



LISTENING SQUAWKS

A REPORT BY FASVIG

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Introduction

1.0 The FASVIG Implementation Programme contains a number of airspace efficiency enablers which have significance to airspace infringement reduction. Package A.3.12 entitled "Extend Use of Listening Squawks" (Transponder Monitoring Codes) is funded in the FASVIG year 1 work as milestone i) and has been integrated in the FASVIG infringement reduction work which emerged during 2016. The package definition is at Annex A.

1.1 During its infringement reduction analysis FASVIG considered the effectiveness of listening squawks as part of its statistical conclusions. It then reviewed deployment and use by ATS units and aircraft flying VFR and considered how its effectiveness could be maximised. This report describes that work and makes recommendations.

Function and Use

2.0 Listening squawks are useful where frequencies or controllers are too busy or not tasked to provide a service to additional traffic outside CAS and provide a means of recovery and risk reduction following an airspace infringement. They also provide a safety net for pilots who choose not to ask for a service outside CAS; radar services are not commonly available in the UK and the "Basic Service" is misunderstood and widely considered to be of little value. Conversely the ICAO defined "Flight Information Service" is clear as to what it provides. The UK difference in naming what is said to be an equivalent service is having a negative impact on airspace safety beyond what might be expected from a simple title difference. Aircraft control and navigation is normally afforded a higher priority than communication so listening out is often preferred to a "Basic Service" by pilots; a monitoring code makes that situation useful for ATS and airspace safety purposes.

Infringement Prevention and Recovery

3.0 Anecdotal evidence gathered during FASVIG airspace infringement work suggests that controllers at busy airfields do not tend to monitor the behaviour of aircraft outside their CAS boundary relying on their detection of an actual infringement and, where appropriate, on CAIT. In those circumstances the utility of a listening squawk as an aid to infringement prevention is limited but it helps post-infringement recovery. We note that in these circumstances, the separation criteria for unknown traffic often result in a loss of separation coincident with infringement detection and we consider the options to change both infringement probability and consequent risk.



3.1 FASVIG analysis suggests that aircraft receiving any form of radar service are most unlikely to infringe; however, radar services are not widely available. ATS units increasingly focus on the aircraft which form the business of their airport, especially at week-ends (when VFR traffic and risk are higher). The basic service is commonly misunderstood as having some monitoring function when it does not; it is not aligned with ICAO nomenclature and that misunderstanding has been cited by the UKAB as a factor in airborne conflict; it does not prevent infringements.

3.2 Where a listening squawk system is radar monitored by a controller it could prevent infringements or resolve them immediately but controller availability and workload limits this. Whilst CAIT is able to identify infringements of CAS it could, given an appropriate algorithm, identify high risk behaviour outside the CAS boundary and alert the controller before an infringement occurs. In the absence of CAIT, controller monitoring coupled with listening squawks could serve a similar purpose. Such arrangements could reduce the risk of infringement by improving CAS resilience.

3.3 Where an infringing aircraft uses a listening squawk the controller should have immediate RT access to it, particularly if the ATS unit uses Mode S. However, because of the required separation criteria an infringement can cause an immediate loss of separation giving the controller no time to resolve the situation. We understand that a reduction in separation requirements from 5nm to 3nm is being trialled and if adopted, that would increase the effectiveness of listening squawks as an airspace safety measure particularly for mode S equipped units.

Deployment

4.0 FASVIG reviewed the distribution and operation of listening squawks. The following principle radar units do not have listening squawks:

Aberdeen

Royal Air Force Brize Norton

Southend

Cardiff

Exeter

Hawarden

Various other military units

Hawarden has just announced a listening squawk. Whilst it might be argued that the traffic density in and around Cardiff, Exeter and Aberdeen CAS is

small and listening squawks are not required, the same cannot be said for Brize Norton and Southend which have some of the busiest passing traffic, the most constrained airspace in the UK and frequencies that can be very busy.

4.1 Brize Norton is about to reduce its LARS coverage. Its LARS frequency is used at week-ends by RAF Tutor aircraft which often block the frequency with the volume of RTF and consume most controller capacity. Brize Norton ATS indicated that a listening squawk was not required by its local airspace users but the CTR is in an area of significant VFR transit traffic. Many civil VFR pilots are not able to make RTF contact so just listen out whilst squawking 7000. Brize Norton may think that introducing a listening squawk would discourage VFR aircraft from requesting a service but that should be balanced by the advantage of knowing that the aircraft which are unable to make contact are immediately contactable and identifiable if an infringement occurs or is imminent.

4.2 Southend is in a constrained area with a high volume of transit traffic. Whilst VFR transit traffic should be able to request a service, there are occasions when the frequency is busy and the needs of safe operation and navigation make an RTF call a lower priority. Southend has provided an additional controller to cope with the VFR traffic and the ATS unit may think that the availability of a listening squawk might reduce the volume of traffic that makes contact with them. But some VFR traffic will avoid calling for a basic service because they do not place any value on it and regard safe operation of their aircraft, safe navigation and particularly collision avoidance as higher priorities. Moreover, many training aircraft operating outside CAS would prefer not to request a service because the RT requirement and general RT loading interferes with the training task. In our view a listening squawk would have the potential to further mitigate infringement risk of both the Southend airspace and the adjacent London TMA.

4.3 We have not reviewed other military airfield services but where VFR traffic volume is significant the same principles apply.

GA Knowledge and use of Listening squawks

5.0 Amongst GA pilots we found a widespread lack of knowledge about listening squawks and how to use them. These codes are not marked on charts and although they are now listed on frequency cards some GA pilots do not have or carry these since their publication with charts was withdrawn. There is no published advice on the areas in which listening squawks are appropriate nor any indication of which areas are covered. As many GA pilots are not familiar with how airports and radars operate, this lack of advice is significant. A card of listening squawks was published and issued with some magazines and an up-to-date version is available on an ASI website (Annex B) but not on the VFR chart section of the NATS AIS website. Moreover, its design (whilst appropriate for a magazine advertising insert or poster) is not in a format that is normal for cockpit use and it is very difficult to use. The frequencies and codes are not listed together but have to

cross referred to a table using a colour code. As at the date of this paper the ASI website card is out of date.

5.1 A coordinated information and publicity campaign is needed to correct this. Cockpit useable reference to areas, codes and frequencies is needed.

5.2 As part of this work we also discovered widespread misunderstanding of the availability of LARS services. The areas and details are published in the AIP and copied into some flight guides but there is no ready reference guide suitable for cockpit use. We know that the use of any radar service reduces infringement risk significantly for the airspace user; LARS and transponder codes are closely associated. The LARS stations and frequencies are published in the Scotland and UK North frequency cards but not on the UK South frequency card. A LARS frequency is now marked as such on VFR charts but it is not compelling or easy to find. The area of LARS service is not shown on charts or any cockpit useable document. We considered that a pilot should be able to easily look up the radar service options for any point, route or area on a flight.

5.3 It is unreasonable to expect the some 30,000 UK PPL-holding pilots to find the already complex aeronautical data in different places and different formats and use it effectively. UK provision of data is complex and not suitable for its purpose. There is a clear need to make the aeronautical data published on frequency cards on the AIS website more complete and accessible to the user. A ready reference card of listening squawks and LARS areas could be published alongside frequency cards on the AIS website and a single and common publicity campaign instigated. Amongst the issues we identified from users concerning the present frequency cards were:

- Back to back printing does not always align on home printers – the sheet is designed for professional printing.
- When printed on A4 card 50% is wasted.
- Card is expensive and not commonly available and the use of colour (particularly for the listening squawk card) makes printing expensive.
- There is no simple system for reminding pilots to print a new card when required.
- The GA community was told the withdrawal of cards with maps was to improve the information available to GA but the widely held view was that it was a cost saving measure. It has not improved access to information overall.
- Many pilots never download a frequency card and rely on the chart.
- Of those that do, many had cards that were out of date.
- A proportion of pilots were not aware of the existence of frequency cards.
- A significant proportion of pilots were not aware of the ASI website or material on it.



Restoring the issue of hard copy reference cards for in-flight use would resolve the data distribution issue and, provided structure and discipline is applied to frequency changes, the overall currency of data would be improved and safety enhanced.

Listening squawks for Infringement Prevention

6.0 As previously discussed, whilst listening squawks can reduce the risk resulting from infringements by aiding resolution they do not, in themselves, prevent infringements. But prevention is better than resolution. Radar controllers could monitor aircraft outside their CAS using listening squawks and if they notice track behaviour which is likely to lead to an infringement they could intervene. However, controller resources may not be provided or sufficient for that task. CAIT is presently deployed to alert controllers about infringing aircraft inside CAS but it should be possible to develop the tool to automatically identify track behaviour outside CAS which is likely to result in an infringement. Coupled with data from the listening squawk and Mode S data where available, a development of CAIT could offer a means to utilise the listening squawk, and indeed any code, for infringement prevention.

6.1 This proposal is relevant to all UK CAS but we understand that CAIT is a NATS proprietary system. UK aviation would benefit from this being available to controllers at all radar units.

Recommendations

7.0 FASVIG recommends that:

7.1 Royal Air Force Brize Norton and Southend airport be pressed to implement listening squawks.

7.2 The areas in which listening squawks are appropriate should be published in a graphical format suitable for pre and in-flight reference in single pilot aircraft.

7.3 The AIS data policy should be reviewed to provide frequency cards, LARS data and areas and listening squawks and areas in a standard format and available from single source.

7.4 The Listening Squawk card should be redesigned to a standard aeronautical format as above and distributed widely in card format

7.5 Frequency and other reference cards should be made available as physical documents and distributed with charts.

7.6 The UK "Basic Service" should be renamed "Flight Information Service"



7.7 Software should be developed to provide an infringement alert on traffic which poses a threat but is still outside CAS. It should be made available to all appropriate ATS units.

7.8 A coordinated publicity campaign should be mounted under the leadership of the CAA using common materials to a common format delivering a consistent message on the value and procedures of listening squawks and, where available, LARS services. Organisations should not mount their own campaigns with different messages and materials.

FASVIG

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Annexes:

- A. FASVIG Programme Package of Change A.3.12 - Extend Use of Listening Squawks
- B. Listening Squawk Card from ASI website



Annex A

FASVIG Programme Package of Change A.3.12 - Extend Use of Listening Squawks

The adoption of 'Listening' Squawk codes as a means by which pilots can indicate to radar controllers they are listening on a given radio frequency has proven to be very effective. It provides a useful service enhancement giving radar controllers an indication of which ATC Unit to liaise with if they have a need to communicate with the pilot concerned. It also aids pilots on 'busy radio days' when they may not be able to 'get in' to speak with a LARS controller but can, by setting the listening squawk, indicate to the controller that they are on frequency.

The London Information listening squawk offers wide UK coverage. But listening squawks are not available for all LARS units in the UK. It would be beneficial if the use of listening squawks was extended to all areas with LARS coverage, with squawk codes for each LARS unit.

FASVIG would propose extending the use of listening squawks to all radar equipped ATC Units.

