



IATA POSITION ON POINT MERGE

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(Version: 11 April 2014 after FOG 18 by C. Godel, chairman of the FOG)

1.0 INTRODUCTION

Point Merge is an innovative procedure developed by the Eurocontrol's Experimental Centre (EEC) to merge arrival flows of aircraft. Point Merge aims at improving and harmonizing arrival operations with existing technology. Point Merge is primarily developed as a tool to facilitate the work for ATC controllers and is considered as a holding procedure.

When needed for sequencing, approaching aircraft will fly an arc which is a form of linear holding that replaces "race track holding" or "stack holding". ATC will instruct the aircraft to leave the arc towards a Merge Point in order to get the aircraft in right sequence. From that moment in time the aircraft is normally flying a continuous descent operation.

According to Eurocontrol, Point Merge promises a significant increase of trajectory predictability and reduced track dispersion, which would enable more efficient sequencing of the approaching aircraft. (See Appendix A explaining the principle of Point Merge)

2.0 FLIGHT OPERATIONAL ISSUES IDENTIFIED WITH POINT MERGE

ICAO Annex 6 and EASA AIR-OPS (see Appendix B) require that operators should uplift an amount of fuel based on the following planning criteria: taxi fuel, trip fuel, contingency fuel, alternate fuel, final reserve fuel, additional fuel and extra (ICAO : discretionary) fuel.

Aircraft operators plan their fuel carriage against the "Expected Approach", which is defined as the STAR and Approach Procedure for the runway in use. Normally, holding fuel is part of the "contingency fuel".

If the Point Merge STAR is the only STAR which can be filed in the ATC flight plan, the complete Merge Arc becomes part of the trip and the trip fuel is increased accordingly even if very few aircraft fly even a part of it and even if the part of the Merge arc flown should be considered as linear holding.

The following IATA Position was derived from the recent operational experiences with Point Merge, the discussions during the Dublin Workshop and information received from airline representatives in the IATA European Regional Coordination Group and the IATA Flight Operations Group:



3.0 IATA POSITION ON POINT MERGE

3.1 POINT MERGE and FUEL CONSIDERATIONS

- Point Merge is an ATC tool to replace other forms of holding or sequencing; in no way should it result in an obligation to increase the previously sufficient trip fuel.
- The part of the Merge arc flown by the aircraft should be considered as linear holding (similar to the legacy race track holding or to radar vectoring for separation).
- Any Point Merge STAR should be accompanied by the promulgation of a Direct STAR to the Point Merge (see example in appendix C) which represents the shortest flight planable route to final approach. As a consequence the Direct STAR will be filed in the ATC flight Plan.
- ANSPs implementing Point Merge STARs should publish statistics showing the portion of the Merge Point Arc flown by arriving aircraft during the different hourly bands of the day or the week.
- ATC should inform the aircraft as soon as possible and at least at first contact with APP the STAR in use, i.e. Point Merge Arc or Direct.
- The fuel necessary to eventually fly the Merge Arc shall be part of the contingency or discretionary/extra fuel.
- An amendment to the ICAO Flight Planning and Fuel Management Manual (FPFMM) has been proposed describing the approach to fuel carriage for Point Merge.

3.2 GENERAL POINT MERGE ISSUES

- Point Merge implementation shall be based on a collaborative decision making and validated by ANSPs, Airspace Users, Airports and the Regulator.
- Point Merge design needs to be standardized at global ICAO and Regional level, especially concerning procedure design and fuel planning aspects.
- The approach to promulgation and operation of Point Merge as Linear Holding structures should be consistent across regions.
- The ATC procedures implemented to support Point Merge should include publication of regular statistics allowing high levels of predictability regarding the sections of the Linear Hold on the Merge Arc which may be flown. These statistics will allow pilots to determine, according to the expected time of arrival, the discretionary/extra fuel needed for a safe flight.
- Commercial airline operations need accurate Estimated Time of Arrival and comprehensive and accurate fuel predictions.
- Use of a Point Merge STAR with no associated Direct Star generates flawed ETA and FMS fuel prediction (see example of CDG in Appendix C).
- Flying the arc should be considered as inbound delay in ATS Performance framework.
- Point Merge operations should only be implemented in conjunction with AMAN to ensure optimum efficiency.
- The Point Merge design must ensure that ATC have sufficient capacity available to sequence aircraft effectively and maximise runway throughput without recourse to stack holding



- In case of loss of communication the aircraft will comply with applicable regulations and fly the Direct STAR

4.0 AIRLINE EXPERIENCES WITH POINT MERGE (PM)

Merits of Point Merge appear to be dependent on the location and the density of air traffic at a particular airport.

OSLO (OSL)

In April 2011 at OSL the first implementation of PM took place and resulted in a substantial increase in fuel consumption for approaching aircraft.

Other achievements in OSL were related to the separation of arriving and departing traffic; increased capacity and compliance with local noise regulations.

Oslo is typically missing the “sister” Direct Star which is recommended by IATA. Therefore operators have no other choice than to include the complete Merge Arc in their trip fuel calculation even if few aircraft fly the complete arc.

PARIS (CDG)

At Paris ACC (Extended TMA/CDG) two trial periods took place during one week in Jun/Jul 2012 and during several week ends in Nov/Dec 2012. It appeared that the PM trials provided for less R/T; better predictability and a slight cost saving in fuel. It also revealed that in about 85 % of the flights the application of PM during the trials was not necessary and flight were given the associated direct STAR. The CDG Merge Point Stars are now in use and seem to satisfy ATC and operators. See Appendix C.

DUBLIN (DUB)

During Dec 2012 PM was implemented on RWY 28 at DUB.

The Point Merge arcs are promulgated as closed STARS. During the first ten months of operation it has been shown that fuel burn is significantly reduced (19 %) compared with the use of stack holding. The Point Merge structure is based around two STARS. The arc itself is promulgated as a LIMA STAR. An alternative XRAY STAR represents the shortest flight planable route to final approach. On first contact with ATC all inbound traffic is initially cleared onto the LIMA STAR and plans to fly the full Point Merge arc. The majority of flights (approx. 95%) arriving with no airborne delay do not fly the LIMA STAR in practice and are cleared again to transition on the shorter XRAY STAR. For traffic that does fly sections of the LIMA STAR, ATC instructs the pilots to turn off the hold at the nearest point sufficient to absorb arrival delays and sequence the aircraft into an efficient order for landing.

Aircraft operators must plan their fuel carriage against the flight plan they have filed. Operators are commercially incentivised to file the shortest flight planable route to the airfield – in Dublin the XRAY STAR. If aircraft are then cleared on to the Point Merge arc on first contact with ATC the crew may receive an amber fuel warning message because the FMS will calculate the full distance to the end of the LIMA STAR (for which the operator has not fuelled), even though most of the track is a contingency for severe delays and will not likely be flown. Some crews carry fuel for the full LIMA STAR as a matter of course to avoid experiencing regular amber fuel warnings.

The aircraft FMS calculates stack holding as circuits in time rather than a total distance so advanced amber fuel warnings have not been an issue in the past. For example if the additional mileage for a Point Merge arc is 40 nm, the time required to fly it will be around 12 minutes. This is the equivalent to 3 holding patterns. If the aircraft is stack holding, the FMS will give the pilot the time remaining that the aircraft can hold before reserve fuel is eroded. Flight crews will not see an amber fuel



warning until the latest time to exit the stack has been exceeded although the same problem lies latent. It is a matter of perception. The Point Merge pilot will see a potential shortfall of fuel early due to the FMS distance based predictions and amber warning. The Stack Holding pilot will not see the alert until it has become real.

The IAA ANSP and NATS confirmed at the workshop that for the Point Merge operation to work effectively and generate an efficient approach spacing to maximise runway throughput all aircraft must be cleared onto the full arc on first contact with ATC. Most aircraft are then cleared again to turn onto the shortest available transition depending on demand, traffic complexity and runway availability.

This procedure appears not to be in line with the IATA policy on PM and needs further discussion to ensure that a globally agreed and harmonized procedure is accepted and in force.

Operators at the workshop confirmed that they cannot endorse an operation that regularly results in the generation of amber fuel warning messages.

PLANNED LOCATIONS FOR PM IMPLEMENTATION

PM is planned to be implemented at the following TMA/airports

Norway:	Stavanger, Bergen en Trondheim
Italy:	Rome (advanced simulation stage)
Germany:	Munich (advanced simulation stage)
UK:	Luton, London City Airport, Stansted and Gatwick, and with a trombone at LHR
Turkey:	Istanbul

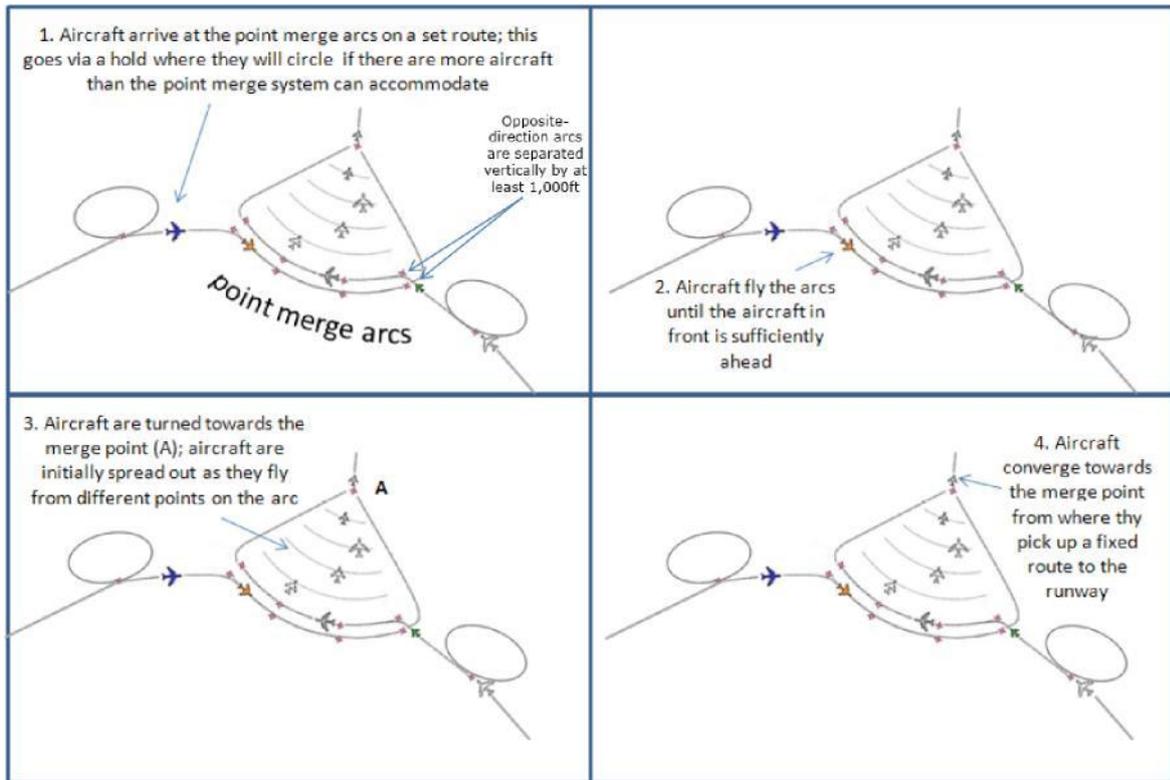


Figure D6: An illustration of Point Merge



EASA AIR-OPS: AMC1 CAT.OP.MPA.150(b) Fuel policy

PLANNING CRITERIA - AEROPLANES

The operator should base the defined fuel policy, including calculation of the amount of fuel to be on board for departure, on the following planning criteria:

(a) Basic procedure

The usable fuel to be on board for departure should be the sum of the following:

- (1) Taxi fuel, ...**
- (2) Trip fuel, which should include:**
 - (i) fuel for take-off and climb from aerodrome elevation to initial cruising level/altitude, taking into account the expected departure routing;
 - (ii) fuel from top of climb to top of descent, including any step climb/descent;
 - (iii) fuel from top of descent to the point where the approach is initiated, taking into account the expected arrival procedure; and
 - (iv) fuel for approach and landing at the destination aerodrome.
- (3) Contingency fuel, except as provided for in (b), which should be the higher of:**
 - (i) Either:
 - a. 5 % of the planned trip fuel or, in the event of in-flight replanning, 5 % of the trip fuel for the remainder of the flight;
 - b. not less than 3 % of the planned trip fuel or, in the event of in-flight replanning, 3 % of the trip fuel for the remainder of the flight, provided that an en-route alternate (ERA) aerodrome is available;
 - c. an amount of fuel sufficient for 20 minutes flying time based upon the planned trip fuel consumption, provided that the operator has established a fuel consumption monitoring programme for individual aeroplanes and uses valid data determined by means of such a programme for fuel calculation; or
 - d. an amount of fuel based on a statistical method that ensures an appropriate statistical coverage of the deviation from the planned to the actual trip fuel. This method is used to monitor the fuel consumption on each city pair/aeroplane combination and the operator uses this data for a statistical analysis to calculate contingency fuel for that city pair/aeroplane combination;
 - (ii) or an amount to fly for 5 minutes at holding speed at 1 500 ft (450 m), above the destination aerodrome in standard conditions.
- (4) Alternate fuel, which should:...**
- (5) Final reserve fuel, which should be:....**
- (6) The minimum additional fuel, which should permit: ...**
- (7) Extra/Discretionary fuel, which should be at the discretion of the commander.**



ETA (Estimated time of arrival) and remaining fuel at landing are depending of the STAR selection:

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Note 1 : To carry one more ton of trip fuel for the arrival means an average of 1,3 T more to load at the departure airport of a long haul flight.

Note 2: ETA is automatically sent to the Destination Station and ground services arrange their operation according to this ETA. On a busy HUB like CDG, 6 minutes makes a big difference.