Subject matter and scope

A continuous climb operation (CCO) (1) is an aircraft operating technique, enabled by airspace design, procedure design and ATC clearances in which departing aircraft climb without interruption, to the greatest possible extent, by employing optimum climb engine thrust at climb speeds until reaching the cruise flight level. The optimum vertical profile takes the form of a continuously climbing path.

Operating at optimum flight levels is a key driver to improving fuel efficiency and minimise carbon emissions as a large proportion of fuel burn occurs during the climb phase.

Many major airports now employ PBN procedures which can enable both CCO and continuous descent operations (CDO) and, in a large number of cases, judicious airspace and procedure design has resulted in significant reductions in environmental impacts. This is particularly the case where the airspace design has supported CCO and CDO.

CCO does not adversely affect safety and capacity and will produce environmental and operational benefits including reductions to fuel burn, gaseous emissions and noise impact.

It is important that monitoring and measuring of CCO execution is defined across ECAC using harmonised definitions to avoid misleading interpretations of performance measurement. It is equally important that CCO execution is measured across ECAC, as far as practicable, using a harmonised methodology and parameters. Whilst reporting can be undertaken at the local level according to local legislation and requirements, when CCO execution is reported on an international basis, this measurement should always be based upon a harmonised method, parameters and metric. The proposed methodology identified by the European TF on CCO/CDO is detailed at http://www.eurocontrol.int/articles/continuous-climb-and-descent-operations.

NOTES:
(1) Since the publication of ICAO Doc 9993, the term Continuous Climb Operation (CCO) has generally replaced the term CCD (Continuous Climb Departure).
(2) In principle, it is not required to implement CCO on a 24/7 basis, but it should be facilitated to the extent possible, according to local conditions.
(3) Being a Local objective to be applied at individual airports according to their local needs, this objective does not have a mandatory implementation deadline. As reference guidance the expected date for deployment of Block 0 modules in the ICAO GANP, to which this objective is linked through ASBU B0-CCO, is 2013-2019.

NOTE FOR MILITARY AUTHORITIES: It is the responsibility of each military authority to review this Objective IN ITS ENTIRETY and address each of the SLoAs that the military authority considers RELEVANT for itself. This has to be done on top and above of the review of "MIL" SLoAs which identify actions EXCLUSIVE to military authorities.

Applicability Area(s) & Timescale(s)

Applicability area
(Aerodromes subject to local needs and complexity)

Timescales:

From: By: Applicable to:

References

European ATM Master Plan

OI step - [AOM-0703]-Continuous Climb Departure
Enablers - PRO-ENV-15

Legend:
WXYZ-001 Covered by SLoA(s) in this objective
WXYZ-002 Covered by SLoA(s) in another objective
WXYZ-003 Objective covering the enabler
WXYZ-0 03 Not covered in the Implementation Plan

Applicable legislation

- Regulation (EU) 598/2014 of 16 April 2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC (as from 16/06/2016);
ICAO GANP – ASBUs

B0-CCO  Improved Flexibility and Efficiency in Departure Profiles

Deployment Programme
- none -

Stakeholder Lines of Action (SLoAs)

<table>
<thead>
<tr>
<th>SLoA ref.</th>
<th>Title</th>
<th>From</th>
<th>By</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENV03-ASP01</td>
<td>Implement rules and procedures for the application of CCO techniques</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ENV03-ASP02</td>
<td>Train controllers in the application of CCO techniques</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ENV03-ASP03</td>
<td>Monitor and measure the execution of CCO</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ENV03-APO01</td>
<td>Monitor and measure the execution of CCO</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ENV03-USE01</td>
<td>Include CCO techniques in the aircrew training manual wherever possible</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Description of finalised and deleted SLoAs is available on the eATM Portal @ https://www.eatmportal.eu/working/depl/essip_objectives

Expected Performance Benefits

Safety:  -  
Capacity: - 
Operational Efficiency: CCOs contribute to reducing airlines operating costs including a reduction in fuel consumption by the flying of optimised profiles (no vertical containment required). If the CCO is flown as part of a PBN procedure, the predictability of the vertical profile will be enhanced for ATC. CCOs are also a proxy for Vertical Flight Efficiency (VFE) and should be monitored according to harmonised definitions and parameters in order to measure efficiency.
Cost Efficiency: - 
Environment: Reduction of fuel burn (and consequently, atmospheric emissions) has been estimated to be 17kg per flight for those flying CCO over those flying non-CCO. In addition, studies have indicated that due to lower drag and thrust facilitated by CCO, over certain portions of the arrival profile, noise may be reduced. Studies are currently ongoing to gauge such noise reductions.
Security: - 

Detailed SLoA Descriptions

<table>
<thead>
<tr>
<th>ENV03-ASP01</th>
<th>Implement rules and procedures for the application of CCO techniques</th>
<th>From:</th>
<th>By:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action by:</td>
<td>ANS Providers</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Description &amp; purpose:</td>
<td>Coordinate activities and implement rules and ATC procedures for the application of CCO techniques in the TMA, whenever practicable. Coordination should be, in all circumstances, undertaken with adjacent ATS units, the NM, aircraft operators and airport operators. Provide the tactical and operational situational awareness support to allow aircrew to apply CCO.</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
| Supporting material(s): | ICAO - Doc 4444 - Air Traffic Management - Edition 15 / 11/2010  
  Url: http://www.icao.int/publications/Pages/catalogue.aspx  
  Url: http://www.icao.int/publications/Pages/catalogue.aspx  
  Url: http://www.icao.int/publications/Pages/catalogue.aspx  
  EUROCONTROL - EUROCONTROL CDO/CCO Supporting Material  
  Url: http://www.eurocontrol.int/articles/continuous-climb-and-descent-operations  
  Url: http://www.icao.int/publications/Pages/catalogue.aspx | -     | -   |
| ATM Master Plan relationship: | IPRO-ENV-15]-ATC Procedures and LoA with adjacent ATS units to ensure that airspace is designed to permit the aircraft continuous climb in order to avoid the unnecessary noise and excessive fuel emissions from non-optimal departure profiles | -     | -   |
| Finalisation criteria: | 1 - CCO procedures have been published in the local/State AIP.  
  2 - CCOs are made available to airspace users, whenever practicable. | -     | -   |
## ENV03-ASP02

**Train controllers in the application of CCO techniques**

<table>
<thead>
<tr>
<th>Action by:</th>
<th>ANS Providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description &amp; purpose:</td>
<td>Train controllers in the application of CCO techniques and the benefits that the facilitation of such techniques can provide to airspace users in terms of airspace efficiency together with fuel, emissions and cost savings.</td>
</tr>
</tbody>
</table>
  Url: [http://www.icao.int/publications/Pages/catalogue.aspx](http://www.icao.int/publications/Pages/catalogue.aspx)  
  EUROCONTROL - IANS-ENV-INTRO - Introduction to Environment e-learning training course 12/2012  
  Url: [https://trainingzone.eurocontrol.int/](https://trainingzone.eurocontrol.int/)  
  EUROCONTROL - EUROCONTROL CDO/CCO Supporting Material  
  Url: [http://www.eurocontrol.int/articles/continuous-climb-and-descent-operations](http://www.eurocontrol.int/articles/continuous-climb-and-descent-operations) |
| Finalisation criteria: | 1 - Approach controllers have been suitably trained in the application of CCO techniques |

## ENV03-ASP03

**Monitor and measure the execution of CCO**

<table>
<thead>
<tr>
<th>Action by:</th>
<th>ANS Providers</th>
</tr>
</thead>
</table>
| Description & purpose: | In cooperation with airports, monitor and measure CCO execution, where possible based upon a harmonised methodology and metrics.  
  The methodology should be used also to identify the cause of any restrictions to CCO (such as inefficient LoAs (reflecting older more inefficient aircraft types and their corresponding vertical profiles)). Route changes should then be proposed to facilitate CCOs, in order to enhance vertical flight efficiency.  
  Provide any feedback to airports, aircraft operators and the NM on the level of CCO execution together with any other trends observed by the CCO performance monitoring. |
| Supporting material(s): | - EUROCONTROL - EUROCONTROL CDO/CCO Supporting Material  
  Url: [http://www.eurocontrol.int/articles/continuous-climb-and-descent-operations](http://www.eurocontrol.int/articles/continuous-climb-and-descent-operations)  
  EUROCONTROL - CCO, CDO harmonised definitions, metrics and parameters  
  Url: [https://youtu.be/PdeNroWY8Y0](https://youtu.be/PdeNroWY8Y0) |
| Finalisation criteria: | 1 - In cooperation with the airport operator, the monitoring and measurement of CCO execution is performed and available.  
  2 - Arrangements are in place to provide feedback of CCO performance to the airport operator, the NM and the local community where practicable |

## ENV03-APO01

**Monitor and measure the execution of CCO**

<table>
<thead>
<tr>
<th>Action by:</th>
<th>Airport Operators</th>
</tr>
</thead>
</table>
| Description & purpose: | In cooperation with the ANSP, monitor and measure CCO execution, where possible based upon a harmonised methodology.  
  The methodology should be used also to identify the cause of any restrictions to CCO (such as inefficient LoAs (reflecting older more inefficient aircraft types and their corresponding vertical profiles)). Route changes should then be proposed, by the ANSP, to facilitate CCOs, in order to enhance vertical flight efficiency.  
  Provide any feedback to the ANSP, aircraft operators and the NM on the level of CCO execution together with any other trends observed by the CCO performance monitoring. |
| Supporting material(s): | - EUROCONTROL - EUROCONTROL CDO/CCO Supporting Material  
  Url: [http://www.eurocontrol.int/articles/continuous-climb-and-descent-operations](http://www.eurocontrol.int/articles/continuous-climb-and-descent-operations)  
  EUROCONTROL - CCO, CDO harmonised definitions, metrics and parameters  
  Url: [https://youtu.be/PdeNroWY8Y0](https://youtu.be/PdeNroWY8Y0) |
| Finalisation criteria: | 1 - In cooperation with the ANSP, the monitoring and measurement of CCO execution is performed and available.  
  2 - Arrangements are in place to provide feedback of CCO performance to the ANSP, the NM and the local community where practicable |

## ENV03-UOE01

**Include CCO techniques in the aircrew training manual wherever possible**

<table>
<thead>
<tr>
<th>Action by:</th>
<th>Airspace Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description &amp; purpose:</td>
<td>Provide suitable training, ensure awareness of and encourage application of CCO techniques.</td>
</tr>
</tbody>
</table>
  Url: [http://www.icao.int/publications/Pages/catalogue.aspx](http://www.icao.int/publications/Pages/catalogue.aspx)  
  EUROCONTROL - IANS-ENV-INTRO - Introduction to Environment e-learning training course 12/2012  
  Url: [https://trainingzone.eurocontrol.int/](https://trainingzone.eurocontrol.int/)  
  EUROCONTROL - EUROCONTROL CDO/CCO Supporting Material  
  Url: [http://www.eurocontrol.int/articles/continuous-climb-and-descent-operations](http://www.eurocontrol.int/articles/continuous-climb-and-descent-operations) |
| Finalisation criteria: | 1 - CCO techniques have been integrated in the aircrew training manual. |