in focus

a briefing from the Civil Aviation Authority - June 2007

CAA announces next steps in Mode S implementation

Mode S - the proposals

The CAA plans to change the rules on the carriage and use of secondary surveillance radar (SSR) transponders in UK airspace in two phases starting next year. This will take four years to implement fully and will be subject to Government approval.

The proposed changes follow an extensive public consultation, together with the analysis of around 3,000 responses to a Partial Regulatory Impact Assessment. Most of these responses came from the UK general aviation community. In addition, the CAA has engaged with a number of representative GA bodies on how to develop the proposals since the initial consultation.

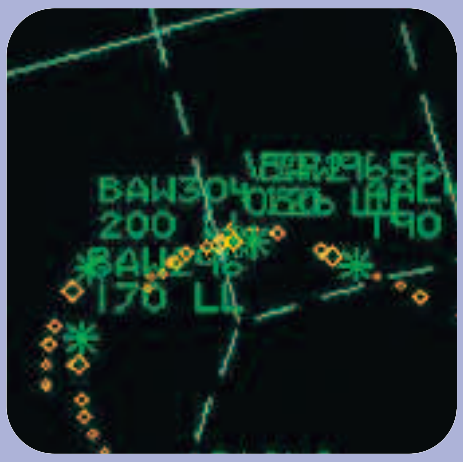
I**n Phase 1**, starting in 2008, there will be no change to the present rules on transponder carriage, but operators of aircraft already required to carry a transponder would be required to become Mode S compliant subject to a transition period.

In Phase 2, starting in 2009, the CAA proposes to extend the rules and it's envisaged that there would be some special areas outside controlled airspace (CAS) below Flight Level (FL) 100 in which transponders would be mandatory. However, Phase 2 will be subject to further public consultation before proposals are made to the Government.

How will the rules be implemented?

In **Phase 1** the present rules on the carriage and use of transponders would continue to apply only to:

- Public transport flights
- Flights at and above FL100
- IFR flights in CAS below FL100
- Specific airspace requirements as notified in the UK Aeronautical Information Publication (AIP)



timetable

The CAA's proposed timetable for Mode S transition is:

Phase 1

Autumn 2007
CAA submits proposals to Government

March 2008
Phase 1 proposals implemented

March 2012
Phase 1 transition period ends

Phase 2

Summer 2007
Informal stakeholder workshops on proposals

End 2007
16-week public consultation begins

Autumn 2008
CAA submits proposals to Government

March 2009
Phase 2 proposals implemented

March 2012
Phase 2 transition period ends

So at this stage the affected operators would only be those whose aircraft are already required to carry transponders. Existing Mode A/C equipment would need to be upgraded to Mode S Elementary Surveillance (ELS) standards from 31 March 2008. A four-year transition period would allow time for making the upgrades. All new SSR equipment installations, or new aircraft being brought into service with an SSR transponder already installed, would have to be Mode S ELS compliant by 31 March 2008.

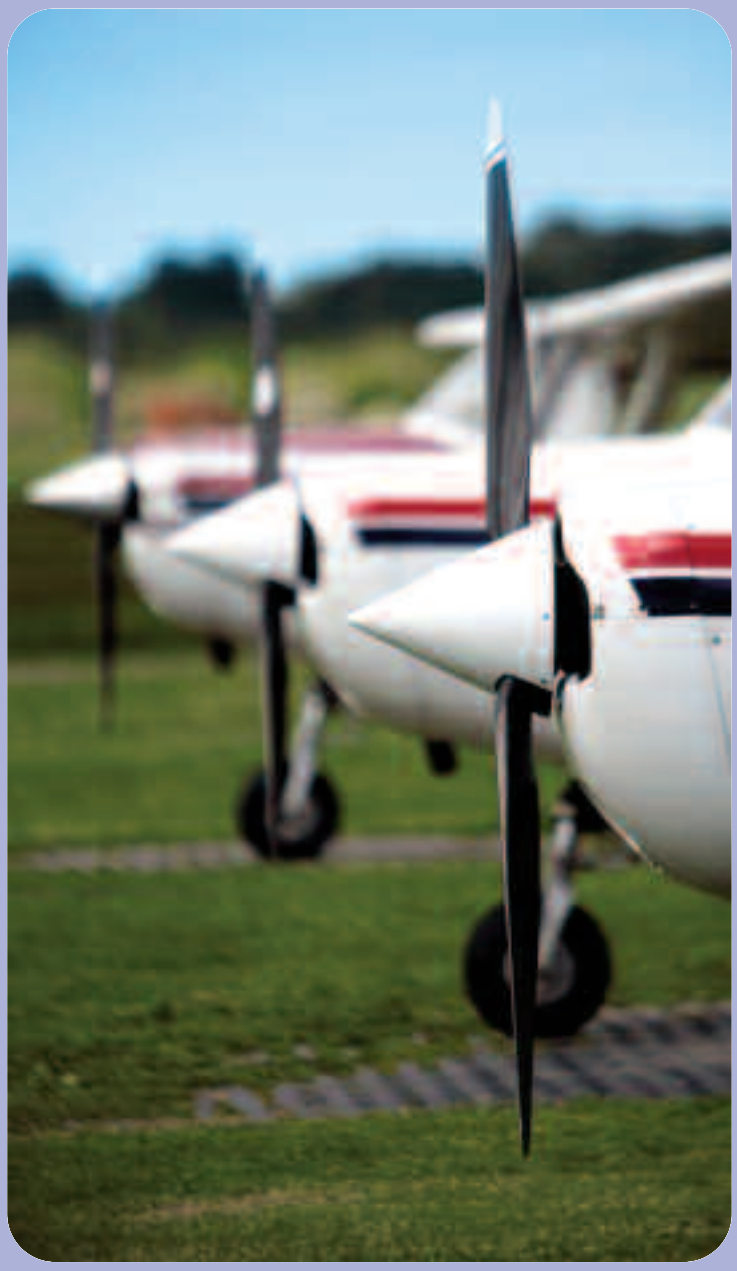
Gliders would remain exempt from Article 20 (2) of Schedule 5 of the Air Navigation Order which details the radio equipment that aircraft are required to carry.

What does SSR do?

Unlike primary surveillance radar in which a beam of radio energy is reflected back from a 'target' to indicate its presence and position, SSR sends out signals that can 'interrogate' aircraft transponders. 'Replies' from the transponder produce additional information of great value to air traffic controllers, including a four-digit identity code (known as Mode A) and pressure-altitude reports (Mode C). 'Replies' are used to display the position, altitude and identity of aircraft on controllers' screens. In addition, TCAS systems also react to SSR responses.

What would Phase 2 cover?

Phase 2 proposes to extend the rules on carrying and using transponders such that from 31 March 2009, Mode S ELS transponders would be required for:



- Aircraft making VFR flights within controlled airspace below FL 100
- Powered aircraft making international flights (as required by Annex 6 to the ICAO Convention)
- Flights within any new Transponder Mandatory Zones' (TMZs) which may be created (see below)

A three year transition period would provide time for operators to install the necessary Mode S equipment.

What about gliders?

The Air Navigation Order would be amended to cover the recent changes to airspace classification which involve operations in Class C airspace above FL 195 for which aircraft are now required to carry an altitude reporting transponder. Special areas known as Temporary Reserved Areas (Gliders) or TRA(G)s have been established in which gliders without transponders can operate up to FL 245. Because of these changes, and because the use of Letters of Agreement (LOA) and airspace reservations would continue to be available in specific circumstances, it's envisaged that the current general

ANO exemption for gliders from the transponder carriage rules would also be removed altogether in Phase 2.

What are TMZs?
Phase 2 would provide a statutory framework for notified 'Transponder Mandatory Zones' (TMZs) to be established within specific portions of uncontrolled airspace. They would be permanent areas below FL 100, initiated at the request of air navigation service providers or by the CAA - using evidence-based criteria - to meet specific risks like a high level of airspace infringements. It's too early to be more specific but the aim is to keep the areas covered by TMZs to the minimum required to mitigate the highlighted risks. Future consultation material will contain further details.

Any other impact on operations outside CAS?
Apart from TMZs, operations in Class G airspace below FL 100 would be unaffected by Phase 2.

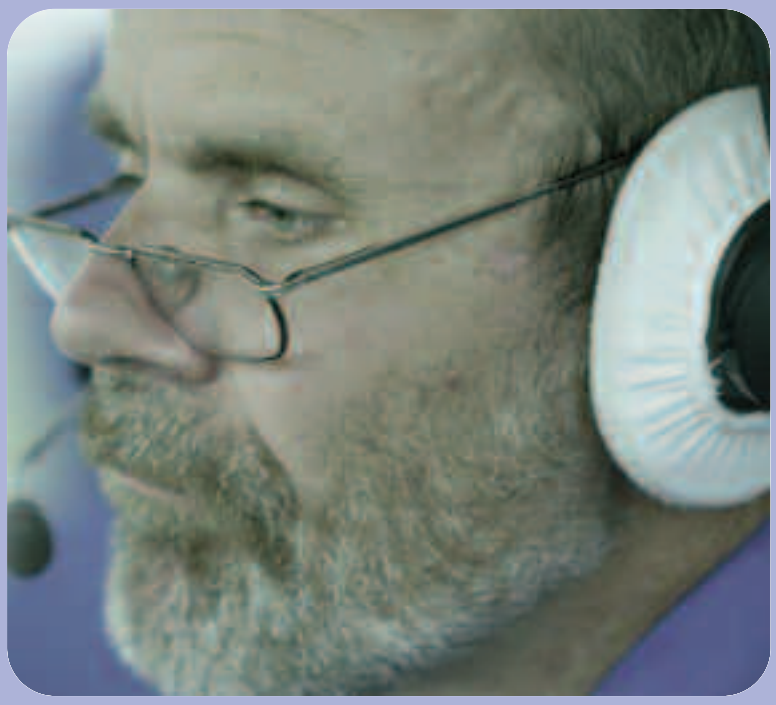
Why do we need Mode S?

Mode Select (or Mode S) takes "classical" SSR to new levels of effectiveness. Aircraft equipped with Mode S transponders are assigned unique addresses allowing Mode S radars to interrogate them selectively and receive individual replies. This means unambiguous identification of aircraft, improved tracking and a significant reduction in interference and loading on the SSR reply frequency.

Although 'classical' SSR is still largely based on the Second World War principles of 'identification friend or foe' (IFF) it has helped make our skies safer despite a fivefold increase in traffic over the last 30 years. Now, though, it needs to be replaced to overcome a range of problems caused partly by continuing traffic growth. These problems include the indiscriminate nature of replies from 'classical' transponders, coupled with overloading of the radio frequency used for replies and consequent garbling of responses. There's also a limit to the number of Mode A identity codes that can be used.

It's widely acknowledged that airborne and ground-based collision warning systems have brought major advances in safety. Such systems are based on SSR technology but frequency overloading and garbling can reduce their effectiveness – and degrade safety - by causing false alarms and nuisance alerts that can increase controllers' and pilots' workload.

What about the cost of these proposals?
The CAA is investigating funding opportunities to support its proposals. These include encouraging an industry partnership to develop a Low Power SSR Transponder (LPST). It's also investigating funding to offset costs like certification, which could benefit all affected operators.



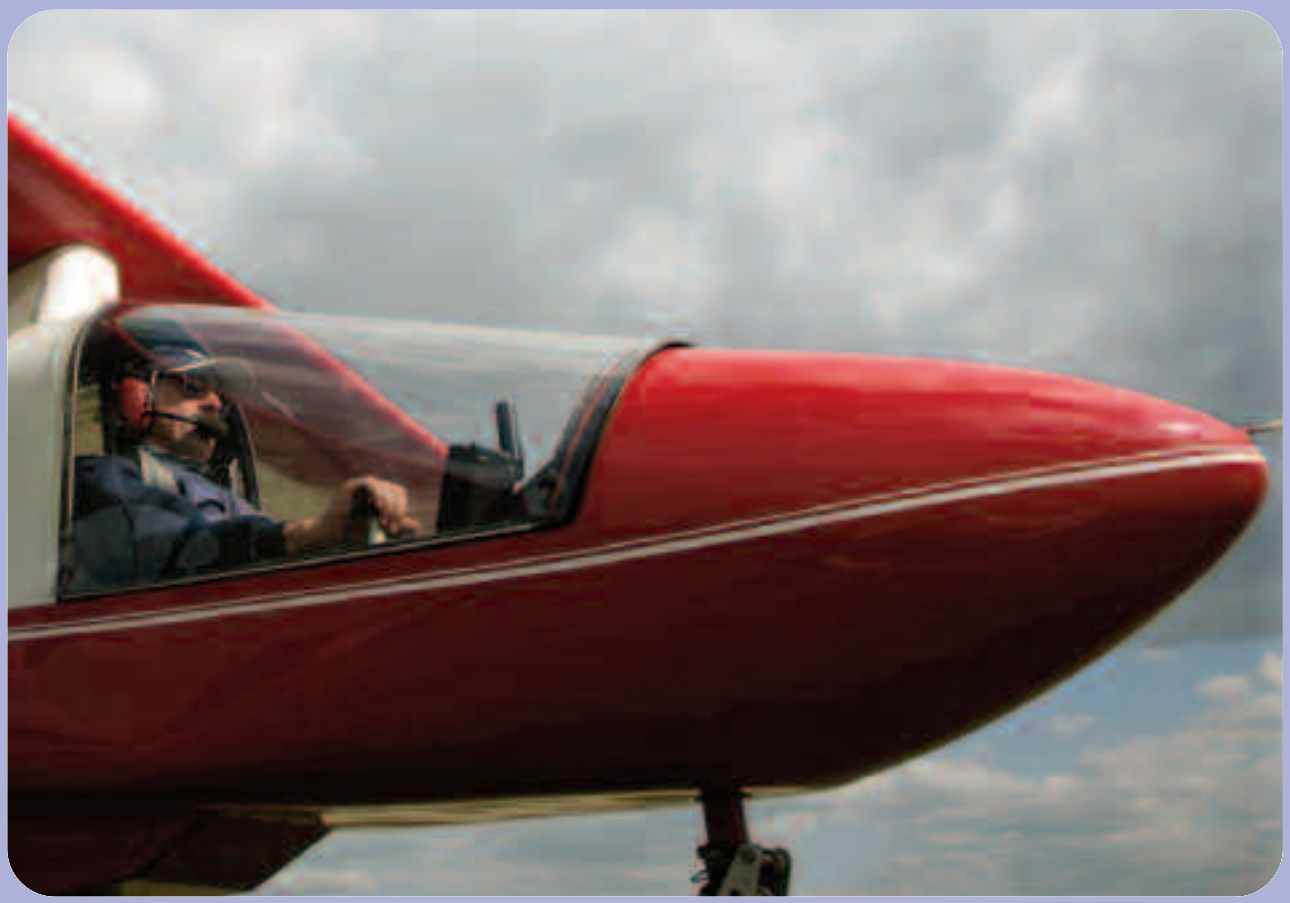
And after Phase 2?
The expansion of SSR transponder carriage covering all UK airspace and, where technically feasible, all aircraft, is envisaged eventually, but only in line with user demand and airspace arrangements. Depending on the timescales, the means of compliance would need to take into account new technologies and the need for consistency with emerging European policy.

Will there be further consultation?
Not for Phase 1, but for Phase 2 there will be a series of informal stakeholder workshops, followed by a 16-week public consultation that will include several regional presentations.

What is ELS?
There are two recognised forms of Mode S capability. Elementary Surveillance (ELS) is suitable for smaller aircraft. Compliant transponders can provide information such as a Mode A identity code, pressure-altitude (Mode C), Aircraft Identification (callsign or aircraft registration) and a unique 24-bit aircraft address. It can also indicate if an aircraft is on the ground or in the air.

With Enhanced Surveillance (EHS) radars can extract more advanced information from transponders, including an aircraft's future intentions. It's generally only supported by aircraft with modern digital avionics and is most useful to controllers managing the busiest terminal and en route airspace. In the UK it's only required within notified EHS airspace for IFR flights by aircraft above a specified weight and speed.

What about the existing Mode S Enhanced Surveillance (EHS) mandate?
The proposed changes will not affect the existing EHS mandate which applies only to IFR flight in major terminal and en-route airspace. Details of these requirements are available in the AIP General section and on the CAA Mode S website.



further information

As it becomes available further information on the development of these proposals will be posted on the Mode S Homepage of the CAA website at www.caa.co.uk/modes.
Specific enquiries can be emailed to mode.s@dap.caa.co.uk.