International Civil Aviation Organization

ASBU/SIP/Lima/2012-WP/28C

Aviation System Block Upgrades
Module N° B0-20/PIA-4

Improved Flexibility and Efficiency in Departure Profiles

Workshop on preparations for ANConf/12 − ASBU methodology
(Lima, 16-20 April 2012)

Module N° B0-20
Improved Flexibility and Efficiency in Departure Profiles

Summary	To implement Continuous Climb Operations in conjunction with PBN to provide opportunities to optimize throughput, improve flexibility, enable fuel-efficient climb profiles and increase capacity at congested terminal areas.	
Main Performance Impact	KPA-04 – Efficiency; KPA-05 – Environment; KPA-10 - Safety	
Operating Environment/Phases of Flight	Departure and En-Route	
Global Concept Component(s)	AUO – Airspace user operations TS – Traffic synchronization AOM – Airspace organization and management	
Global Plan Initiatives (GPI)	GPI 5- RNAV/RNP (Performance. Based Navigation) GPI-10- Terminal Area Design and Management GPI-11- RNP and RNAV SIDs and STARs	
Pre-Requisites	NIL	
		Status
Global Readiness Checklist	Standards Readiness	Ready
	Avionics Availability	Ready
	Infrastructure Availability	Ready
	Ground Automation Availability	Ready
	Procedures Available	Ready
	Operations Approvals	Ready

Module N° B0-20 - Baseline

- Varies from one State/region to the next.
- Some aspects of the movement to PBN have already been subject of local improvements in areas

Module N° B0-20 – Change Brought by the Module

- RNAV; RNP where possible and needed
  - PBN SIDs
  - Increased efficiencies in terminal separation rules
  - Effective airspace design and classification
- Continuous Climb Operations
  - CCO is an aircraft operating technique aided by appropriate airspace and procedure design and appropriate ATC clearances
  - A CCO can be flown with or without the support of function of the flight management system (FMS)) and with or without a fixed lateral path.

Module N° B0-20 – – Intended Performance Operational Improvement

Efficiency	Cost savings through reduced fuel burn and efficient aircraft operating profiles.; Reduction in the number of required radio transmissions.
Environment	Authorization of operations where noise limitations would otherwise result in operations being curtailed or restricted. Environmental benefits through reduced emissions.
Safety	More consistent flight paths. Lower pilot and Air Traffic Control workload.
CBA	CCO benefits are heavily dependent on each specific ATM environment. If implemented within the ICAO CCO manual framework, the benefit/cost ratio (BCR) will be positive.

Module N° B0-20 – Necessary Procedures (Air & Ground)

- The ICAO Performance-based Navigation Manual (Doc 9613)-Provides general guidance on PBN implementation
- The Continuous Climb Operations *(CCO)* Manual (Doc xxxx); Provides guidance on
  - Airspace design
  - Instrument flight procedures
  - ATC facilitation
  - Flight techniques necessary to enable CC0s

Module N° B0-20 – Necessary System Capabilities

- **Avionics**
  - CCO does not require specific air/ground technology.
  - CCO is an aircraft operating technique aided by appropriate airspace and procedure design, and appropriate ATC clearances
- ***Ground systems***
  - Controllers would benefit from some automation support to display aircraft capabilities in order to know which aircraft can do what

Module N° B0-20 – Training and Qualification Requirements

- Training in the operational standards and procedures are required for this module
- Likewise, the qualifications requirements are identified in the regulatory requirements

Module N° B0-20 – Regulatory/standardization needs and Approval Plan (Air and Ground)

- **Regulatory/Standardization**
  - Use current published requirements
- **Approval Plans**
  - Must be in accordance with application requirements

Module N° B0-20 – Reference Documents

- ***Standards:*** Nil
- ***Procedures***
  - ICAO Doc 4444, *Procedures for Air Navigation Services — Air Traffic Management.*
  - ICAO Doc 9613, *Performance-based Navigation (PBN) Manual*;
  - ICAO Doc xxxx, Continuous Climb Operations (CCO) Manual
- ***Approval Documents***
  - ICAO Doc XXXX, Continuous Climb Operations Manual;
  - ICAO Doc 9613, *Performance Based Navigation Manual;*
  - ICAO Doc 4444, *Procedures for Air Navigation Services — Air Traffic Management*.

Module N° B0-20 Implementation - Benefits and Elements

Improved Flexibility and Efficiency in Departure Profiles

- Benefits: Efficiency, Environment and Safety
- Elements: CCO and PBN SIDs
- No avionics or Ground systems required
- To be reflected in ANRF