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[RASG-APAC]

Model Advisory Circular

ISSUANCE OF TERRAIN or OBSTACLE ALERT / WARNING

NOTE

This Model Advisory Circular has been prepared under the authority of the Regional Aviation Safety Group – Asia and Pacific Regions (RASG-APAC)

This Model Advisory Circular has been developed to address [state the safety issue(s)] with a view to reduce the risk of an aviation accident.

National civil aviation administrations should consider this Model Advisory Circular when developing safety-related regulations, information and guidance for their own aviation industry.

A Model Advisory Circular may provide information and guidance purposes. It may describe an example of an acceptable means, but not the only means, of demonstrating compliance with internationally-recognized standards and recommended practices.

A Model Advisory Circular does not create, amend or permit deviations from internationally-recognized standards and recommended practices.

An Advisory Circular issued by a National civil aviation administration should be consistent with its national regulatory framework, regulations and standards.

RASG Model Advisory Circular Control Information

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Table of Contents

1.0	INTRODUCTION
1.1	Purpose
1.2	Applicability
1.3	Description of Changes
2.0	REFERENCES
2.1	Reference Documents
2.2	Cancelled Documents
2.3	Definitions and Abbreviations
3.0	BACKGROUND
4.0	PERFORMANCE
5.0	INVESTIGATIONS
6.0	TRUST, TRAINING AND ANALYSIS
7.0	ACTION BY STATES
8.0	INFORMATION MANAGEMENT
9.0	DOCUMENT HISTORY
10.0	CONTACT OFFICE

1.0 INTRODUCTION

This Advisory Circular (AC) is provided for information and guidance purposes. It may describe an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards. This AC on its own does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards. This AC is issued in accordance with [applicable national regulatory framework.]

This AC may use mandatory terms such as “must”, “shall” and “is/are required” so as to convey the intent of the regulatory requirements where applicable. The term “should” is to be understood to mean that the proposed method of compliance is strongly recommended, unless an alternative method of safety protection is implemented that would meet or exceed the intent of the recommendation.

1.1 Purpose

The purpose of this AC is to bring to the attention of APAC States that ground-based surveillance systems and their associated functions must provide the necessary levels of terrain avoidance protection to aircraft provided with radar services by ATC. This includes the need for States to ensure that there is adequate terrain clearance in all phases of flight in and around controlled airports where MSAW is installed and used.

1.2 Applicability

(1) This document is applicable to States where Air Traffic Service (ATS) providers are using ground-based ground based surveillance systems that are capable of generating a Minimum Safe Altitude Warning (MSAW).

1.3 Description of Changes

(1) N/A

2.0 REFERENCES AND REQUIREMENTS

2.1 Reference Documents

The following reference material may be consulted for information purposes:

(1) *ICAO Procedures for Air Navigation Services — Air Traffic Management (PANS -ATM) Doc 4444*

(2) *ICAO Annexes 11 and 15*

(3) *Commercial Aviation Safety Team (CAST) Safety Enhancement Plan (Reference SE009)*

(4) *EUROCONTROL Guidance Material for Minimum Safe Altitude Warning*

EUROCONTROL-GUID-127

2.2 Cancelled Documents

- (1) N/A
- (2) By default, it is understood that the publication of a new issue of a document automatically renders any earlier issues of the same document null and void.

2.3 Definitions and Abbreviations

- (1) The following **definitions** are used in this document:

Note: The term MSAW can be found in ICAO documents; however an ICAO definition has not been established as yet.

- (2) The following **abbreviations** are used in this document:

- (a) **AC:** Advisory Circular
- (b) **ACC:** area control centre
- (c) **APRAST:** Asia Pacific Regional Aviation safety Team
- (d) **ATC:** air traffic control
- (e) **ATCO:** air traffic controller
- (f) **ATS:** air traffic services
- (g) **CAST:** Commercial Aviation Safety Team
- (h) **eTOD:** Electronic Terrain and Obstacle Data
- (i) **GASP:** Global Aviation Safety Plan
- (j) **MSAW:** minimum safe altitude warning
- (k) **PAR:** precision approach radar
- (l) **RASG:** Regional Aviation Safety Group
- (m) **SEI:** safety enhancement initiative

3.0 BACKGROUND

3.1 The United States Commercial Aviation Safety Team (CAST) was founded in 1998 with a goal to reduce the commercial aviation fatality rate in the United States by 80 percent by 2007. To achieve this ambitious goal, the CAST developed and started implementing a comprehensive Safety Enhancement Plan. By 2007, CAST was able to report that, by implementing the most promising safety enhancements, the fatality rate of commercial air travel in the United States was reduced by 83 percent. CAST continues to develop, evaluate and add Safety Enhancements to the CAST Plan for continuing accident rate reduction.

3.2 ICAO in its Global Aviation Safety Plan (GASP) 2013 continues to prioritize action in three areas of aviation safety – improving runway safety, reducing the number of Controlled Flight Into Terrain (CFIT) accidents and reducing the number of loss of control in-flight accidents and incidents. All of these actions will contribute to the overarching priority of the GASP to continually reduce the global accident rate.

3.3 In line with the ICAO's GASP and the CAST initiatives, the RASG/APRAST Controlled Flight Into Terrain Sub Group developed a Safety Enhancement Initiative (SEI) focused on Minimum Altitude Warning Systems (MSAW) with a goal of precluding future CFIT accidents.

3.4 Minimum Safe Altitude Warning (MSAW) is a ground-based safety net intended to warn the air traffic controller (ATCO) about the increased risk of controlled flight into terrain by generating, in a timely manner, an alert of aircraft proximity to terrain or obstacles.

The main purpose of MSAW is to enhance safety and not to monitor adherence to any specified minima. In practice MSAW is a part of the ATC system and from this perspective it can be regarded as a “function”.

3.5 The MSAW function monitors the levels reported by aircraft transponders with pressure-altitude reporting capability against defined minimum safe altitudes. When the level/altitude of an aircraft is detected or predicted to be lower than the applicable minimum safe altitude, an acoustic and visual warning is generated to an air traffic controller within whose area of responsibility the aircraft is operating.

3.6 MSAW adds independent alerting logic to the control loop to help prevent controlled flight into terrain by generating alerts of existing or pending situations related to aircraft proximity to terrain or obstacles, which require attention/reaction.

3.7 In order to provide the MSAW function with proper data for monitoring, a terrain and obstacles model should be created in the air traffic control system. States are required by ICAO *Annex 15 (Chapter 10)* to provide Electronic Terrain and Obstacle Data (eTOD) for the use in different air navigation applications, including MSAW. The eTOD should be provided as data sets having specific numerical requirements and covering the following areas:

- Area 1: the entire territory of a State
- Area 2: within the vicinity of an aerodrome, sub-divided in 4 smaller sections
- Area 3: the area bordering an aerodrome movement area
- Area 4: the area extending 900x60m prior to the runway category II or III threshold.

3.8 In addition ICAO *Doc. 4444 PANS-ATM* provides guidance on the development of local instructions concerning the use of the MSAW function.

4.0 Performance

4.1 The performance of the MSAW function can be described as the best balance between warning time and nuisance alert, taking into account local environment. In this way an air traffic controller would be able to rely on the MSAW during the provision of service.

5.0 Investigations

5.1 However the operational use of MSAW has not always led to the best advantage being taken of its potential as a safety net. Investigations of accidents and serious incidents which occurred in an ATS environment where MSAW was available sometimes disclosed problems with the display of MSAW alerts to controllers, its selection and serviceability and with the operational procedures and associated training.

6.0 Trust, training and analysis

6.1 The use of MSAW depends in part on the controller's trust. Trust is a result of many factors such as reliability and transparency. Neither mistrust nor complacency is desirable; training and experience are needed to build trust at the appropriate level. An excessive amount of false alarms can reduce the controller's confidence in the MSAW.

6.2 Good practices of using the MSAW have shown that the increasing complexity of the MSAW and the environment in which it is used is addressed through appropriate training and competency assessment. The primary goal of the training is to develop and maintain an adequate level of trust in MSAW, i.e. to make controllers aware of situations where MSAW is likely to be effective and, more importantly, situations in which MSAW will not be so effective (e.g. sudden, unexpected manoeuvres).

6.3 Retaining electronic records of all MSAW alerts generated by the appropriate ATS authority may facilitate statistical analyses. The data and circumstances pertaining to each alert should be analysed to determine whether an alert was justified or not. Non-justified alerts, e.g. during visual approach, should be ignored. A statistical analysis should be made of justified alerts in order to identify possible shortcomings in airspace design and ATC procedures as well as to monitor overall safety levels.

7.0 ACTION BY STATES

7.1 States should enhance aviation safety by:

1. Ensuring that ground-based surveillance systems and their associated functions provide the necessary levels of terrain avoidance protection to aircraft operating within airspace under their control; and,
2. Ensuring that where MSAW is installed air traffic controller training is adequate and appropriate to operate, and use MSAW systems.

8.0 INFORMATION MANAGEMENT

(1) Not applicable.

9.0 DOCUMENT HISTORY

(1) Not applicable.

10.0 CONTACT OFFICE

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