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THE RATIONALE FOR OMNIDIRECTIONAL DEPARTURES IN THE UK

1. INTRODUCTION

- 1.1 The CAA in 2010 adopted a Regulatory role with regard to procedure design including Standard Instrument Departures (SIDs). This resulted in queries from industry concerning the draft guidance and policy on departures that were being written at the time. Consequently this led to scrutiny of the draft UK requirements for SIDs against International Civil Aviation Organisation (ICAO) design criteria contained in ICAO Doc 8168 Volume II, *Procedures for Air Navigation Services Aircraft Operations, Construction of Visual and Instrument Flight Procedures (PANS-OPS)*.
- 1.2 The process of writing the Departure policy document CAP 778 - *Policy and Guidance for the Design and Operation of Departure procedures in UK Airspace* and consideration of minimum climb gradients highlighted a safety concern. This concern was that at many UK aerodromes there are no notified obstacle-cleared instrument departure procedures.
- 1.3 This paper presents the case for the introduction of Omnidirectional Departures in the UK, in order to address the current safety risk of departures at those UK aerodromes that have no obstacle-cleared departure procedures. It also affords the UK the opportunity to become ICAO compliant whilst dispensing with a number of terms, such as 'Planned or Standard Departure Route', which have been confused with SIDs.

2. HISTORY OF SIDs IN UK

- 2.1 SID procedures were introduced into the UK in the 1960s, initially in the London TMA (Heathrow and Gatwick Airports) and in the Manchester TMA (Manchester Airport). There was no PANSOPS criterion until 1984 and, therefore, in its place, common sense, experience and logic were the primary tools used to design the routes. These routes were dependent upon adequate navigational coverage being available from the navigation aids infrastructure. The 'procedure design' was supplemented with pilot and operator advice as necessary, and finally the routes went "where ATC needed them to go". The responsibility for policy, design and promulgation was originally vested in the Directorate of Civil Air Traffic Operations (CATO), the responsibility for policy and design authority now rests with the Directorate of Airspace Policy.
- 2.2 A CAA SID Working Group Report in 1975 made various recommendations for improving procedure design from an operations viewpoint, but did not establish formal construction criteria apart from reiteration of the flight safety requirement of "no turns below 500ft".

- 2.3 By the late 1970s the use of SID procedures in Terminal Airspace was widespread throughout the world. In 1983 ICAO produced its guidance material for Noise Abatement Procedures in PANS-OPS, including aircraft operating procedures (power reduction after take-off) and the requirements of Noise Preferential Routes (NPRs):
- The safety requirements of departure procedure design should be taken into full consideration;
 - Turns should not be required below 500ft above terrain/obstacles;
 - Angles of Bank (AOB) should be limited to 15° unless a specific provision has been made for acceleration;
 - Turns should not be required co-incident with power reductions; and
 - Sufficient navigational guidance must be available.
- 2.4 PANS-OPS criteria for the design of departure procedures were published in 1984, giving guidance on obstacle assessment and clearance along specific tracks.
- 2.5 By the time the formal procedure construction criteria were published by ICAO, the TMA route structures in the UK were long-established and were seen to work well for the aircraft types then operating. In particular, the environmental elements forming the initial part of the routes, and which were therefore closest to the obstacle environment, had by then become important to Airport Operators (AO) and surrounding communities.

3. CURRENT POSITION IN THE UK

- 3.1 Current CAA policy is that all SIDs are contained in controlled airspace (CAS). They will conform to ICAO criteria with regard to obstacle clearance, but may have a nominal track that requires additional ATM-derived constraints, as shown on SID charts published in the UK AIP. Other UK specific criteria as specified in CAP 778 may be applied if required.
- 3.2 Departure procedures that are not wholly contained within CAS but accord with any local noise preferential routes and which may or may not meet obstacle clearance requirements are notified in textual format in individual aerodrome sections AD 2.22 of the UK AIP (e.g. Farnborough).

4. PANS-OPS CRITERIA

- 4.1 The purpose of PANS-OPS criteria is to standardise procedures; this is achieved by the criteria being implemented globally by States. Two types of departure procedures are described in PANS-OPS: specific routes, Standard Instrument Departures (SIDs), which are notified in the UK Aeronautical Information Publications (UK AIP) and Omnidirectional Departures.

5. OBSTACLE CLEARANCE

- 5.1 Obstacle clearance is obtained by declaring a Procedure Design Gradient (PDG), nominally 3.3%, with an underlying Obstacle Identification Surface (OIS) set 0.8% below this at 2.5% (thereby Minimum Obstacle Clearance (MOC) increases with range from the departure runway). If an obstacle penetrates the OIS, the PDG is raised, the OIS rising respectively maintaining a differential of 0.8%, until the OIS is

no longer penetrated. A turning departure demands a (MOC) of 90m (295ft) in the turn initiation area, or 0.8% of the distance flown, whichever is the greater.

6. PURPOSE AND STATUS OF OMNIDIRECTIONAL PROCEDURES

- 6.1 Departure procedures are required for different reasons, for example: connectivity to en-route structure, reduction of route complexity in terminal areas, and avoidance of obstacles. For major aerodromes with complex airspace arrangements SIDs are required. However, for smaller, remote or less busy aerodromes an Omnidirectional Departure can fulfil the requirement to provide a safe obstacle cleared departure procedure. This would allow a departing aircraft to climb on runway track, with a maximum lateral deviation of $\pm 15^\circ$ to a specified altitude/height (not below 500ft above aerodrome elevation in UK) before turning to continue en-route.
- 6.2 Omnidirectional Departures are currently not published in the UK.

7. WHY SHOULD OMNIDIRECTIONAL DEPARTURES BE INTRODUCED TO THE UK?

- 7.1 The principle benefit associated with the introduction of Omnidirectional Departures is to afford a quantitative level of safety to aircraft departing under Instrument Flight Rules (IFR) especially those in Instrument Meteorological Conditions (IMC) at those aerodromes in the UK, which accommodate such IFR operations.
- 7.2 The proximity of obstacles and terrain at aerodromes in the UK where no departure procedures are notified raises an issue of safety regarding IFR departure operations. Current UK practice may mean that the underlying obstacle-cleared climb gradient is not transparent.
- 7.3 The introduction of Omnidirectional Departures showing the minimum obstacle-cleared climb gradient gives a basis of climb performance required to operators, when considering engine-inoperative calculations and procedures. For example, the departure gradient required from Farnborough if the proposal were adopted would be in excess of the nominal PDG of 3.3% for both runways.
- 7.4 The introduction of ICAO Omnidirectional Departures would bring the UK non-SID departure procedures into line with ICAO standards. This removes the need for bespoke procedures that may not be readily understood by aircraft operators and pilots.
- 7.5 Non-SID departures are currently subject to narrative descriptions only in individual aerodromes' textual entries in the UK AIP and may be known as standard or planned departure routes. An isolated textual entry in the AIP is not the optimum place or way of describing a flight procedure to a pilot. The introduction of Omnidirectional Departures will require chart depiction, thus enhancing clarity and ease of understanding.
- 7.6 The application of defined design criteria will be subject to data and design quality controls thus ensuring consistency of product.
- 7.7 The introduction of ICAO Omnidirectional Departures would support the safety, capacity, environmental and cost benefit aspirations of the Future Airspace Strategy.
- 7.8 Omnidirectional Departures are already used in Ireland, therefore their introduction within UK airspace increases operational commonality within the UK-Ireland Functional Airspace Block.

7.9 Omnidirectional departures are widely used elsewhere within Europe, for example in France, Ireland, Norway, Sweden, Finland, and Denmark.

8 OPTIONS

8.1 **Option 1** Do nothing. Maintain the status quo and retain current non-SID instrument departure procedures (e.g. PDRs, SDRs,).

Option 2 Introduce Omnidirectional Departures to the UK.

8.2 The advantages and disadvantages of each are as follows:

Option 1

Advantages:

- It requires no change to current procedures; and,
- Supports to some degree noise abatement routes.

Disadvantages:

- Does not address safety issue of aircraft departing IFR/IMC at an aerodrome without an obstacle cleared procedure;
- Does not allow for harmonisation with ICAO requirements and the removal of a filed difference from ICAO documentation;
- Does not clearly address the issue of minimum climb gradients when using UK derived departure criteria; and,
- Extra requirements/policy required with the introduction of planned departure routes for the approved procedure designers having outsourced the procedure design function.

Option 2

Advantages:

- Addresses the issue of assured obstacle safety for aircraft departing IFR/IMC, thereby increasing safety for departing aircraft in the UK;
- Clearly indicates to operators and pilots what the minimum climb gradient is with respect to obstacle clearance;
- Reduce the work required for Airspace Change Proposal (ACP) if regularising the current aerodrome written departure procedures;
- Broadens the scope of designs amongst CAA and external Approved Procedure Designers (APD);
- Ensures that industry has a standard to follow; and,
- Harmonisation with ICAO requirements allowing the UK to remove a filed difference.

Disadvantages

- The cost to industry for the design and implementation of new procedures;
- Has limited flexibility with respect to noise abatement procedures;
- Requires an extra AIP chart or charting standard; and
- An additional requirement for the aerodrome to maintain and review.

9 CONCLUSION

- 9.1 Option 1, the status quo is questionable in today's environment. The points as listed above strongly support Option 2. The adoption of Option 2 has the potential benefits of improving the safety of IFR departure operations in the UK and additionally permits the removal of a filed difference (ICAO PANS-OPS Vol II). Assuming that all parties in the UK adopt the implementation of Omnidirectional Departures, there remains the issue of timing with respect as to whether the requirement should be implemented as soon as possible or phased in as aerodromes see fit. On safety grounds it should be the former. However, bearing in mind the extra costs to those aerodromes which may implement Omnidirectional Departures, emphasis should initially be directed at those aerodromes that have significant numbers of IFR operations and have terrain or obstacles proximate to their departure flight paths.

10 RESPONSE

- 10.1 This communication forms part of the NATMAC aviation information process. As such, you are invited to comment on the above proposal in relation to any anticipated impact it may have on your organisation or its ability to operate. The DAP point of contact for this consultation is Mr Matthew Temple-Smith of Controlled Airspace Section, telephone: 0207 453 6511 or email to:

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