



RSA-07B

RASG-PA SAFETY ADVISORY – 07B

September 2023

Regional Aviation Safety Group-Pan America (RASG-PA)

Mitigations for Controlled Flight into Terrain

1. Introduction

1.1 The Regional Aviation Safety Group – Pan America (RASG-PA) remains committed to promoting a collaborative approach, with its members, to addressing key safety issues in the Pan American Region such as the Controlled Flight into Terrain (CFIT).

1.2 CFIT occurs when an airworthy aircraft under the complete control of the pilot is inadvertently flown into terrain, water, or an obstacle. The pilots are generally unaware of the danger until it is too late. Most CFIT accidents occur in the approach and landing phase of flight and are often associated with non-precision approaches.

1.3 In 2022, RASG-PA issued Regional Safety Advisory (RSA) 07 to share important mitigations for CFIT to operators and states in the Pan American region. The mitigations for operators and states leveraged the use of the Terrain Avoidance and Warning Systems (TAWS) such as the Enhanced Ground Proximity Warning System (EGPWS). TAWS was developed to alert the flight crew of a potential hazard so that they may take evasive action. TAWS is susceptible to undesired alerts or failure to provide timely warnings when it uses outdated software and/or terrain and obstacle databases. RSA-07 stressed the importance for operators to ensure their fleets' TAWS are updated with the latest version of the system software (logic version, terrain, and obstacle databases) and for states to continually update their terrain and obstacle databases.

1.4 RASG-PA surveyed the Pan American region's states and operators to get a sense of the procedures and practices they follow to mitigate the risk of CFIT. For the most part, states and operators are following good industry practices to mitigate CFIT. RASG-PA; however, identified

areas where states and operators should strengthen their procedures to mitigate the risk of CFIT.

1.5 The purpose of this Safety Advisory is to revise RSA-07 based on the areas of improvements identified in the survey results to strengthen the recommendations provided in RSA-07.

2. Recommendations to Operators

2.1a. RASG-PA recommends operators to continue strengthening the safety barrier against collision with terrain by ensuring the TAWS software is periodically updated to the latest version (including logic version) issued by the manufacturer¹ along with the terrain and obstacle database. Updating the TAWS software ensures the effectiveness of the system remains at a level that provides flight crew with timely alerts to escape a collision with terrain. Additionally, it is highly recommended that operators stay abreast of manufacturers' decisions regarding the technical support of their TAWS equipment. TAWS manufacturers may end production of their units due to parts obsolesce which may result in ending the support, repair and service of their equipment (i.e.: Honeywell MK V EGPWS End of Production – December 31, 2024²). In cases like these, often times manufacturers replace their outdated equipment with newer equipment that provides additional safety benefits (i.e.: Honeywell MK A EGPWS³). Operators' unawareness of TAWS manufacturers' plans to discontinue the production and/or technical support of their on-board TAWS equipment may increase the risk of operators' use of outdated TAWS which in turn increases the risk of CFIT.

2.1b. Because critical alerts from TAWS need to be accurate, it is also important that operators ensure the terrain and obstacle database used by the system is continually updated. This ensures flight crews stay clear of newly erected structures and vegetation growth near the approach and departure path in and out of airports. For departures, Eurocontrol notes "that operational take-off calculations fully depend on proper obstacle information reflecting the current reality⁴." Additionally, updating the terrain and obstacle database ensures the TAWS software logic considers new runways which helps in eliminating false alerts.

2.2 RASG-PA highly recommends operators to ensure a GNSS (such as GPS) signal is provided to the TAWS box to maximize the safety features of the system. Operating TAWS without GNSS renders the system less accurate thus exposing flight crews to receiving nuisance or false alerts which could result in crew desensitization. As a reminder, the TAWS box could be manually linked to the GNSS box during a C-Check. GNSS sensors are also critical to achieving the full potential of TAWS in a limited ground-based navigation aid (NAVAID) environment. To this end, air carriers should develop a policy that advise flight crews of the possible increased risk of operating into areas with limited ground-based NAVAIDs. Additionally, this policy should help verify the aircraft's

¹ Version 218 or higher (or equivalent) is recommended.

² Honeywell SIL Publication Number D201312000067 Rev 1, 31 August 2020.

³ Honeywell MK A EGPWS also enables low speed, runway overrun awareness, and surface misalignment alerts.

⁴ EUROCONTROL-GUID-158

actual position relative to displayed ground track when appropriate. Linking GNSS to TAWS improves the alerting and display functionality of the system by enabling the use of geometric altitude and higher precision alerting terrain clearance floor profiles. These linked devices also ensure the TAWS terrain display and alerts remain accurate when operating into areas with minimal NAVAIDs.

2.3 RASG-PA recommends that operators implement a policy to ensure flight crews select terrain display during critical phases flight - such as climb and descent below Minimum Sector Altitude – MSA – and in areas with minimal or out-of-service-NAVAIDs (as referenced in 2.2) for additional situational awareness. This policy should also consider situations where weather is a factor and there is a requirement to use the weather radar display. In these situations, the policy should ensure the terrain display is used along with the weather radar display. The risk of collision with terrain increases when weather is a factor and implementing this policy mitigates that risk.

2.4 RASG-PA stresses the imperative need of ensuring that TAWS always remain active and operational. To this end, operators should develop policies to ensure that TAWS on board their fleet is always operational and properly maintained to avoid system malfunctions or erroneous system behaviour. Aircraft with unserviceable TAWS operate without an important safety net against collision with terrain.

2.5 RASG-PA recommends that operators establish a training program to ensure flight crews are trained to respond to TAWS alerts as expected. IATA⁵, EASA⁶, ICAO and OEMs have developed training guidance that can be incorporated into operators' TAWS training. Training Departments should perform gap analyses against the latest TAWS training guidance to identify training areas that need to be updated or strengthened.

2.6 RASG-PA highly recommends that operators monitor flight crew responses to TAWS alerts in their Flight Data Analysis Programs (FDAP). Mishandled or deficient responses should be tracked and monitored for trends. A rising trend of deficient responses to TAWS alerts may point to issues that may need to be analysed to identify their underlying causes for intervention. To this end, RASG-PA also encourages operators to refer to the IATA/Honeywell Performance Assessment of pilot response guidance material and recommendations. Additionally, monitoring TAWS alerts in FDAP can help Training Departments identify areas in the training that should be revised or strengthened.

3. Recommendations to States

3.1 RASG-PA recommends States to continue ensuring that operators use TAWS to avoid collision with terrain and that all the required inputs for TAWS are kept up to date. These inputs are to be provided to operators in accordance with ICAO requirements TAWS updates (Annex

⁵ <https://www.iata.org/en/programs/safety/operational-safety/controlled-flight-into-terrain/>

⁶ IR-OPS GM1 to CAT.OP.MPA.290 TAWS Flight Crew Training Program

15/PANS AIM). Additionally, states must continue to update their navigational references in accordance with WGS-84.

3.2. RASG-PA recommends States to include the verification of control and updates of operators' fleet terrain database and TAWS software in their continuous surveillance processes, such as the Procedures Manual for inspectors, guides, job aids, etc.

3.3 RASG-PA also recommends that States include specific provisions to ensure the implementation of standard operating procedures (SOPs) related to the use of Terrain Display, by operators, in different phases of flight especially climb and descent below Minimum Sector Altitude – MSA – and in areas with minimal or out-of-service-NAVAIDs.

3.4 RASG-PA recommends States to have procedures to continuously monitor the reliability and age of their terrain (area 4) and obstacle (area 2) data. The interval at which an obstacle or terrain data set must be amended or reissued depends on the frequency at which the data changes. Due to the cost and complexity of performing field surveys, RASG-PA recommends the following complementary monitoring elements:

- The establishment of standards clearly defining airspace obstructions/obstacles.
- Early and efficient communication and data exchange between the CAA and the governmental department(s) tasked with infrastructure and planning.

Establishing these elements within the monitoring process allows the States to be able to better assess the need to update their terrain and obstacle database. Additionally, states should develop processes to ensure that survey data for new runways are provided to TAWS service providers early in the runway planning stage so that, in turn, it can be included in the TAWS database early. These actions will result in the reduction of undesired alerts and risks associated with uncharted obstacles which will then result in the reduction of the probability of a collision with terrain by an operator.

3.5 RASG-PA recommends that States ensure their regulations require the use of GNSS as position source for the operators' TAWS. GNSS sensors are also critical to achieving the full potential of TAWS, in a limited ground-based navigation aid (NAVAID) environment. Furthermore, the promulgation of regulation and the enforcement thereof accelerates the implementation of TAWS-GNSS and in contrary to guidance or recommendations, regulations assure conformity.

4. Final remarks

4.1 RASG-PA encourages all States and operators to implement the initiatives outlined in this RSA to mitigate the risk of CFIT. The adoption of terrain awareness technologies has directly or indirectly contributed to the reduction of CFIT accidents. It is paramount that all stakeholders continue to ensure updating of the relevant databases amongst other recommended practices.

4.2 To request any additional information, please contact the RASG-PA by email rasg-pa@icao.int or visit the RASG-PA website at <http://www.icao.int/RASGPA/Pages/default.aspx>

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