that Mode S is the best way forward to achieve this interoperability but it wants an informed debate with the GA community to elicit the necessary information on the potential impact of its proposals.

Equipage Challenges

Andy Knill, Head, Surveillance and Spectrum Management, CAA, said: "We understand that there are genuine difficulties with fitting transponders to some light aircraft due to issues with limited space, power generation, antenna placement, weight limits and the proportionality of costs."

"The consultation responses will help determine what arrangements could realistically be put in place to accommodate these aircraft.

"To help shape the final proposals that we will put forward to Government, we are looking to the GA community to provide us with continued constructive feedback on our plans. Let us know what you think – we are convinced that Mode S is the best way forward but we need to have an informed debate."

How to Get Involved

You can help the CAA by getting involved in the following ways:

- Send views and information to your GA representative associations;
- Attend consultation presentations;
- Visit the CAA Mode S web pages at: <http://www.caa.co.uk/modes>
- Respond to the forthcoming public consultation.

The audience took a mixed view of the presentation from the CAA, the issue of cost and practicality of equipage still being a major concern to many of those present. Perhaps the most cynical statement that was made was when somebody suggested that GA was being forced down the road of investing in equipment that was solely for the benefit of commercial aviation. The response was that the expansion of commercial aviation had a net benefit for society as a whole, so we all stood to gain. I couldn't see if the CAA guys had their fingers crossed when they came out with that little gem. That apart, the CAA team was receptive to comment, if a little vague on how co-operative other departments within its organisation might be concerning the fitting/approval etc of new equipment.

Unlike a similar presentation at Lasham Gliding Club, when apparently the presenters were given a very rough ride, the Turweston audience were far more polite and restrained, and asked a range of thought provoking and intelligent questions, the following being a representative selection.

Q. If you are not allowed to fit a Mode A/C to an aircraft after 31st March 2008, what is the situation for the 1500+ home-builders/restorers who have already bought a Mode A/C for their incomplete aircraft due for flight after the deadline?

A. This had not been considered and the CAA suggested the PFA write to

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► *members affected to gauge the size of the problem. PFA Chairman, Roger Hopkinson felt that the CAA should undertake the job as it was inappropriate for the PFA to have to fund this exercise. The CAA said it would consider this.*

Q. Although the rules now state that if you replace or install a transponder after 31st March 2008, it must be a Mode S, if you do not need to access controlled airspace, it might be better not to install a transponder at all. How is this helpful for safety?

A. *The CAA had considered this, but had no answer, except that carrying a transponder is good for safety.*

Q. What happens for microlights, such as the C42, where the installation of a transponder would take it above the legal empty weight limit.

A. *The CAA had no answer to this but suggested that the BMAA and PFA could come up with a proposal.*

Q. If Mode S is required in Classes A-E, how do non-compliant aircraft access airfields located within controlled airspace, such as Draycott Farm, Rush Green etc?

A. *These airfields would have Letters of Agreement exempting them from the Mode S requirement. ATSUs would be permitted to come to local agreements with small airfields.*

Q. What were the results of the radiological study?

A. *The Health Protection Agency have produced a report at the request of the CAA, and this has been published on the CAA website. Unfortunately it is in highly scientific terms and the CAA has not commented officially on the document.*

Roger Hopkinson told the CAA team that this was not good enough, as it will form part of the forthcoming consultation. The CAA will need to make a statement outlining their view of the conclusions and how the



use of a transponder in an aircraft may affect the human body, especially when held close to the body.

Q. If in Phase 2, aircraft making international flights will require Mode S from 2008, how do UK-based aircraft under the transitional arrangements make such flights?

A. *The CAA is waiting to see how our EU neighbours enact the rules. There will be further meetings between National Airworthiness Authorities where bi-lateral arrangements may be discussed.*

Q. What is the situation with the low-cost, low-powered LPST/LAST?

A. *At the moment the lowest powered transponder is around 70 W. There is still no 30 W product close to being available, and no specification.*

Some trials have taken place with a de-rated transponder, but there are a number of issues over performance. For example, there is an effective speed limitation of less than 170kts and range is a problem.

There is also a question of how worthwhile the financial saving would actually be on producing a lower powered transponder, it might in fact be so small as to be unrealistic to proceed with it.

There is still hope that the market will move towards producing a "mobile phone-sized transponder at sub-700 euros," but there is no sign that any manufacturer is making any progress in this direction.

Q. Is there any chance of help with costs?

A. *Discussion with other government departments is taking place, but don't hold your breath.*

Q. Could the CAA waive modification charges?

A. *Interdepartmental questions will be asked to see if some form of concession was possible.*

One supplier, Trig Avionics, has produced a generic modification approval for fitting their transponders, but only for

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the main GA types. This reduces the cost of installation for owners of those types.

In conclusion

The CAA has undoubtedly realised that what can only be regarded as the wholly arrogant approach they took to Mode S implementation pre the Phase 1 consultation is inappropriate. They are now presenting a much more considerate approach, as indeed I guess anybody would if their role were, as is the CAA's, under intense scrutiny by the Government.

Many issues still remain unclear. The attitude of foreign aviation authorities to border crossings, and whether the avionics market will actually develop the low-cost, low-powered transponder that will be acceptable to EASA and Eurocontrol, to name but two.

It is vital that when the next CAA consultation comes out in the New Year, we make our views and ideas known, supported by evidence and detail. The gliding community was responsible for 80% of the responses to the first consultation, let us in the powered GA sector ensure that we get our views across with Phase 2.

Useful links:

www.caa.co.uk/modes ■