



## **C G BUTLER – SENIOR CORONER FOR BUCKINGHAMSHIRE**

### **INVESTIGATION INTO THE DEATHS OF JASPAL SINGH BAHRA, SAAVAN SINGH MUNDAE, MICHAEL LEONARD GREEN & THANH TRUNG NGUYEN**

#### **CIVIL AVIATION AUTHORITY RESPONSE TO A REPORT ON ACTION TO PREVENT OTHER DEATHS PURSUANT TO REGULATION 29 OF THE CORONERS (INVESTIGATIONS) REGULATIONS 2013**

The Civil Aviation Authority (CAA) has considered carefully the report of the Senior Coroner to prevent future deaths and its response to the concerns raised is set out below:

##### A) 'See & Avoid'

###### i) Introduction

At present, there is no single alternative available that comprehensively addresses the limitations inherent in the use of 'see and avoid' techniques.

The CAA anticipates that the further development and deployment of universally-compatible electronic conspicuity devices will aid in mitigation the risk of future mid-air collisions occurring in Class G (uncontrolled) airspace. As such, this is an area in which the CAA has invested and will continue to invest significant resources.

However, pending such further advancement and subsequent adoption, the CAA continues to address the associated risk by ensuring that pilots are cognisant of the limitations of 'see and avoid'; reviewing reports of airprox incidents identifying causal or contributory factors; collaborating with industry stakeholders through the Mid-Air Collision Programme and recommending or acting where appropriate to mitigate the risk of such incidents occurring.

###### ii) Regulatory Framework

The European Aviation Safety Agency (EASA) was established as an agency of the European Union (EU). In 2003, EASA assumed the responsibility for certain International Civil Aviation Organisation (ICAO) obligations on behalf of EU Member States. These obligations include policies for personnel licensing,

rules of the air and operations. The EU Basic Regulation established EASA competence in these areas and implementing rules have since been published setting out the requirements. Commission Regulation (EU) No. 1178/2011 concerns the regulation of aircrew and provides certain requirements for the training and licencing of pilots. Annex 1 to the EU Aircrew Regulations is referred to Part-FCL. 'Acceptable Means of Compliance' (AMC) and 'Guidance Material' are published to support each element of the regulations. AMC1 to FCL.210 details the syllabus that instructors have to deliver, so that a student pilot may build the necessary competence and skills in a structured and achievable manner.

Student pilots are required to complete a training course at a Declared Training Organisation or an Approved Training Organisation. The course includes theoretical knowledge and flight instruction appropriate to the privileges applied for. The standard format for a course is a series of exercises, starting from basic principles, to allow the student pilot to achieve an initial solo standard. The student is required to consolidate these skills before moving on to navigation, landing at other aerodromes and introduction into radio navigation and instrument flight. Effective look out technique training is incorporated from a very early stage in pilot training. The Acceptable Means of Compliance to FCL.210 states that 'each of the exercises involves the need for the applicant to be aware of the needs of good airmanship and look-out, which should be emphasised at all times'.<sup>1</sup>

The importance of maintaining an effective visual lookout is reinforced through CAA publications. In May 2019, the CAA published the second edition of the 'Skyway Code',<sup>2</sup> which is intended to provide pilots involved in non-commercial and flight training operations with practical guidance on the operational, safety and regulatory issues relevant to their flying. Its primary focus is safe aircraft operations and the safe use of airspace. It is oriented towards Visual Flight Rules (VFR) flight and provides guidance on the rules for the prevention of collisions; precautionary measures that pilots can take; techniques for effective visual scanning; the limitations of 'see and avoid' and available means of ensuring electronic or visual conspicuity. The CAA intends that the Skyway Code will be reviewed annually to ensure it reflects the latest regulatory requirements and best aviation practice.

iii) UK AIRPROX Board

The United Kingdom Airprox Board (UKAB) is the UK's focal point for investigating and reporting the circumstances, causes and risk of collision for all airprox occurrences<sup>3</sup> in UK airspace. The UKAB conducts investigations into airprox events, reporting directly to Chief Executive of the CAA and the Director

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<sup>1</sup> AMC1 FCL.210.A PPL(A) – Experience Requirements and Crediting.

<sup>2</sup> CAP 1535, Skyway Code, Version 2 <<http://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=7920>>.

<sup>3</sup> An 'airprox' is defined as a situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised.

Military Aviation Authority (MAA) as a quasi-independent endeavour beyond the day-to-day oversight activity of those entities.

The UKAB focuses on enhancing air safety. It provides a mechanism for feedback and follow-up of airprox-related insights and recommendations regarding the efficacy of airspace regulation and the factors that have influenced the performance of pilots and controllers. The sole objective of the UKAB is to assess occurrences in the interests of enhancing air safety; it does not apportion blame or liability.

The UKAB website details specific airprox events together with 'lessons identified' and actions flowing from UKAB Safety Recommendations. The Pilots and controllers involved in the airprox event each receive their own copy of the UKAB's final report which sets out what happened and why. Safety Recommendations are made where appropriate to reduce the risk of recurrence.

The UKAB publishes an annual report, which includes an analysis of UK airprox numbers, rates and trends, to raise awareness and understanding in the aviation community. Airprox Reports are one method of monitoring instances in which aviation safety may have been compromised. Together with mandatory occurrence reports and voluntary reports made to the CAA, they ensure that incidents or occurrences are reported and can be learned from.

iv) Mid-Air Collision (MAC) Programme

Mitigating against the risk of a future mid-air collision is a complex and long-term challenge. The CAA's current MAC Programme aims to reduce by regulatory action the risk of a mid-air collision. The programme pursues improvements in systems, cultures, and operational processes.

The MAC programme stakeholders work with the UKAB, UK Flight Safety Committee, CAA UAS Programme, Military Aviation Authority and industry stakeholders to better understand and assess risk and identify effective and collaborative mitigation. This coordinated effort in turn ensures that the UK meets the European Plan for Aviation Safety (EPAS) requirement for Member States to address the risk of mid-air collisions in their safety plans.

The current MAC Programme Board provides the CAA's Safety & Airspace Regulation Group ('SARG') with a data observatory function, where key indicators, trend analysis data and causal factor information is received, monitored and considered. Potential intervention actions are identified by the Programme Board and tasked for action. This data and coordination function will continue into the foreseeable future in compliance with EPAS requirements.

Among other measures, the MAC Programme will continue to:

- a. manage data on MAC events and use this evidence to steer action and mitigation strategies with industry collaboration;

- b. encourage the further development and deployment of conspicuity devices which are interoperable, practical and affordable; and
- c. contribute to the update and accessibility of the recently published CAP 1535 *The Skyway Code* to act as a guide to airmanship.

v) Conclusion

Pilots are trained to be proficient in, and to understand the limitations of, 'see and avoid' techniques as part of their basic training requirements. In addition, there are measures in place to ensure that accidents, incidents and 'near misses' in uncontrolled airspace, are reported and dealt with appropriately. Where appropriate, such occurrences may be investigated to determine whether regulatory action may be required.

The Regulation 28 report to prevent future deaths has provided an opportunity to review the approach to 'see and avoid' techniques and to give consideration as to how best to mitigate the risk of collisions in Class G airspace. The issue is a complex and long-term challenge. The CAA will continue to analyse the findings and recommendations of the UKAB, and utilise the outcomes promoted by the MAC Programme to enhance safety in this area.

B) Carbon Monoxide Exposure

The potential for carbon monoxide contamination in small aircraft (fixed or rotary wing) is addressed through regulations that concern the design, maintenance and operation of such aircraft.

i) Aircraft Design

The European Aviation Safety Agency (EASA) has oversight of the design of the aircraft involved in this accident. EASA promulgates design requirements ('codes') CS-23 for 'Small Light Aeroplanes' and CS-VLR for 'Very Light Rotorcraft', which contain specific requirements on cockpit contamination preventative measures. Any change to those requirements would need to be brought about by EASA. The codes address the required levels of ventilation, the maximum acceptable CO content in the cockpit and the design of heating systems (notably exhaust-related heat exchangers) with a view to preventing CO contamination in the cockpit. The codes do not require CO detectors to be fitted as part of the design. Similar design requirements exist in the United States, which is the primary source of general aviation aircraft types.

ii) Maintenance

Maintenance (Continuing Airworthiness) requirements and recommendations in the UK provide that aircraft exhaust systems are to be inspected in accordance with the manufacturer's instructions, the requirements of which may vary from physical inspection to physical inspection with partial disassembly, internal inspection and pressure testing. In the UK, there are two publications of specific relevance to this topic:

CAA Publication (CAP) 562 'Civil Aircraft Airworthiness Information and Procedures'

This publication includes Leaflet B-190 'CO contamination', which provides generic expectations for the maintenance-related measures to minimise the likelihood of such occurrences. It addresses the nature and effects of carbon monoxide, the causes of contamination, the importance of routine inspections and means of testing for contamination.

CAA Publication CAP 747 'Mandatory Requirements for Airworthiness'

This publication contains a related Generic Requirement, 'GR No. 11', covering potential CO contamination from combustion heaters, which are only fitted to a relatively small number of light aircraft. GR No. 11 addresses servicing and overhaul requirements intended to detect CO contamination

Also, as a result of specific in-service instances, some manufacturers have issued type-specific information that has been mandated by the responsible aviation authorities in the form of 'Airworthiness Directives'.

The new pan-European light aircraft maintenance requirements that are being proposed for adoption later this year (Part M Light) are expected to contain a requirement in the Minimum Inspection Programme (MIP) to "[i]nspect Cabin Heating Heat Exchanger for improper condition and function. For exhaust heat exchanger check CO-Carbon monoxide concentration."

iii) Operation

In the UK, there are a series of pamphlets ('Safety Sense' leaflets) providing guidance to aircraft owners/operators on a variety of subjects. The 'Winter Flying' Safety Sense Leaflet contains information on the use of 'spot-type' passive indicators. Such devices are small, widely-available and relatively inexpensive. They can be attached to a wall or panel in the cockpit and do not need to be professionally installed.

There are a range of active CO detectors available that use audible, visible or vibration warnings when pre-determined CO levels are exceeded. These have the notable advantage of actively engaging the pilot's attention and are accordingly more likely to be more effective than the 'spot-type indicators'.

CO detectors may be fitted to UK-registered aircraft as 'standard changes' under the provisions of CS-STAN (for EASA aircraft) and CAP 1419 (for non-EASA aircraft). This removes the need for direct authority involvement, allowing equipment to be installed without the associated time and costs.

CO detectors are not mandated for general aviation aircraft, as from an initial design viewpoint, the requirements for the certification of the aircraft are such that the system design should minimise the likelihood of CO contamination, but the maintenance of sometimes notably highly-utilised airframes and/or their ageing systems means that contamination can occasionally take place. The more widespread use of CO detectors is thus currently down to the pilot/owner's discretion.

iv) Conclusion

The Regulation 28 report to prevent future deaths has provided an opportunity to review available material on CO contamination avoidance. Notwithstanding the measures already in place and those expected in the near future, the CAA will consider the merits of an additional information on best practice CO contamination avoidance, in a 'Safety Notice' publication. To this end, the CAA will consult with members of the relevant stakeholder forum, the AOPA Maintenance Working Group, in making this decision by the end of the third quarter of 2019. If a decision be made to publish a Safety Notice, this is expected to take place by the end of 2019.