24 August 2015

Policy Statement

POLICY FOR 'POINT MERGE' AND 'TROMBONE' TRANSITION PROCEDURES

1 Introduction

1.1 The Point Merge transition procedure is an Area Navigation procedure that facilitates controllers to sequence inbound aircraft onto the final approach. The technique for sequencing inbound aircraft does not involve traditional radar vectoring, rather aircraft fly along published sequencing legs and when it is considered that there is adequate spacing, the controller will instruct the pilot to route direct to the 'Merge Point', see Figure 1.

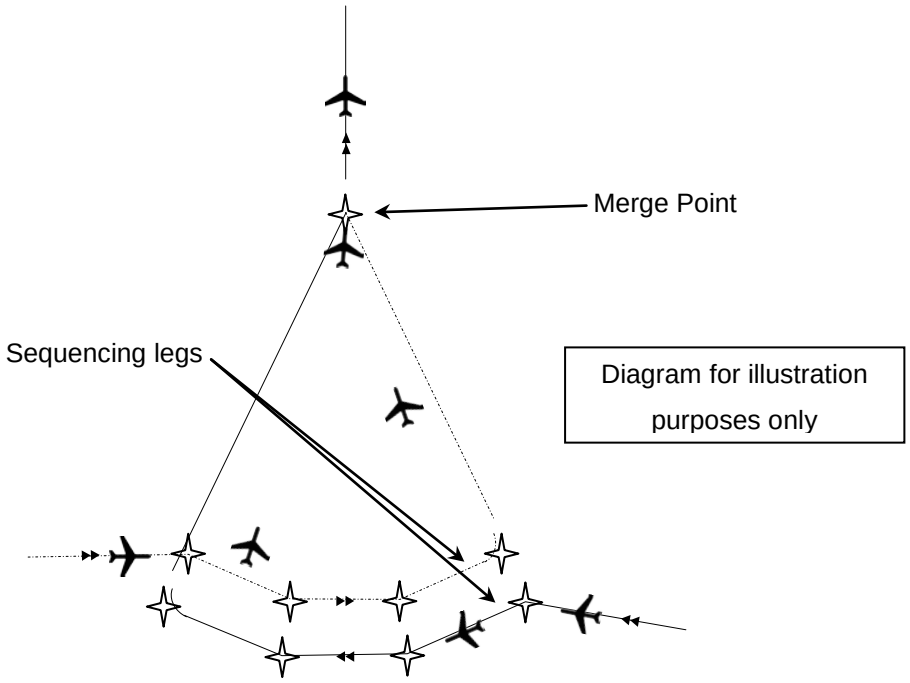

Figure 1 - Point Merge Procedure

1.2 The rationale behind the introduction of Point Merge procedure is to systemise the manner in which aircraft are sequenced onto final approach. ATC speed instructions are issued in the traditional manner to ensure spacing between aircraft on final approach does not reduce below the minimum of surveillance separation minima or wake turbulence separation minima. ATC level instructions are also issued in the traditional manner for separation purposes as well as to complement continuous descent approaches.

1.3 The purpose of this policy statement is to confirm the interpretation of existing procedures in how they should be applied to the United Kingdom's implementation of 'Point Merge' and 'Trombone' procedures and addresses:

a) Phraseology

b) RNAV equipment requirements,

c) Holding,

d) Radio Communication Failure (RCF),

e) Runway change,

f) Fuel planning requirements, and

g) RNAV Linear holding design criteria and requirements.

2 Phraseology

2.1 Phraseology associated with Point Merge Transition Procedures and Trombone Procedures is at Annex A.

3 RNAV Equipment Requirements

3.1 The current UK implementation of Point Merge transition procedures requires aircraft to be equipped with serviceable RNAV1 equipment and for aircraft operator procedures to be approved by the State of Registry for RNAV1 Operations. Due to the various types of operation, there are three different sets of regulations that can apply; these are:

a) EASA Air Operator Certificate (AOC) holders require appropriate Performance Based Navigation (PBN) approval in accordance with Part-SPA, Sub-Part B.

b) Flights conducted by other UK-registered RNAV1-equipped aircraft must comply with Article 124 of the Air Navigation Order 2009 and follow procedures approved under General Approval ORS4 1082 dated 30 January 2015.

c) Aircraft registered elsewhere than in the United Kingdom and not operating under an EASA AOC must comply with Article 125 of the Air Navigation Order 2009, which requires aircraft to be approved by their State of Registry.

3.2 Given the various sets of regulations that apply to PBN, UK Aeronautical Information Publication (AIP) GEN 1.5 entitled "Aircraft Instruments, Equipment and Flight Documents" warrants amendment to ensure that aircraft operators are aware of the United Kingdom's requirements for flying RNAV1 procedures:

"To fly this procedure, aircraft operators are required to comply with:

Sub-Part B of Part-SPA, or

Article 124 of the UK Air Navigation Order (ANO) 2009 and ORS4 1082, or

Article 125 of the UK Air Navigation Order (ANO) 2009 as applicable."

4 Holding

4.1 The innovation of Point Merge has also enabled the associated sequencing legs to accommodate an amount of airborne holding, which has lead to the introduction of the expression 'Linear Holding'. The maximum amount of airborne holding that can be accommodated in the Point Merge procedure is specific to its design and is based on Air Navigation Service Provider (ANSP) operational requirements. However, linear holding cannot accommodate situations that necessitate the use of the phraseology "delay not determined" such as those described in the Manual of Air Traffic Services Part 1, Section 1, Chapter 4, Paragraph 13 entitled "Expected Approach Time (EAT)". For this reason, traditional racetrack holds at the end of the Standard Terminal Arrival Route (STAR) will still be required and, in the interests of clarity, the Point Merge transition procedure must be published separately on an Instrument Approach Procedure (IAP) describing the transition. Figure 2 depicts how the Point Merge transitions and STARs connect.

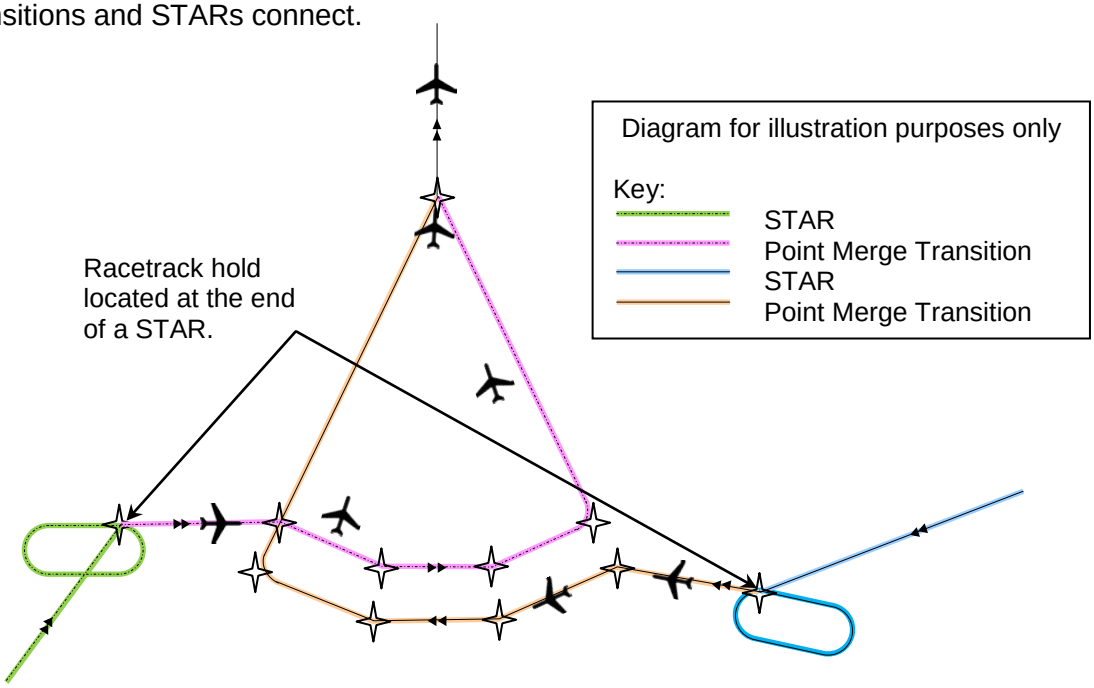

Figure 2 - Point Merge procedure with racetrack holds.

5 Radio Communication Failure

5.1 The introduction of Point Merge does not require change to the Radio Communication Failure (RCF) procedures published in the UK AIP ENR 1.1-13, Paragraph 3.4.2 and CAP 493 Manual of Air Traffic Services Part 1 (MATS Pt 1), Section 5, Chapter 4. However, ANSPs must ensure that the construction of Point Merge procedures comply with current UK basic RCF procedures in Instrument Meteorological Conditions (IMC).

5.2 In particular, as STARs terminate at a holding fix, the issue of an Expected Approach Time (EAT) notifies the pilot to enter that hold, and in the event of a RCF (and following the expiry of the EAT), pilots are required to follow the published procedure. ANSPs must ensure that the RCF procedure associated with the Point Merge transition procedure complements the fuel planning policy described in section 7.

5.3 In the event of an RCF pilots shall:

a) Select squawk code mode A7600.

b) Aircraft prior to entry into the sequencing leg:

i) Fly to the initial point on the sequencing leg at the last assigned level.

ii) Fly to the merge point via the shortest published route.

iii) Comply with the vertical profile of the published procedure.

c) Aircraft on Sequencing Leg:

i) Aircraft shall be flown at the last assigned level to the end of sequencing leg before turning to the merge point unless an earlier turning point is specified in a published procedure.

ii) Comply with the vertical profile of the published procedure.

d) Aircraft turned off the Sequence Leg:

i) Fly direct to the merge point.

ii) Comply with the vertical profile of the published procedure.

e) In the event of any subsequent emergency, pilots shall select squawk code mode A7700 and fly the most appropriate routing.

5.4 If an ANSP is unable to mitigate risks associated with the generic RCF procedure described above, the ANSP may publish RCF procedures specific to the Point Merge procedure.

6 Runway Change

6.1 MATS Pt 1 Section 2, Chapter 1, paragraphs 23 and 24 outline the procedure that controllers are required to follow when determining the choice of ‘Landing Direction and Runway-in-use’ and when undertaking a ‘Runway change’. The introduction of Point Merge does not generate additional national requirements to these procedures, but ANSPs must complete a safety assessment to determine the impact of introducing Point Merge on any locally determined runway change safety requirements.

7 Fuel Planning Requirements and Considerations

7.1 Global Standards for fuel planning requirements applicable to international commercial air transport flights are set out in ICAO Annex 6 Volume I paragraph 4.3.6 ‘Fuel Requirements’. These Standards are enacted in national law by each ICAO Member State or, in the case of EASA Member States, through the Air Operations Regulation, its Annexes (e.g. Annex IV Part-CAT CAT.OP.MPA.150 ‘Fuel policy’ and CAT.OP.MPA.151 ‘Fuel policy - alleviations’ and CAT.OP.MPA.280 ‘In-flight fuel management - aeroplanes’), plus supporting Acceptable Means of Compliance and Guidance Material.

7.2 ICAO Annex 6 Volume I paragraph 4.3.6.2 states that the amount of usable fuel to be carried shall, as a minimum, be based on:

a) the following data:

i) current aeroplane-specific data derived from a fuel consumption monitoring system, if available; or

ii) if current aeroplane-specific data are not available, data provided by the aeroplane manufacturer; and

(b) the operating conditions for the planned flight including:

i) anticipated aircraft mass;

ii) Notices to Airmen;

iii) current meteorological reports or a combination of current reports or forecasts;

iv) air traffic services procedures, restrictions and expected delays; and

v) the effects of deferred maintenance items and/or configuration deviations.

7.3 Fuel planning requirements applicable to international general aviation (e.g. business jets) are set out in ICAO Annex 6 Operation of Aircraft Part II ('International General Aviation - Aeroplanes') paragraph 2.2.3.6 'Fuel and oil supply'. These Standards are also enacted in national law by each ICAO Member State or, in the case of EASA Member States-registered business jets from 25 August 2016, through the Air Operations Regulation and its Annexes (e.g. Annex VI Part-NCC NCC.OP.130 Fuel and oil supply — aeroplanes), plus associated Acceptable Means of Compliance and Guidance Material.

7.4 Aircraft are therefore to be operated in accordance with their respective national fuel management policies and legal requirements, as overseen by their National Aviation Authority. Operators using a linear holding procedure must therefore plan their fuel in accordance with procedures agreed with, and acceptable to, their National Aviation Authority.

7.5 ICAO fuel planning guidance in Doc 9976 (Flight Planning and Fuel Management Manual) assists National Aviation Authorities when explicitly addressing Point Merge and allowing operators to account for the linear hold as part of contingency/extra fuel, rather than as part of trip fuel. Further details can be found at ICAO Doc 9976 Flight Planning and Fuel Management Manual (2015 Edition). It is anticipated that elements of the revised Manual will be incorporated into the Air Operations Regulation in due course.

7.6 ATS providers, in conjunction with airport operators, should consider publishing guidance to aircraft operators regarding any additional fuel carriage requirements to address expected delay for any period. Such guidance will be based upon operational experience and may, at the discretion of the ATS provider and/or the airport operator, be subject to variation, e.g. to reflect peak traffic periods or to match changes in aircraft operator schedules. This may be promulgated by NOTAM or in the UK AIP, with an expected delay expressed as follows:

a) The amount of delay, expressed in minutes, that can be expected upon reaching the holding fix (this is the preferred method); or

b) The distance, expressed in nautical miles that an aircraft can expect to fly in addition to the shortest route available within the Point Merge procedure.

7.7 It is recognised that data will not be available in the initial stages of a new point merge operation, and aircraft operators will initially need to apply conservative fuel calculations.

7.8 Key terms associated with fuel management are at Annex B.

8 Short and Long Routeing Options

8.1 The short transition routeing is for fuel planning purposes only (see paragraph 7.5 above); pilots can expect to be cleared by ATC on to the long transition routeing.

8.2 ANSPs should be aware of the inconsistency between offering aircraft operators the ability to fuel plan the shortest available route within the Point Merge transition procedure but expecting pilots to be able to fly the entirety of the longest available route when required. The shortest route tracks within the Point Merge transition procedure are highlighted in blue and green in Figure 3.

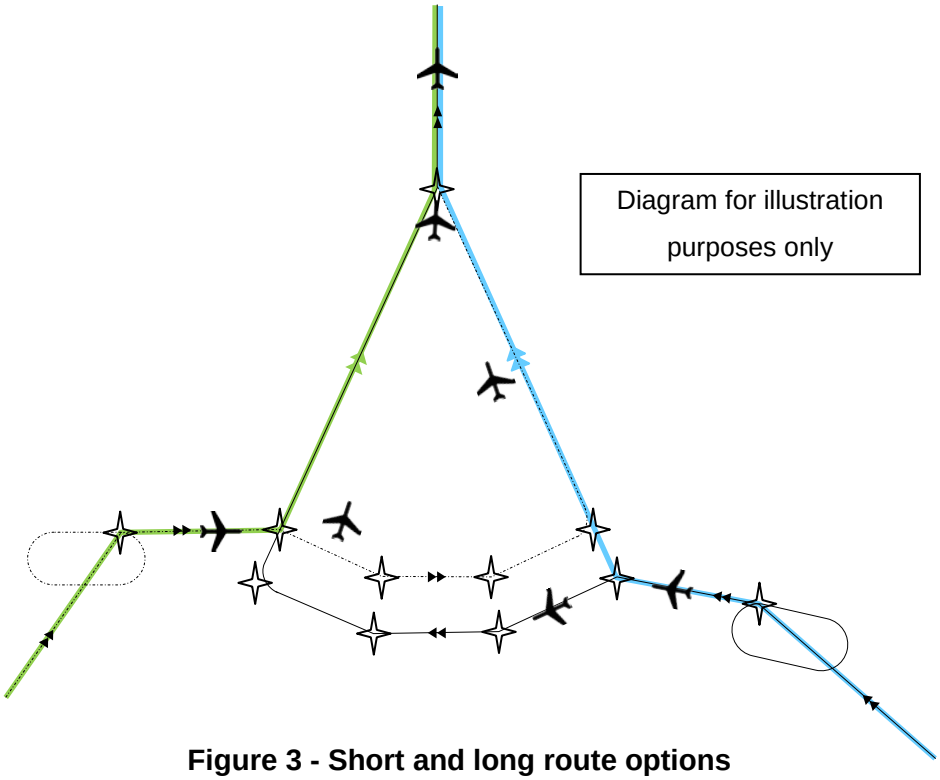

Figure 3 - Short and long route options

8.3 ANSPs are to ensure that the published Point Merge transition procedure states the minimum and maximum distances from the Initial Approach Fix (IAF) at the end of the STAR to touchdown for each Point Merge transition in order to facilitate suitable fuel planning calculations to be made.

9 Trombone Procedure

9.1 The trombone procedure shares a number of similar characteristics to those used within the Point Merge transition procedure.

9.2 Whilst this document has focused on highlighting the issues and considerations associated with Point Merge, the same issues and considerations are equally applicable to the trombone procedure.

10 RNAV Linear Holding Design Criteria and Associated Requirements

10.1 The RNAV design principles and criteria in ICAO Doc 8168 PANS-OPS Part III, Section 3, Chapter 2 shall be adhered to in the first instance. It is expected that the navigation

specification will be RNAV5 or RNAV1 depending on the application or airspace that the procedures are intended for.

10.2 Procedure designers shall ensure that the standard obstacle clearance of 300 m (984 ft) can be achieved at any point between the shortest and longest route on the arc to the Point Merge waypoint. This is to ensure that the any shortcut from the arc to the Point Merge waypoint is obstacle protected.

10.3 Where PANS-OPS criteria compliance cannot be implemented, then the IFP section of CAA SARG Airspace Regulation must be contacted to discuss the possible options available and/or clarification, on a case-by-case basis, as outlined in CAP 785 Section 3 Chapter 1.

10.4 The initial point on the sequencing leg should be identified by a 5-letter name code.

11 Enquiries

11.1 Enquiries concerning this policy statement should be addressed to the CAA at: ats.enquiries@caa.co.uk.

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Annex A

ASSOCIATED PHRASEOLOGY

A1 CLEARANCE ON A STAR

A1.1 Clearances to aircraft on a STAR with published and remaining level and/or speed restrictions shall indicate if such restrictions are to be followed or are cancelled.

A1.2 The following phraseology shall be used with the following meaning:

Descend via star to (level)

- descend to the cleared level and comply with published level restrictions;
- follow the lateral profile of the STAR;
- comply with published speed restrictions or ATC issued speed control instructions as applicable.

Descend via star to (level) cancel level restrictions

- descend to the cleared level, published level restrictions are cancelled;
- follow the lateral profile of the STAR;
- comply with published speed restrictions or ATC issued speed control instructions as applicable.

Descend via star to (level) cancel level restriction(s) at (point(s))

- descend to the cleared level, published level restriction(s) at the specified point(s) are cancelled;
- follow the lateral profile of the STAR;
- comply with published speed restrictions or ATC issued speed control instructions as applicable.

Descend via star to (level) cancel speed restrictions

- descend to the cleared level and comply with published level restrictions;
- follow the lateral profile of the STAR;
- published speed restrictions and ATC issued speed control instructions are cancelled.

Descend via star to (level) cancel speed restriction at (point(s))

- descend to the cleared level and comply with published level restrictions;
- follow the lateral profile of the STAR;
- published speed restrictions are cancelled at the specified point(s).

Descend unrestricted to (level) (or) descend to (level) cancel level and speed restrictions

- descend to the cleared level, published level restrictions are cancelled;
- follow the lateral profile of the STAR;
- published speed restrictions and ATC issued speed control are cancelled.

Note 1: The phrase '*Descend via star to (level)'* is not required when there is no change to the previously cleared level.

Note 2: If there are no published or remaining STAR level and/or speed restrictions, the phrase '*DESCEND TO (level)*' may be used.

Note 3: Cancellation of STAR speed restrictions does not relieve the pilot of compliance with speed limitations associated with airspace classifications as specified in ICAO Annex 11 Appendix 4, and/or speed limitations necessary to ensure containment with an RNAV departure or arrival procedure (e.g. maximum speed associated with a radius to fix (RF) leg.

Note 4: ATC instructions that provide a direct route to a published waypoint on the STAR cancel only those speed and level restrictions associated with the bypassed waypoints; all remaining published speed and level restrictions remain applicable.

A1.3 Vectors or instructions to route to a point that is not on the STAR will cancel published STAR speed and level restrictions, and controllers should:

- reiterate the cleared level;
- provide speed and level restrictions as necessary;
- notify the pilot if ATC expects the aircraft to subsequently rejoin the STAR.

A1.4 ATC instructions to an aircraft to rejoin a STAR shall include:

- the designator of the STAR to be rejoined, unless advance notification of rejoin has been provided;
- the cleared level on rejoining the STAR

A2 POINT MERGE/TROMBONE ARRIVAL WITHOUT VERTICAL COMPONENT

A2.1 Where a Point Merge/Trombone arrival has no vertical component, (therefore a 2 dimensional trajectory) the following phraseology shall be applied:

- **To clear aircraft onto the transitions**:

(Callsign) Cleared (Name)……..Transition Runway (Runway in use)

- **Aircraft routes can be shortened at any time using the following:**

(Callsign) Route Direct (waponit)

Note: The aircraft must first be cleared onto the appropriate transition prior to any shortcut routing given

- **To turn aircraft off sequencing legs to the merge point:**

(Callsign) turn (left/right) direct (Merge Point Name)

- **Aircraft requiring a heading for tactical reasons should be advised to expect to resume the transition when issuing the heading:**

(Callsign) fly heading XXX, expect to resume the Runway....transition

- **To resume the transition:**

(Callsign) resume own navigation (left/right) turn direct (waponit) on the (Runway in use) transition

- **Descent on the sequencing legs:**

(Callsign) Descend FL80 opposite direction traffic 1000 ft below (if appropriate)

Note: 'Cleared level may be the reiteration of the current cleared level. A STAR designator alone does not authorise the a/c to descend on the STAR vertical profile.'

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Annex B

GLOSSARY OF TERMS AND ACRONYMS

TERM OR ACRONYM	**MEANING**	**SOURCE (ICAO, EU, UK)**
additional fuel	The supplementary amount of fuel required if the minimum fuel calculated in accordance with ICAO Annex 6 Part I para 4.3.6.3 (b), (c), (d) and (e) is not sufficient to**:** 1) allow the aeroplane to descend as necessary and proceed to an alternate aerodrome in the event of engine failure or loss of pressurization, whichever requires the greater amount of fuel based on the assumption that such a failure occurs at the most critical point along the route; i) fly for 15 minutes at holding speed at 450 m (1,500 ft) above aerodrome elevation in standard conditions; and ii) make an approach and landing; 2) allow an aeroplane engaged in EDTO to comply with the EDTO critical fuel scenario as established by the State of the Operator; 3) meet additional requirements not covered above; *Note 1 - Fuel planning for a failure that occurs at the most critical point along a route (4.3.6.3 f) 1) may place the aeroplane in a fuel emergency situation based on 4.3.7.2.* *Note 2 - Guidance on EDTO critical fuel scenarios is contained in ICAO Annex 6 Part I Attachment D;*	ICAO Annex 6 'Operation of Aircraft' Part I ('International Commercial Air Transport - Aeroplanes')
contingency fuel	The amount of fuel required to compensate for unforeseen factors. It shall be five per cent of the planned trip fuel or of the fuel required from the point of in-flight re-planning based on the consumption rate used to plan the trip fuel but, in any case, shall not be lower than the amount required to fly for five minutes at holding speed at 450 m (1,500 ft) above the destination aerodrome in standard conditions; *Note - Unforeseen factors are those which could have an influence on the fuel consumption to the destination aerodrome, such as deviations of an individual aeroplane from the expected fuel consumption data, deviations from forecast meteorological conditions, extended taxi times before take-off, and deviations from planned routings and/or cruising levels.*	ICAO Annex 6 'Operation of Aircraft' Part I ('International Commercial Air Transport — Aeroplanes')
	'Contingency fuel' means the fuel required to compensate for unforeseen factors that could have an influence on the fuel consumption to the destination aerodrome.	Annex I (Definitions) to Commission Regulation (EU)

		No. 965/2012 on air operations
destination alternate fuel	1) where a destination alternate aerodrome is required, the amount of fuel required to enable the aeroplane to: i) perform a missed approach at the destination aerodrome; ii) climb to the expected cruising altitude; iii) fly the expected routing; iv) descend to the point where the expected approach is initiated; and v) conduct the approach and landing at the destination alternate aerodrome; or 2) where two destination alternate aerodromes are required, the amount of fuel, as calculated in ICAO Annex 6 Part I para 4.3.6.3 (d) (1), required to enable the aeroplane to proceed to the destination alternate aerodrome which requires the greater amount of alternate fuel; or 3) where a flight is operated without a destination alternate aerodrome, the amount of fuel required to enable the aeroplane to fly for 15 minutes at holding speed at 450 m (1,500 ft) above destination aerodrome elevation in standard conditions; or 4) where the aerodrome of intended landing is an isolated aerodrome: i) for a reciprocating engine aeroplane, the amount of fuel required to fly for 45 minutes plus 15 per cent of the flight time planned to be spent at cruising level, including final reserve fuel, or two hours, whichever is less; or ii) for a turbine-engined aeroplane, the amount of fuel required to fly for two hours at normal cruise consumption above the destination aerodrome, including final reserve fuel;	ICAO Annex 6 'Operation of Aircraft' Part I ('International Commercial Air Transport - Aeroplanes')
discretionary fuel	The extra amount of fuel to be carried at the discretion of the pilot-in-command.	ICAO Annex 6 'Operation of Aircraft' Part I ('International Commercial Air Transport - Aeroplanes')
EDTO	Extended diversion time operations	ICAO Annex 6 'Operation of Aircraft' Part I ('International Commercial Air Transport - Aeroplanes')
EDTO critical	The fuel quantity necessary to fly to an en-route	ICAO Annex 6

fuel	alternate aerodrome considering, at the most critical point on the route, the most limiting system failure.	'Operation of Aircraft' Part I ('International Commercial Air Transport - Aeroplanes')
extended diversion time operations	Any operation by an aeroplane with two or more turbine engines where the diversion time to an en-route alternate aerodrome is greater than the threshold time established by the State of the Operator.	ICAO Annex 6 'Operation of Aircraft' Part I ('International Commercial Air Transport - Aeroplanes')
final reserve fuel	The amount of fuel calculated using the estimated mass on arrival at the destination alternate aerodrome, or the destination aerodrome when no destination alternate aerodrome is required: 1) for a reciprocating engine aeroplane, the amount of fuel required to fly for 45 minutes, under speed and altitude conditions specified by the State of the Operator; or 2) for a turbine-engined aeroplane, the amount of fuel required to fly for 30 minutes at holding speed at 450 m (1,500 ft) above aerodrome elevation in standard conditions;	ICAO Annex 6 'Operation of Aircraft' Part I ('International Commercial Air Transport - Aeroplanes') EASA Part Cat AMC1CAT.OP.MPA 150(b) Fuel Policy
minimum fuel	The term used to describe a situation in which an aircraft's fuel supply has reached a state where the flight is committed to land at a specific aerodrome and no additional delay can be accepted.' The declaration of 'MINIMUM FUEL' informs ATC that all planned aerodrome options have been reduced to a specific aerodrome of intended landing and any change to the existing clearance may result in landing with less than the planned final reserve fuel. This is not an emergency situation but an indication that an emergency situation is possible should any additional delay occur.	ICAO Annex 6 'Operation of Aircraft' Part I ('International Commercial Air Transport - Aeroplanes')
taxi fuel	The amount of fuel expected to be consumed before take-off.	ICAO Annex 6 'Operation of Aircraft' Part I ('International Commercial Air Transport - Aeroplanes')
trip fuel	The amount of fuel required to enable the aeroplane to fly from take-off, or the point of in-flight re-planning, until landing at the destination aerodrome taking into account the operating conditions of ICAO Annex 6 Part I para 4.3.6.2 (b);	ICAO Annex 6 'Operation of Aircraft' Part I ('International Commercial Air Transport - Aeroplanes')

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