

International Civil Aviation Organization


ASBU/SIP/Lima/2012-WP/16C

Aviation System Block Upgrades

Module N° B0-75/PIA-1

Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)

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



Module N° B0-75

Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)

Summary	-Basic A-SMGCS provides surveillance and alerting of movements of both aircraft and vehicles on the aerodrome thus improving runway/aerodrome safety. ADS-B information is used when available (ADS-B APT)	
Main Performance Impact	KPA-1 Access and Equity; KPA-02 Capacity; KPA-04 Efficiency; KPA-05 Environment; KPA-10 Safety	
Domain / Flight Phases	Aerodrome surface movements (aircraft /vehicles), taxi, push-back, parking	
Applicability Considerations	-Any aerodrome/all classes of aircraft/vehicles. - Implementation based on requirements from individual aerodrome operational and cost-benefit assessments.	
Global Concept Component(s)	AO – Aerodrome Operations CM – Conflict Management	
Global Plan Initiatives (I)	GPI-9 Situational Awareness GPI-13 Aerodrome Design and Management GPI-16 Decision Support Systems and Alerting Systems	
Main Dependencies	- Non-cooperative aerodrome surveillance in form of surface movement radar (SMR), although SMR could be installed simultaneously with A-SMGCS.	
Global Readiness Checklist		Status
	Standards Readiness	ready
	Avionics Availability	ready
	Infrastructure Availability	ready
	Ground Automation Availability	ready
	Procedures Available	ready
	Operations Approvals	ready

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2

Module N° B0-75 - Baseline



- Historically, ANSP personnel and flight crew visually scan surface operations
 - Both have as basis taxi management & as aircraft navigation/separation
- Enhanced surface situational awareness based upon use of an aerodrome surface movement primary radar system and display (SMR).
- **Visual aids, Wild life strike hazard reduction**
(Not included in the Module but mapped to this Module)

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3

Module N° B0-75 – Change Brought by the Module



- **Element 1- Surveillance**
 - Enhances primary radar surface surveillance with the addition of at least one cooperative surface surveillance system.
 - Systems include Multilateration, Secondary Surveillance Radar Mode S, Automatic Dependent Surveillance – Broadcast (ADS-B)
 - Marginal improvement in routine management of taxi operations
 - More efficient sequencing of aircraft departures.
- **Element 2 – Alerting**
 - Alerting with flight identification information improves the ATC response to situations requiring resolution ex: runway incursion incidents and improved response times to unsafe surface situations
 - Levels of sophistication vary considerably

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4

Module N° B0-75 - Intended Performance Operational Improvement



Access and Equity	A-SMGCS: Improves access to portions of the manoeuvring area obscured from view of the control tower for vehicles and aircraft. ADS B APT: provides traffic situational awareness to the controller.
Capacity	A-SMGCS: Sustained levels of aerodrome capacity for visual conditions reduced to minima. ADS-B APT: potentially improve capacity for medium complexity aerodromes
Efficiency	A-SMGCS and ADS-B APT Reduced taxi times.
Environment	Reduced aircraft emissions
Safety	A-SMGCS: and ADS-B APT: Reduced runway incursions.
CBA	A-SMGCS: A positive CBA can be made from improved efficiencies in surface operations leading to significant savings in aircraft fuel usage. ADS B APT: less costly surveillance solution for medium complexity aerodromes

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5

Module N° B0-75 – Necessary Procedures (Air & and Ground)



- Flight crew procedures specific to A-SMGCS are not beyond those associated with basic operation of aircraft transponder systems and settings of aircraft identification.
- Vehicle drivers must be in a position to effectively operate vehicle transponder systems.
- ATC is required to apply procedures specific to A-SMGCS

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6

Module N° B0-75 – Necessary System Capability



- **Avionics**
 - Existing aircraft ADS-B and/or SSR transponder systems, including correct setting of aircraft identification.
- **Vehicles**
 - Vehicle cooperative transponder systems, type as a function of the local A-SMGCS installation. Industry solutions readily available
- **Ground systems**
 - A-SMGCS: The surface movement radar should be complemented by a cooperative surveillance means allowing to track aircraft and ground vehicles. A surveillance display including some alerting functionalities is required in the tower.
 - ADS B APT: cooperative surveillance infrastructure deployed on the aerodrome surface; installation of a tower traffic situational awareness display.

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7

Module N° B0-75 – 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 in Section 6 which form an integral part to the implementation of this module.

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8

Module N° B0-75 – Regulatory/Standardization needs and Approval Plan (Air & Ground)



- Standards approved for aerodrome Multilateration, ADS-B and safety logic systems exist for use in:
 - Europe
 - The United States
 - Other member States.
- Standards for SMR exist for use globally.

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9

Module N° B0-75 – Reference Documents



- **Standards**
 - Community Specification on A-SMGCS Levels 1 and 2;
 - ICAO Doc 9924, *Aeronautical Surveillance Manual*;
 - ICAO Doc 9871, *Technical Provisions for Mode S Services and Extended Squitter*;
 - ICAO Doc 9830, *Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Manual*;
 - ICAO Doc 7030/5, (EUR/NAT) *Regional Supplementary Procedures*, Section 6.5.6 and 6.5.7;
 - FAA Advisory Circulars:
 - AC120-86 Aircraft Surveillance Systems and Applications
 - AC120-28D Criteria for Approval of Category III Weather Minima for Take-off, Landing, and Rollout
 - AC120-57A Surface Movement Guidance and Control System
 - Avionics standards developed by RTCA SC-186/Eurocae WG-51 for ADS-B
 - Aerodrome map standards developed by RTCA SC-217/Eurocae WG-44
 - EUROCAE ED 163 Safety, Performance and Interoperability Requirements document for ADS B Airport Surface surveillance application (ADS-B APT)
- **ATC Procedures**
 - ICAO Doc 4444, *Procedures for Air Navigation Services — Air Traffic Management*; and
 - ICAO Doc 7030, *Regional Supplementary Procedures* (EUR SUPPS).
- **Guidance material**
 - FAA NextGen Implementation Plan
 - European ATM Master Plan

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10

Module N° B0-75 Implementation - Benefits and Elements



Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)

- **Benefits: Access, Capacity, Efficiency, Environment and Safety**
- **Elements:**
 - Visual aids, Wild life strike hazard reduction
(Not included in the Module)
 - Multilateration, SSR Mode S, and ADS-B/transponder for both aircraft and vehicles
 - Alerting systems with flight identification information
To be reflected in ANRF

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11

