INTERNATIONAL CIVIL AVIATION ORGANIZATION

THE THIRD MEETING OF THE AERODROMES OPERATIONS AND PLANNING – WORKING GROUP (AOP/WG/3)

Malaysia, 2 – 4 June 2015

Agenda Item 2: Review relevant Action Item of RASG-APAC/4

REVIEW OF RELEVANT DECISIONS OF RASG-APAC/4

(Presented by the Secretariat)

SUMMARY

This Paper presents relevant information from the fourth Meeting of Regional Aviation Safety Group Asia Pacific (RASG-APAC/4), held from 20 to 21 November 2014 at Hong Kong, China.

This paper relates to –

Strategic Objectives:

A: ***Safety*** *– Enhance global civil aviation safety*

1. INTRODUCTION

1.1 The Fourth Meeting of Regional Aviation Safety Group Asia Pacific was held at Hong Kong Civil Aviation Department Headquarters in Hong Kong, China from 20 to 21 November 2014.

1.2 The Meeting was attended by 91 delegates from 22 Asia/Pacific Administrations and 8 International Organizations & industry partners. The meeting final report is available at ICAO Secure Portal site.

2. DISCUSSION

2.1 The 4th Meeting of RASG APAC identified 23 Decisions and requested States/Administrations to act upon. RASG APAC in Decision 4/4 approved the coordination mechanism principles and framework for coordination between APANPIRG and RASG APAC.

2.2 On runway safety outcomes the RASG/4 meeting noted that ACI has published guidance material on runway maintenance/operations in the "ACI Runway Safety Handbook" (Chapters 3 and 4). The Handbook also provided guidance on the design and planning of aerodromes and establishment of runway safety teams to minimize risks of runway incursion. The handbook is now a part of the ICAO Runway Safety Toolkit and available at http://cfapp.icao.int/tools/RSP_ikit/story_content/external_files/ACI%20Runway%20Safety%20Handbook%202014%20v2%20low.pdf.

ACI has also developed an online training course for runway maintenance and operations, based on the content of the ACI Runway Safety Handbook. More information on this Training course can be found at the following link:
http://www.olc.aero/Courses/Runway-Safety-Management.aspx.

2.3 RASG APAC in Decision 4/9 approved the model Advisory Circular for Runway Safety Check List. Attachment C to WP/32 presented by APRAST Co Chairs contained the Runway Safety Check List for aerodromes. APRAST - WP/32 attached for easy reference.

2.4 RASG APAC in Decision 4/12 approved the regional aviation safety priorities and targets for the APAC Region as described in Annex B to RASG APAC/4 - WP/25 (attached for easy reference).

3. ACTION BY THE MEETING

3.1 The Meeting is invited to note the information and action taken in this Paper.

International Civil Aviation Organization

Fourth Meeting of the Regional Aviation Safety Group – Asia Pacific Regions (RASG-APAC/4)

(Hong Kong, China, 20 – 21 November 2014)

Agenda Item 4.3: APAC Priorities and Targets

PROPOSED REGIONAL AVIATION SAFETY PRIORITIES AND TARGETS

(Presented by APRAST Co-Chairs)

SUMMARY

This paper proposes the regional aviation safety priorities and targets for the Asia-Pacific Region.

Action by the meeting is at Paragraph 3.

1. INTRODUCTION

1.1 The RASG-APAC/3 meeting, which was held on 27-28 June 2013, had requested APRAST to review the regional aviation safety priorities and targets and submit them for RASG APAC's consideration (see Annex A for relevant decisions and conclusions).

1.2 The review should also take into account the Global Aviation Safety Priorities and Targets specified in the revised Global Aviation Safety Plan (GASP), which was endorsed by the 50th Conference of Directors-General of Civil Aviation Asia and Pacific Regions ("DGCA Conference") in July 2013 (DGCA Action Item 50/14) and by the ICAO General Assembly in September 2013. In particular, the Global Aviation Safety Priorities and Targets provide a framework for the development of regional priorities and targets. It sets out three broad objectives for States over the next 15 years –

a. Implementation of an effective safety oversight system by 2017;

b. Full implementation of the ICAO State safety programme framework by 2022; and

c. Advanced safety oversight system including predictive risk management by 2027.

2. DISCUSSION

2.1 Taking into consideration the GASP objectives and the initial APRAST regional priorities and targets presented earlier at RASG-APAC/3, the APRAST/4 meeting held in Manila, the Philippines on 22-25 April 2014, revised the proposed regional safety priorities and targets, which were subsequently circulated by the Secretariat to RASG-APAC members for comments in a State Letter dated 7 May 2014 (T 6/13.11.1 – AP070/14 (FS)). Seven States/Administrations provided their comments.

2.2 Based on the comments received from the RASG-APAC members and inputs from discussions with ICAO HQ, the APRAST Co-chairs further revised the regional safety priorities and targets, which were then presented at the APRAST/5 meeting held in Bangkok, Thailand on 16-19 September 2014. After much deliberation, the meeting agreed to submit the revised proposed regional safety priorities and targets, as presented in Annex B of this working paper, to RASG-APAC/4 for approval (Conclusion APRAST5/5 refers).

2.3 The revised proposed regional safety priorities and targets focus on five broad priority areas:

a. Reduction in Operational Risks
b. Improvements in Safety Oversight and Compliance
c. Consistent and effective Safety Management Systems (SMS) and State Safety Programmes (SSP)
d. Predictive risk management and advanced regulatory oversight
e. Enhanced Aviation Infrastructure

In each of the areas, there are proposed Actions and Targets that States/Administrations and industry are encouraged to work together to progress and achieve. Metrics, which are the modes used to measure the progress in meeting the targets, are also stated. The actions, targets and metrics are intended to directly support the global aviation safety priorities and targets, and the needs of the APAC region.

2.4 Separately, ICAO tracks the status of aviation safety globally and for various regions on the Regional Performance Dashboard section of the ICAO website. The areas tracked for global civil aviation are as follows:

a. Progressive increase of the USOAP EI score to 60%
b. Resolution of all Significant Safety Concerns
c. Improvement of Aviation Safety Record
d. Certification of International Aerodromes
e. Implementation of State Safety Programme.

In addition, the safety indicators and targets of each ICAO region would be placed on the Regional Performance Dashboard website. All of the regions except the APAC region have provided the regional safety indicators and targets. Given that the Regional Performance Dashboard is meant to be a tool to track progress of the GASP (and Global Air Navigation Plan), it is proposed that only those APAC targets that are relevant to ICAO's global indicators and targets be placed on the Regional Performance Dashboard. These targets are denoted in Annex B.

2.5 Some of the targets are related to the implementation of safety enhancement initiatives (SEIs) and the activities of APRAST, such as organisation of workshops and coordination with industry and other bodies. As such, the active participation and collaboration of States/Administrations and industry in RASG APAC and APRAST activities is essential towards implementing the priorities and achieving the targets.

2.6 Relevant items have been included (and will be recommended by APRAST for inclusion) in the RASG APAC work programme to assist States/Administration and industry to achieve the priorities and targets. In addition, the proposed changes to the existing APRAST structure is intended to provide closer monitoring and more support for States/Administrations' and industry's implementation of SEIs.

3. ACTION BY THE MEETING

3.1 The RASG APAC/4 meeting is invited to:

a) review and approve the regional aviation safety priorities and targets for the APAC region;

b) provide ICAO with the relevant APAC regional aviation safety priorities and targets for update of the Regional Performance Dashboard; and

c) encourage States/Administrations and industry to collaborate and participate actively in RASG APAC and APRAST activities to implement the priorities and achieve the targets.

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RELEVANT DECISIONS AND CONCLUSIONS

RASG-APAC Decision 3/22
That,
a) the RASG agreed to release the draft safety priorities and targets for discussion at the 50th Conference of the Director General of Civil Aviation, Asia and Pacific Regions, noting the need to finalise the regional safety priorities and targets by RASG and its subsidiary bodies.
That,
b) APRAST review the Regional Safety Priorities and Targets presented in WP/21, and finalise them for circulation to RASG for comments, before submitting the final version incorporating comments received, to RASG Chair for consideration before March 2014.

50th Conference of Directors General of Civil Aviation Asia and Pacific Regions
Action Item 50/14
Recognising that actions are already underway within the RASG-APAC to address the Global Aviation Safety Priorities and Targets specified in the revised Global Aviation Safety Plan, the Conference adopted these Safety Priorities and Safety Targets as well as the target dates for the implementation of related key milestones.
Action Item 50/15
Recognising the importance of enhancing aviation safety in the region, in line with the GASP, the regional priorities and targets, the Conference urged States and industry to actively participate in implementing the RASG-APAC Decision 3/22 and provide expertise to implement the RASG work programmes.

Conclusion APRAST 5/5:
That APRAST submit the revised proposed regional priorities and targets to RASG-APAC/4 for approval.

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PROPOSED RASG-APAC PRIORITIES AND TARGETS

Note: Targets that are proposed to be placed on the ICAO Regional Performance Dashboard are denoted with "[RPD]"

I. Reduction of operational risks

According to the APAC Annual Safety Report, the percentage of global fatal accidents attributed to the APAC region has increased from 11% in 2008 to 25% in 2011. The report has also identified Loss of Control In-flight (LOC-I), Controlled Flight Into Terrain (CFIT) and runway safety related accidents as the main contributing factors to fatal accidents in the APAC region, which is in line with the analysis in the ICAO Global Aviation Safety Plan.

Action – Implement priority Safety Enhancement Initiatives (SEIs)

- RASG-APAC should continue its focus on the development of the current SEIs to address the priority areas of LOC-I, CFIT and Runway Safety.
- RASG-APAC should continue to provide implementation support to States and industry.
- States and industry should likewise accord priority to the implementation of these SEIs.

Targets:

- RASG-APAC to complete the development of currently identified priority SEIs by end 2016.
- States and industry to complete the implementation of all priority SEIs in RASG-APAC work programme by 2018.
- *[RPD]* Reduction in the number of fatal accidents in 2018 compared to 2014 irrespective of the volume of air traffic in the APAC region

Metric:

- Number of fatal accidents irrespective of the volume of air traffic in the APAC region.

II. Improvements to safety oversight and compliance

Recognising that the APAC region has one of the fastest air traffic growth rates and that effective safety oversight systems are crucial in ensuring high standards of safety, States should enhance their safety oversight system as a high priority.

Action – Enhance safety oversight systems through capacity building

Capacity building is an important element to enhance safety oversight capabilities. Considering that ICAO's last comprehensive systems approach audit cycle showed that the highest lack of effective implementation (52%, please see Figure 1 below) was in the area of CE 4 "qualified personnel", programmes should be initiated to increase the number of qualified inspectors in the region. A dedicated task force should be established by APRAST to develop an action plan on capacity building.

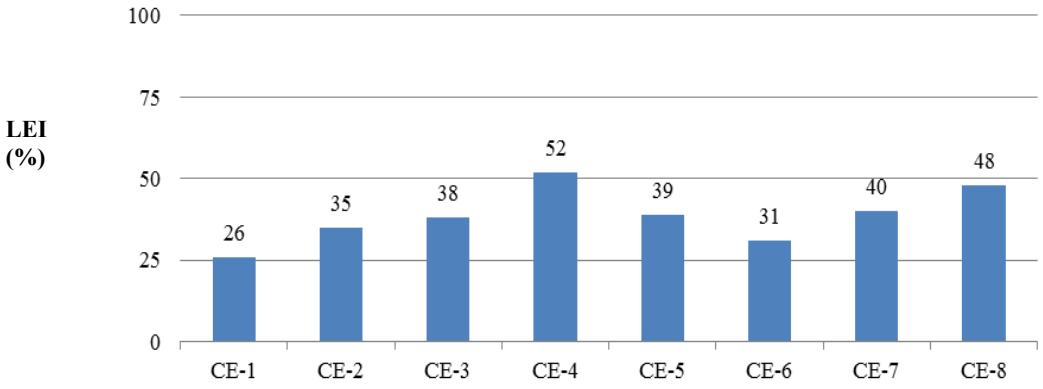

Figure 1 LEI by CE – APAC region

Action – Resolve Significant Safety Concerns (SSCs)
States should accord the utmost priority to the resolution of any SSCs identified by the ICAO Universal Safety Oversight Audit Programme Continuous Monitoring Approach (USOAP CMA) programme. States with SSCs should draw on the necessary resources available, including technical assistance from other States and regional programmes such as COSCAPs, where necessary, to resolve the SSCs promptly.

Action – Use of the IATA Operational Safety Audit (IOSA) and the IATA Standard Safety Assessment (ISSA)
IOSA registered carriers have demonstrated safety performance more than 2 times better than that for non-registered operators for the period between 2008 and 2013. IOSA can be utilised as an effective tool for States to evaluate operational capability and to establish level of confidence of air operators. Airlines are encouraged to pursue IOSA registration as a means to strengthen their safety management and compliance. States should consider various options to leverage IOSA from including recognition of IOSA to encouraging IOSA registration for all applicable operators. ISSA is a new safety programme, applicable to smaller operators whose aircraft or business model does not meet the eligibility criteria of IOSA. States are also encouraged to promote ISSA registration for all applicable operators.

Action – Use of the IATA Safety Audit for Ground Operations (ISAGO) to improve ground safety

Aircraft ground damage is a significant APAC issue and contributes to a global figure of nearly US$ 4-billion annual loss in terms of damage and injury. ISAGO aims to improve safety oversight of ground service providers, promptly identify ground operation activities with higher risks and reduce the number of accidents related to ground operations. With these aims in mind, operators are encouraged to pursue ISAGO registration for ground service providers for enhancement in aviation safety.

Targets:
- Task force (to be formed by APRAST) to develop an action plan on capacity building by December 2015.
- *[RPD]* States to resolve any SSCs identified by the ICAO USOAP CMA programme promptly within the timeline specified in the corrective action plan and agreed to by ICAO
- *[RPD]* States to achieve at least 60% EI in USOAP CMA by 2017.

- Maintain at least 60% of applicable APAC airlines to be IOSA certified by the end of 2017.
- Achieve at least 15% of applicable APAC airlines to be ISSA certified by the end of 2017.
- Pursue at least a 50% increase in ISAGO registrations by end of 2017.

Metrics:
- APAC States' ICAO USOAP CMA effective implementation rate
- Registration rate for IOSA and ISAGO

III. Consistent and effective Safety Management Systems (SMS) and State Safety Programmes (SSP)

The growing air traffic in the APAC region and the increasingly complex operating environment necessitate the involvement of both industry and States in ensuring high levels of safety. During the period between 2008 and 2012, 27% of APAC accidents involved deficiencies in safety management while 33% of the accidents in APAC involved deficiencies in regulatory oversight. Effective implementation of SMS is essential for the industry to identify hazards and resolve safety concerns. The robust implementation of the SSP also enables States to focus their safety oversight resources where they are most needed.

Action – Support robust implementation of SMS and SSP
- RASG–APAC should facilitate the sharing of best practices amongst States in the region on SMS and SSP.
- States should accord priority to the implementation of SMS and SSP to achieve an acceptable level of safety in aviation operations
- APAC COSCAPs should focus on assisting States in the implementation of SMS and SSP.

Targets:
- *[RPD]* Industry, particularly airlines, aviation training organisations, maintenance and repair organisations, airport operators, air navigation service providers, organisations responsible for the type design or manufacture of aircraft and aviation service providers to implement SMS by 2017
- *[RPD]* States to implement the full ICAO SSP by 2022

Metrics:
- Number of organisations that have implemented SMS as a percentage of the number of organisations required to implement SMS
- Number of States that have implemented SSP

IV. Predictive risk management and advanced regulatory oversight

The evolution from reactive to predictive safety management and data-driven regulatory oversight systems hinges on the availability of high quality safety data. Proper risk management and oversight is also reliant on the effective investigation of accidents and incidents in order to prevent recurrence.

Many APAC States have yet to fully implement ICAO Annex 13 requirements for accident investigation (53% - please see Figure 2 below). AIG AWG recommendations offer guidance to States to at least meet the minimum requirements. Implementation of these recommendations would help to improve each State's capacity to effectively investigate accidents and serious incidents and should also enhance the level of reporting by States to assist in the identification of regional safety issues and trends.

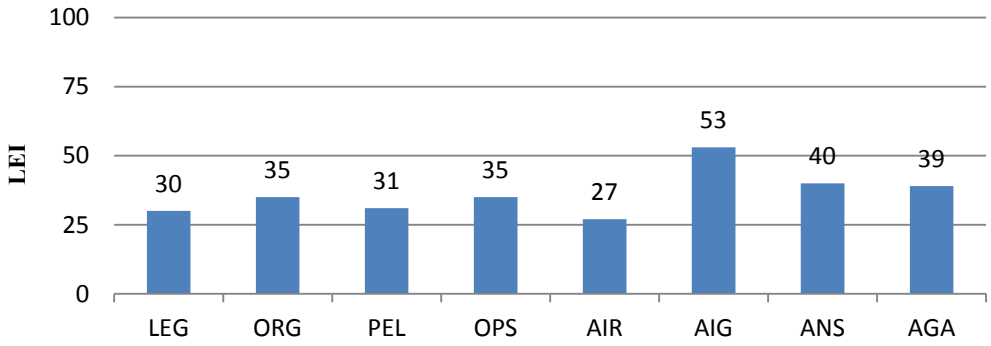

Figure 2 LEI by area - APAC region

Furthermore, APAC States often lack the resources and expertise to manage and collect data on a State level and there are currently no formal mechanisms in place that allow for the sharing and benchmarking of information at the regional level.

Finally, while many air operators in APAC have Flight Data Analysis Programmes, many have yet to fully incorporate the data into their risk management decision-making and few are leveraging on the valuable information available from external data-sharing platforms such as the IATA Flight Data Exchange (FDX) or the FAA Aviation Safety Information Analysis and Sharing (ASIAS) programmes.

Action – Implementation of AIG AWG recommendations to address Annex 13 requirements
States should consider it a priority to implement the APAC AIG's recommendations.

Action – Establish a structure for safety data collection, analysis and sharing
RASG–APAC should establish an action plan that facilitates the use of standardised taxonomies for data collection in the region. Standardised taxonomies, for example in the description of safety occurrences, ramp inspection outcomes and definitions of audit findings, would facilitate the benchmarking and sharing of data among States. In the longer term, RASG-APAC should put in place a structure for the collection, analysis and sharing of safety and operational data in the region in support of predictive risk management.

Action – Establish a mechanism for regional data collection and sharing
RASG-APAC should facilitate initiatives to develop regional data collection, analysis and sharing systems, including collaboration with existing data sharing systems ASIAS and IATA FDX programmes, with support from States and industry.

Targets:
- *[RPD]* States to achieve at least 60% EI in AIG of USOAP CMA by 2017
- To develop regional mechanism for data collection, analysis and sharing by 2017.
- 50% of APAC air operators participating in flight data sharing initiative by 2016.
- APAC States to provide assurance that predictive risk management is fully effective by 2027

Metrics:
- States' ICAO USOAP CMA EI rate for AIG module

V. Enhanced Aviation Infrastructure

Air Traffic Services

Sustainable growth of the international aviation system will require the introduction of advanced safety capabilities (e.g. full trajectory-based operations) that increase capacity while maintaining or enhancing operational safety margins. The long-term safety objective is intended to support a collaborative decision making environment characterised by increased automation and the integration of advanced technologies on the ground and in the air, as contained in ICAO's Aviation System Block Upgrades (ASBUs) strategy.

Aerodrome Facilities

Particular attention should be paid to runway safety. Most aerodromes in the region are not certified due to lack of capacity of their respective regulatory authorities. The aerodrome and ground aids (AGA) CMA module has one of highest levels of lack of effective implementation (39%, see Figure 2 above). In 2012, 13% of APAC accidents included threats that were related to the malfunction or unavailability of ground based navigation aids. During the period between 2008 and 2012, 30% of the accidents in APAC were runway excursions.

Action – Coordination with APANPIRG

- Support the implementation of ASBU and ensure their implementation accounts for and properly manages existing and emerging risks (i.e. approaches with vertical guidance (APV) to mitigate CFIT and runway excursion).
- Jointly develop the proper structures to sustain the collection and sharing of regional ATM data.

Action – Promotion of Effective Implementation of AGA

- RASG-APAC should promote effective implementation of AGA, with focus on runway safety programmes that support the establishment of Runway Safety Teams (RSTs) and implementation of inter-organisational SMS and Collaborative Decision Making schemes.

Targets:

- Implement structures between RASG and APANPIRG to facilitate collection and sharing of ATM data by end 2015
- *[RPD]* States to achieve at least 60% EI in AGA of USOAP CMA by 2017
- Promote runway safety through workshops and seminars at least yearly
- All aerodromes in APAC region that are used for international operations to have RSTs by 2017

Metrics:

- Structures in place to collect and share regional ATM data
- States' ICAO USOAP CMA EI rate for AGA module
- Number of runway safety seminars, workshops or other events at APRAST or RASG-APAC
- Number of aerodromes with RSTs in APAC region that are used for international operations.

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International Civil Aviation Organization

Fourth Meeting of the Regional Aviation Safety Group – Asia Pacific Regions (RASG-APAC/4)

(Hong Kong, China 20 – 21 November 2014)

Agenda Item 4.2: APRAST Outputs for RASG Consideration and Approval

Safety Enhancement Initiative (SEI) Outputs for RASG Consideration and Approval

(Presented APRAST Co-chair Industry)

SUMMARY

This paper summarises APRAST work toward accomplishing Yearly Work Program objectives and presents the outputs of completed SEIs for RASG-APAC consideration and approval.

Action by the Meeting is described in paragraph 3 of this working paper.

1. INTRODUCTION

1.1 The RASG-APAC 2013/2014 Yearly Work Program tasks the APRAST to develop a number of SEIs related to controlled flight into terrain (CFIT), runway safety (RS) and loss of control Inflight (LOC-I).

1.2 Outputs for 2 SEIs on CFIT and 2 SEIs on runway safety are complete and ready for RASG-APAC review and approval prior to dissemination to States and Industry. Work on priority SEIs related to LOC-I continues and will transfer to the 2014/2015 Yearly Work Program.

2. DISCUSSION

CFIT Outputs

2.1 SEI CFIT/3 Output 1 – Precision-Like Approach Standard Operating Procedures Model Advisory Circular (Champion – Civil Aviation Safety Authority of Australia)

2.1.1 The purpose of this SEI is to promote the development and issuance of advisory circulars (AC) containing information for air operators to use to develop Standard Operating Procedures and training for pilots in use of the continuous descent final approach (CDFA) technique when flying non-precision approach procedures in all aircraft types.

2.1.2 The SEI will consolidate valuable information that air operators may utilise to develop Standard Operating Procedures (SOP) and training for pilots in the use of continuous descent final approach (CDFA) techniques when flying non-precision approach procedures.

2.1.3 The final draft model advisory circular, titled ‘Instrument Approach Procedures Using Continuous Descent Final Approach Techniques can be found at **Attachment A**.

2.2 SEI CFIT/8 – Minimum Safe Altitude Warning (MSAW) Model Advisory Circular (Champion – COSCAP NA)

2.2.1 The purpose of this Model Advisory Circular is to raise awareness among APAC States that ground-based surveillance systems and their associated functions must provide the necessary levels of terrain avoidance protection to aircraft within the ATC radar service area. 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 Minimum Safe Altitude Warning (MSAW) is installed and used.

2.2.2 The final draft model advisory circular, titled 'Issuance of Terrain or Obstacle Alert / Warning' can be found at **Attachment B**.

Runway Safety Outputs

2.3 RS/1 – Runway Safety Maturity Checklist (Champion – CANSO)

2.3.1 CANSO has developed a global runway excursion risk map using the Bow Tie technique, to assist in identifying potential weaknesses in the ATM system in the final phase of flight. This work has provided the opportunity to strengthen human centred risk controls.

2.3.2 The risk map has allowed the development of a Runway Safety Maturity Checklist, which has been designed to allow ANSPs, Airlines, Airport Operators, Regulators and ATEL/ANAV providers to benchmark their respective levels of maturity with regard to managing Runway Safety risks. The checklist identifies key elements, (which equate to risk controls derived from the risk map), and uses a series of questions to assess an organisation's maturity against each element.

2.3.3 An introduction and detailed description of the 'Runway Safety Maturity Checklist' can be found at **Attachments C1** and **C2**

2.4 RE/7 Output 2 – Guidance material and training program for runway pavement, maintenance and operations from aerodrome operator's perspective (Champion – ACI)

2.4.1 The purpose of this SEI is to help reduce the risk of runway excursions by providing aerodrome operators with guidance materials and training in the form of courses (online or face-to-face) and seminars on runway maintenance and operations based on Annex 14 SARPs and industry best practices.

2.4.2 ACI has completed and published its guidance materials on runway maintenance and operations incorporated those in the "ACI Runway Safety Handbook" (Chapters 3 and 4). The handbook also provides guidance on the design and planning of aerodromes and the setup and running of runway safety teams to minimize risks of runway incursion. The handbook is now part of the ICAO Runway Safety Toolkit and can be found at http://cfapp.icao.int/tools/RSP_ikit/story_content/external_files/ACI%20Runway%20Safety%20Handbook%202014%20v2%20low.pdf.

2.4.3 ACI has also developed an online training course for runway maintenance and operations, based on the content of the ACI Runway Safety Handbook. More information on this training course can be found at the following link: http://www.olc.aero/Courses/Runway-Safety-Management.aspx.

LOC-I

2.5 APRAST/5 Meeting conclusion 5/12 recommended that SEI LOC/1 (Use of Standard Operating Procedures) / Output 2, which also includes standard operating procedures for SEI CFIT/2, be submitted to RASG-APAC/4 for approval.

2.6 Subsequent to the meeting it was determined that further work is required before the document is fully ready for release. As such, this SEI will be carried forward to the proposed 2014/2015 Yearly Work Programme.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) Note the work of CASA and the CFIT Sub-Group in the completion of SEI CFIT/3 Output 1 and approve the Model Advisory Circular on Precision-Like Approach Standard Operating Procedures for dissemination to States and Industry;

b) Note the work of COSCAP NA and the CFIT Sub-Group in the completion of SEI CFIT/8 and approve the Model Advisory Circular on Minimum Safe Altitude Warning (MSAW) for dissemination to States and Industry;

c) Note the work of ACI and the Runway Safety Sub-Group in the completion of SEI REI/7 Output 2 and endorse and promote the use of the developed guidance material and training program for runway pavement, maintenance and operations from aerodrome operator's perspective;

d) Note the work of CANSO and the Runway Safety Sub-Group in the completion of SEI/RS1 and endorse and promote the use of the Runway Safety Maturity Checklist to States as appropriate.

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Image

[RASG-APAC]

Model Advisory Circular

INSTRUMENT APPROACH PROCEDURES USING CONTINUOUS DESCENT FINAL APPROACH TECHNIQUES

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. 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

This page is NOT part of the Model Advisory Circular

Model Advisory Circular	
Subject:	Instrument approach procedures using continuous descent final approach techniques
Document Number	
Issue number	
Issue Effective Date	
Valid until date	
Approved	[RASG Decision reference, date]
ICAO Secretariat file no.	
ICAO Technical Office:	
Inform Changes to:	

	Document History	
Issue number	**Description**	**Effective**

This page is NOT part of the Model Advisory Circular

– Title & Image – NATIONAL CIVIL AVIATION ADMINSTRATION

Advisory Circular			
Subject:	Instrument approach procedures using continuous descent final approach techniques		
Issuing Office:		Document No.:	
File No.:		Issue Number:	01
Available from		Effective Date:	
		Valid until:	

Table of Contents

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 [insert the 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 provide guidance for all operators regarding the use of the Continuous Descent Final Approach (CDFA) technique when conducting conventional or RNAV[1] Non-Precision Approach (NPA)[2] procedures or Approach Procedures with Vertical guidance (APV)[3]. It describes the rationale for using the CDFA techniques and documents the related regulations and guidance material to be applied, including some of those relating to Standard Operating Procedures (SOP) and Flight Crew Training (FCT).

1.2 Applicability

This AC does not apply to precision approaches such as ILS, GLS, and MLS

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) FAA AC 120-108

(2) FAA AC 120-71A

(3) ICAO Doc 8168

(4) ICAO Doc 9613

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[1] RNAV Non-Precision Approach procedures are GNSS-predicated and charted variously as RNAV (GNSS), RNAV (GPS) or RNP APCH. To comply with the ICAO PBN Manual any description of RNAV should have an associated value. E.g. RNAV 10, RNAV 5, 2 or 1 etc.

[2] Non Precision Approaches may be referred to as 2D (two dimensional) approaches from November 2014.

[3] APV and Precision Approaches (PA) may be collectively described as 3D (three dimensional) approaches from November 2014.

(5) ICAO Doc 9849

(6) CASA CAAP 178-1(2)

(7) COSCAP AC SEA 002

(8) FAA-H-8261-1A

(9) ICAO PBN TF4 WP09 Euro Control Draft Guidance.doc

(10) PANS OPS, Volume I, Part II, Section 4, Chapter 1

(11) TSB Canada Aviation Investigation Report A09Q0203

2.2 Cancelled Documents

(1) Reserved

(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 Abbreviations Acronyms and Definitions

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

(a) Reserved**…**

(2) The following **acronyms and definitions** are used in this document:

(a) **AC:** Advisory Circular

(b) **APV**[4]: Approach Procedure with Vertical guidance. This term is used for RNP APCH operations that include vertical guidance. That is, those flown to LNAV/VNAV or LPV minima. An APV does not meet the requirements established for precision approach and landing operations.

(c) **APV Baro**[5] : An approach (including RNP Approach) with barometric vertical guidance flown to LNAV/VNAV minima expressed as a DA/H.

(d) **APV SBAS:** Is supported by Satellite Based Augmentation Systems, such as WAAS in the US and EGNOS in Europe, to provide lateral and vertical guidance. The lateral guidance is equivalent to an ILS localizer and the vertical guidance is provided against a geometric path in space rather than a barometric altitude. RNAV (GNSS) approach to LP minima is also supported by SBAS.

[4] The term APV is currently used in ICAO Annex 10-however navigation terminology is undergoing revision in other ICAO documents relevant to flight operations and PBN

[5] ICAO APV Baro procedure design criteria now allow the use of SBAS for vertical guidance. This shall however be explicitly approved by the publishing ANSP before such an operation can be conducted.

(e) **APV SBAS:** An approach (including an RNP approach) with geometric vertical guidance flown to the LPV minima expressed as a DA/H.

(f) **ANSP:** Air Navigation Service Provider

(g) **ATC:** Air Traffic Control

(h) **Baro VNAV:** An on-board function where the barometric altimeter forms part of the integrated Air Data System enabling the Flight Management Computer (FMC) to compute deviation from the instrument approach procedure's vertical design profile.

(i) **CAST:** Commercial Aviation Safety Team

(j) **CDFA:** Continuous Descent Final Approach. A flying technique where a continuous descent is made along a predefined vertical path.

(k) **DA (H):** Decision Altitude (Height) as used on a precision approach and an APV.

(l) **EGNOS:** The European Geostationary Navigation Overlay Service. This is the European SBAS System.

(m) **GASP:** Global Aviation Safety Plan

(n) **GPS NPA:** An RNP APCH flown to LNAV minima

(o) **GNSS:** Global Navigation Satellite System. GNSS is a generic term for satellite navigation systems which include GPS, Galileo (in 2015), and GLONASS.

(p) **LNAV:** Lateral Navigation

(q) **LNAV:** An approach procedure without VNAV approval with minima expressed as an MDA (H). LNAV approval is according to EASA AMC 20-27 or FAA AC 90-105.

(r) **LNAV/VNAV:** An approach procedure incorporating barometric VNAV with minima expressed as a DA/ (DH). The aircraft's VNAV system may be approved in accordance with EASA AMC 20-27 or FAA AC 90-105.

(s) **LPV:** Localizer Performance with Vertical guidance. An approach procedure incorporating SBAS with minima expressed as DA (DH). The aircraft's system must be approved in accordance with AMC 20-28 or FAA AC 90-107.

(t) **LP:** Localizer Performance. An approach where the minima is expressed as an MDA flown by SBAS-capable aircraft where the vertical performance is not good enough to support LPV operations.

(u) **MDA/H:** Minimum Descent Altitude (Height) as used on a Non Precision Approach.

(v) **NPA:** A Non Precision Approach based on conventional navigation aids or RNAV, flown to a LNAV (MDA/H) or LP (MDA/H).

(w) **PBN:** Performance Based Navigation

(x) **RNAV Approach:** This is a generic name for any kind of approach which is designed to be flown using an onboard area navigation system. RNAV systems typically integrate information from sensors such as: air data; inertial reference; radio navigation and satellite navigation, together with inputs from internal databases and data entered by the crew to perform: navigation; flight plan management; guidance and control; display and system control- functions.

(y) **RNP AR APCH:** An approach which requires special operational approval. Such procedures are useful in terrain rich environments or operations with airspace constraints.

(z) **RNP APCH:** RNP approach procedures include existing RNAV (GNSS) or RNAV (GPS) approach procedures designed with a straight segment[6].

(aa) **RNP:** Required Navigation Performance.

(bb) **SEI:** Safety Enhancement Initiative

(cc) **SBAS:** Satellite Based Augmentation System

(dd) **VNAV:** Vertical Navigation

(ee) **WAAS:** USA-Wide Area Augmentation System

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, the 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[7] prioritized 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 CFIT sub working group developed a Safety Enhancement Initiative (SEI) focused on Instrument Approach Procedures (IAP) utilising CDFA techniques[8] with a goal of precluding future CFIT accidents.

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[6] ICAO Doc 9613 Part II C 5.1.1.2. See also ICAO Doc 8168 Vol1 Part II Section 3 Figure II-3-1-1

[7] This is re-iterated in the GASP 2014-2016

[8] Such procedures can be described as 'precision like' in the sense that they allow flight crew to conduct the final approach to land at a constant descent rate and angle in a manner similar to that practiced by following the (externally referenced) glideslope during an ILS precision approach.

4.0 NPA OPERATIONAL PROCEDURES AND FLIGHT TECHNIQUES

4.1 NPAs are designed to permit safe descent to a Minimum Descent Altitude (MDA). Unlike a Decision Altitude (DA) associated with a precision approach (or an Approach Procedure with Vertical guidance (APV)) where the loss of height during the initial stage of a missed approach is taken into account, obstacle clearance is not assured if descent below the MDA occurs, and flight crew need to ensure that the aircraft's descent is arrested prior to reaching the MDA.

4.2 NPAs terminate in a visual segment that may provide for:

- A 'straight-in' landing.
- A circling approach that requires maneuvering to align the aircraft with the landing runway.
- A visual leg from a point where the MDA is reached to the circling area of the aerodrome.

4.3 Traditionally NPAs were flown as a series of descending steps conforming to the minimum published altitudes. This technique is referred to, colloquially, as the "dive and drive" method. Unfortunately many CFIT accidents have been attributed to, flight crew descending before clearing a limiting step or flight crew failing to arrest descent when approaching a limiting step or other such human lapses/ errors/ factors. An aircraft's descent is more difficult for the flight crew to manage where changes are required in power, rate of descent, and aircraft configuration as is the case during a stepped descent. This can lead to an increased flight crew workload and a corresponding reduction in their situational awareness.

4.4 Where NPAs are published with a Vertical Descent Angle (VDA)[9], the conduct of a stable approach complying with all limiting altitudes is facilitated.

4.5 CDFA approach techniques contribute to an approach characterized by a stable:

- Airspeed
- Descent rate, and
- Flight path in the landing configuration to a point where the landing manoeuver begins.

A CDFA approach is not only safer but also:

- Improves fuel efficiency by minimizing the flight time at low altitudes.
- Reduces noise levels

[9] Also referred to as Vertical Path Angle (VPA)

- Reduces the probability of infringement of the required obstacle clearance during the final approach segment.

4.6 Equipment Requirement

CDFA is primarily a concept therefore it requires no specific aircraft equipment other than that specified in the title of the NPA procedure. Once in the landing configuration and when at an appropriate approach fix the flight crew will simply select a rate / angle of descent and adjust it as required to manage the aircraft's flight path within the charted limits of the instrument approach procedure while maintaining the required approach speed and respecting the aircraft's performance envelope. The key is to determine an appropriate descent point and descent rate / angle.

Although RNAV systems and RNAV overlay procedures may be used to assist flight crew in conducting NPA based on legacy azimuth radio navigation aids such as: the Non Directional Beacon (NDB); VHF Omnidirectional Range (VOR); or Localiser (LLZ), it is still necessary for the flight crew to ensure that the approach is monitored and flown within the tolerances of the navigation aid on which the IAP has been designed.

4.7 Identifying the Type of Approach

Whenever the approach minimum is expressed as a MDA the Instrument Approach Procedure (IAP) is a Non-Precision Approach (Refer to the Annex, Figures 1A and 1B).

A NPA procedure, when conducted with reference to representations of the aircraft's vertical profile calculated by the onboard flight guidance computers, does not necessarily ensure compliance with all altitude constraints or the approach design gradient.[10] That is- a NPA must not be flown using flight directors as command instruments to provide guidance in the vertical plane. Any representation of the aircraft's vertical profile must be considered **advisory** only.

4.8 Preparation

Before conducting a NPA ensure:

a) The aircraft's navigation, flight management and instrument systems have been approved for NPA operations, and

b) Where required, GNSS Receiver Autonomous Integrity Monitoring (RAIM) is available and verified by NOTAM or a prediction service, and

c) Where required the Actual Navigation Performance (ANP) meets the RNP standard applicable to the instrument procedure being flown, and

d) The aircraft manufacturer has approved the aircraft for NPA operations and the aircraft complies with the minimum equipment listed to enable the conduct of NPA's, and

[10] This is not always clearly documented by the flight management system manufacturers.

e) The crew are appropriately qualified and meet all recency requirements, and

f) The operator has approved the conduct of NPA for the aircraft type and the aerodrome, and

g) The airport meets the applicable runway and lighting standards.

4.9 Recommended Operating Procedures

(1) Lateral Navigation/ LNAV

- GNSS /Inertial Navigation System (INS) or VOR; LLZ; NDB
- A NPA can be flown with lateral guidance provided by conventional navigation aids such as VOR; NDB; LLZ as well as by using an approved RNAV system. All RNAV operations are critically dependent on valid data. The operator must have in place quality processes that ensure database validity.

(2) Vertical Information

- The approach should be flown to the NPA MDA respecting all altitude constraints primarily by reference to the altimeter, supplemented by reference to the vertical advisory information provided by flight guidance computers
- Where an accurate local QNH source is / is not available the approach minima may need to be adjusted
- In addition to normal SOPs it is necessary for each crewmember to independently verify the destination altimeter subscale setting.

(3) Visual

- Non-standard temperature effects and altimeter subscale setting round down can cause vertical errors from the nominal path. Flight crew must understand this effect and be aware that a lack of harmony with visual approach slope aids may occur, and indeed should be anticipated
- Operators must ensure that flight crew are aware of the effects of non-standard temperatures and altimeter subscale round down.

4.10 Computing Rate of Descent

CDFA requires use of the approach path angle / Vertical Descent Angle (VDA) published in the IAP.

A VDA incorporated in a navigation database can be used by the flight guidance computers and presented as a vertical profile (pseudo glideslope) to the pilot. Any such representation is to be regarded as advisory only.

Aircraft equipped with a Flight Path Angle (FPA) capability enable the flight crew to more precisely fly the design VDA (whether manually or by use of an autopilot). Pilots of aircraft without flight guidance systems or a flight path angle capability will need to compute a rate of descent which correlates with the design VDA.

The table presented in Figure 3 to the Annex offers flight crew a way to compute a rate of descent or, knowing the altitude change required per nautical mile (NM) - the angle of descent.

Exercise:

Refer to LOC/ NDB Runway 2 approach at La Porte Municipal Airport (Shown in the Annex, Figure 4).

(1) Find the published VDA[11]

(2) From the table find the descent gradient expressed in ft. /NM which equates to the published VDA[12]

(3) From the table, convert that gradient to a descent rate based on groundspeed[13]

4.11 VDA Design

The VDA is calculated from the Final Approach Fix (FAF) altitude to the threshold crossing height (TCH). The optimum NPA descent angle (VDA) is 3.0 degrees[14].

On approaches with step-down fixes, the goal is to publish a VDA that keeps the aircraft's vertical path above the step-down fixes. In some cases, the VDA is calculated from a step-down fix altitude to the TCH. In this situation, the VDA is published on the profile chart after the associated step-down fix (Refer to the Annex, Figure 5). In most cases, the descent angle between the FAF altitude and the step-down fix altitude is slightly shallower than the published VDA for the segment between the step-down fix and the runway.

Operators should determine how they would like their pilots to fly such approaches.

- Option 1: Descend from the FAF at the shallower rate in order to cross above the step-down fix altitude and then transition to published VDA, or

[11] In this example, it is 3.20 degrees
[12] 340 feet (ft.) per nautical mile (NM).
[13] A groundspeed of 120 knots (kts) requires a rate of descent of 680 fpm to fly the 3.20-degree descent angle.

[14] The minimum and maximum VDA can range from 2.75 º to 3.77 º depending on the Instrument Approach Procedure Design standard used.

- Option 2: Begin descent at a point past the FAF to allow the aircraft to descend at the published VDA and still clear the step-down fix altitude. Refer to the Tallahassee Regional, VOR RWY 18 approach (Annex, Figure 5).
    - To calculate the descent point beyond the FAF:
        1. First determine the desired altitude to lose: (FAF (2,000 ft.) – (Airport Elevation (81 ft.) + TCH (46 ft.))) = 1,873 ft.
        2. Take the desired altitude to lose (1,873 ft.) and divide by the descent gradient (316 ft. /NM) that equates to the 2.98º VDA.
        3. This produces a distance of 5.9 NM from the runway threshold or 2.8 DME when outbound on the 173 radial from the SZW VORTAC.
        4. The descent rate will be 632 fpm at a groundspeed of 120 knots.

CAUTION: When conducting a NPA any representation of the aircraft's vertical profile should be considered to be advisory ONLY. Strict adherence by the flight crew to the limiting or minimum altitudes is essential for obstacle clearance.

4.12 Timing-Dependent Approaches

Control of airspeed and rate of descent is particularly important on approaches solely dependent on timing to identify the Missed Approach Point (MAP). Pilots should cross the FAF already configured for landing and at the correct speed for the final approach segment.

4.13 Derived Decision Altitude (DDA)

Pilots must not descend below the MDA when executing a missed approach from a NPA. Operators should instruct their pilots to initiate the go-around at an altitude above the MDA (referred to as the DDA) which ensures the aircraft does not descend below the published MDA.

4.14 Decision Approaching MDA

Flying the published VDA will have the aircraft intersect the plane established by the MDA at a point before the MAP. Approaching the MDA, the pilot has two choices: continue the descent to land with required visual references, or execute a missed approach, not allowing the aircraft to descend below the MDA. (See the Annex, Figure 1B- Approach Example Using Continuous Descent Final Approach.)

4.15 Executing a Missed Approach Prior to the MAP

When executing a missed approach prior to the MAP and not cleared otherwise by an Air Traffic Control (ATC) climb-out instruction, fly the published missed approach procedure. Proceed on track to the MAP before accomplishing a turn.

4.16 Visibility Minima Penalty

The appropriate Operations Specification (OpSpec); Management Specification (MSpec) document, and /or Letter of Authorization (LOA) will detail the visibility penalty to be applied to the published approach minima in the event that an operator does not use the CDFA technique when conducting NPAs.

5.0 APV OPERATIONAL PROCEDURES AND FLIGHT TECHNIQUES

5.1 APV by design incorporates the CDFA concept. The conduct of an APV approach contributes positively to situational awareness by reducing flight crew workload at a critical stage of flight. This in turn reduces the risk of CFIT.

5.2 APV approaches are designed to provide vertical guidance to a Decision Altitude (DA). Where an approach is designed to a DA the loss of height during the initial stage of a missed approach is taken into account.

The 36th ICAO Assembly in 2007 passed a resolution encouraging States to implement approach procedures with vertical guidance (Baro-VNAV and/or SBAS) for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016. This resolution was reiterated at the 37th Assembly in 2010, where RNAV (GNSS) NPA was also recognised as an acceptable alternative where APV cannot be implemented.

5.3 APV approaches terminate in a visual segment and provide for a 'straight-in' landing. An APV approach is not a precision approach.

5.4 APV (like CDFA) procedures contribute to a stabilized approach and are characterized by a stable:

- Airspeed
- Descent rate, and
- Flight path, in the landing configuration to the point where the flare manoeuver begins.

An APV approach is not only safer but also:

- Improves fuel efficiency by minimizing the flight time at low altitudes.
- Reduces noise levels.
- Reduces the probability of infringement of the required obstacle clearance during the final approach segment.

5.5 Equipment Requirements

APV approaches **require** specific aircraft equipment. To ensure that the obstacle clearance requirements of the approach are met, the procedure must be flown within the tolerances of the navigation system on which the procedure is based **and** the barometric altimeter *system* must be within the manufacturer's and operator's accuracy limits.

5.6 Identifying the Type of Approach

- If an IAP minimum is expressed as LNAV/VNAV (DA); LPV (DA); or RNP AR APCH (DA) it means that the approach is an APV approach and that representations on aircraft navigation systems of the aircraft's vertical profile with respect to the design VDA can be considered as providing guidance. Flight directors systems can be used as command instruments in order to maintain the correct approach profile.

Note: It is good practice to determine the rate of descent required to achieve the design VDA. (Refer Figure 2 in the Annex).

- An approach conducted using the flight directors as command instruments can provide a higher level of safety over CDFA NPA since a flight crew's workload can be further reduced leading to a corresponding increase in their situational awareness.

5.7 Preparation

Before commencing an APV approach the flight crew must ensure:

a) The aircraft's navigation, flight management and instrument systems have been approved for APV operations, and

b) GNSS RAIM is available and verified by NOTAM or a prediction service, and

c) Where required the Actual Navigation Performance (ANP) meets the RNP standard applicable to approach being flown, and

d) The aircraft manufacturer has approved the aircraft for APV operations and the aircraft complies with the minimum equipment listed to enable the conduct of an APV approach, and

e) The crew are appropriately qualified and meet all recency requirements, and

f) The operator has approved the conduct of a APV approaches for the aircraft type and the aerodrome, and

g) The airport meets the applicable runway and lighting standards.

5.8 Recommended Operating Procedures

(1) Lateral Navigation/ LNAV

GNSS or GNSS/INS

- An APV approach must be extracted from the aircraft database. All RNAV and RNP operations are critically dependent on valid navigation data. The operator must have in place quality processes to ensure database validity. Where corrective action is required it must be taken prior to the effective date of the database or if a problem is discovered in a current database, corrective action must be taken such as issuing a company NOTAM or withdrawal of the procedure.

- No alterations are to be made to the database procedure between the Final Approach Point (FAP) and the MAP, except to add/ modify speed constraints.
- GNSS RAIM is available and the aircraft meets the RNAV or RNP standard required by the instrument approach procedure.
- Positive crew action is required when cross track deviation reaches ½ RNP for the relevant segment.
- A missed approach must be initiated when cross track deviation exceeds the RNP value for the segment.

(2) Vertical Navigation/ VNAV

BARO

- The approach is flown to a DA.
- If an approved local QNH source is/ is not available an adjustment to the DA may be required.
- The reported temperature must be above the minimum specified on the IAP chart.
- When conducting an LNAV/VNAV approach, the primary means of obstacle clearance is provided by the VNAV system rather than the altimeter, and adherence to the vertical flight path within reasonable tolerance is required. Vertical deviations from the defined path shall be limited to +/-75 ft.
- As the flight path guidance provided by a barometric VNAV system is directly affected by the altimeter subscale setting, particular attention needs to be placed to pressure setting.
    - In addition to normal Standard Operating Procedures (SOPs) it is necessary for each crewmember to independently verify the destination altimeter subscale setting.
    - In addition to the existing aircraft system design features that will alert crew to some altimeter setting errors it is recommended that at least one Radio Altimeter (RA) and the Enhanced Ground Proximity Warning System (EGPWS) are serviceable prior to commencing any APV approach.
- Altimeter subscales can be miss-set for a variety of reasons. It is important to remember that this issue is not unique to Baro VNAV operations. Any approach which relies on barometric information for vertical profile information will be affected by a miss-set altimeter subscale.

Augmented GNSS [15]

- Where a SBAS[16] is available and the vertical performance is in accordance with AMC 20-28 an approach to LPV (DA) can be conducted otherwise a NPA to a LP (MDA) must be made.

(3) Visual

- Non-standard temperature effects and altimeter subscale setting round down can cause offset errors from the nominal path. Flight crew must understand this effect and be aware that a lack of harmony with visual approach slope aids may occur, and indeed should be anticipated.
- Operators must ensure that flight crew are aware of the effects of non-standard temperatures and altimeter subscale round down.

5.10 Decision Altitude (DA)

At the DA, the pilot has two choices:

1. Continue the descent to land with required visual references, or
2. Execute a missed approach.

5.11 Executing a Missed Approach prior to the MAP

When executing a missed approach prior to the MAP, unless directed otherwise by an Air Traffic Control (ATC) instruction, fly the published missed approach procedure. This means, proceed on track to the MAP, before accomplishing a turn.

Note 1.— Guidance on the operational approval for approach and landing operations with vertical guidance using BARO-VNAV equipment can be found in the Performance Based Navigation Manual (Doc 9613) Volume II Attachment A titled 'Barometric-VNAV'.

Note 2. — For challenging obstacle environments or where tight separation requirements exist, specific procedure design criteria are available for approach and landing operations with vertical guidance. Associated operational approval guidance for RNP AR APCH operations can be found in the Performance Based Navigation Manual (Doc 9613) Volume II Part C Chapter 6 titled 'Implementing RNP AR APCH'.

5.12 Approach Requirement

[15] Some flight management system equipment manufacturers claim their navigation equipment will provide LNAV/VNAV capability but this may not be true if the equipment is reliant on an augmentation system which has not yet been established in the region.

[16] The Civil Aviation Safety Authority of Australia (CASA) refers to SBAS as Space Based Augmentation System in CAAP 178-1(2)

APV requires the use of the approach path angle / Vertical Descent Angle (VDA) published on the IAP.

5.13 Computing Rate of Descent.

The table presented in Figure 2 of the Annex offers the flight crew a way to compute a rate of descent based on either the altitude change required per nautical mile (NM) or the angle of descent. Knowledge of the rate of descent required enables flight crew to cross check that the IAP design VDA is being correctly flown.

6.0 SOP and FCT

Operators should revise their SOP and Flight Crew Training (FCT) programs to identify CDFA as a standard method of conducting NPA and APV. Operators should consult: the relevant State regulations; Original Equipment Manufacturer (OEM) bulletins; and advisory documents such as the FAA AC 120-71A; COSCAP AC SEA 002A; and the *RASG- APAC Model Advisory Circular regarding Standard Operating Procedures for Flight Deck Crew Members (currently under development)*- in order to develop procedures specific to their needs.

7.0 INSTRUMENT APPROACH CHARTS

7.1 Navigation terminology is subject to ongoing revision. For this reason operators should **consider** charting options which minimize the likelihood of instrument approach charts being misused, misinterpreted or misread by the flight crew. One such method would be the customisation of charts such that only those which bear the operator's logo are to be used by that operator's flight crew. This will minimise the chance of flight crew members conducting an approach for which they or the operator are not authorised. Operating minima (MDA/DA) should also be customised to reflect corrections to be applied by the flight crew to the approach minima stemming from Management Specifications (MSpecs) or those imposed by a State in Operational Specifications (OpSpec) documents or Letters of Authorisation (LOA).

8.0 ACTION BY STATES

States should further enhance aviation safety by:

9.0 INFORMATION MANAGEMENT

(1) Not applicable.

10.0 DOCUMENT HISTORY

(1) Not applicable.

11.0 CONTACT OFFICE

Issued under the authority of:

[Name]

[Title] [Typically, this would be the Director General]

[National Civil Aviation Administration]

For more information, please contact:

[Name]

[Title] [Typically, this would be the Technical Office responsible for the subject of this AC]

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Suggestions for amendment to this document are invited, and should be submitted to:

[Name]

[Title]

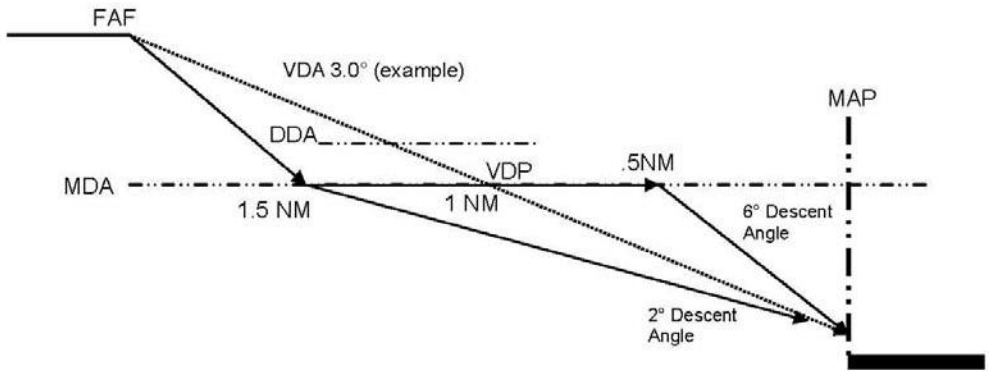
[National Civil Aviation Administration]

[Email]

[Phone]

12.0 ANNEX

FIGURE 1A
APPROACH WITHOUT USING CONTINUOUS DESCENT FINAL APPROACH

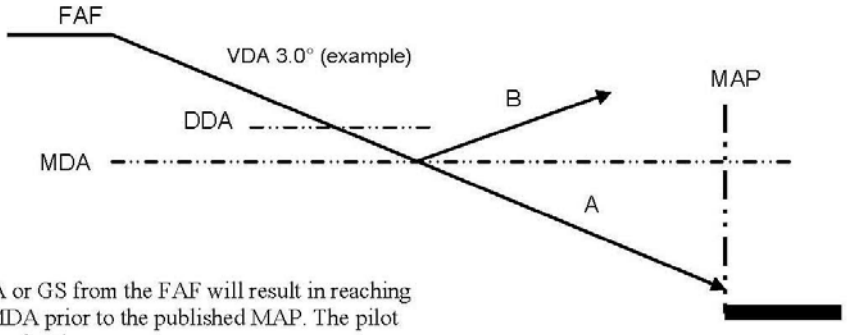


In this example, the aircraft leveled at the MDA (dive and drive) and is proceeding to the MAP in an attempt to acquire the required visual references to continue the approach below the MDA. The 3.0° VDA would be used in this example to fly a CDFA.

A. As the aircraft approaches the published MAP, the required descent angle to the runway threshold steepens. At approximately.5 NM from the MAP, the required angle has increased to 6°. At a groundspeed of 120 kts, a 1270 FPM rate of descent would be required to cross the threshold at a planned TCH of 50 ft. The steep final angle, low-power setting and high descent rate may result in an unstable approach and unsafe condition in the transition to landing.

B. If a pilot descends .5NM early, a 2° descent angle is required. At a groundspeed of 120 kts., this corresponds to a 425 FPM rate of descent. Higher power settings and increased deck angles are required, the aircraft is closer to the ground and the TCH may be reduced to an unsafe height for large aircraft.

FIGURE 1B
APPROACH USING CONTINUOUS DESCENT FINAL APPROACH TECHNIQUE



Flying the VDA or GS from the FAF will result in reaching the DDA and MDA prior to the published MAP. The pilot has two courses of action:

A. If required visual cues are acquired, continue visually to the landing runway.

B. If required visual cues are not acquired, execute a missed approach. Do not descend below the MDA. Proceed on track to the MAP before accomplishing a turn.

FIGURE 2
INSTRUMENT APPROACH PROCEDURE LEGEND

09071

LEGEND

INSTRUMENT APPROACH PROCEDURES (CHARTS)

PROFILE VIEW

Two different methods are used for vertical guidance:
a. "GS" indicates an electronic glide slope or barometric vertical guidance is present. In the case of an Instrument Landing System (ILS) and Wide Area Augmentation System (WAAS) LPV approach procedures, an electronic signal provides vertical guidance. Barometric vertical guidance is provided for RNP and LNAV/VNAV instrument approach procedures. All ILS, LPV, RNP, and LNAV/VNAV will be in this format GS 3.00°/TCH 55, located in the lower left or right corner.

b. Other charts without electronic or barometric vertical guidance will be in this format ∠3.00°/TCH 55, indicating a non-precision vertical descent angle to assist in preventing controlled flight into terrain. On Civil (FAA) procedures, this information is placed above or below the procedure track following the fix it is based on.

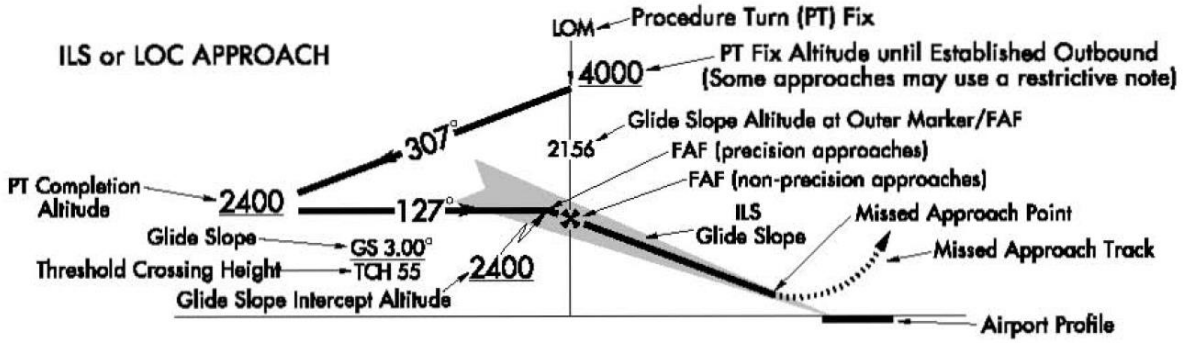


FIGURE 3
RATE OF DESCENT TABLE

CLIMB/DESCENT TABLE 10042

INSTRUMENT TAKEOFF OR APPROACH PROCEDURE CHARTS
RATE OF CLIMB/DESCENT TABLE

(ft. per min)

A rate of climb/descent table is provided for use in planning and executing climbs or descents under known or approximate ground speed conditions. It will be especially useful for approaches when the localizer only is used for course guidance. A best speed, power, altitude combination can be programmed which will result in a stable glide rate and altitude favorable for executing a landing if minimums exist upon breakout. Care should always be exercised so that minimum descent altitude and missed approach point are not exceeded.

CLIMB/ DESCENT ANGLE (degrees and tenths)		ft/NM	GROUND SPEED (knots)										
			60	90	120	150	180	210	240	270	300	330	360
2.0		210	210	320	425	530	635	743	850	955	1060	1165	1275
2.5		265	265	400	530	665	795	930	1060	1195	1325	1460	1590
VERTICAL PATH ANGLE	2.7	287	287	430	574	717	860	1003	1147	1290	1433	1576	1720
	2.8	297	297	446	595	743	892	1041	1189	1338	1486	1635	1783
	2.9	308	308	462	616	770	924	1078	1232	1386	1539	1693	1847
	3.0	318	318	478	637	797	956	1115	1274	1433	1593	1752	1911
	3.1	329	329	494	659	823	988	1152	1317	1481	1646	1810	1975
	3.2	340	340	510	680	850	1020	1189	1359	1529	1699	1869	2039
	3.3	350	350	526	701	876	1052	1227	1402	1577	1752	1927	2103
	3.4	361	361	542	722	903	1083	1264	1444	1625	1805	1986	2166
3.5		370	370	555	745	930	1115	1300	1485	1670	1860	2045	2230
4.0		425	425	640	850	1065	1275	1490	1700	1915	2125	2340	2550
4.5		480	480	715	955	1195	1435	1675	1915	2150	2390	2630	2870
5.0		530	530	795	1065	1330	1595	1860	2125	2390	2660	2925	3190
5.5		585	585	880	1170	1465	1755	2050	2340	2635	2925	3220	3510
6.0		640	640	960	1275	1595	1915	2235	2555	2875	3195	3510	3830
6.5		690	690	1040	1385	1730	2075	2425	2770	3115	3460	3805	4155
7.0		745	745	1120	1490	1865	2240	2610	2985	3355	3730	4105	4475
7.5		800	800	1200	1600	2000	2400	2800	3200	3600	4000	4400	4800
8.0		855	855	1280	1710	2135	2560	2990	3415	3845	4270	4695	5125
8.5		910	910	1360	1815	2270	2725	3180	3630	4085	4540	4995	5450
9.0		960	960	1445	1925	2405	2885	3370	3850	4330	4810	5295	5775
9.5		1015	1015	1525	2035	2540	3050	3560	4065	4575	5085	5590	6100
10.0		1070	1070	1605	2145	2680	3215	3750	4285	4820	5355	5890	6430

FIGURE 4
APPROACH: LOCALIZER / NON-DIRECTIONAL BEACON RUNWAY 02

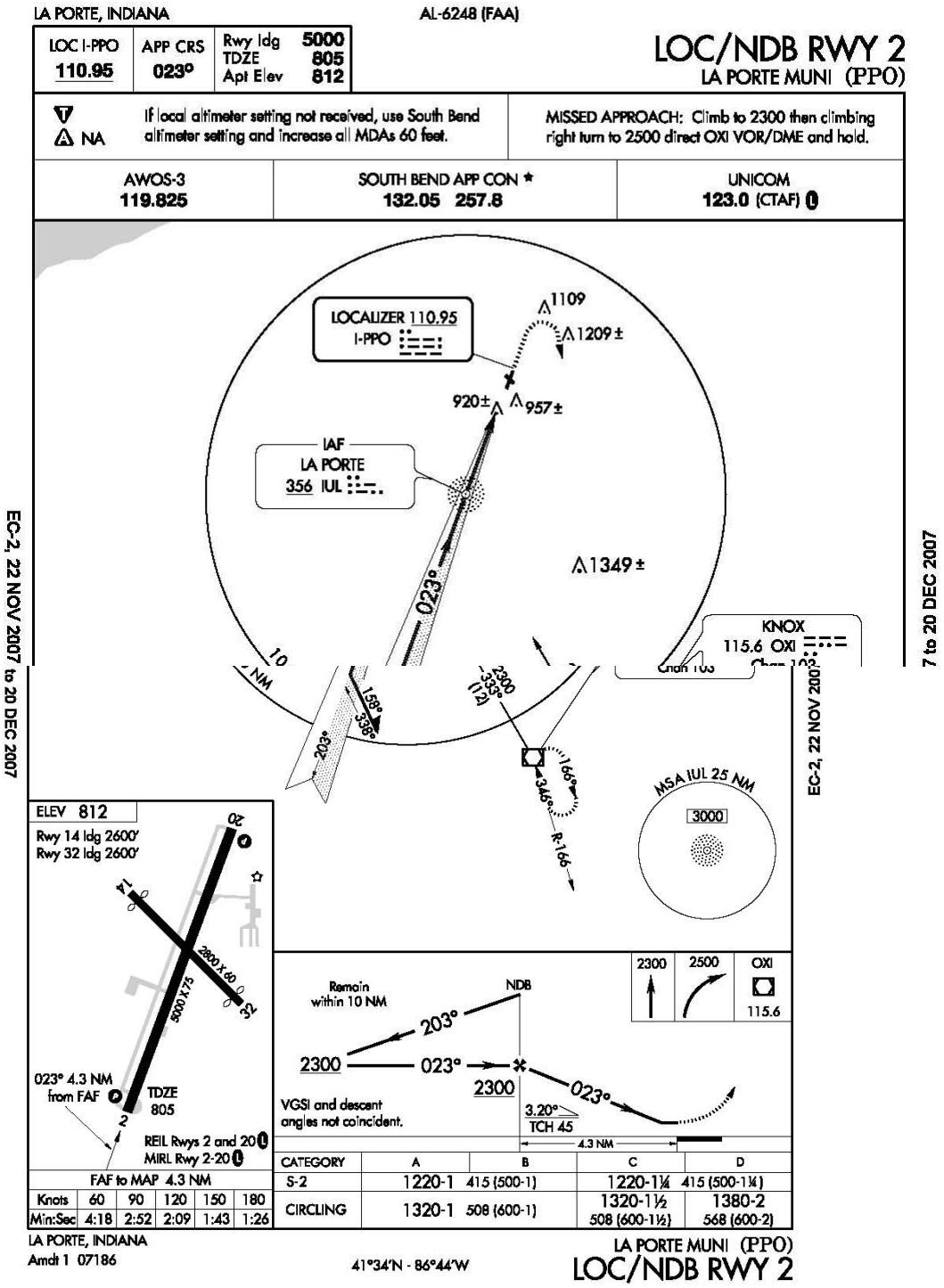
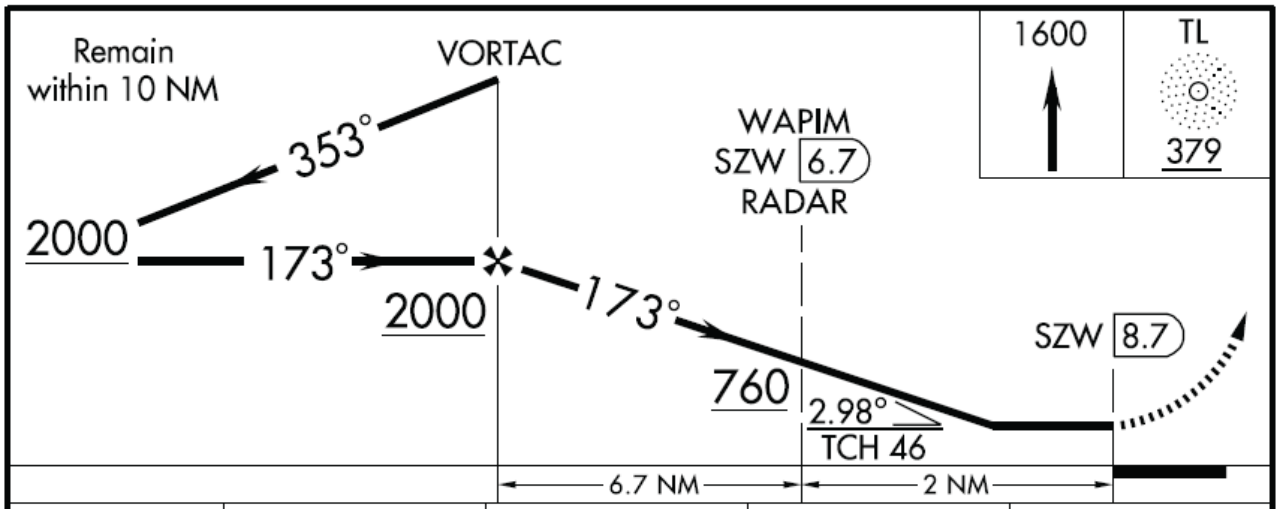


FIGURE 5
INSTRUMENT APPROACH PROCEDURES WITH CONTROLLING STEPDOWN FIX



CATEGORY	A	B	C	D
S-18	760-1	679 (700-1)	760-2 679 (700-2)	760-2¼ 679 (700-2¼)
CIRCLING	760-1	679 (700-1)	760-2 679 (700-2)	760-2¼ 679 (700-2¼)
WAPIM FIX MINIMUMS				
S-18	540-1	459 (500-1)	540-1¼ 459 (500-1¼)	540-1½ 459 (500-1½)
CIRCLING	540-1	459 (500-1)	580-1½ 499 (500-1½)	640-2 559 (600-2)

TALLAHASSEE, FLORIDA
Amdt 11A 09043

TALLAHASSEE RGNL (TLH)
VOR RWY 18

Image

[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

This page is NOT part of the Model Advisory Circular

Model Advisory Circular	
Subject:	Issuance of Safety Alert /Warning due to unsafe proximity to terrain or obstacles
Document Number	
Issue number	
Issue Effective Date	
Valid until date	
Approved	[RASG Decision reference, date]
ICAO Secretariat file no.	
ICAO Technical Office:	
Inform Changes to:	

	Document History	
Issue number	**Description**	**Effective**

This page is NOT part of the Model Advisory Circular

– Title & Image – NATIONAL CIVIL AVIATION ADMINSTRATION

Advisory Circular			
Subject:			
Issuing Office:		Document No.:	
File No.:		Issue Number:	01
Available from		Effective Date:	
		Valid until:	

Table of Contents

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 11and 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

Issued under the authority of:

Name and Title of the person with authority to issue this AC on behalf of the National Civil Aviation Administration. Typically, this would be the Director General

[Name]

[Title]

[National Civil Aviation Administration]

For more information, please contact:

Name and Title of the Technical Office responsible for the subject of this AC

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[Title]

[National Civil Aviation Administration]

[email]

[phone]

Suggestions for amendment to this document are invited, and should be submitted to:

[Name]

[Title]

[National Civil Aviation Administration]

[email]

[phone]

<Cover Page>

International Civil Aviation Organization (ICAO)

Regional Aviation Safety Group (Asia & Pacific Regions)

Asia Pacific Regional Aviation Safety Team

Develop a set of Runway Safety Checklists suitable for use by ANSPs, Airlines and Airport Operators to benchmark their level of safety against best practice.

developed by

[CANSO for the Runway Safety Sub-Group]

Executive Summary

CANSO has been developing a global runway excursion risk map using the Bow Tie technique, to assist in identifying potential weaknesses in the ATM system in the final phase of flight. The work has led to CANSO developing a set of Runway Safety Checklists suitable for use by ANSPs, Airlines, Airport Operators, Regulators and ATEL/ANAV providers to benchmark their level of safety against best practice.

Version 1 dated 08 05 2013

<Preamble>

Background on Regional Aviation Safety Group – Asia & Pacific (RASG – APAC)

The Regional Aviation Safety Group Asia-Pacific (RASG-APAC) was established in 2011 by the Council of ICAO. The RASG-APAC is tasked with improving aviation safety in the Asia & Pacific regions by developing and implementing a work programme, in line with the ICAO Global Aviation Safety Plan, aimed at identifying and implementing safety initiatives to address known safety hazards and deficiencies in the region.

The Asia Pacific Regional Aviation Safety Team (APRAST), a sub-group of the RASG-APAC, assists the RASG-APAC in its work by recommending safety interventions which will reduce aviation safety risks.

The full commitment and active participation of APAC States/Administrations and the industry partners is fundamental to the success of the RASG-APAC in reducing aviation safety risks and accident rates in the Asia and Pacific regions.

Disclaimer

This report makes use of information, including air transport and safety related data and statistics, which is furnished to the RASG/APRAST by third parties. All third party content was obtained from sources believed to be reliable and was accurately reproduced in the report at the time of printing. However, RASG/APRAST specifically does not make any warrants or representations as to the accuracy, completeness or timeliness of such information and accepts no liability or responsibility arising from reliance upon or use of the same. The views expressed in this report do not necessarily reflect individual or collective opinions or official positions of RASG/APRAST Members. It is the responsibility of each RASG/APRAST member to determine the applicability of the contents of this report. If there should be any conflict between the contents of this report and ICAO Standards, then the ICAO Standards will take precedence over that contained in this report.

Feedback/Enquiries

Should there be any feedback or queries with regard to this report, please address them to:

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Development of Runway Safety Maturity Checklists

Introduction

1.1 ICAO Assembly resolution A 37-6 on Runway Safety urged States to take measures to enhance Runway Safety, including the establishment of runway safety programmes using multidisciplinary approach that includes at least the regulators, Aircraft Operators, Air Navigation Service Providers, Aerodrome Operators and Aircraft Manufacturers to prevent and mitigate the effects of runway excursions, runway incursions and other occurrences related to runway safety.

1.2 CANSO has been working closely with Eurocontrol, and the Federal Aviation Administration (FAA), and supported by ICAO, IATA, ACI and industry associations, to develop a Runway Safety Maturity Checklist that can be used ANSPs, Airlines, Airport Operators, Regulators and ATEL/ANAV providers to determine the relative 'strength' of runway safety efforts in their sector, region etc. Such a tool will be useful in enabling organisations to improve their runway safety index (performance) over time.

1.3 This report details the work completed by CANSO for Runway Safety Sub-Group SEI/RS1 – *Runway Safety Maturity Checklist.*

Background of Safety Enhancement Initiative (SEI)

1.4 CANSO has developed a global runway excursion risk map using the Bow Tie technique, to assist in identifying potential weaknesses in the ATM system in the final phase of flight. This work has provided the opportunity to strengthen human centred risk controls.

1.5 The work has enabled CANSO to identify specific training for pilots and air traffic controllers to avoid unstable approaches – an identified precursor to runway excursions. Training products, including a booklet, flyers and a web application, were completed through as SEI/RE2 - *Training for Pilots and Air Traffic Controllers to Avoid Unstabilized Approaches.*

1.6 The risk map has also allowed the development of a Runway Safety Maturity Checklist, which has been designed to allow ANSPs, Airlines, Airport Operators, Regulators and ATEL/ANAV providers to benchmark their respective levels of maturity with regard to managing Runway Safety risks. The checklist identifies key elements, (which equate to risk controls derived from the risk map), and uses a series of questions to assess an organisation's maturity against each element. The assessment calls for evidence against each of the following questions, for each element of the checklist:

1.6.1 Is there a practice in place?

1.6.2 Is the practice written down?

1.6.3 Are people trained, checked and assessed?

1.6.4 Is it working? How do you know?

1.6.5 How could you improve the element?

1.7 The checklist uses the Analytical Hierarchy Process (AHP) to assist organisations to prioritise their improvement actions around Safety Benefit, Financial Impact, Stakeholder Impact, Complexity, and Dependencies.

1.8 A hard copy of the checklist was released on 18 June 2013 in conjunction with the deliverables for APRAST1 SEI/RE2 - *Training for Pilots and Air Traffic Controllers to Avoid Unstabilized Approaches.*

1.9 Since the release of the hard copy version, Eurocontrol have successfully developed and trialled an online version of the checklist within their Comparion programme. The online version incorporates the AHP considerations allowing 'scores' for each element to be automatically calculated by the programme. The online version is now available for industry use and Eurocontrol have established a dedicated email mailbox for organisations to request access. The mailbox address is rwysafety@eurocontrol.int.

Applicability to States / Industry

The Runway Safety Maturity Checklist is designed to benefit ANSPs, Airlines, Airport Operators, Regulators and ATEL/ANAV providers by enhancing their understanding of unstable approaches and providing guidance on how to reduce the likelihood of such situations.

SEI Contents / Phases

The Runway Safety Maturity checklist has been completed and the online version is available for access by industry.

Action/Comments by RASG

1.10 The RASG is invited to:

a) Note the work of the Runway Safety Sub-Group in the completion of SEI/RS1 – *Runway Safety Maturity Checklist.*

b) *Promote the Runway Safety Maturity Checklist to States as appropriate.*

Runway Safety Maturity Checklist

ATC	Element What are you looking for? For example, "Do you have….."	Objective Why are you looking for it?	Does the element exist? Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	Training Are people trained in the use of the element? Remedial and/or Refresher training? Details	Is it working? How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	Improvement What could you do to improve this element?	Index
ATC	ATC procedures to ensure that ATIS is updated in a timely manner and the action is recorded and/or directly broadcasted e.g. including a) SPECIs b) Wind shear reports (pilot and/or system derived) c) PIREP d) Soliciting Pilots for updates e) Runway Surface Conditions f) Approach aid status (unavailability) e) Other	Meteorological information is provided, timely and accurate					
ATC	Agreement between ATC and Meteorological office to notify ATC of changing weather conditions	ATC receives accurate and timely weather information where PIREPs are not provided or meteorological conditions are different from the ATIS.					
ATC	ATC procedures for provision of timely, accurate and clear instructions to Flight Crew including position, track and distance information based on aircraft type and performance to convey traffic management intentions e.g. following a) any updates b) change to sequence c) turning a/c in close d) vectoring e) before approach gate (e.g. 5nm from airport or 1nm from final approach fix which ever is farther) provide position and distance information. f) vector aircraft to intercept the glidepath from below g) aircraft off published approach due wx, wake turbulence separation etc. h) other	ATC providing instructions to establish / maintain / re-establish a stabilised approach					

ATC	**Element** **What are you looking for?** **For example, "Do you have….."**	**Objective** **Why are you looking for it?**	**Does the element exist?** **Is it written down (e.g. procedure)?** **Does it exist (e.g. equipment, signs, markings etc)?** **Details**	**Training** **Are people trained in the use of the element?** **Remedial and/or Refresher training?** **Details**	**Is it working?** **How do you know?** **(e.g. incident reports, analysis, corrective action, feedback)** **Details**	**Improvement** **What could you do to improve this element?**	**Index**
ATC	ATC flow control procedures manage ATC capacity to ensure provision of track and distance information allowing for prevailing meteorological conditions	ATC workload is managed to ensure timely, accurate and clear instructions are provided to Flight Crew including required position, track and distance information					
ATC	ATC supervisor and controller roles and responsibilities require monitoring of controller environment, workload, distractions, and internal or external pressures are not influential.						
ATC	ATC procedures for late notice runway changes that reduce track miles require planning and assessment of a) aircraft type and performance capability b) vectoring and resequencing to re-establish aircraft profile c) tail wind affect on profile speed d) approach type (i.e. precision/non-precision/visual) e) ICAO noise / capacity criteria for approach requirements dictate acceptability of runway selection f) other	ATC providing instructions to establish / maintain / re-establish a stabilised approach					
ATC	ATC procedures to review aircraft performance guidance material in consultation with Airlines.	Alignment between ATC instruction and airline SOPs for aircraft type, performance and stable approach criteria.					

ATC	Element What are you looking for? For example, "Do you have….."	Objective Why are you looking for it?	Does the element exist? Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	Training Are people trained in the use of the element? Remedial and/or Refresher training? Details	Is it working? How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	Improvement What could you do to improve this element?	Index
ATC	ATC procedures require: a) speed control is only applied outside final approach fix b) ATC monitoring of separation c) query any pilot deviation with speed, or other instruction d) effective communication and coordination between Tower and Approach e) other	Prescribed wake turbulance separation standards are maintained					
ATC	ATC procedures to monitor air speed through Mode S down link of actual aircraft parameters to controller	Controller situation awareness					
ATC	NOTAM system requires publication of approach aid status, runway surface condition (SNOWTAM)	Accurate information to pilots					
ATC	ATC procedures specify the criteria for offering visual approaches recognising the priority of precision/non-precision approaches over visual approaches	Fly precision approaches when available - reduce risk of visual approach					
ATC	ATC procedures require ATC to visually scan aircraft on approach and alert Flight Crew of significant flight path/profile deviation, and respond to pilot requests.	Independent prompt to pilot to consider go-around					
ATC	ATC procedures provide criteria to aid decision making in go around situations (e.g. piggy back issue)	Correct ATC actions to manage separation assurance in go around situations					
ATC	ATC procedures require notification and update to Flight Crew of runway surface condition, including request for runway surface / state inspection	Clear expectation to pilots with regard to required braking system settings					

ATC	Element What are you looking for? For example, "Do you have….."	Objective Why are you looking for it?	Does the element exist? Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	Training Are people trained in the use of the element? Remedial and/or Refresher training? Details	Is it working? How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	Improvement What could you do to improve this element?	Index
ATC	ATC procedures for selection of active runway include consideration of runway surface conditions.	To have runway in use suitable for prevailing conditions					
ATC	ATC procedures detail requirements for protection of critical and sensitive areas of approach aids and runway strip including notifications of obstructions to flight crew.	Prevent deviations in guidance information					
ATC	ATC procedures require monitoring of approach aid status.	Detect failure in approach aid to inform pilot					
ATC	ATC training, checking and assessment regimes verify use of ICAO compliant phraseology including readback/hearback techniques	Standard phraseology applied by all parties					
ATC	ATC procedures require taxiway exit requests only to be provided to landing aircraft after completion of the landing phase.	To enable pilot to maintain directional control of the aircraft					
ATC	ATC provide a mechanism to gain feedback from Airlines regarding ongoing suitability of approach procedures.	Continual improvement					
ATC	Just culture policy and procedures	Robust and complete reporting, trusting non-punitive environment					
ATC	Fatigue risk management system	Controllers fit for duty					
ATC	Drug and alcohol management program	Controllers fit for duty					

ATC	Element What are you looking for? For example, "Do you have….."	Objective Why are you looking for it?	Does the element exist? Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	Training Are people trained in the use of the element? Remedial and/or Refresher training? Details	Is it working? How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	Improvement What could you do to improve this element?	Index
ATC	Fitness for Duty policy and procedures	Controllers fit for duty					
ATC	CRM/TEM/MCRM procedures	Teamwork, improved risk management, appropriate decision making					
ATC	Human Factors training	Understanding human performance and limitations					
ATC	OHS policy and procedures (conducive workplace environment e.g. lighting, temperature, humidity, air quality, ergonomics, noise, distraction etc)	Environment to support optimal performance					

Runway Safety Maturity Checklist

AIRLINE	Element What are you looking for? For example, "Do you have….."	Objective Why are you looking for it?	Does the element exist? Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	Training Are people trained in the use of the element? Remedial and/or Refresher training? Details	Is it working? How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	Improvement What could you do to improve this element?	Index
Airline	Pilot SOPs indicate the stage of approach (e.g. TOD, pre flight briefing) ATIS should be monitored and require a PIREP is to broadcast if the meteorological conditions are different to the ATIS. Eg a) Wind shear reports b) Wake turbulence c) Request ATC updates d) TAF and METAR d) Other						
Airline	Airline SOPs require pilot monitoring of track miles, height or speed on approach including a) confirmation with ATC of new track distance, height or speed information and ATC plans b) rejection of instructions that are outside the SOPs including interception above glidepath	Sufficient / accurate track and distance information is provided by ATC (including sequence change, deviation from track)					
Airline	Airline SOPs require the use of local knowledge in assisting with determining required track miles.						
Airline	Airline SOPs to advise ATC of changes to aircraft type, performance and stable approach criteria.						

AIRLINE	**Element** **What** are you looking for? For example, "Do you have….."	**Objective** **Why** are you looking for it?	**Does the element exist?** Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	**Training** Are people trained in the use of the element? Remedial and/or Refresher training? Details	**Is it working?** How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	**Improvement** What could you do to improve this element?	Index
Airline	Airline SOPs require Flight Crew to: a) Utilise precision approaches where available b) Brief appropriately for non-precision / visual approach when precision approaches are not available. c) Bpply Airline SOPs criteria for use of non-precision and visual approaches d) Request appropriate published instrument approach procedure to a runway with visual vertical guidance (e.g. PAPI, VASIS etc) e) Other						
Airline	Airline SOPs to ensure cross cockpit communication minimises internal/external pressures and power gradient so that decision to continue can be instantly challenged without recourse.						
Airline	Airline procedures support a Just Culture where a go-around or refected take-off is required. (e.g. management support for PF decision to initiate a go-around)	Initiate a go-around when aircraft becomes unstable as specified in Airline SOPs					
Airline	Airline SOPs detail energy management on approach and landing phase: a) for airspeed, thrust, drag, flight path, braking application etc b) standard calls by PNF to alert PF including current automation mode c) to ensure correct profile or initiate go-around.						

AIRLINE	**Element** **What** are you looking for? For example, "Do you have….."	**Objective** **Why** are you looking for it?	**Does the element exist?** Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	**Training** Are people trained in the use of the element? Remedial and/or Refresher training? Details	**Is it working?** How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	**Improvement** What could you do to improve this element?	Index
Airline	Airline SOPs require cross check of information (e.g. rad alt Vs distance) and appropriate response to on-board alerts and cross checks including approach aid status						
Airline	Airline SOPs to assure appropriate use of automation						
Airline	Pilot procedures require notification to ATC of runway surface condition.	ATC will advise other pilots of runway surface condition, may change runway in use.					
Airline	Airline SOPs prescribe braking settings according to runway surface conditions						
Airline	Airline SOPs for recovery from : a) failure of avionics b) failure of undercarriage or braking systems c) failure of flight and propulsion systems d) FMS indicated gross error check						
Airline	Training, checking and assessment to verify use of ICAO compliant phraseology including readback/hearback procedures						
Airline	Mechanism to provide feedback to ATC regarding ongoing suitability of approach procedures.						

AIRLINE	**Element** **What** are you looking for? For example, "Do you have….."	**Objective** **Why** are you looking for it?	**Does the element exist?** Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	**Training** Are people trained in the use of the element? Remedial and/or Refresher training? Details	**Is it working?** How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	**Improvement** What could you do to improve this element?	Index
Airline	Conducting effective pre-flight planning and pre-departure briefing including flight planning packages / NOTAM summaries						
Airline	Airline SOPs detail pre-flight review, walkarounds, acceptance of Minimum Equipment List (MEL), system checks						
Airline	Just culture policy and procedures						
Airline	Fatigue risk management system						
Airline	Drug and alcohol management program						
Airline	CRM/TEM/MCRM procedures						
Airline	Fitness for Duty policy and procedures						
Airline	Human Factors training						
Airline	OHS policy and procedures (conducive workplace environment e.g. lighting, temperature, humidity, air quality, egonomics, noise, distraction etc)						
Airline	Airline enables improvement by providing evidence of reports, analysis, recommendations and implementation of change to procedures/practices/facilities to improve runway safety performance	Application of the SMS for continual improvement to procedures and practices to maximise runway safety performance					

Runway Safety Maturity Checklist

AERODROME	**Element** **What** are you looking for? For example, "Do you have….."	**Objective** **Why** are you looking for it?	**Does the element exist?** Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	**Training** Are people trained in the use of the element? Remedial and/or Refresher training? Details	**Is it working?** How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	**Improvement** What could you do to improve this element?	Index
Aerodrome	Provision of weather information systems (ATIS / AWIS / Windsock / Windshear alerting system/weather radar/runway visibility and range monitoring systems) to provide real-time meteorological information.						
Aerodrome	Provision of available, reliable and accurate precision approach aids a) Redundancy / diversity in system architecture						
Aerodrome	Aerodrome procedures for a) conduct of runway inspections including surface conditions and state b) reporting and repair (e.g. contamination, FOD, damage) c) periodic inspection, reporting and maintenance of lighting, signage, markings and taxiway condition						
Aerodrome	Aerodrome procedures for provision of runway visibility information to ATC.						
Aerodrome	Runway and taxiway layout is designed to optimise runway safety performance by a) being consistent with ICAO requirements b) include RESA and/or other arrestor systems c) appropriate position, length, width, gradient and surface characteristics, friction coatings, grooving, surface texturing and drainage optimised for prevailling conditions, including alternatively aligned runway d) provision of adequate runway (edge & centreline) / taxiway lighting						

AERODROME	**Element** **What are you looking for?** **For example, "Do you have….."**	**Objective** **Why are you looking for it?**	**Does the element exist?** **Is it written down (e.g. procedure)?** **Does it exist (e.g. equipment, signs, markings etc)?** **Details**	**Training** **Are people trained in the use of the element?** **Remedial and/or Refresher training?** **Details**	**Is it working?** **How do you know?** **(e.g. incident reports, analysis, corrective action, feedback)** **Details**	**Improvement** **What could you do to improve this element?**	**Index**
Aerodrome	Availability of ICAO compliant aviation rescue and fire fighting service						
Aerodrome	Emergency planning arrangements which include Airlines, ATC, Aerodrome and emergency services						
Aerodrome	Training, checking and assessment to verify use of ICAO compliant phraseology including readback/hearback procedures (airside vehicle operators)						
Aerodrome	Transponder equipage of vehicles required to operate airside where ground surveillance is available						
Aerodrome	Provision of adequate taxiway and holding point lighting in accordance with ICAO standards						
Aerodrome	Development and implementation of a Snow and Ice Control Plan						
Aerodrome	Partial and full closure of taxiway and runways in accordance with ICAO defined criteria including use of displaced thresholds.						
Aerodrome	Established means to address aerodrome runway safety issues between airlines, ATC and aerodrome operators through a) Established Runway Safety Teams b) Airport safety committees where runway safety is a standing agenda item c) other						
Aerodrome	Just culture policy and procedures						

AERODROME	Element What are you looking for? For example, "Do you have….."	Objective Why are you looking for it?	Does the element exist? Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	Training Are people trained in the use of the element? Remedial and/or Refresher training? Details	Is it working? How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	Improvement What could you do to improve this element?	Index
Aerodrome	Fatigue risk management system						
Aerodrome	Drug and alcohol management program						
Aerodrome	CRM/TEM/MCRM procedures						
Aerodrome	Fitness for Duty policy and procedures						
Aerodrome	Human Factors training						
Aerodrome	OHS policy and procedures (conducive workplace environment e.g. lighting, temperature, humidity, air quality, egonomics, noise, distraction etc)						
Aerodrome	Aerodrome enables improvement by providing evidence of reports, analysis, recommendations and implementation of change to procedures/practices/facilities to improve runway safety performance	Application of the SMS for continual improvement to procedures and practices to maximise runway safety performance					

Runway Safety Maturity Checklist

ATEL/ANAV	**Element** **What** are you looking for? For example, "Do you have….."	**Objective** **Why** are you looking for it?	**Does the element exist?** Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	**Training** Are people trained in the use of the element? Remedial and/or Refresher training? Details	**Is it working?** How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	**Improvement** What could you do to improve this element?	Index
ATEL/ANAV	System maintenance regime to ensure sufficient availability and reliability of ATIS/AWIS etc. When system is not in service, an appropriate alternative method of providing meteorological information should be available.						
ATEL/ANAV	System design requirements specify requirement to flag out of date information presented at the ATC console	Correct meteorological information displayed at ATC console					
ATEL/ANAV	Integrated air traffic management system includes meteorological information integrated into Flow control	Planning of runway changes to minimise negative impact on Airlines					
ATEL/ANAV	Just culture policy and procedures						
ATEL/ANAV	Fatigue risk management system						
ATEL/ANAV	Drug and alcohol management program						
ATEL/ANAV	CRM/TEM/MCRM procedures						
ATEL/ANAV	Fitness for Duty policy and procedures						
ATEL/ANAV	Human Factors training						

ATEL/ANAV	**Element** **What are you looking for?** **For example, "Do you have….."**	**Objective** **Why are you looking for it?**	**Does the element exist?** **Is it written down (e.g. procedure)?** **Does it exist (e.g. equipment, signs, markings etc)?** **Details**	**Training** **Are people trained in the use of the element?** **Remedial and/or Refresher training?** **Details**	**Is it working?** **How do you know?** **(e.g. incident reports, analysis, corrective action, feedback)** **Details**	**Improvement** **What could you do to improve this element?**	**Index**
ATEL/ANAV	OHS policy and procedures (conducive workplace environment e.g. lighting, temperature, humidity, air quality, egonomics, noise, distraction etc)						
ATEL/ANAV	ATEL/ANAV provider enables improvement by providing evidence of reports, analysis, recommendations and implementation of change to procedures/practices/facilities to improve runway safety performance	Application of the SMS for continual improvement to procedures and practices to maximise runway safety performance					

Runway Safety Maturity Checklist

Regulator / Government	Element What are you looking for? For example, "Do you have….."	Objective Why are you looking for it?	Does the element exist? Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	Training Are people trained in the use of the element? Remedial and/or Refresher training? Details	Is it working? How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	Improvement What could you do to improve this element?	Index
Regulator / Government	AIP requirement for pilots to notify ATC of receipt of current ATIS						
Regulator / Government	Approach design criteria are applied and checked to ensure optimal published approach	ATC and Pilots utilise published approach procedures utilising precision approaches where available.					
Regulator / Government	Regulator / Government specifies the requirement to protect sensitive and critical areas approach aids						
Regulator / Government	Regulations are appropriate, reviewed and optimised for runway safety performance with regard to a) airport siting b) design c) ongoing master planning including upgrade to taxiways / markings and signage lighting to meet future aircraft design changes, capacity requirements and to address incursion/confusion hotspots d) restricting on building development within aerodrome PANS-OPS and Obstacle Limitation Surface (OLS) and minimising mechanical turbulence						
Regulator / Government	Review and update of certification requirements and aligned to ICAO standards, recommendations and international best practice						

Regulator / Government	**Element** **What** are you looking for? For example, "Do you have….."	**Objective** **Why** are you looking for it?	**Does the element exist?** Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	**Training** Are people trained in the use of the element? Remedial and/or Refresher training? Details	**Is it working?** How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	**Improvement** What could you do to improve this element?	Index
Regulator / Government	Effective liaison between civil and military organisations to achieve a) optimal approaches b) alignment with ICAO compliant phraseology c) coordination including restricted area activation / deactivation and airspace release d) alignment with civil and military procedures e) other						
Regulator / Government	Curfew dispensation when a go-around is required						
Regulator / Government	Approach procedures are periodically validated to ensure ongoing suitability for expected aircraft type, equipage and performance						
Regulator / Government	Alignment of policy across applicable government agencies						
Regulator / Government	Airlines, aerodromes, manufacturers and ANSPs collaborating with Regulator / Government during development of technological change and certification						
Regulator / Government	Regular and formalised communication between Regulator / Government, government and ANSPs						
Regulator / Government	Regulator provides a mechanism to gain feedback from pilots and ATC regarding ongoing suitability of approach procedure						
Regulator / Government	Just culture policy and procedures						

Regulator / Government	**Element** **What** are you looking for? For example, "Do you have….."	**Objective** **Why** are you looking for it?	**Does the element exist?** Is it written down (e.g. procedure)? Does it exist (e.g. equipment, signs, markings etc)? Details	**Training** Are people trained in the use of the element? Remedial and/or Refresher training? Details	**Is it working?** How do you know? (e.g. incident reports, analysis, corrective action, feedback) Details	**Improvement** What could you do to improve this element?	Index
Regulator / Government	Fatigue risk management system						
Regulator / Government	Drug and alcohol management program						
Regulator / Government	CRM/TEM/MCRM procedures						
Regulator / Government	Fitness for Duty policy and procedures						
Regulator / Government	Human Factors training						
Regulator / Government	OHS policy and procedures (conducive workplace environment e.g. lighting, temperature, humidity, air quality, egonomics, noise, distraction etc)						
Regulator / Government	Regulator / Government enables improvement by providing evidence of reports, analysis, recommendations and implementation of change to procedures/practices/facilities to improve runway safety performance	Application of the Regulator SMS for continual improvement to procedures and practices to maximise runway safety performance					