NATS

Performance
through Innovation

Edinburgh Flight/Simulator Validation Plan

Initial Detailed Plan

Version 3.0
31 January 2018

Prepared by
[redacted]

Edinburgh Flight/Simulator Validation Plan

Prepared by:
[redacted]

Version 2.1 Approved by:
Dave Raine – CAA Case Officer

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31 January 2018

Version	Date	Changes
0.7	23/09/2016	High-Level Strategic Plan Final Draft for CAA Review
1.2	21/12/2016	Initial Detailed Plan First Draft for NATS Review
1.3	22/12/2016	Initial Detailed Plan Second Draft for EAL Review
2.0	23/12/2016	Initial Detailed Plan Final Draft for CAA Review
2.1	15/02/2017	Initial Detailed Plan Revised Draft for Simulation Planning
3.0	31/01/2018	Initial Detailed Plan Revised to address changes to RWY 06 SIDs Final Draft for CAA Review Changed / New Paragraphs: • Introduction • Final paragraph of section 4 • Section 5 (new) • Section 6.5 (new) • Sections 7.16 – 7.17 • Sections 7.18 – 7.29 (new) • Section 8.3 (new)

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Introduction

The Edinburgh RNAV1 Standard Instrument Departure (SID) and Arrival Transition designs are being developed by NATS on behalf of Edinburgh Airport Limited. These procedures are outside the scope of the Prestwick Lower Airspace Systemisation (PLAS) project but have been developed in full cooperation with the PLAS development team.

The CAA requires that flight or simulator validation takes place to demonstrate the flyability of new procedures before they are approved for publication in the AIP.

Since conducting the initial flight validation activities, NATS has been advised by the CAA that the departure procedures must ensure aircraft do not turn before reaching the departure end of the runway (DER). This required a re-design of the initial segment of all runway 06 SIDs based on an agreed set of acceptable design parameters[1].

Flight validation sessions 10 and 11 will test the two most extreme turns immediately after the redesigned initial segment as these will be the most limiting. This document provides an initial detailed plan covering the revised procedures to be validated, simulator runs required for each procedure, and aircraft / environmental parameters for each run.

[1] Based on IFP design discussion with CAA SARG on 08/12/17 at CAA House.

1 Regulatory Requirement

The flight/simulator validation is identified as part of the CAP785 approval process (Figure 1). This particular activity is controlled by the CAA Policy Statement "Validation of Instrument Flight Procedures" and compliance is the ultimate responsibility of the sponsor (Figure 2). The sponsor varies depending on the procedure type (Figure 3). For this project, sponsorship of the redesign of the holding procedure at the end of the STAR has been taken on by Edinburgh Airport Ltd. Therefore the requirements for flight/simulator validation will be covered in this plan.

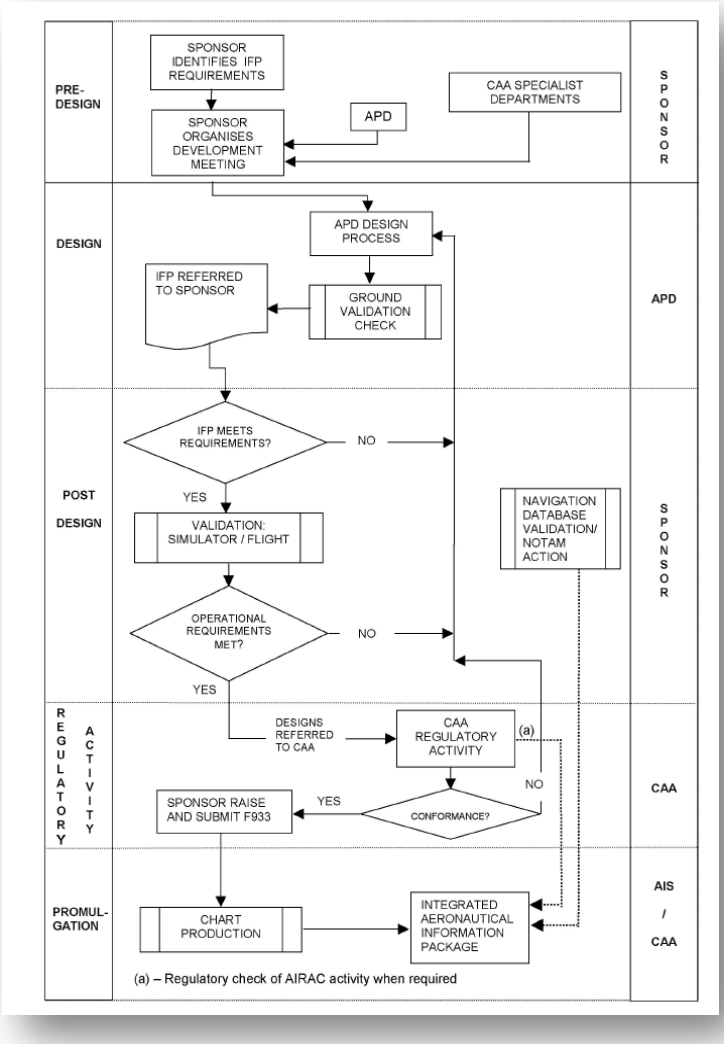


Figure 1: CAP785 - Approval Process Flowchart

4.4 The sponsor is responsible for all elements of the validation and shall document their proposed validation activities in a plan and submit as early as possible for agreement with the CAA DAP Controlled Airspace Section.

Figure 2: Paragraph 4.4 from CAA Policy Statement "Validation of Instrument Flight Procedures"

2.1 The CAA considers that the responsibility for maintaining and developing IFPs is held as follows:

- **IAPs** and associated hold and Missed Approach Procedures by the aerodrome licence holder;
- **STARs** by the en-route ANSP;
- A **holding procedure** at the end of a STAR, and any contingency hold associated with an PBN arrival transition (under the jurisdiction of the en-route ANSP), by the en-route ANSP;
- **PBN Arrival Transition** by the aerodrome licence holder;
- **SIDs** by the aerodrome licence holder;
- **PBN Departure Transition** by the en-route ANSP.

Figure 3: Paragraph 2.1 from CAA Policy Statement "POLICY CLARIFYING RESPONSIBILITIES REGARDING THE DEVELOPMENT OF, OR CHANGES TO, INSTRUMENT FLIGHT PROCEDURES"

2 Validation Plan

2.1 Context

Overall three tiers of planning are required, with each one increasing in levels of detail. This initial detailed plan is the second of three as depicted below:

High-Level Strategic Plan

- Means of validation (flight/sim/desktop)
- Aircraft types

Initial Detailed Plan <-this document

- Detailed breakdown of each procedure into relevant segments
- Flight/sim/desktop runs assigned to relevant segments
- Aircraft/environment parameters for each run (e.g. speed, climb gradient, wind)

Final Detailed Plan

- As per the Initial Detailed Plan but now with specific locations, dates, times, pilots.

The aim of this Initial Detailed Plan is to provide the details of the specific flight validation runs required. Each procedure will be validated on a variety of aircraft types under specific aircraft and environmental conditions. These are designed to stress test each procedure to ensure it is flyable on a representative selection of aircraft types under a wide range of environmental conditions. The Final Detailed Plan will then provide the logistical details such as location, dates, and attendees for each simulator session.

2.2 Process

The Approved Procedure Designer (APD) typically drafts the validation plan on behalf of the sponsor with input from key personnel including (but not limited to) the sponsor, the SARG Case Officer, and the validation pilot. For the Edinburgh ACP the stakeholders identified are:

- Lead Designer: [redacted]
- Procedure Designer: [redacted]
- ATC Lead: [redacted]
- Sponsor: [redacted]
- SARG Case Officer: [redacted]
- Validation Pilot(s): [redacted]

The regulatory objectives of flight/simulator validation are summarised in Figure 4. At aerodromes with existing Instrument Flight Procedures (IFPs), Obstacle Verification is not required since the obstacle environment is considered to be known. On this basis the Obstacle Verification requirement is not included in the plan. As such, the main regulatory requirement to be fulfilled is the Flyability Assessment. Therefore the remaining sections of this plan will focus on the Flyability Assessment only.

6.2 The objectives of the flight validation of IFP are:

Obstacle verification.

- Flight validation should aim to verify the obstacle that is identified as the controlling obstacle for each segment, and to check that no new obstacles have been erected since the design was undertaken, or that no existing obstacles have been charted with grossly incorrect heights along the designated track; and
- Such validations must be carried out in daylight hours in VMC and are flown at the minimum published altitude. The final approach segment should be flown at an altitude 30m (100ft) below the proposed minimum descent altitude on a non-precision approach and should be flown ½ scale deflection low, evaluated according to the decision altitude on a precision approach.

Flyability Assessment.

- Flight validation can provide a detailed assessment of crew workload and charting issues. However, due to the limitation of data received from one aircraft under flight validation conditions, relying on ground validation for a flyability assessment may provide a more comprehensive analysis.

Figure 4: Paragraph 6.2 from CAA Policy Statement "Validation of Instrument Flight Procedures"

3 Means of Validation

The options available to assess the flyability of the draft designs are:

A. Actual flight of an aircraft on the procedures. (e.g. DA42 flies procedures.)
B. Full-motion or fixed-base simulator. (e.g. Suitably qualified pilot flies procedures in A318 simulator.)
C. PC 'Monte Carlo' flight simulation. (e.g. NATS analysts perform runs on PC Desktop tool)

Option A is excluded from this plan on the basis that obstacle verification is not required, and that there is no other known benefit by physically flying these procedures compared to a simulation.

Option B is included in order to test:

- Flight Management System (FMS) performance – how well do a variety of FMSs handle the procedures?
- Aircraft performance – how manageable are the procedures for a variety of aircraft?
- Integrity of RNAV coding – assurance that the proposed procedure codings work in all feasible wind conditions without FMS errors (such as disconnect).
- Cockpit workload – how easy/difficult are the procedures to manage?

Option C is excluded from this plan on the basis that the available tools have not yet been accepted by the CAA for the purpose of flyability assessments. Desktop simulation is in the early stages of development and until such time as it is accepted for flyability assessment, the evidence will be provided solely by Option B.

4 Aircraft Types

Aircraft departure figures have been taken from the Electronic Flight Progress Strip (EFPS) data covering the period from 31 August 2015 to 13 March 2016. The top 20 aircraft types are listed below.

Type	Manufacturer	Name	Number	Percent
DH8D	Bombardier	Dash 8 Q400	4279	15.90%
B738	Boeing	737-800	4120	15.31%
A319	Airbus	A319	4109	15.27%
A320	Airbus	A320	3863	14.35%
E190	Embraer	Embraer 190	2197	8.16%
B733	Boeing	737-300	1138	4.23%
SF34	Saab	340 (Saab)	1029	3.82%
AT76	ATR	Alenia ATR-72-600	842	3.13%
D328	Fairchild-Dornier	328 (Dornier)	733	2.72%
E170	Embraer	Embraer 170	635	2.36%
B752	Boeing	757-200	456	1.69%
B763	Boeing	767-300ER	449	1.67%
A321	Airbus	A321	443	1.65%
RJ1H	BAE Systems	Avro RJ-100 Avroliner	301	1.12%
B788	Boeing	787-8	183	0.68%
A332	Airbus	A330-200	152	0.56%
B737	Boeing	737-700	140	0.52%
SH36	Short	SD3-360	118	0.44%
BE20	Hawker Beechcraft	King Air 200	109	0.41%
F70	Fokker	70 (Fokker)	101	0.38%

Table 1: Top 20 Aircraft Types (by Volume) at Edinburgh Airport

Based on the performance characteristics of these aircraft types we propose that flight simulator validation be conducted on the following types:

Airbus A320

- Covers A319, A320, and A321 aircraft types
- Covers 31% of aircraft movements
- This type has previously been identified (EGKK "Route 4") as being negatively affected by certain RNAV SID design configurations and weather conditions (i.e. crosswind to tailwind conditions in first turn on 'wrap around' SID designs)
- Primary operator: Easyjet

Boeing 737-800

- Covers B733, B734, B736, B737, B738, and B739 aircraft types
- Covers 21% of aircraft movements
- This type has previously been identified (during TUTUR SID route trial at EGPH) as being negatively affected by certain RNAV SID design configurations and high climb gradients which it can achieve (the B787-8 was also similarly affected and therefore this type is seen as covering the lateral deviation/discontinuity error)
- Primary operator: Ryanair

Bombardier Dash 8 Q400

- Covers 16% of aircraft movements
- Turbo-prop with significantly different performance characteristics to the jet types
- Primary operator: Flybe

Boeing 767-300ER

- Covers B762, B763, and B788 aircraft types
- Covers 3% of aircraft movements
- This represents the Heavy aircraft operating from Edinburgh
- Primary operator: British Airways

Using past performance, including the TUTUR SID trial, we believe that the Embraer E170 and E190 have similar performance characteristics to the Boeing 737 (though were NOT affected by discontinuity errors) so could be considered to be covered by that aircraft type.

Conducting flight simulator validation using these four typical aircraft types/performance groups covers approximately 80% of the aircraft operating at Edinburgh Airport.

While the Saab 340 or ATR-72-600 (primary operators: Loganair and Stobart Air); covering AT76, D328, and SF34 aircraft types (equal to 10% of current aircraft movements) could be used to represent the turboprop aircraft with a low rate of climb (excluding the, now relatively rare, Shorts 360), this type/group has been excluded as the climb profiles required on the non-jet SID design options will be no steeper than current conventional non-jet SIDs at EGPH.

The revised runway 06 SIDs will only be validated on the A320 and B738 aircraft types. This covers over 50% of the aircraft movements at the airport and gives evidence for both main aircraft manufacturers. This will also cover both Honeywell (A320) and GE (B738) Flight Management Systems.

5 Flight Validation Sessions

Flight validation activities will take place over a number of simulator sessions on different aircraft types as detailed below.

5.1 Sessions 1-8

These were the initial flight validation sessions to test the full suite of arrival / approach and departure procedures.

Session	Date / Time	A/C Type	Operator	Routes
Session 1	05/05/17 15:00	DH8D	Flight Safety International	E3, F1, F2, H1
Session 2	09/05/17 06:00	B763	British Airways	B1, B2, C, D1, D2, 06, 24
Session 3	11/05/17 05:30	B738	Ryanair	B1, B2, C, D1, D2, 06, 24
Session 4	12/05/17 05:30	B738	Ryanair	E1, E2, E3, F1, F2, G, H2
Session 5	19/05/17 14:00	B763	British Airways	E1, E2, E3, F1, F2, G, H2
Session 6	29/05/17 06:00	DH8D	Flight Safety International	A, C, 06, 24
Session 7	01/06/17 05:30	A320	easyJet	B1, B2, C, D1, D2, 06, 24
Session 8	02/06/17 05:30	A320	easyJet	E1, E2, E3, F1, F2, G, H2

5.2 Session 9

This supplemental flight validation session was added to investigate the problems that the A320 had with the runway 06 departure procedures. It will also re-validate the arrival transitions following the move of the EDIBO hold and validate a new departure route from runway 24.

Session	Date / Time	A/C Type	Operator	Routes
Session 9	13/10/17 09:00	A320	British Airways	A2, E2, F2, G, H1, 06, 24

5.3 Sessions 10-11

These additional flight validation sessions were added following the guidance from the CAA that the departure procedures must prevent aircraft from turning before the departure end of the runway (DER). They will also re-validate the transition from the RNAV arrival transitions to the ILS approach procedures.

Session	Date / Time	A/C Type	Operator	Routes
Session 10	12/02/18 14:00	A320	British Airways	EU, EV, EW, EX, EY, EZ, KU, KV, KW, KX, KY, KZ, 06, 24
Session 11	23/02/18 07:00	B738	Ryanair	EU, EV, EW, EX, EY, EZ, KU, KV, KW, KX, KY, KZ, 06, 24

6 Conditions

The following data has been obtained from the Iowa Environmental Mesonet which collects and stores environmental data from cooperating members with observing networks. This data includes historical METARs for Edinburgh dating back to 22 August 2011. The full archive of data from 22 August 2011 to 22 December 2016 was downloaded including the Surface Temperature, Wind Direction, Wind Speed, Atmospheric Pressure, and Wind Gust Speed. This data has been analysed to provide an understanding context of the chosen environmental variables.

6.1 Wind Direction

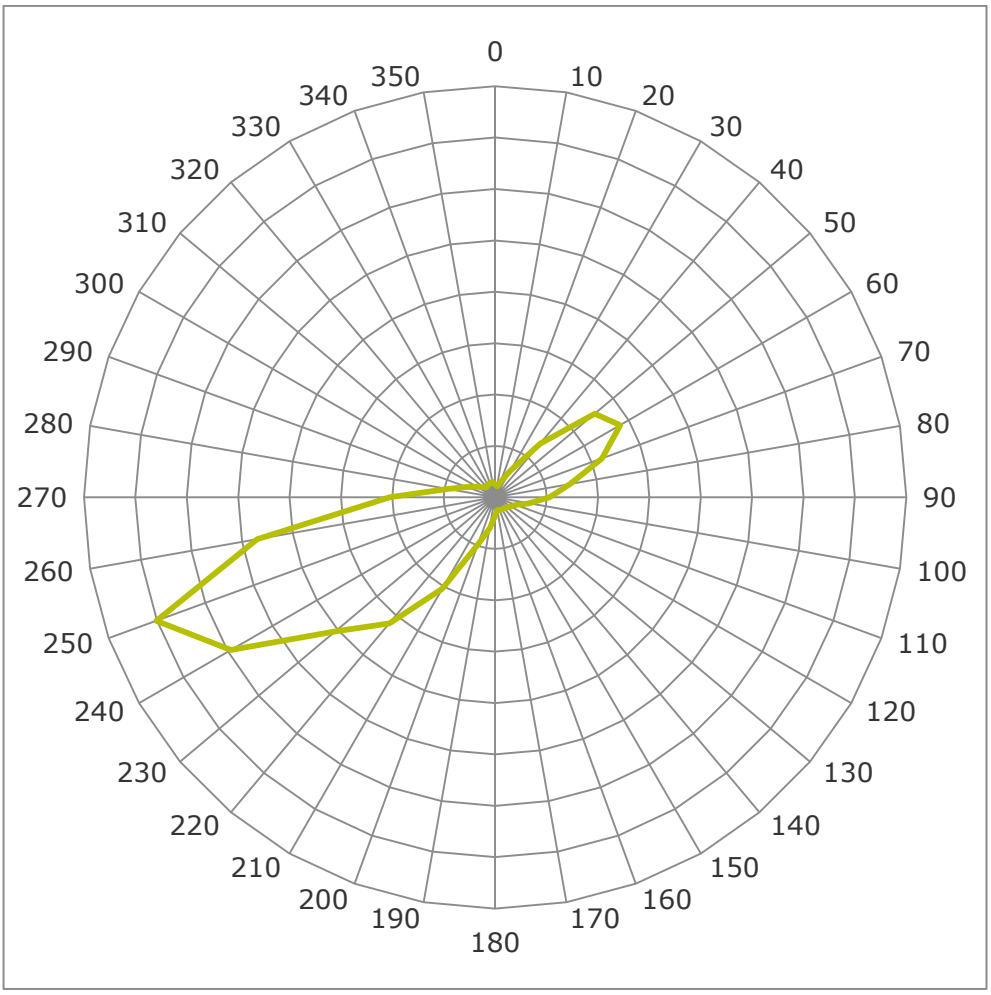


Figure 5: Wind Direction

The predominant wind direction is clearly the W-SW with the most common wind direction being 250. For the purposes of testing the procedures in the most extreme conditions we have considered both headwind and crosswind / tailwind scenarios. For "worst case" climb conditions we have chosen to use a direct crosswind in order to eliminate any headwind component on the initial climb. For "best case" climb conditions we have chosen to use a wind direction that is the average headwind for the first few legs of the procedure.

Wind direction changes with altitude and in the northern hemisphere the wind typically "veers" or rotates in a clockwise direction as altitude increases. This

change in wind direction is typically modelled automatically by the flight simulator. If the simulator does not have a default model then a change of +10° per 1000ft should be used.

6.2 Wind Speed

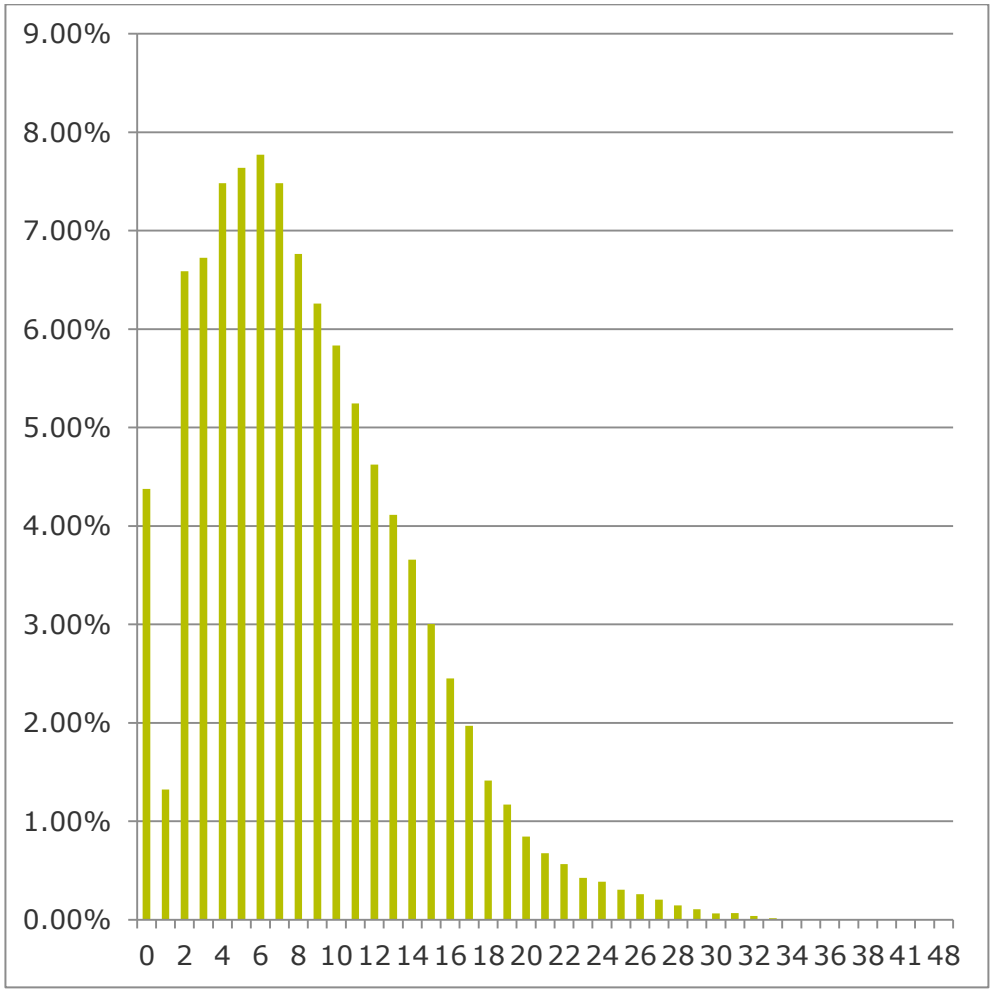


Figure 6: Wind Speed (kts)

As can be seen from Figure 6, winds rarely go above 30kts with wind speeds averaging 8.5kts over this period. For the purposes of testing the procedures in the most extreme conditions we have used a maximum wind speed of 30kts. For "worst case" climb conditions we have therefore used 30kts for the crosswind. For "best case" climb conditions we have used 30kts for the average headwind.

Wind speed increases with altitude and this is typically modelled automatically by the flight simulator. If the simulator does not have a default model then the UK wind gradient of +1kt per 1000ft should be used.

If the wind speed specified in a specific scenario causes headwind or crosswind components to be outside the aircraft type's operating envelope then the wind speed may be reduced until the headwind and crosswind components are inside the operating envelope.

6.3 Surface Temperature

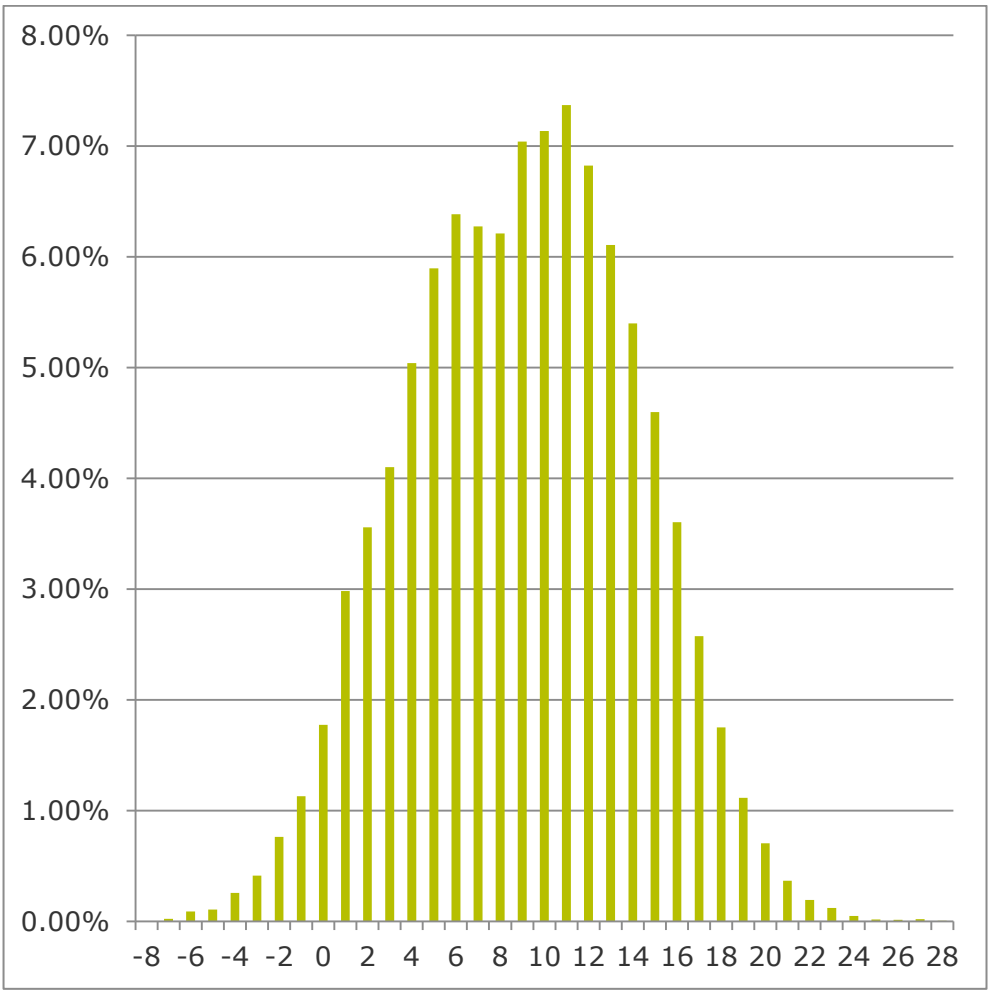


Figure 7: Surface Temperature (°C)

As can be seen from Figure 7, the surface temperature rarely goes below -5°C or above 25°C with an average temperature of 9°C. For the purposes of testing the procedures in the most extreme conditions we have used a minimum temperature of -5°C and a maximum temperature of 25°C. Although the average temperature is 9°C we have used the International Standard Atmosphere (ISA) temperature at mean sea level (MSL) of 15°C for the "base case" scenarios.

Temperature decreases with altitude according to the lapse rate and this is typically modelled by the flight simulator. If the simulator does not have a default model then then the ISA lapse rate of -1.98°C per 1000ft should be used.

6.4 Atmospheric Pressure

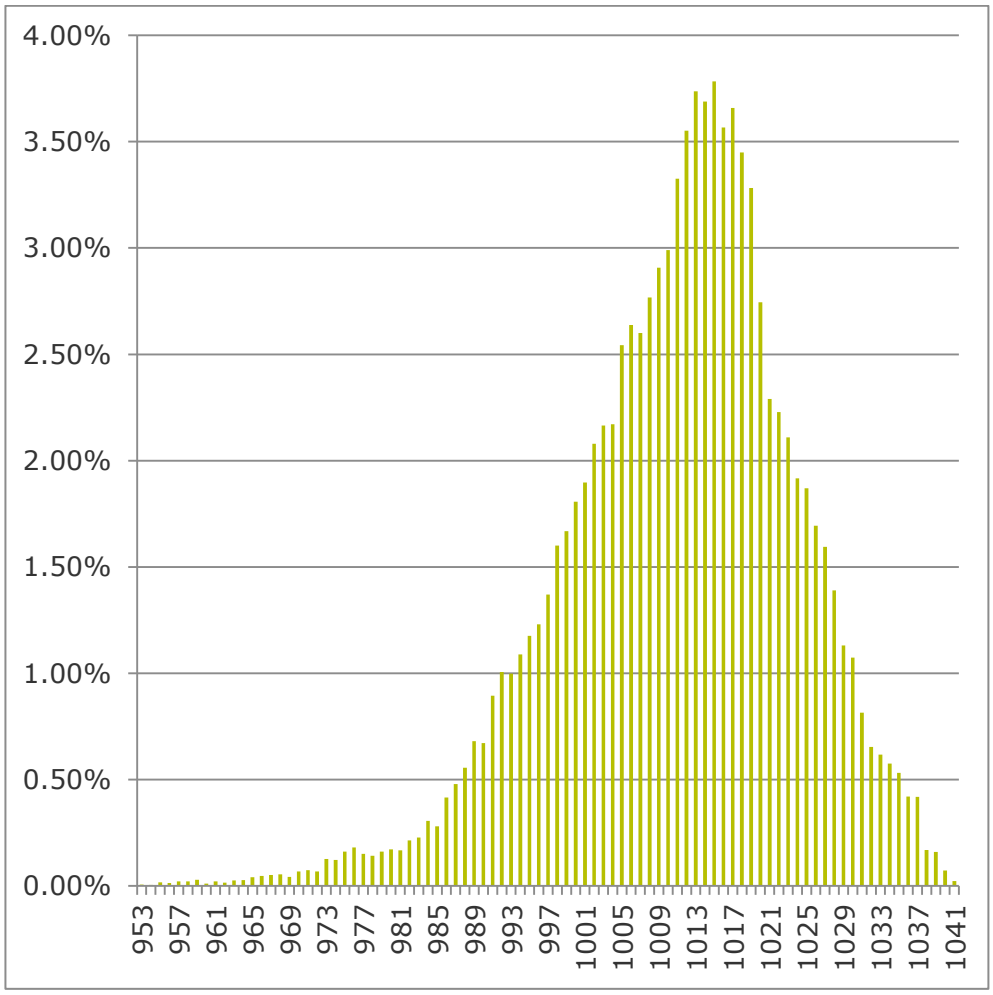


Figure 8: Atmospheric Pressure (hPa)

As can be seen from Figure 8, the atmospheric pressure rarely goes below 960hPa or above 1040hPa with an average pressure of 1011hPa. For "worst case" climb conditions we have used 980hPa as this will reduce climb performance. For "best case" climb conditions we have used 1025hPa as this will increase climb performance.

However, for SIDs which climb to a Flight Level these pressure changes will also have an opposite effect. On a low pressure day the target flight level is actually closer to the ground so the amount of climb is reduced. On a high pressure day the target flight level is actually further from the ground so the amount of climb is increased.

6.5 Aircraft Weight

The procedures will be validated at three different aircraft weights as follows:

MTOW (Maximum Take Off Weight)

This is the aircraft manufacturer's published maximum weight for the aircraft on departure. This weight is used to test the level restrictions on the departure

procedures in the most adverse climb conditions. It is also used to test the track of the missed approach procedures in the most adverse climb conditions.

Min TOW (Minimum Take Off Weight)

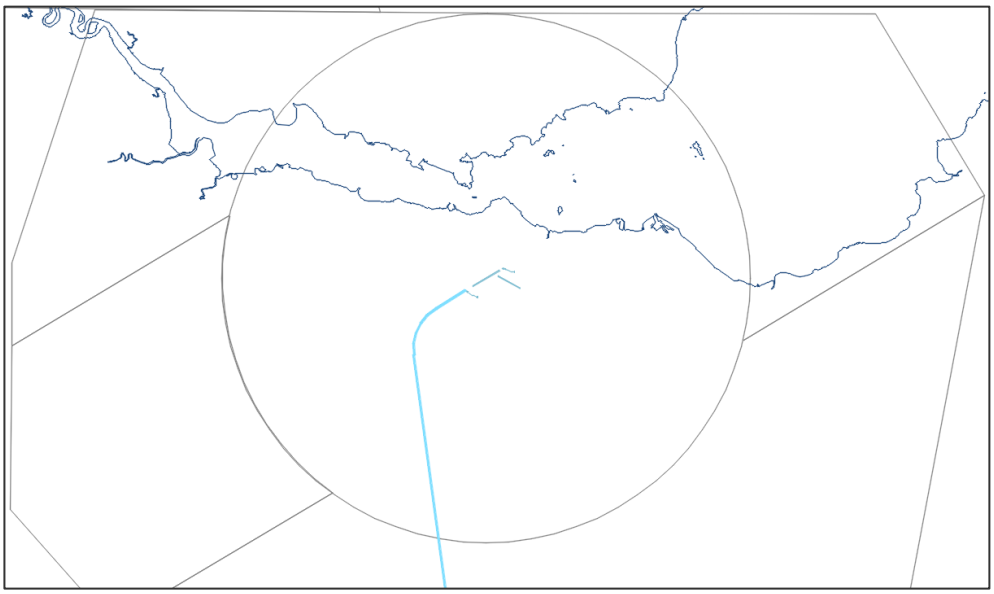
This is the empty aircraft weight with the bare minimum of fuel added. This weight is used to test the minimum segment lengths on the departure procedures in the best case climb conditions. It is also used to test the level restrictions on the arrival transitions in the most adverse descent conditions.

Average

This should be approximately halfway between the MTOW and Min TOW values. This weight is used to determine where the typical aircraft track is likely to go and is used to ensure that the routes shown in the consultation materials were appropriate.

7 Instrument Flight Procedures

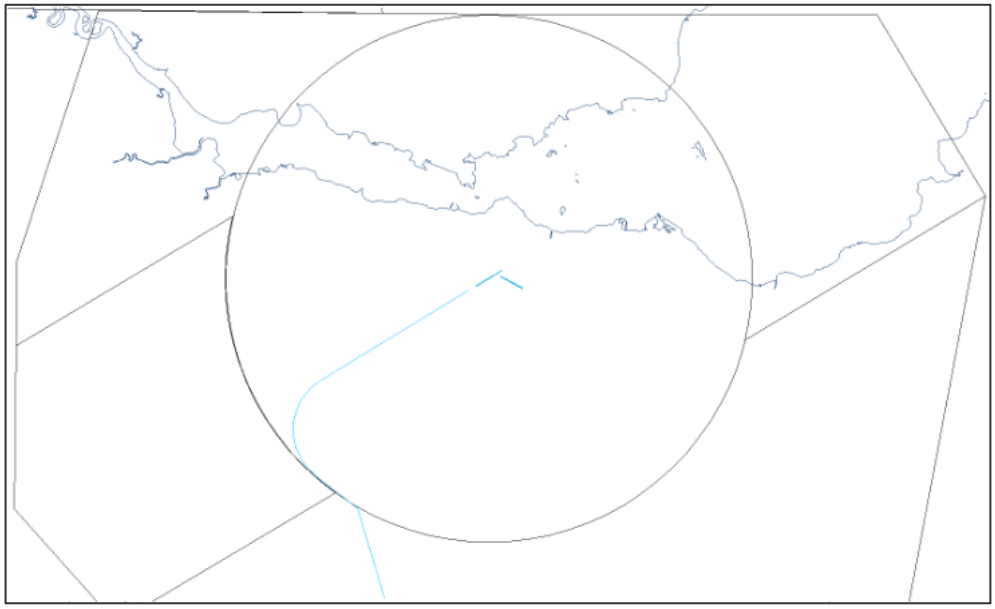
7.1 Route A



7.1.1 Sessions 1-8

Description:	Replacement for TALLA 6C SID (Non-Jet Only)		
Purpose:	Split eastbound, southbound, and westbound non-jets away from all other aircraft		
Aircraft Types:	AT76, D328, DH8D		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	330°	210°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	N/A	N/A	N/A
B738 Run ID:	N/A	N/A	N/A
DH8D Run ID:	A-DH8D-S1	A-DH8D-S2	A-DH8D-S3
B763 Run ID:	N/A	N/A	N/A
Notes:	• Run can terminate after passing penultimate waypoint • Assume climb clearance to FL240		

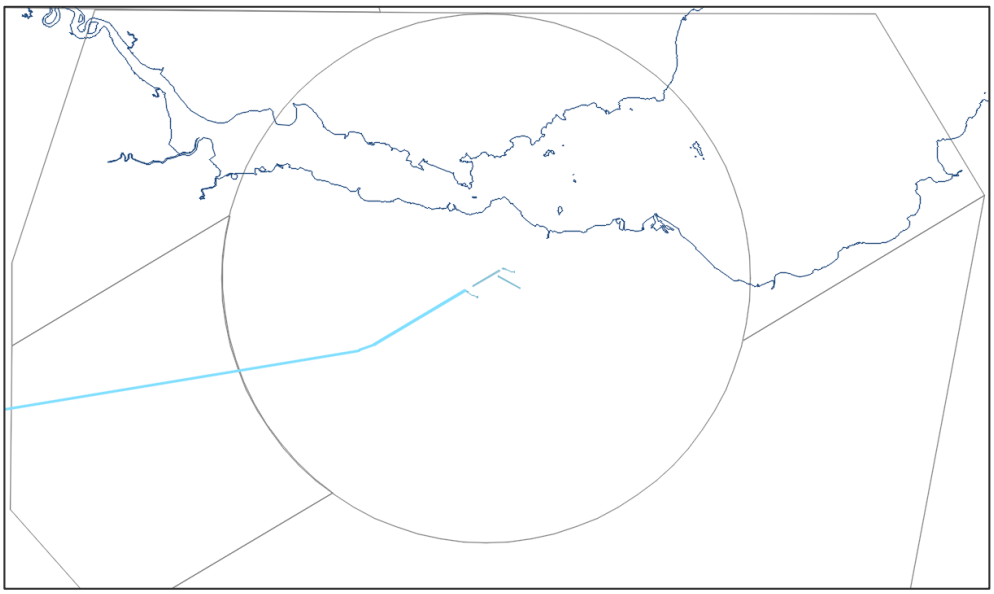
7.2 Route A2



7.2.1 Session 9

Description:	Replication of TALLA 6C SID	
Purpose:	For jet and non-jet departures from R24 to the south via TALLA (turbo-props will use route A6 when it is available).	
Aircraft Types:	A320, A330, AT76, B733, B738, B752, B763, B788, D328, DH8D, SB20, SF34	
	Scenario 4	**Scenario 5**
Wind Direction:	330°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions?	Average conditions
A320 Run ID:	A2-A320-S4	A2-A320-S5
Notes:	• Assume climb clearance to FL240	

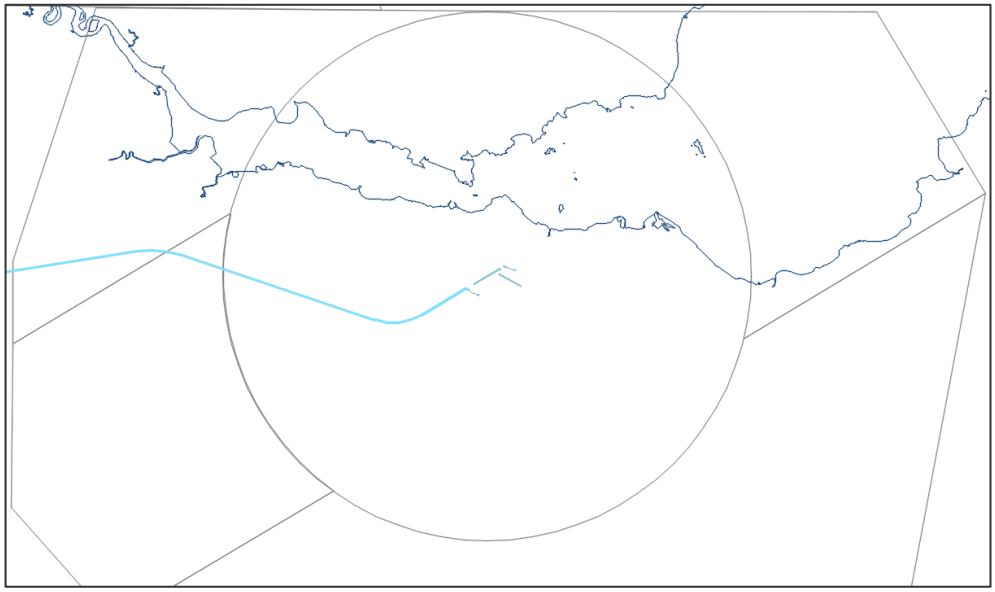
7.3 Route B1



7.3.1 Sessions 1-8

Description:	Replacement for GOSAM 1C SID (Jet Only)	
Purpose:	Split southbound jets from all other aircraft	
Aircraft Types:	A320, A330, B733, B738, B788, E170, E190	
	Scenario 1	**Scenario 2**
Wind Direction:	Still	150°
Wind Speed:	Still	30kts
Surface Temp:	15°C	25°C
Pressure:	1013.2hPa	980hPa
Aircraft Weight:	MTOW	MTOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?
A320 Run ID:	B1-A320-S1	B1-A320-S2
B738 Run ID:	B1-B738-S1	B1-B738-S2
DH8D Run ID:	N/A	N/A
B763 Run ID:	B1-B763-S1	B1-B763-S2
Notes:	• SID must be flown to termination point • Assume climb clearance to FL300	

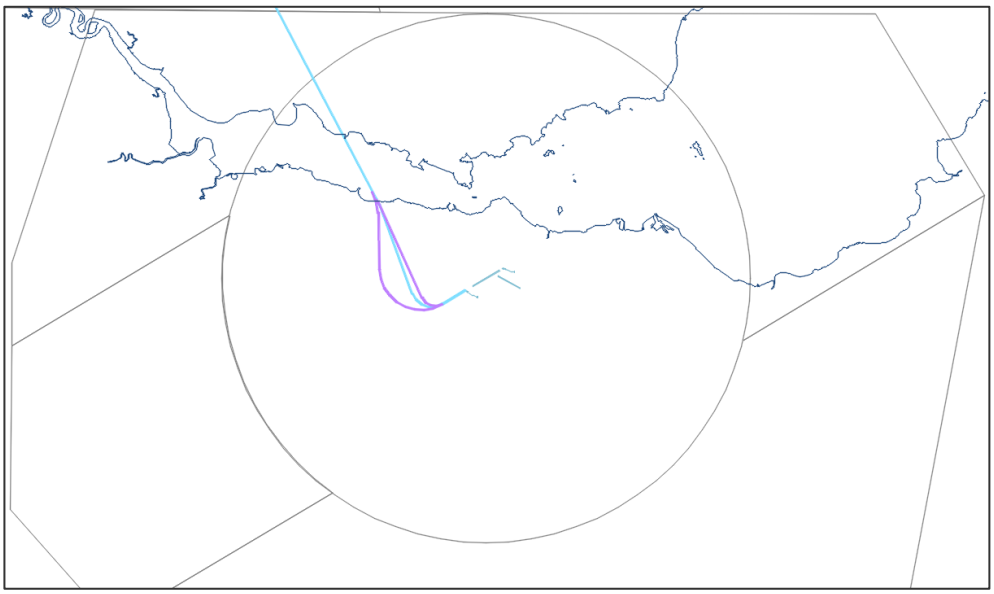
7.4 Route B2



7.4.1 Sessions 1-8

Description:	New SID turning right after Broxburn (Jet Only)		
Purpose:	Split westbound jets from all other aircraft		
Aircraft Types:	A320, A330, B733, B738, B788, E170, E190		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	150°	265°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	B2-A320-S1	B2-A320-S2	B2-A320-S3
B738 Run ID:	B2-B738-S1	B2-B738-S2	B2-B738-S3
DH8D Run ID:	N/A	N/A	N/A
B763 Run ID:	B2-B763-S1	B2-B763-S2	B2-B763-S3
Notes:	• SID must be flown to termination point • Assume climb clearance to FL300		

7.5 Route C

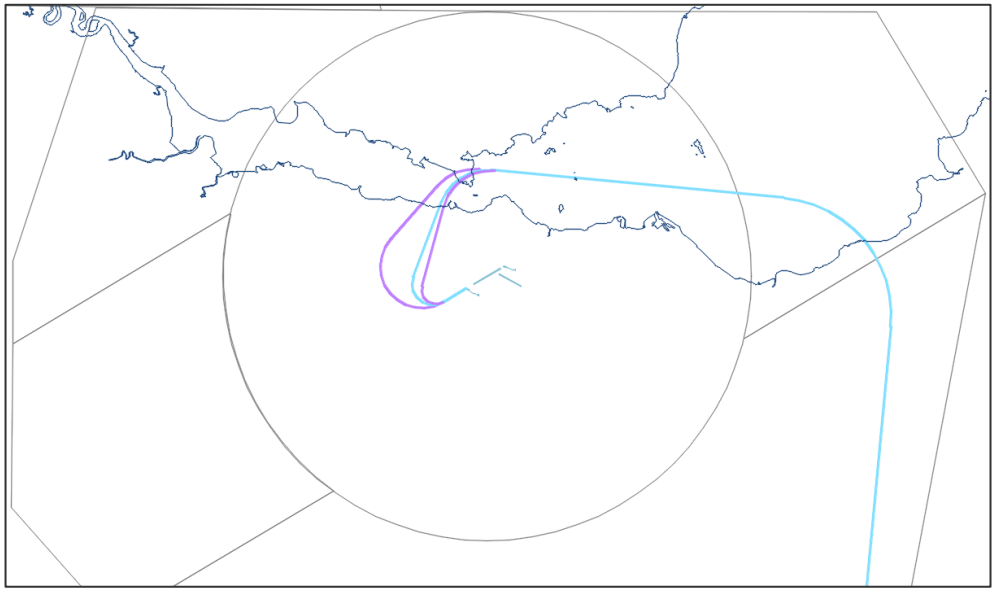


7.5.1 Sessions 1-8

Description:	Replacement for GRICE 3C SID		
Purpose:	Split northbound aircraft from southbound and westbound jets and all other non-jets using an early fly-over waypoint		
Aircraft Types:	A320, A330, B733, B738, B752, B763, B788, D328, SB20, SF34		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	150°	290°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	N/A *	C-A320-S2	N/A *
B738 Run ID:	N/A *	C-B738-S2	N/A *
DH8D Run ID:	C-DH8D-S1	C-DH8D-S2	C-DH8D-S3
B763 Run ID:	N/A *	C-B763-S2	N/A *
Notes:	• Run can terminate after passing penultimate waypoint • Assume climb clearance to FL240		

** Jets will test the full fly-over turn for Route D Option 1. For Route C the only test required is that they can meet the Route C level restrictions in the worst case climb conditions.*

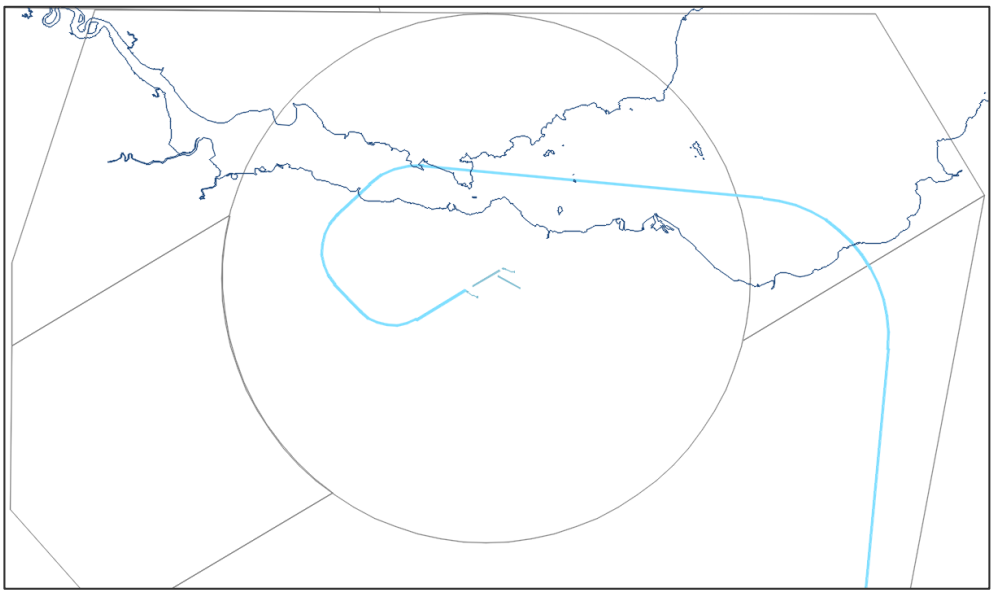
7.6 Route D Option 1



7.6.1 Sessions 1-8

Description:	New SID turning right before Broxburn and climbing over the Firth of Forth (Jet Only)		
Purpose:	Remove eastbound jets from TALLA SID and split from southbound and westbound jets and eastbound, southbound, and westbound non-jets using an early fly-over waypoint		
Aircraft Types:	A320, A330, B733, B738, B788, E190		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	150°	290°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	D1-A320-S1	D1-A320-S2	D1-A320-S3
B738 Run ID:	D1-B738-S1	D1-B738-S2	D1-B738-S3
DH8D Run ID:	N/A	N/A	N/A
B763 Run ID:	D1-B763-S1	D1-B763-S2	D1-B763-S3
Notes:	• SID must be flown to termination point • Assume climb clearance to FL300		

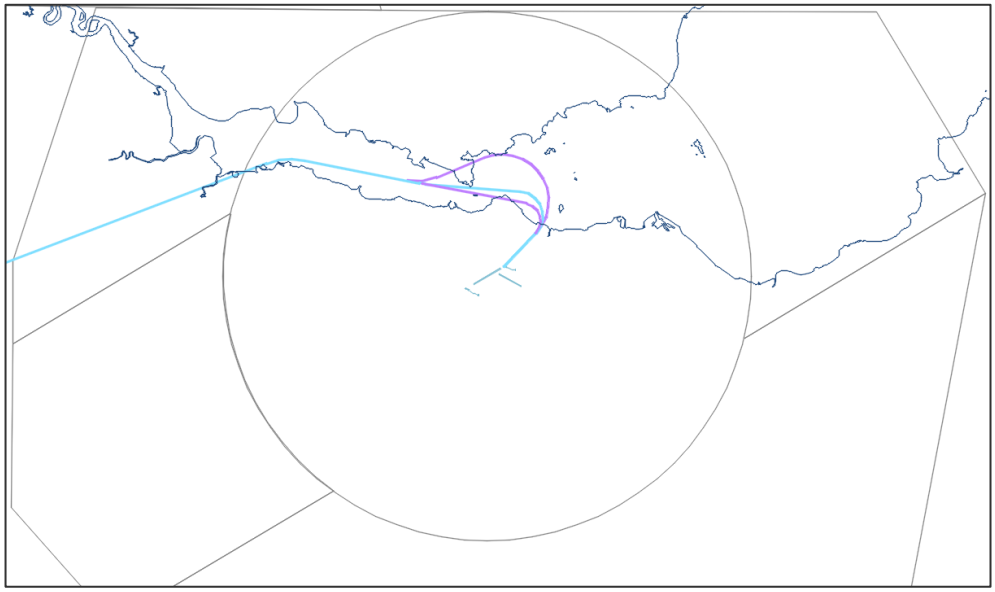
7.7 Route D Option 2



7.7.1 Sessions 1-8

Description:	New SID turning right after Broxburn and climbing over the Firth of Forth (Jet Only)		
Purpose:	Remove eastbound jets from TALLA SID and split from southbound and westbound jets and eastbound, southbound, and westbound non-jets using a fly-by waypoint		
Aircraft Types:	A320, A330, B733, B738, B788, E190		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	150°	290°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	D2-A320-S1	D2-A320-S2	D2-A320-S3
B738 Run ID:	D2-B738-S1	D2-B738-S2	D2-B738-S3
DH8D Run ID:	N/A	N/A	N/A
B763 Run ID:	D2-B763-S1	D2-B763-S2	D2-B763-S3
Notes:	• SID must be flown to termination point • Assume climb clearance to FL300		

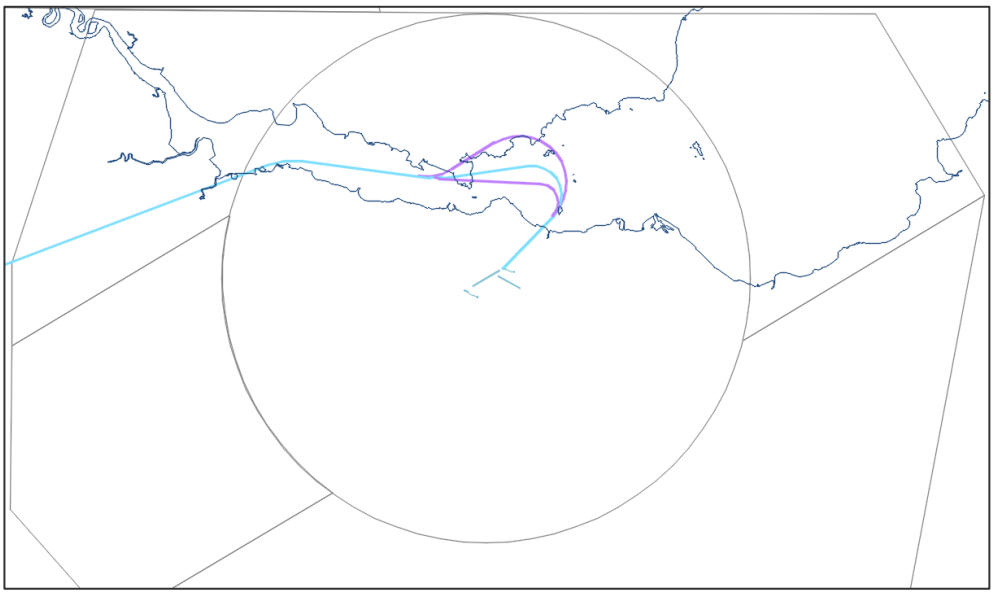
7.8 Route E Option 1



7.8.1 Sessions 1-8

Description:	Replacement for GOSAM 1D SID (Jet Only)		
Purpose:	Split southbound and westbound jets from eastbound jets and eastbound, southbound, and westbound non-jets using an early fly-over waypoint		
Aircraft Types:	A320, A330, B733, B738, B788, E170, E190		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	150°	360°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	E1-A320-S1	E1-A320-S2	E1-A320-S3
B738 Run ID:	E1-B738-S1	E1-B738-S2	E1-B738-S3
DH8D Run ID:	N/A	N/A	N/A
B763 Run ID:	E1-B763-S1	E1-B763-S2	E1-B763-S3
Notes:	• SID must be flown to termination point • Assume climb clearance to FL300		

7.9 Route E Option 2



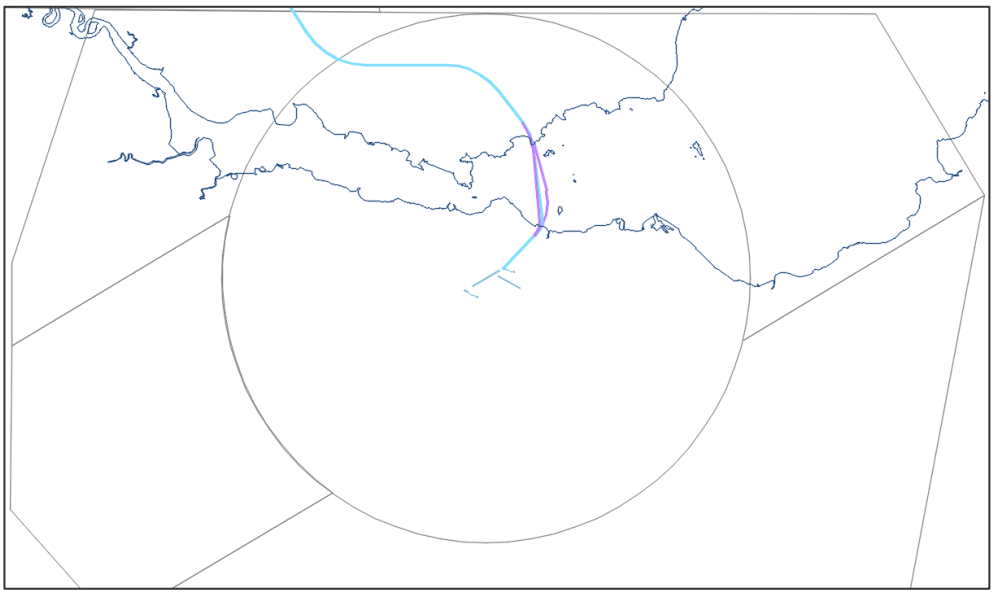
7.9.1 Sessions 1-8

Description:	Replacement for GOSAM 1D SID (Jet Only)		
Purpose:	Split southbound and westbound jets from eastbound jets and eastbound, southbound, and westbound non-jets using a late fly-over waypoint		
Aircraft Types:	A320, A330, B733, B738, B788, E170, E190		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	150°	360°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	E2-A320-S1	E2-A320-S2	E2-A320-S3
B738 Run ID:	E2-B738-S1	E2-B738-S2	E2-B738-S3
DH8D Run ID:	N/A	N/A	N/A
B763 Run ID:	E2-B763-S1	E2-B763-S2	E2-B763-S3
Notes:	• SID must be flown to termination point • Assume climb clearance to FL300		

7.9.2 Session 9

Description:	Replacement for GOSAM 1D SID (Jet Only)	
Purpose:	Split southbound and westbound jets from eastbound jets and eastbound, southbound, and westbound non-jets using a late fly-over waypoint	
Aircraft Types:	A320, A330, B733, B738, B788, E170, E190	
	Scenario 4	**Scenario 5**
Wind Direction:	150°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions?	Average conditions
A320 Run ID:	E2-A320-S4	E2-A320-S5
Notes:	• Assume climb clearance to FL300	

7.10 Route F Option 1

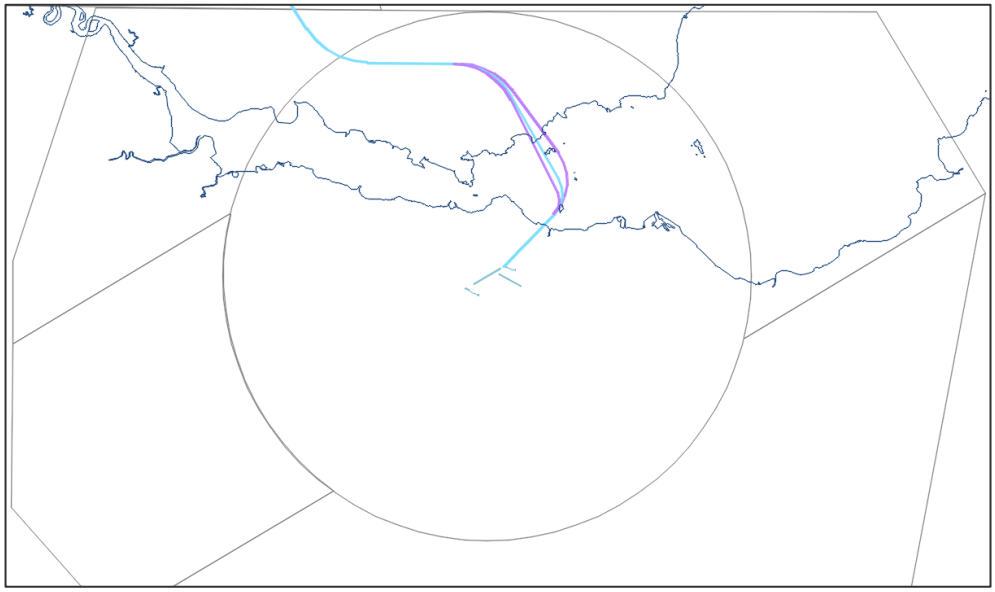


7.10.1 Sessions 1-8

Description:	Replacement for GRICE 4D SID		
Purpose:	Split northbound aircraft from eastbound jets and all other non-jets using an early fly-over waypoint		
Aircraft Types:	A320, A330, B733, B738, B752, B763, B788, D328, SB20, SF34		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	150°	360°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	N/A *	F1-A320-S2	N/A *
B738 Run ID:	N/A *	F1-B738-S2	N/A *
DH8D Run ID:	F1-DH8D-S1	F1-DH8D-S2	F1-DH8D-S3
B763 Run ID:	N/A *	F1-B763-S2	N/A *
Notes:	• Run can terminate once established on final leg • Assume climb clearance to FL240		

** Jets will test the full fly-over turn for Route E Option 1. For Route F Option 1 the only test required is that they can meet the Route F Option 1 level restrictions in the worst case climb conditions.*

7.11 Route F Option 2



7.11.1 Sessions 1-8

Description:	Replacement for GRICE 4D SID		
Purpose:	Split northbound aircraft from eastbound jets and all other non-jets using a late fly-over waypoint		
Aircraft Types:	A320, A330, B733, B738, B752, B763, B788, D328, SB20, SF34		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	150°	360°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	N/A *	F2-A320-S2	N/A *
B738 Run ID:	N/A *	F2-B738-S2	N/A *
DH8D Run ID:	F2-DH8D-S1	F2-DH8D-S2	F2-DH8D-S3
B763 Run ID:	N/A *	F2-B763-S2	N/A *
Notes:	• Run can terminate once established on final leg • Assume climb clearance to FL240		

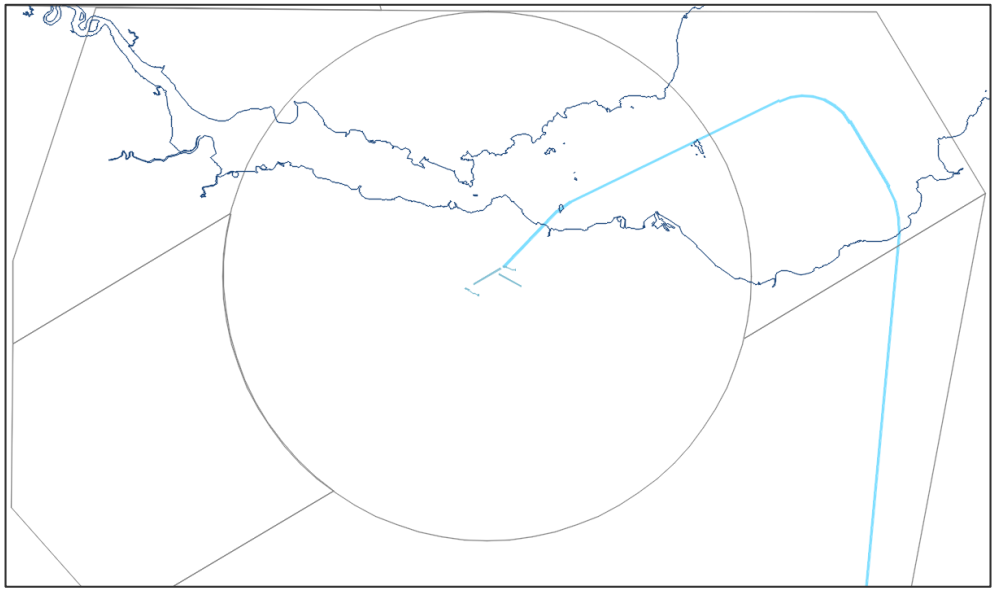
** Jets will test the full fly-over turn for Route E Option 1. For Route F Option 1 the only test required is that they can meet the Route F Option 1 level restrictions in the worst case climb conditions.*

7.11.2 Session 9

Description:	Replacement for GRICE 4D SID
Purpose:	Split northbound aircraft from eastbound jets and all other non-jets using a late fly-over waypoint
Aircraft Types:	A320, A330, B733, B738, B752, B763, B788, D328, SB20, SF34
	Scenario 4
Wind Direction:	150°
Wind Speed:	30kts
Surface Temp:	25°C
Pressure:	980hPa
Aircraft Weight:	MTOW
Objective:	Can level restrictions be met in worst case climb conditions?
A320 Run ID:	F2-A320-S4
Notes:	• Assume climb clearance to FL240

** Jets will test the full fly-over turn for Route E Option 1. For Route F Option 1 the only test required is that they can meet the Route F Option 1 level restrictions in the worst case climb conditions.*

7.12 Route G



7.12.1 Sessions 1-8

Description:	New SID climbing over the Firth of Forth (Jet Only)		
Purpose:	Remove eastbound jets from TALLA SID and split from all other aircraft		
Aircraft Types:	A320, A330, B733, B738, B788, E190		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	330°	060°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	G-A320-S1	G-A320-S2	G-A320-S3
B738 Run ID:	G-B738-S1	G-B738-S2	G-B738-S3
DH8D Run ID:	N/A	N/A	N/A
B763 Run ID:	G-B763-S1	G-B763-S2	G-B763-S3
Notes:	• SID must be flown to termination point • Assume climb clearance to FL300		

7.12.2 Session 9

Description:	New SID climbing over the Firth of Forth (Jet Only)	
Purpose:	Remove eastbound jets from TALLA SID and split from all other aircraft	
Aircraft Types:	A320, A330, B733, B738, B788, E190	
	Scenario 4	**Scenario 5**
Wind Direction:	330°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions?	Average conditions
A320 Run ID:	G-A320-S4	G-A320-S5
Notes:	• Assume climb clearance to FL300	

7.13 Route H1

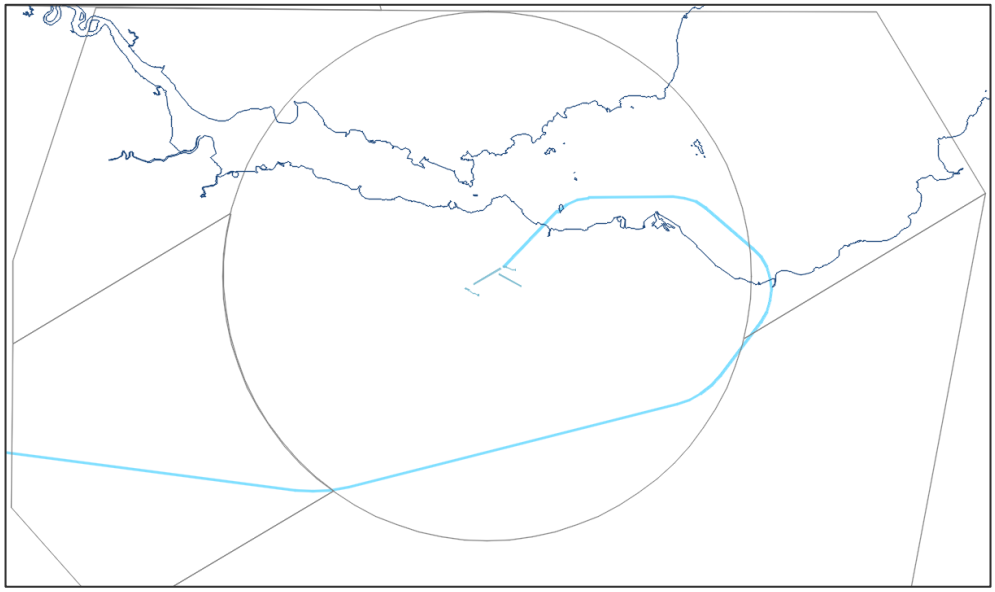
7.13.1 Sessions 1-8

Description:	Replacement for TALLA 6D SID (Non-Jet Only)		
Purpose:	Split eastbound, southbound, and westbound non-jets from all other aircraft		
Aircraft Types:	AT76, D328, DH8D		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	330°	090°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	N/A	N/A	N/A
B738 Run ID:	N/A	N/A	N/A
DH8D Run ID:	H1-DH8D-S1	H1-DH8D-S2	H1-DH8D-S3
B763 Run ID:	N/A	N/A	N/A
Notes:	• Run can terminate once established on final leg • Assume climb clearance to FL240		

7.13.2 Session 9

Description:	Replacement for TALLA 6D SID (Non-Jet Only)	
Purpose:	Split eastbound, southbound, and westbound non-jets from all other aircraft	
Aircraft Types:	AT76, D328, DH8D	
	Scenario 4	**Scenario 5**
Wind Direction:	330°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions?	Average conditions
A320 Run ID:	H1-A320-S4	H1-A320-S5
Notes:	• Assume climb clearance to FL240	

7.14 Route H2



7.14.1 Sessions 1-8

Description:	New SID following H2 route (Jet Only)		
Purpose:	Potential to split southeastbound jets from all other jets and northbound non-jets if a parallel airway is introduced		
Aircraft Types:	A320, A330, B733, B738, B788		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	330°	090°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	H2-A320-S1	H2-A320-S2	H2-A320-S3
B738 Run ID:	H2-B738-S1	H2-B738-S2	H2-B738-S3
DH8D Run ID:	N/A	N/A	N/A
B763 Run ID:	H2-B763-S1	H2-B763-S2	H2-B763-S3
Notes:	• Run can terminate once established on final leg • Assume climb clearance to FL300		

7.15 Route E Option 3

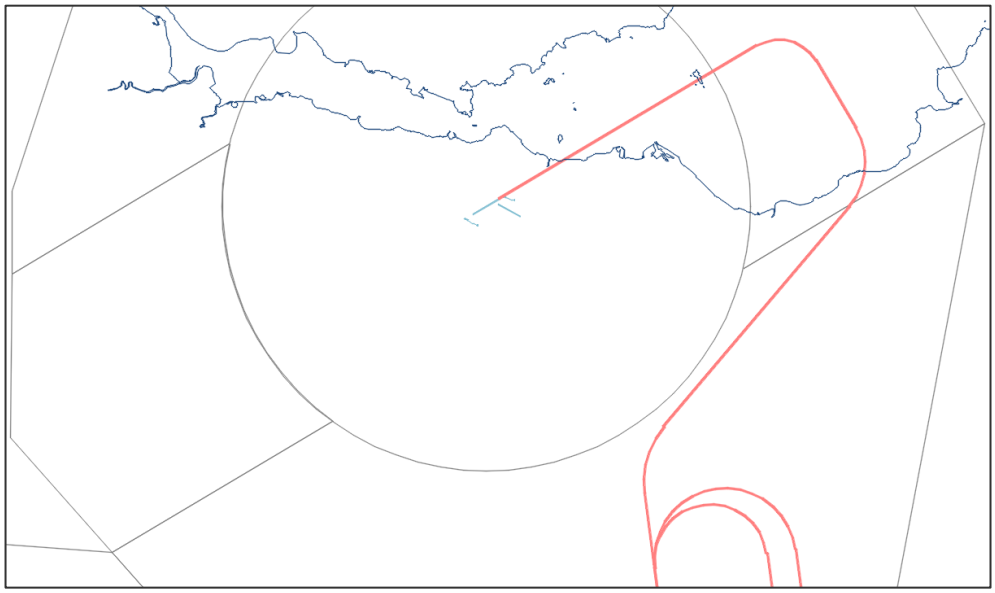
This option is not part of the formal consultation and has not yet gone through the design process. The intention is to construct a SID with a 17.5° offset to the left to more closely replicate the current conventional tracks and reduce the noise impact on Cramond.

7.15.1 Sessions 1-8

Description:	Replacement for GOSAM 1D SID (Jet Only)		
Purpose:	Split southbound and westbound jets from eastbound jets and eastbound, southbound, and westbound non-jets using an early fly-over waypoint		
Aircraft Types:	A320, A330, B733, B738, B788, E170, E190		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	150°	360°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	25°C	-5°C
Pressure:	1013.2hPa	980hPa	1025hPa
Aircraft Weight:	MTOW	MTOW	Min TOW
Objective:	Base case climb performance	Can level restrictions be met in worst case climb conditions?	Are there any track keeping issues in best case climb conditions?
A320 Run ID:	E3-A320-S1	E3-A320-S2	E3-A320-S3
B738 Run ID:	E3-B738-S1	E3-B738-S2	E3-B738-S3
DH8D Run ID:	E3-DH8D-S1 *	E3-DH8D-S2 *	E3-DH8D-S3 *
B763 Run ID:	E3-B763-S1	E3-B763-S2	E3-B763-S3
Notes:	• Run can terminate once established on final leg • Assume climb clearance to FL300		

** Non-jets will not fly route E but if the flight validation is successful we would want to implement the same 17.5° track adjustment for route F. If non-jets are able to fly Route E Option 3 then they should be able to fly the less demanding Route F.*

7.16 EDIBO 1A and ILS or RNAV(GNSS) Approach to Runway 24



7.16.1 Sessions 1-8

Description:	New arrival transition to 12.9NM from threshold		
Purpose:	PBN Arrival Transition from hold to IF for ILS, LOC, or RNAV(GNSS) approach to runway 24		
Aircraft Types:	All		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	290°	330°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	-5°C	25°C
Pressure:	1013.2hPa	1025hPa	980hPa
Aircraft Weight:	Average	Min TOW	MTOW
Approach Type:	ILS	RNAV(GNSS)	RNAV(GNSS)
Missed App'ch:	No	Yes	Yes
Objective:	Base case descent performance and RNAV to ILS validation	Worst case descent conditions and best case climb conditions	Best case descent conditions and worst case climb conditions
A320 Run ID:	24-A320-S1	24-A320-S2	24-A320-S3
B738 Run ID:	24-B738-S1	24-B738-S2	24-B738-S3
DH8D Run ID:	24-DH8D-S1	24-DH8D-S2	24-DH8D-S3
B763 Run ID:	24-B763-S1	24-B763-S2	24-B763-S3
Notes:	• Aircraft should leave the hold at FL90 • Assume unrestricted descent clearance • Scenario 1 can terminate once established on glide path • Scenarios 2 and 3 must be flown to end of missed approach		

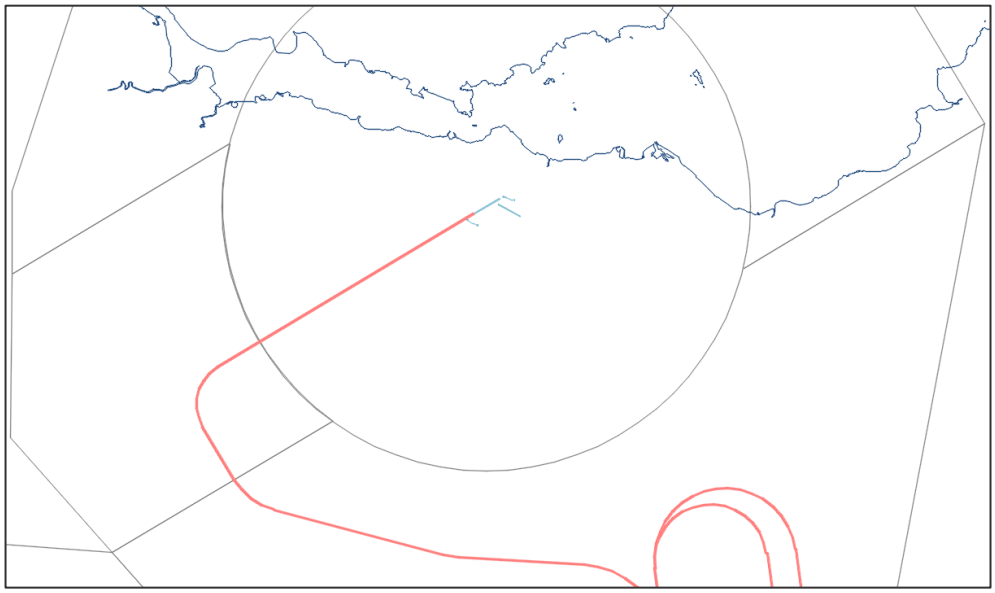
7.16.2 Session 9

Description:	New arrival transition to 12.9NM from threshold		
Purpose:	PBN Arrival Transition from hold to IF for ILS, LOC, or RNAV(GNSS) approach to runway 24		
Aircraft Types:	All		
	Scenario 4	**Scenario 5**	**Scenario 6**
Wind Direction:	290°	Still	330°
Wind Speed:	30kts	Still	30kts
Surface Temp:	-5°C	15°C	25°C
Pressure:	1025hPa	1013.2hPa	980hPa
Aircraft Weight:	Min TOW	Average	MTOW
Approach Type:	RNAV(GNSS)	ILS	RNAV(GNSS)
Starting Point:	PHE18	EDIBO	PHE18
Missed App'ch:	Yes	No	Yes
Objective:	Worst case descent conditions and best case climb conditions	Base case descent performance and RNAV to ILS validation	Best case descent conditions and worst case climb conditions
A320 Run ID:	24-A320-S4	24-A320-S5	24-A320-S6
Notes:	• Aircraft should leave the hold at FL90 • Assume unrestricted descent clearance • Scenario 5 can terminate once established on glide path • Scenarios 4 and 6 must be flown to end of missed approach		

7.16.3 Sessions 10-11

Description:	New arrival transition to 12.9NM from threshold
Purpose:	PBN Arrival Transition from hold to IF for ILS, LOC, or RNAV(GNSS) approach to runway 24
Aircraft Types:	All
	Scenario 7
Wind Direction:	Still
Wind Speed:	Still
Surface Temp:	15°C
Pressure:	1013.2hPa
Aircraft Weight:	Average
Approach Type:	ILS Y
Starting Point:	EDIBO
Missed App'ch:	No
Objective:	RNAV to ILS validation
A320 Run ID:	24-A320-S7
B738 Run ID:	24-B738-S7
Notes:	• Aircraft should leave the hold at FL90 • Assume unrestricted descent clearance • Scenario 7 can terminate once established on glide path

7.17 EDIBO 1B and ILS or RNAV(GNSS) Approach to Runway 06



7.17.1 Sessions 1-8

Description:	New arrival transition to 12.9NM from threshold		
Purpose:	PBN Arrival Transition from hold to IF for ILS, LOC, or RNAV(GNSS) approach to runway 06		
Aircraft Types:	All		
	Scenario 1	**Scenario 2**	**Scenario 3**
Wind Direction:	Still	010°	150°
Wind Speed:	Still	30kts	30kts
Surface Temp:	15°C	-5°C	25°C
Pressure:	1013.2hPa	1025hPa	980hPa
Aircraft Weight:	Average	Min TOW	MTOW
Approach Type:	ILS	RNAV(GNSS)	RNAV(GNSS)
Missed App'ch:	No	Yes	Yes
Objective:	Base case descent performance and RNAV to ILS validation	Worst case descent conditions and best case climb conditions	Best case descent conditions and worst case climb conditions
A320 Run ID:	06-A320-S1	06-A320-S2	06-A320-S3
B738 Run ID:	06-B738-S1	06-B738-S2	06-B738-S3
DH8D Run ID:	06-DH8D-S1	06-DH8D-S2	06-DH8D-S3
B763 Run ID:	06-B763-S1	06-B763-S2	06-B763-S3
Notes:	• Aircraft should leave the hold at FL90 • Assume unrestricted descent clearance • Scenario 1 can terminate once established on glide path • Scenarios 2 and 3 must be flown to end of missed approach		

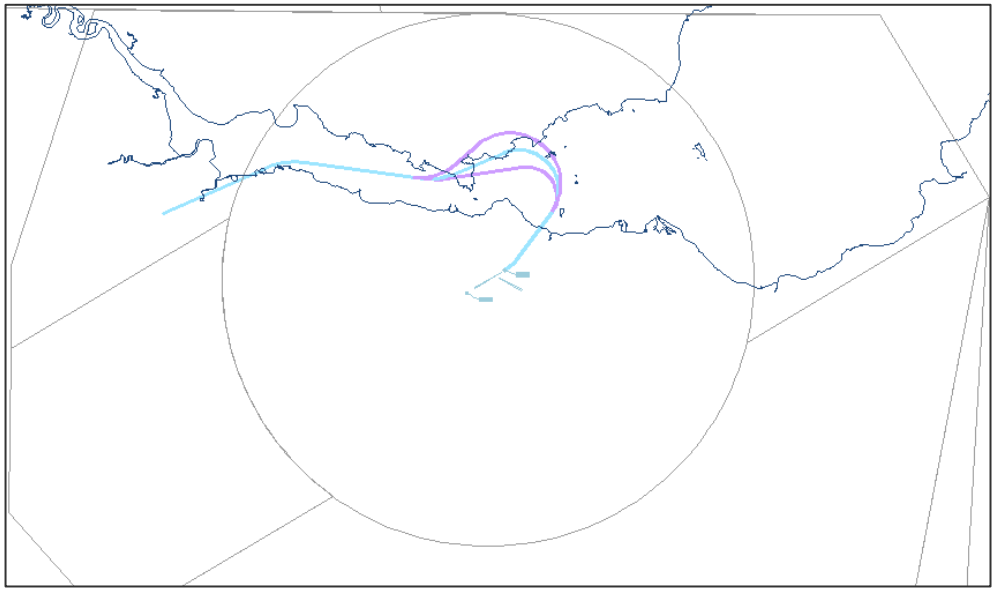
7.17.2 Session 9

Description:	New arrival transition to 12.9NM from threshold		
Purpose:	PBN Arrival Transition from hold to IF for ILS, LOC, or RNAV(GNSS) approach to runway 06		
Aircraft Types:	All		
	Scenario 4	**Scenario 5**	**Scenario 6**
Wind Direction:	010°	Still	150°
Wind Speed:	30kts	Still	30kts
Surface Temp:	-5°C	15°C	25°C
Pressure:	1025hPa	1013.2hPa	980hPa
Aircraft Weight:	Min TOW	Average	MTOW
Approach Type:	RNAV(GNSS)	ILS	RNAV(GNSS)
Starting Point:	PHW16	EDIBO	PHW16
Missed App'ch:	Yes	No	Yes
Objective:	Worst case descent conditions and best case climb conditions	Base case descent performance and RNAV to ILS validation	Best case descent conditions and worst case climb conditions
A320 Run ID:	06-A320-S4	06-A320-S5	06-A320-S6
Notes:	• Aircraft should leave the hold at FL90 • Assume unrestricted descent clearance • Scenario 5 can terminate once established on glide path • Scenarios 4 and 6 must be flown to end of missed approach		

7.17.3 Sessions 10-11

Description:	New arrival transition to 12.9NM from threshold
Purpose:	PBN Arrival Transition from hold to IF for ILS, LOC, or RNAV(GNSS) approach to runway 06
Aircraft Types:	All
	Scenario 7
Wind Direction:	Still
Wind Speed:	Still
Surface Temp:	15°C
Pressure:	1013.2hPa
Aircraft Weight:	Average
Approach Type:	ILS Y
Starting Point:	EDIBO
Missed App'ch:	No
Objective:	RNAV to ILS validation
A320 Run ID:	06-A320-S7
B738 Run ID:	06-B738-S7
Notes:	• Aircraft should leave the hold at FL90 • Assume unrestricted descent clearance • Scenario 7 can terminate once established on glide path

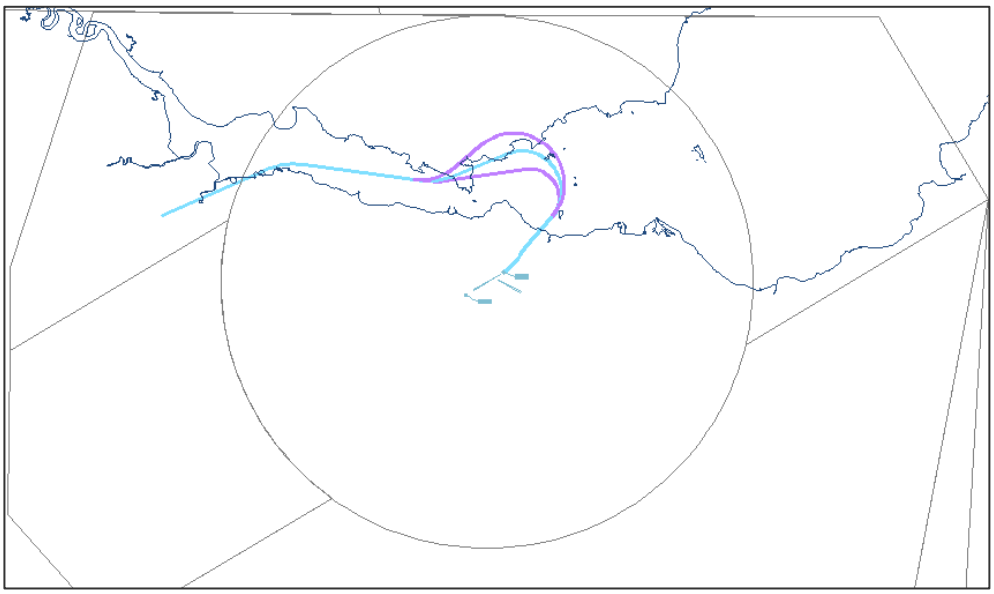
7.18 EMJEE 1U



7.18.1 Sessions 10-11

Description:	Replacement for GOSAM 1D SID (Jet Only)	
Purpose:	Split southbound and westbound jets from eastbound jets and eastbound, southbound, and westbound non-jets using a fly-over waypoint at the DER followed by a DF leg	
Aircraft Types:	A320, A330, B733, B738, B788, E170, E190	
	Scenario 7	**Scenario 8**
Wind Direction:	150°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions?	Average conditions
A320 Run ID:	EU-A320-S7	EU-A320-S8
B738 Run ID:	EU-B738-S7	EU-B738-S8
Notes:	• Assume climb clearance to FL300	

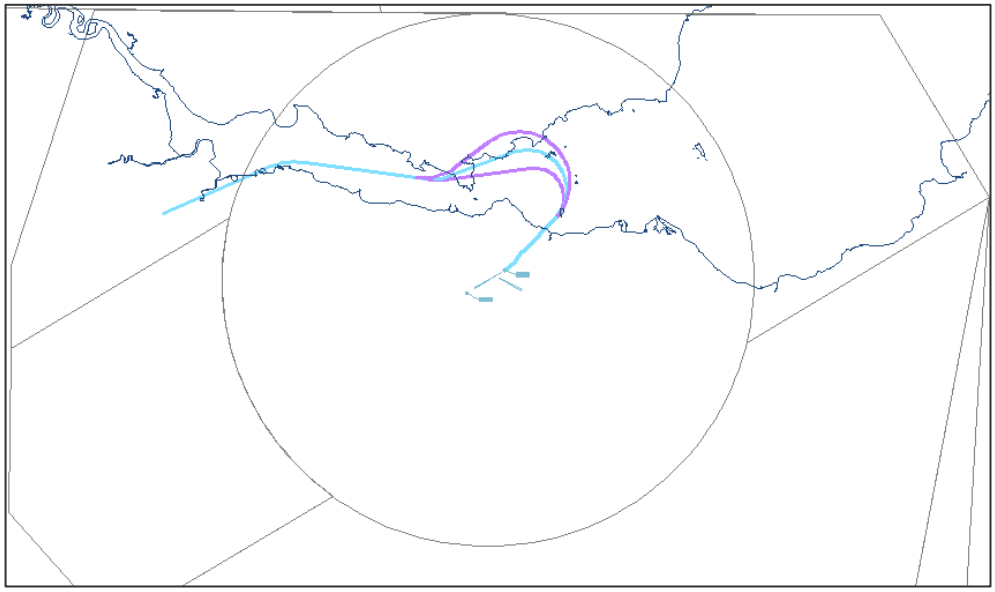
7.19 EMJEE 1V



7.19.1 Sessions 10-11

Description:	Replacement for GOSAM 1D SID (Jet Only)	
Purpose:	Split southbound and westbound jets from eastbound jets and eastbound, southbound, and westbound non-jets using a fly-over waypoint at the DER followed by an 18° offset CF leg	
Aircraft Types:	A320, A330, B733, B738, B788, E170, E190	
	Scenario 7	**Scenario 8**
Wind Direction:	150°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions?	Average conditions
A320 Run ID:	EV-A320-S7	EV-A320-S8
B738 Run ID:	EV-B738-S7	EV-B738-S8
Notes:	• Assume climb clearance to FL300	

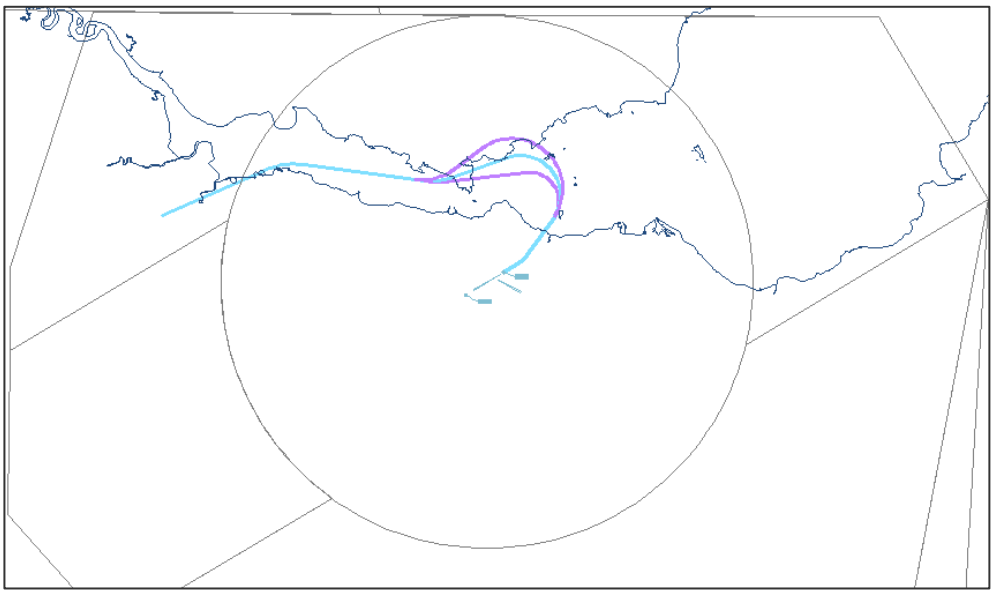
7.20 EMJEE 1W



7.20.1 Sessions 10-11

Description:	Replacement for GOSAM 1D SID (Jet Only)	
Purpose:	Split southbound and westbound jets from eastbound jets and eastbound, southbound, and westbound non-jets using a fly-over waypoint at the DER followed by a 15° offset CF leg	
Aircraft Types:	A320, A330, B733, B738, B788, E170, E190	
	Scenario 7	**Scenario 8**
Wind Direction:	150°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions?	Average conditions
A320 Run ID:	EW-A320-S7	EW-A320-S8
B738 Run ID:	EW-B738-S7	EW-B738-S8
Notes:	• Assume climb clearance to FL300	

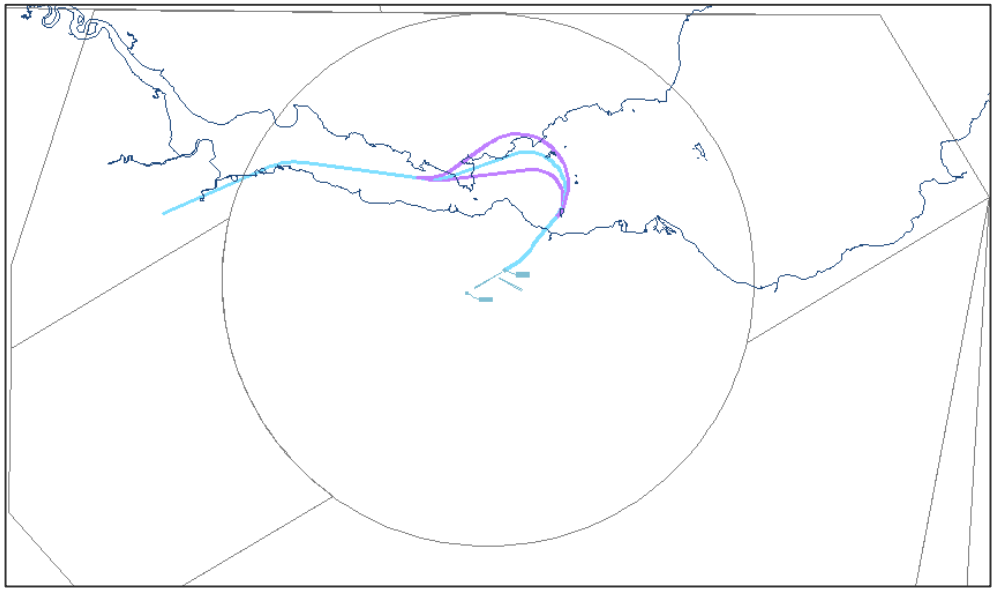
7.21 EMJEE 1X



7.21.1 Sessions 10-11

Description:	Replacement for GOSAM 1D SID (Jet Only)	
Purpose:	Split southbound and westbound jets from eastbound jets and eastbound, southbound, and westbound non-jets using a fly-over waypoint 0.5NM after the DER followed by a DF leg	
Aircraft Types:	A320, A330, B733, B738, B788, E170, E190	
	Scenario 7	**Scenario 8**
Wind Direction:	150°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions?	Average conditions
A320 Run ID:	EX-A320-S7	EX-A320-S8
B738 Run ID:	EX-B738-S7	EX-B738-S8
Notes:	• Assume climb clearance to FL300	

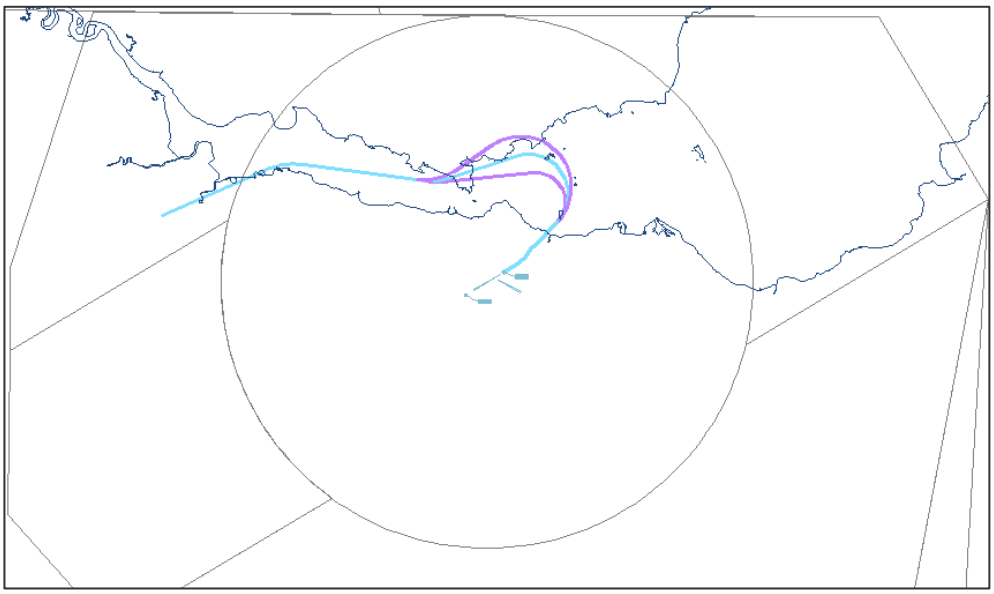
7.22 EMJEE 1Y



7.22.1 Sessions 10-11

Description:	Replacement for GOSAM 1D SID (Jet Only)	
Purpose:	Split southbound and westbound jets from eastbound jets and eastbound, southbound, and westbound non-jets using a fly-over waypoint 0.5NM after the DER followed by an 18° offset CF leg	
Aircraft Types:	A320, A330, B733, B738, B788, E170, E190	
	Scenario 7	**Scenario 8**
Wind Direction:	150°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions?	Average conditions
A320 Run ID:	EY-A320-S7	EY-A320-S8
B738 Run ID:	EY-B738-S7	EY-B738-S8
Notes:	• Assume climb clearance to FL300	

7.23 EMJEE 1Z



7.23.1 Sessions 10-11

Description:	Replacement for GOSAM 1D SID (Jet Only)	
Purpose:	Split southbound and westbound jets from eastbound jets and eastbound, southbound, and westbound non-jets using a fly-over waypoint 0.5NM after the DER followed by a 15° offset CF leg	
Aircraft Types:	A320, A330, B733, B738, B788, E170, E190	
	Scenario 7	**Scenario 8**
Wind Direction:	150°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions?	Average conditions
A320 Run ID:	EZ-A320-S7	EZ-A320-S8
B738 Run ID:	EZ-B738-S7	EZ-B738-S8
Notes:	• Assume climb clearance to FL300	

7.24 KRAGY 1U

7.24.1 Sessions 10-11

Description:	Replacement for TALLA 6D SID (Non-Jet Only)	
Purpose:	For departure from runway 06 to the south via TALLA, non-jets from 0600-2259 all aircraft types 2300-0559, using a fly-over waypoint at the DER followed by a DF leg	
Aircraft Types:	AT76, D328, DH8D	
	Scenario 7	**Scenario 8**
Wind Direction:	330°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions	Average conditions
A320 Run ID:	KU-A320-S7	KU-A320-S8
B738 Run ID:	KU-B738-S7	KU-B738-S8
Notes:	• Assume climb clearance to FL240	

7.25 KRAGY 1V

7.25.1 Sessions 10-11

Description:	Replacement for TALLA 6D SID (Non-Jet Only)	
Purpose:	For departure from runway 06 to the south via TALLA, non-jets from 0600-2259 all aircraft types 2300-0559, using a fly-over waypoint at the DER followed by an 18° offset CF leg	
Aircraft Types:	AT76, D328, DH8D	
	Scenario 7	**Scenario 8**
Wind Direction:	330°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions	Average conditions
A320 Run ID:	KV-A320-S7	KV-A320-S8
B738 Run ID:	KV-B738-S7	KV-B738-S8
Notes:	• Assume climb clearance to FL240	

7.26 KRAGY 1W

7.26.1 Sessions 10-11

Description:	Replacement for TALLA 6D SID (Non-Jet Only)	
Purpose:	For departure from runway 06 to the south via TALLA, non-jets from 0600-2259 all aircraft types 2300-0559, using a fly-over waypoint at the DER followed by a 15° offset CF leg	
Aircraft Types:	AT76, D328, DH8D	
	Scenario 7	**Scenario 8**
Wind Direction:	330°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions	Average conditions
A320 Run ID:	KW-A320-S7	KW-A320-S8
B738 Run ID:	KW-B738-S7	KW-B738-S8
Notes:	• Assume climb clearance to FL240	

7.27 KRAGY 1X

7.27.1 Sessions 10-11

Description:	Replacement for TALLA 6D SID (Non-Jet Only)	
Purpose:	For departure from runway 06 to the south via TALLA, non-jets from 0600-2259 all aircraft types 2300-0559, using a fly-over waypoint 0.5NM after the DER followed by a DF leg	
Aircraft Types:	AT76, D328, DH8D	
	Scenario 7	**Scenario 8**
Wind Direction:	330°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions	Average conditions
A320 Run ID:	KX-A320-S7	KX-A320-S8
B738 Run ID:	KX-B738-S7	KX-B738-S8
Notes:	• Assume climb clearance to FL240	

7.28 KRAGY 1Y

7.28.1 Sessions 10-11

Description:	Replacement for TALLA 6D SID (Non-Jet Only)	
Purpose:	For departure from runway 06 to the south via TALLA, non-jets from 0600-2259 all aircraft types 2300-0559, using a fly-over waypoint 0.5NM after the DER followed by an 18° offset CF leg	
Aircraft Types:	AT76, D328, DH8D	
	Scenario 7	**Scenario 8**
Wind Direction:	330°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions	Average conditions
A320 Run ID:	KY-A320-S7	KY-A320-S8
B738 Run ID:	KY-B738-S7	KY-B738-S8
Notes:	• Assume climb clearance to FL240	

7.29 KRAGY 1Z

7.29.1 Sessions 10-11

Description:	Replacement for TALLA 6D SID (Non-Jet Only)	
Purpose:	For departure from runway 06 to the south via TALLA, non-jets from 0600-2259 all aircraft types 2300-0559, using a fly-over waypoint 0.5NM after the DER followed by a 15° offset CF leg	
Aircraft Types:	AT76, D328, DH8D	
	Scenario 7	**Scenario 8**
Wind Direction:	330°	Still
Wind Speed:	30kts	Still
Surface Temp:	25°C	15°C
Pressure:	980hPa	1013.2hPa
Aircraft Weight:	MTOW	Average
Objective:	Can level restrictions be met in worst case climb conditions	Average conditions
A320 Run ID:	KZ-A320-S7	KZ-A320-S8
B738 Run ID:	KZ-B738-S7	KZ-B738-S8
Notes:	• Assume climb clearance to FL240	

8 Simulator Runs

The following table lists the Run IDs for each aircraft type for reference.

8.1 Sessions 1-8

Procedure	Scenario	A320	B738	DH8D	B763
Route A	Scenario 1			A-DH8D-S1	
	Scenario 2			A-DH8D-S2	
	Scenario 3			A-DH8D-S3	
Route B1	Scenario 1	B1-A320-S1	B1-B738-S1		B1-B763-S1
	Scenario 2	B1-A320-S2	B1-B738-S2		B1-B763-S2
Route B2	Scenario 1	B2-A320-S1	B2-B738-S1		B2-B763-S1
	Scenario 2	B2-A320-S2	B2-B738-S2		B2-B763-S2
	Scenario 3	B2-A320-S3	B2-B738-S3		B2-B763-S3
Route C	Scenario 1			C-DH8D-S1	
	Scenario 2	C-A320-S2	C-B738-S2	C-DH8D-S2	C-B763-S2
	Scenario 3			C-DH8D-S3	
Route D Option 1	Scenario 1	D1-A320-S1	D1-B738-S1		D1-B763-S1
	Scenario 2	D1-A320-S2	D1-B738-S2		D1-B763-S2
	Scenario 3	D1-A320-S3	D1-B738-S3		D1-B763-S3
Route D Option 2	Scenario 1	D2-A320-S1	D2-B738-S1		D2-B763-S1
	Scenario 2	D2-A320-S2	D2-B738-S2		D2-B763-S2
	Scenario 3	D2-A320-S3	D2-B738-S3		D2-B763-S3
Route E Option 1	Scenario 1	E1-A320-S1	E1-B738-S1		E1-B763-S1
	Scenario 2	E1-A320-S2	E1-B738-S2		E1-B763-S2
	Scenario 3	E1-A320-S3	E1-B738-S3		E1-B763-S3
Route E Option 2	Scenario 1	E2-A320-S1	E2-B738-S1		E2-B763-S1
	Scenario 2	E2-A320-S2	E2-B738-S2		E2-B763-S2
	Scenario 3	E2-A320-S3	E2-B738-S3		E2-B763-S3
Route F Option 1	Scenario 1			F1-DH8D-S1	
	Scenario 2	F1-A320-S2	F1-B738-S2	F1-DH8D-S2	F1-B763-S2
	Scenario 3			F1-DH8D-S3	
Route F Option 2	Scenario 1			F2-DH8D-S1	
	Scenario 2	F2-A320-S2	F2-B738-S2	F2-DH8D-S2	F2-B763-S2
	Scenario 3			F2-DH8D-S3	
Route G	Scenario 1	G-A320-S1	G-B738-S1		G-B763-S1
	Scenario 2	G-A320-S2	G-B738-S2		G-B763-S2
	Scenario 3	G-A320-S3	G-B738-S3		G-B763-S3
Route H1	Scenario 1			H1-DH8D-S1	
	Scenario 2			H1-DH8D-S2	
	Scenario 3			H1-DH8D-S3	
Route H2	Scenario 1	H2-A320-S1	H2-B738-S1		H2-B763-S1
	Scenario 2	H2-A320-S2	H2-B738-S2		H2-B763-S2
	Scenario 3	H2-A320-S3	H2-B738-S3		H2-B763-S3

Procedure	Scenario	A320	B738	DH8D	B763
Route E Option 3	Scenario 1	E3-A320-S1	E3-B738-S1	E3-DH8D-S1	E3-B763-S1
	Scenario 2	E3-A320-S2	E3-B738-S2	E3-DH8D-S2	E3-B763-S2
	Scenario 3	E3-A320-S3	E3-B738-S3	E3-DH8D-S3	E3-B763-S3
FAULD 1A and ILS or RNAV(GNSS) Runway 06	Scenario 1	06-A320-S1	06-B738-S1	06-DH8D-S1	06-B763-S1
	Scenario 2	06-A320-S2	06-B738-S2	06-DH8D-S2	06-B763-S2
	Scenario 3	06-A320-S3	06-B738-S3	06-DH8D-S3	06-B763-S3
FIRTH 1A and ILS or RNAV(GNSS) Runway 24	Scenario 1	24-A320-S1	24-B738-S1	24-DH8D-S1	24-B763-S1
	Scenario 2	24-A320-S2	24-B738-S2	24-DH8D-S2	24-B763-S2
	Scenario 3	24-A320-S3	24-B738-S3	24-DH8D-S3	24-B763-S3
Total Runs Required		**35**	**35**	**24**	**35**

8.2 Session 9

Procedure	Scenario	A320
Route A2	Scenario 4	A2-A320-S4
	Scenario 5	A2-A320-S5
Route E Option 2	Scenario 4	E2-A320-S4
	Scenario 5	E2-A320-S5
Route F Option 2	Scenario 4	F2-A320-S4
Route G	Scenario 4	G-A320-S4
	Scenario 5	G-A320-S5
Route H1	Scenario 4	H1-A320-S4
	Scenario 5	H1-A320-S5
FAULD 1A and ILS or RNAV(GNSS) Runway 06	Scenario 4	06-A320-S4
	Scenario 5	06-A320-S5
	Scenario 6	06-A320-S6
FIRTH 1A and ILS or RNAV(GNSS) Runway 24	Scenario 4	24-A320-S4
	Scenario 5	24-A320-S5
	Scenario 6	24-A320-S6
Total Runs Required		**15**

8.3 Sessions 10-11

Procedure	Scenario	A320	B738
EMJEE 1U	Scenario 7	EU-A320-S7	EU-B738-S7
	Scenario 8	EU-A320-S8	EU-B738-S8
EMJEE 1V	Scenario 7	EV-A320-S7	EV-B738-S7
	Scenario 8	EV-A320-S8	EV-B738-S8
EMJEE 1W	Scenario 7	EW-A320-S7	EW-B738-S7
	Scenario 8	EW-A320-S8	EW-B738-S8
EMJEE 1X	Scenario 7	EX-A320-S7	EX-B738-S7
	Scenario 8	EX-A320-S8	EX-B738-S8
EMJEE 1Y	Scenario 7	EY-A320-S7	EY-B738-S7
	Scenario 8	EY-A320-S8	EY-B738-S8

Procedure	Scenario	A320	B738
EMJEE 1Z	Scenario 7	EZ-A320-S7	EZ-B738-S7
	Scenario 8	EZ-A320-S8	EZ-B738-S8
KRAGY 1U	Scenario 7	KU-A320-S7	KU-B738-S7
	Scenario 8	KU-A320-S8	KU-B738-S8
KRAGY 1V	Scenario 7	KV-A320-S7	KV-B738-S7
	Scenario 8	KV-A320-S8	KV-B738-S8
KRAGY 1W	Scenario 7	KW-A320-S7	KW-B738-S7
	Scenario 8	KW-A320-S8	KW-B738-S8
KRAGY 1X	Scenario 7	KX-A320-S7	KX-B738-S7
	Scenario 8	KX-A320-S8	KX-B738-S8
KRAGY 1Y	Scenario 7	KY-A320-S7	KY-B738-S7
	Scenario 8	KY-A320-S8	KY-B738-S8
KRAGY 1Z	Scenario 7	KZ-A320-S7	KZ-B738-S7
	Scenario 8	KZ-A320-S8	KZ-B738-S8
EDIBO 1A and ILS Runway 24	Scenario 7	24-A320-S7	24-B738-S7
EDIBO 1B and ILS Runway 06	Scenario 7	06-A320-S7	06-B738-S7
Total Runs Required		**26 ***	**26 ***

** For sessions 10-11 the specific runs to be conducted will be based on the success or failure of previous runs. It is expected that the actual number of runs required at each session will be no more than 14.*

9 Simulator Requirements

- Prior to each simulator session the validation pilot must complete Appendix C: Navigation Database Validation Report from the CAA Policy Statement on the Validation of Instrument Flight Procedures
- For each simulator run the validation pilot must complete the appropriate pages of Appendix B: Simulator / Flight Validation Report from the CAA Policy Statement on the Validation of Instrument Flight Procedures
- A data file providing (at a minimum) latitude, longitude, and barometric altitude on a rolling basis (ideally 1 or 4 second intervals) must be provided for all simulator runs. This can be in the form of a single file for the entire simulator session or as discrete files for each simulator run. Other parameters that should be included in the data file if possible include:
    - Aircraft Heading
    - Aircraft Track
    - Angle of Bank
    - QNH
    - IAS
    - TAS
    - GS
    - Wind
    - OAT
- Following each simulator session the validation pilot must provide a general summary of any issues observed based on the Simulator / Flight Validation Report.