| Title: | **Opinion and Instruction Document** |
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| Package Number | Task 0170 |
| Headline Purpose: | Prohibit 'faster than sound' flight over land. |
| Proposed action: | Amend Standardised European Rules of the Air (UK Reg (EU) No 923/2012), SERA.5015 Instrument Flight Rules (IFR) – Rules applicable to all flights. |

## Policy Objective

The objective of this rulemaking activity is to prohibit 'faster than sound' flight over land[1] to safeguard the public from the environmental impacts of sonic booms. The existing Rules of the Air Regulations (UK Reg (EU) No 923/2012 Standardised European Rules of the Air (SERA)) permit, by omission, flights under the instrument flight rules (IFR) to be undertaken at supersonic and hypersonic speeds over land, and the environmental implications on the ground (due to the effects of sonic booms) of such flights are potentially significant. Consequently, to address this omission, we propose to amend UK Reg (EU) No 923/2012 to prohibit supersonic and hypersonic IFR flight over land unless approved by the Civil Aviation Authority[2].

With new aircraft types already under development that will be capable of supersonic and hypersonic speeds, it is important that any measures taken do not restrict ongoing progress. Therefore, to protect the public, whilst providing the flexibility to support ongoing research and development, the Civil Aviation Authority will retain powers to approve such flights.

Finally, we are seeking to make an editorial amendment to SERA.5005(d)(2)(ii) and replace "flight level 285" with "FL285" to ensure consistency.

## Background

There are 4 speeds of regimes of flight:

- subsonic, which is below the speed of sound;
- transonic, which is at or about the speed of sound;
- supersonic, which is between one and five times the speed of sound; and,
- hypersonic, which is more than five times the speed of sound.

Previous civil supersonic transport (SST) aircraft, such as Concorde, were banned from flying at supersonic speed over land[3] due to the sonic boom they created; this 'boom' reaches the ground creating a 'carpet' of sound under the flight path, approximately 60km wide, impacting multiple individuals. Whilst many states, including the United States of America (USA), continue to ban flights at supersonic speed over land, the requirements in SERA.5005(d)(1) (visual flight rules (VFR)) implemented in the UK only prohibit transonic and supersonic flights under VFR, in line with ICAO Annex 2. There are no ICAO provisions defining operational limitations for supersonic flight conducted IFR over land. Moreover, since the development of

[1] Where 'over land' is used in this document, this means within 'UK airspace' which refers to the airspace above the territory of the UK which encompasses the land areas and territorial waters adjacent to, and under the sovereignty of, the UK; i.e. that airspace that is within 12 nautical miles (NM) of the low water mark baseline for the UK's coast.

[2] The competent authority in all circumstances would be the Civil Aviation Authority. Although the term "competent authority" is utilised within SERA, should the DfT be minded to replace all references to "competent authority" with "Civil Aviation Authority" in SERA, we would support this initiative.

these ICAO provisions, the possibility of hypersonic flight is now moving closer to becoming a reality. As such, operators would be able to carry out supersonic and hypersonic IFR flights over land, or hypersonic VFR flights over land, creating the risk of sonic booms with their resultant impact to individuals on the ground.

Sonic booms have long been considered unacceptable to the public with the potential effects including interference to sleep and harmful effects to persons both inside and outside buildings and damage to property.[4]

With the demise of Concorde, supersonic flight and the potential impacts associated with it have not been an issue; however, with several manufacturers now involved in the development of a new generation of SST aircraft for both business jet and commercial applications, the omission of restrictions under IFR needs to be addressed. There are currently no ICAO standards to address the issue of sonic booms and, whilst 'low-boom' technology is being investigated, in particular by NASA in the USA, these initial SST aircraft will not utilise such technology.

These aircraft are therefore likely to produce similar noise effects to Concorde, creating similar unacceptable impact to those under the flight path. Until noise standards are created which can prevent these impacts, the only alternative option is to prohibit supersonic and hypersonic flight over land by IFR flights. Whilst transonic VFR flights are prohibited, transonic IFR flight will not be prohibited as this is a speed often used by commercial operators who, whilst capable of reaching transonic speed, will not reach supersonic speeds causing the impacts this proposal is intended to prevent. This is intended to be an interim-measure which provides the flexibility to support research and development and the subsequent certification of 'low-boom' aircraft through the power afforded to the Civil Aviation Authority to approve such flights, whilst still ensuring the protection of people on the ground.

Potential future steps could assess the implementation of a coastal 'buffer' for flights at supersonic speed and in the longer term, once 'low-boom' technology is more advanced, it may be possible to review the acceptability of supersonic flight over land, subject to those aircraft meeting yet to be determined noise and boom effect criteria. At that point, further amendments to UK Reg (EU) No 923/2012 could be made to enable the routine operation of 'low-boom' aircraft.

## What legal powers are being used to achieve the change?

Article 40 of the Basic Regulation and Annex VIII paragraph 1.1 and UK Reg (EU) No 551/2004, Article 4(1).

## Further considerations

There are no ICAO provisions that define operational restrictions for supersonic and hypersonic flights over land under IFR or for hypersonic flights under VFR, nor are there any ICAO certification standards for supersonic aircraft that address the aspect of en-route noise (sonic booms). With several manufacturers now involved in the development of a new generation of supersonic and hypersonic aircraft, and a stated aim to make their first flights towards the end of the decade, there are no current restrictions that afford any environmental protection. Therefore, without this proposed legislation, supersonic and hypersonic flight over land could take place creating environmental issues and the threat of sonic booms, with resultant impacts that would be unacceptable to the public.

[4] Appendix G to ICAO Assembly Resolution A40-17, in ICAO Doc 10140 'Assembly Resolutions in Force (as of 4 October 2019)', ICAO 2020.

## Affected Law (and, if Applicable, UK AMC)

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| What is the existing UK legal framework which is relevant here? | UK Reg (EU) No 923/2012 Standardised European Rules of the Air<br><br>SERA.5005(d)(1) and SERA.5015 contained within the Annex to UK Reg (EU) No 923/2012 |
| Are any consequential amendments needed to other pieces of law? | No |
| If the change proposed is to assimilated EU Implementing Rules made under the UK Basic Regulation is there any UK Acceptable means of compliance (AMC), Guidance Material (GM) or Certification Specification (CS) that will be changed/newly adopted as a consequence if the law is changed as proposed? | Once the prohibition is in law, the next phase of work will see the development of the criteria that the CAA will use to consider a request for authorisation to operate at, supersonic and hypersonic speeds. It is likely that this will see the development of additional AMC and GM. |
| Does this proposal relate to an international treaty obligation (e.g. an ICAO SARP)? | No |
| Is a consultation required? | Yes. CitizenSpace consultation took place between 3 Jan and 7 Feb 2024. Prohibition of Supersonic, Transonic and Hypersonic Flight over land - Civil Aviation Authority - Citizen Space<br><br>Consultation response was published in Spring 2025. |
| Is an Impact Assessment necessary? | Yes. A De Minimis impact assessment has been prepared for these proposals |
| When is it intended that these provisions should be brought into force? | Immediately upon the coming into force of the amending SI |
| Will there be any criminal offences? | Given the potential impact to individuals on the ground, the CAA considers that a breach of these requirements should be a criminal offence with associated sanctions. The CAA is exploring options for the creation of a criminal offence, whether now or in the future, with the DfT, |
| If so, is a Justice Impact Test required? | The CAA and the DfT will consider the need for a Justice Impact Test as part of the |

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| | consideration of criminal offences detailed above. |
| What is the intended extent of the provision? | All UK. |
| Are any transitional provisions needed? If so, what are they? | No transitional period required as there are no current operations in this area. |

## Suggested Changes to existing wording of Law

The CAA's proposed amendment to the regulations is set out below. The text of the amendment is arranged to show deleted text, new or amended text as shown below:

(a) ~~Text to be deleted is shown struck through;~~

(b) New text is highlighted in grey;

(c) ~~Text to be deleted is shown struck through~~ followed by the replacement text which is highlighted in grey.

## SERA.5005 Visual flight rules

(a) Except when operating as a special VFR flight, VFR flights shall be conducted so that the aircraft is flown in conditions of visibility and distance from clouds equal to or greater than those specified in Table S5-1.

(b) Except when a special VFR clearance is obtained from an air traffic control unit, VFR flights shall not take off or land at an aerodrome within a control zone, or enter the aerodrome traffic zone or aerodrome traffic circuit when the reported meteorological conditions at that aerodrome are below the following minima:

(1) the ceiling is less than 450 m (1500 ft); or

(2) the ground visibility is less than 5 km.

(c) When so prescribed by the competent authority, VFR flights at night may be permitted under the following conditions:

(1) if leaving the vicinity of an aerodrome, a flight plan shall be submitted in accordance with SERA.4001(b)(6);

(2) flights shall establish and maintain two-way radio communication on the appropriate ATS communication channel, when available;

(3) the VMC visibility and distance from cloud minima as specified in Table S5-1 shall apply except that:

(i) the ceiling shall not be less than 450 m (1500 ft);

(ii) the reduced flight visibility provisions specified in Table S5-1(a) and (b) shall not apply;

(iii) in airspace classes B, C, D, E, F and G, at and below 900 m (3000 ft) AMSL or 300m (1000 ft) above terrain, whichever is the higher, the pilot shall maintain continuous sight of the surface; and

(iv) Provision repealed before document was ~~retained~~ assimilated.

(v) for mountainous area, higher VMC visibility and distance from cloud minima may be prescribed by the competent authority;

(4) Provision repealed before document was ~~retained~~ assimilated.

(5) except when necessary for take-off or landing, or except when specifically authorised by the competent authority, a VFR flight at night shall be flown at a level which is not below the minimum flight altitude established by the State whose territory is overflown, or, where no such minimum flight altitude has been established:

(i) over high terrain or in mountainous areas, at a level which is at least 600 m (2000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft;

(ii) elsewhere than as specified in i), at a level which is at least 300 m (1000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft.

(d) VFR flights shall not be operated:

(1) at transonic ~~and~~, supersonic and hypersonic speeds unless authorised by the competent authority;

(2) above FL 195. Exceptions to this requirement are the following:

(i) an airspace reservation has been established, where practical, by the Member States, in which VFR flights may be allowed; or

(ii) airspace up to and including ~~flight level~~ FL 285, when VFR traffic in that airspace has been authorised by the responsible ATS unit in accordance with the authorisation procedures established by the Member States and published in the relevant aeronautical information publication.

(e) Authorisation for VFR flights to operate above FL 285 shall not be granted where a vertical separation minimum of 300 m (1000 ft) is applied above FL 290.

(f) Except when necessary for take-off or landing, or except by permission from the competent authority, a VFR flight shall not be flown:

(1) over the congested areas of cities, towns or settlements or over an open-air assembly of persons at a height less than 300 m (1000 ft) above the highest obstacle within a radius of 600 m from the aircraft;

(2) elsewhere than as specified in (1), at a height less than 150 m (500 ft) above the ground or water, or 150 m (500 ft) above the highest obstacle within a radius of 150 m (500 ft) from the aircraft.

(g) Except where otherwise indicated in air traffic control clearances or specified by the competent authority, VFR flights in level cruising flight when operated above 900 m (3000 ft) from the ground or water, or a higher datum as specified by the competent authority, shall be conducted at a cruising level appropriate to the track as specified in the table of cruising levels in Appendix 3.

(h) VFR flights shall comply with the provisions of Section 8:

(1) when operated within Classes B, C and D airspace;

(2) when forming part of aerodrome traffic at controlled aerodromes; or

(3) when operated as special VFR flights.

(i) A VFR flight operating within or into areas or along routes designated by the competent authority, in accordance with SERA.4001(b)(3) or (4), shall maintain continuous air-ground voice communication watch on the appropriate communication channel of, and report its position as necessary to, the air traffic services unit providing flight information service.

(j) An aircraft operated in accordance with the visual flight rules which wishes to change to compliance with the instrument flight rules shall:

(1) if a flight plan was submitted, communicate the necessary changes to be effected to its current flight plan; or

(2) as required by SERA.4001(b), submit a flight plan to the appropriate air traffic services unit as soon as practicable and obtain a clearance prior to proceeding IFR when in controlled airspace.

## SERA.5015 Instrument flight rules (IFR) – Rules applicable to all IFR flights

(a) Aircraft equipment

Aircraft shall be equipped with suitable instruments and with navigation equipment appropriate to the route to be flown and in accordance with the applicable air operations legislation.

(b) Minimum levels

Except when necessary for take-off or landing, or except when specifically authorised by the competent authority, an IFR flight shall be flown at a level which is not below the minimum flight altitude established by the State whose territory is overflown, or, where no such minimum flight altitude has been established:

(1) over high terrain or in mountainous areas, at a level which is at least 600 m (2000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft;

(2) elsewhere than as specified in (1), at a level which is at least 300 m (1000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft.

(c) Change from IFR flight to VFR flight

(1) An aircraft electing to change the conduct of its flight from compliance with the instrument flight rules to compliance with the visual flight rules shall notify the appropriate air traffic services unit specifically that the IFR flight is cancelled and communicate thereto the changes to be made to its current flight plan.

(2) When an aircraft operating under the instrument flight rules is flown in or encounters visual meteorological conditions it shall not cancel its IFR flight unless it is anticipated, and intended, that the flight will be continued for a reasonable period of time in uninterrupted visual meteorological conditions.

(3) Change from IFR flight to VFR flight shall only be acceptable when a message initiated by the pilot-in-command containing the specific expression ‘CANCELLING MY IFR FLIGHT’, together with the changes, if any, to be made to the current flight plan, is received by an ATS unit. No invitation to change from IFR flight to VFR flight shall be made by ATS either directly or by inference.

(d) Supersonic and hypersonic flight

IFR flights shall not be operated at supersonic and hypersonic speeds unless authorised by the competent authority.