



International Civil Aviation Organization

SIP/2012/ASBU/Dakar-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
(Dakar, 16-20 July 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.	
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	<ul style="list-style-type: none"> -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 ()	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



- 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)**



- **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

Module N° B0-75 - Intended Performance Operational Improvement



Access and Equity

Improves access to portions of the manoeuvring area obscured from view of the control tower for vehicles and aircraft.

Capacity

Sustained levels of aerodrome capacity for visual conditions reduced to minima. ADS-B APT: potentially improve capacity for medium complexity aerodromes

Efficiency

Reduced taxi times and hence reduced fuel burn,

Environment

Reduced emissions

Safety

Reduced runway incursions.

CBA

A positive CBA can be made from improved efficiencies in surface operations leading to significant savings in aircraft fuel usage.

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

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.

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.



- 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

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

Module N° B0-75 Implementation

- Benefits and Elements



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

Benefits - Main Key Performance Areas (KPA)

KPAs	Access	Capacity	Efficiency	Environment	Safety
Applicable	Y	Y	Y	Y	Y

**Elements: 1. Visual aids, Wild life strike hazard reduction
(Not included in the Module)**

**2. Multilateration, SSR Mode S, and ADS-B; Transponder
for both aircraft and vehicles**

3. Alerting systems with flight identification information

To be reflected in ANRF

ICAO

Uniting Aviation on

Safety | Security | Environment