

SESAR		Active							LOC/APT	
ENV03		Continuous Climb Operations (CCO)								
REG	ASP	MIL	APO	USE	INT	IND	NM	MET	AIS	USP

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 (4) 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.
- (4) At the time of publication of this document, the methodology released in 2016 by the CCO/CDO TF1 is currently being reviewed by the CCO/CDO TF2.

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 (Subject to local needs and complexity)					
Timescales:		From:	By:	Applicable to:	
FOC used for Analytics functioning only - not for implementation planning		01/01/2013		Applicability Area	
FOC used for Analytics functioning only - not for implementation planning			01/01/2030	Applicability Area	

References

European ATM Master Plan

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

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

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- 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).
- EC Directive 2002/49/EC, dated 25.06.2002 relating to the assessment and management of environmental noise.
- EC Directive 2008/50/EC, dated 21.05.2008 on ambient air quality and cleaner air for Europe.

Essential Operational Changes

Airport and TMA performance

SESAR Solution

ICAO GANP - ASBUs

APTA-B0/5	CCO (Basic)
APTA-B1/5	CCO (Advanced)

Deployment Programme

- none -

European Plan for Aviation Safety

- none -

Operating Environments

Airport
Terminal Airspace

Stakeholder Lines of Action (SLoAs)

SLoA ref.	Title	From	By
ENV03-ASP01	Implement rules and procedures for the application of CCO techniques		
ENV03-ASP02	Train controllers in the application of CCO techniques		
ENV03-ASP03	Monitor and measure the execution of CCO		
ENV03-APO01	Monitor and measure the execution of CCO		
ENV03-USE01	Include CCO techniques in the aircrew training manual wherever possible		

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

ENV03-ASP01	Implement rules and procedures for the application of CCO techniques	From:	By:
		-	-
Action by:	ANS Providers		

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Description & purpose:	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.		
Supporting material(s):	ICAO - Doc 9993 - Continuous Climb Operations (CCO) Manual - Edition 1 / 11/2013 Url : https://cfapp.icao.int/tools/ATMiKIT/story_content/external_files/10260008117raft_en_CCO.pdf EUROCONTROL - EUROCONTROL CDO/CCO Supporting Material Url : https://www.eurocontrol.int/concept/continuous-climb-and-descent-operations ICAO - Doc 9426 - Air Traffic Services Planning Manual - Edition 1 / 12/1992 Url : http://www.icao.int/publications/Pages/catalogue.aspx EUROCONTROL - European CCO/CDO Action Plan Url : https://www.eurocontrol.int/publication/european-continuous-climb-and-descent-operations-action-plan ICAO - Doc 9613 - Performance-based Navigation (PBN) Manual - Edition 4 / 03/2013 Url : https://store.icao.int/en/performance-based-navigation-pbn-manual-doc-9613 ICAO - Doc 4444 - Air Traffic Management - Edition 16 / 11/2016 Url : https://store.icao.int/ EUROCONTROL - CCO / CDO Performance dashboard Url : https://www.eurocontrol.int/dashboard/continuous-climb-and-descent-operations-performance-monitoring-dashboard		
ATM Master Plan relationship:	[PRO-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	From: -	By: -
Action by:	ANS Providers		
Description & purpose:	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.		
Supporting material(s):	ICAO - Doc 9993 - Continuous Climb Operations (CCO) Manual - Edition 1 / 11/2013 Url : https://cfapp.icao.int/tools/ATMiKIT/story_content/external_files/10260008117raft_en_CCO.pdf EUROCONTROL - IANS-ENV-INTRO - Introduction to Environment -e-learning training course 12/2012 Url : https://trainingzone.eurocontrol.int/ EUROCONTROL - EUROCONTROL CDO/CCO Supporting Material Url : https://www.eurocontrol.int/concept/continuous-climb-and-descent-operations EUROCONTROL - CDO refresher course for ATCs Url : https://trainingzone.eurocontrol.int/ilp/pages/coursedescription.jsf?courseId=8117329&catalogId=232380 EUROCONTROL - CCO / CDO Performance dashboard Url : https://www.eurocontrol.int/dashboard/continuous-climb-and-descent-operations-performance-monitoring-dashboard		
Finalisation criteria:	1 - Approach controllers have been suitably trained in the application of CCO techniques		
ENV03-ASP03	Monitor and measure the execution of CCO	From: -	By: -
Action by:	ANS Providers		
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.		
	Note : At the time of publication of this document, the methodology released in 2016 by the CCO/CDO TF1 is currently being reviewed by the CCO/CDO TF2.		

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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	From: -	By: -
Action by:	Airport Operators		
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.		
	Note : At the time of publication of this document, the methodology released in 2016 by the CCO/CDO TF1 is currently being reviewed by the CCO/CDO TF2.		
Supporting material(s):	EUROCONTROL - EUROCONTROL CDO/CCO Supporting Material Url : https://www.eurocontrol.int/concept/continuous-climb-and-descent-operations EUROCONTROL - European CCO/CDO Action Plan Url : https://www.eurocontrol.int/publication/european-continuous-climb-and-descent-operations-action-plan EUROCONTROL - CCO, CDO harmonised definitions, metrics and parameters Url : https://youtu.be/PdeNroWY8Y0 EUROCONTROL - CDO refresher course for ATCs Url : https://trainingzone.eurocontrol.int/ilp/pages/coursedescription.jsf?courseId=8117329&catalogId=232380 EUROCONTROL - CCO / CDO Performance dashboard Url : https://www.eurocontrol.int/dashboard/continuous-climb-and-descent-operations-performance-monitoring-dashboard		
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-USE01	Include CCO techniques in the aircrew training manual wherever possible	From: -	By: -
Action by:	Airspace Users		
Description & purpose:	Provide suitable training, ensure awareness of and encourage application of CCO techniques.		
Supporting material(s):	ICAO - Doc 9993 - Continuous Climb Operations (CCO) Manual - Edition 1 / 11/2013 Url : https://cfapp.icao.int/tools/ATMiKIT/story_content/external_files/10260008117raft_en_CCO.pdf EUROCONTROL - IANS-ENV-INTRO - Introduction to Environment -e-learning training course 12/2012 Url : https://trainingzone.eurocontrol.int/ EUROCONTROL - EUROCONTROL CDO/CCO Supporting Material Url : https://www.eurocontrol.int/concept/continuous-climb-and-descent-operations EUROCONTROL - European CCO/CDO Action Plan Url : https://www.eurocontrol.int/publication/european-continuous-climb-and-descent-operations-action-plan EUROCONTROL - CCO, CDO harmonised definitions, metrics and parameters Url : https://youtu.be/PdeNroWY8Y0 EUROCONTROL - CDO refresher course for ATCs Url : https://trainingzone.eurocontrol.int/ilp/pages/coursedescription.jsf?courseId=8117329&catalogId=232380 EUROCONTROL - CCO / CDO Performance dashboard Url : https://www.eurocontrol.int/dashboard/continuous-climb-and-descent-operations-performance-monitoring-dashboard		

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Finalisation criteria:	1 - CCO techniques have been integrated in the aircrew training manual.
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