

# Guidance Material for Approach and Landing Accidents Reduction (ALAR) and Controlled Flight into Terrain (CFIT) Prevention

CAAT-GM-OPS-ALAR/CFIT

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Director General of the Civil Aviation Authority of Thailand

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# 0. Introduction

#### 0.1 Background

Controlled Flight into Terrain (CFIT) refers to an accident in which the aircraft collided with terrain, water, or obstacle, without indication of loss of control in-flight. Although CFIT is not the most frequent type of accident category, CFIT accidents account for a substantial number of fatalities.

Historic accident data shows that CFIT are almost always catastrophic with fatalities to passengers or flight crews. At present, statistics record shows that CFIT accidents dramatically reduced over the past decade, and the number of aircrafts that have landed safely after EGPWS alert is noticeably increasing every year. Nevertheless, CFIT accident continues to occur.

In accordance with IATA accident statistics record, total of 25 CFIT accidents occurred resulting in 323 fatalities from the year 2012 to 2021.

#### 0.2 Purpose

This guidance material provides guidance for all operators in order to establish training programs to effectively improve situational awareness by flight crews to prevent an actual Approach and Landing Accident (ALA) or CFIT from occurring. It includes the CFIT training programme and ALAR training programme to provide practical guidance or certainty in respect of the statutory requirements for aviation safety for prevention of collision with terrain, water or obstacle without indication of loss of control in-flight.



#### 0.3 Applicability

This GM is applicable for the Thai's Operator conducting operations under Thai AOCR.

#### 0.4 Reference

- (a) AOCR Issue 02 Revision 00 Eff. 30 April 2021
- (b) Flight Safety Foundation (FSF) Approach and Landing Accident Reduction (ALAR) Tool Kit -Flight Safety Foundation - Current Safety Initiatives

#### 0.5 Other Guidance

The AOC holder may refer to the Guidance Material for Continuous Descent Final Approach and Guidance Material for Ground Proximity Warning System (GPWS). From time to time, GPWS has played a role in the reduction of CFIT accidents. Those alone do not prevent CFIT accidents from occurring, but with effective flight crew performance, effective Crew Resource Management (CRM), correct situational awareness, effective training, responding to EGPWS/TAWS warnings in time, updating EGPWS/TAWS Software and Terrain/Obstacle/Runway database in a timely manner, good decision-making as well as execution can greatly attribute to the reduction of this accident category.



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# 1. Acronyms and Abbreviations

#### 1.1 Acronyms and Abbreviations

Acronyms / Abbreviations	Meaning
ALA	Approach and landing accidents
ALAR	Approach and landing accident reduction
AOC	Air Operator Certificate
ATC	Air Traffic Control
CANPA	Constant Angle Non-Precision Approach
CFIT	Controlled Flight into Terrain
CRM	Crew Resource Management
EGPWS	Enhanced Ground Proximity Warning System
FMA	Flight Mode Annunciator
FMS	Flight Management Systems
FSF	Flight Safety Foundation
ΙΑΤΑ	International Air Transport Association
ICAO	International Civil Aviation Organization
LOFT	Line Oriented Flight Training
MORA	Minimum Off Route Altitudes
MSA	Minimum Sector Altitude
NDB	Non-Directional Beacon
SOP	Standard Operating Procedure
TAWS	Terrain Avoidance and Warning System
VOR	VHF Omnidirectional range



### 1.2. Definitions

Controlled Flight into Terrain (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.



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# 2. CFIT

#### 2.1 Requirement

AOCR Issue 02 Revision 00 Eff. 30 April 2021 requires an AOC holder to have Instructions, training or awareness programmes, as appropriate for Avoidance of Controlled Flight into Terrain and policy for the use of the Ground Proximity Warning Systems (GPWS), to enhance the flight crew's situational awareness and recognition of their responsibility for terrain clearance despite conflicting ATC instructions must be emphasized during both the departure and arrival phases of the flight. The additional threats imposed by non-precision approaches must be covered. Some of these items will need to be covered by 'touch drills' and if the check is conducted in an aircraft (rather than in a simulator) they are normally best attended to on the ground.

#### 2.2 CFIT Training Programme

A CFIT training programme should be integrated into initial, transition and recurrent training and check programmes. Its importance is reinforced and its effectiveness is improved when the subject is a core element in all training and checking programmes. It can also be structured as a standalone programme. The ground training programme is designed to improve awareness by increasing the flight crew's ability to recognize and avoid getting into CFIT situations. The simulator training program is designed to apply this knowledge, have a close-to real-world appreciation of situation where an aircraft may be in CFIT situation and, develop proficiency in an escape maneuver that must be applied to prevent a CFIT accident. An AOC holder should provide this training during initial and transition training and, at least once every two years as part of recurrent training.

#### 2.3 Objectives

The CFIT training programme are to provide pilots with the ability to:

- (a) recognise the importance of effective situational awareness and its importance in identifying potential CFIT situations;
- (b) know prevention strategies and operating practices that mitigates CFIT threats and hazards; and
- (c) learn and apply the escape manoeuvre(s) and its associated techniques that will avoid CFIT and enhance the possibility of survival.

#### 2.4 Training Material

ICAO, State regulators, manufacturers and other industry groups have been actively promoting CFIT awareness and training programmes in a continued effort to reduce CFIT accidents and incidents. The Flight Safety Foundations (FSF) has produced the ALAR Tool Kit, which in addition



to information concerning ALAR, includes an updated version of the Controlled Flight into Terrain Education and Training Aid.

The CFIT training material contained in the FSF ALAR Tool Kit includes detailed information concerning CFIT, information for the avoidance of CFIT, and CFIT training programme material and a safety alert containing the ground proximity escape manoeuvre recommended for many of the specific airplane makes and models flown by most air operators. A generic ground proximity escape manoeuvre is provided for use in respect to airplanes that do not have a specific manoeuvre. It is recommended that the AOC holder utilises the FSF ALAR Tool Kit as a basis for developing its training programme.



# 3. ALAR

#### 3.1 ALAR Training Programme

This ALAR training programme should be a core component of flight operations and integrated into existing initial, transition, and recurrent training and check programmes. The ground training programme is designed to improve awareness by increasing the flight crew's ability to recognize and avoid situations to help prevent ALAs. The AOC holder should provide this training during initial and transition training and at least once every two years as part of recurrent training.

#### 3.2 Objectives

The objectives of the training programme are to provide the pilot with the ability to:

- (a) be aware of the high risk involved in the approach and landing phase of flight;
- (b) know the available interventions to address this risk (e.g. SOPs, stabilized approach criteria, no fault go-around policy, Constant Angle Non-Precision Approach (CANPA) descent profiles, Runway aligned approaches, etc.);
- (c) increase awareness of ALA pre-cursors; and
- (d) learn and apply risk reduction interventions to reduce the risk of approach and landing accidents.

#### 3.3 The FSF ALAR Tool Kit

The FSF ALAR Tool Kit includes information to help prevent approach and Landing accidents. In addition to providing training material, there are many other tools and educational materials contained in the FSF Tool Kit that an AOC holder may utilise to reduce the risk of approach and landing accidents.



# 4. Introducing ALAR/CFIT Training into An Initial (Type) Endorsement Training Programme

Strategies that address terrain awareness and the causes of CFIT events should be discussed at initial training. Continuous reinforcement and the practice of sound SOPs combined with a focus on good crew communications and situational awareness should be emphasized at all times.

Items to be discussed should include:

- (a) awareness of the aircraft energy state at all times avoidance of excessive rates of descent and too low or too fast airspeeds at low levels;
- (b) understanding the autopilot operating modes;
- (c) intervention (including manual interventions) if the aircraft is not responding as intended;
- (d) SOPs that include standard callouts that alert crew to Flight Mode Annunciator (FMA) and/or Flight Management Systems (FMS) changes;
- (e) SOP usage to highlight any undesirable aircraft energy states;
- (f) barometric and radio altimetry issues and procedures;
- (g) observance of stabilised approach criteria;
- (h) criteria for descent below MSA this should only occur when established on a published instrument procedure, under radar control or when visual with terrain;
- (i) review the primary elements of the missed approach especially when a missed approach appears likely;
- (j) go-around and discontinued approach awareness; and
- (k) effective CRM and crew communications highlighting terrain issues and situational awareness.

Additionally, a programme dedicated to CFIT recovery techniques should be included in simulator training detail(s). This training should include:

- (a) the type specific GPWS escape manoeuvres;
- (b) non-precision approaches using the CANPA descent profile;
- (c) the appropriate use of automation and manual flying during an approach;
- (d) the practice of discontinuing an approach any time that the aircraft becomes unstable below stabilisation height; and
- (e) landings that are practised with different crosswind conditions on dry, wet and contaminated (if these operations are envisaged) runways.



# 5. Introducing ALAR/CFIT Training into A Recurrent Training Programme

After initial ALAR/CFIT training is introduced, it is imperative to keep the flight crew updated and current with procedures concerning ALAR/CFIT.

It is important to reinforce, refresh and practice the concepts and manoeuvres that were covered in the initial type training programme. This can be done by the use of instructor-led discussion as well as training in an appropriate flight training device.

Items to be discussed should include:

- (a) usage and understanding of EGPWS warnings;
- (b) understanding the autopilot operating modes and its use;
- (c) crew briefings that include threat and error management;
- (d) understanding approach charts;
- (e) effective crew resource management techniques; and
- (f) review knowledge of en-route charts making sure that the crew have a clear understanding of the charts features and their meanings (e.g. grid MORA).

A simulator training detail should include:

- (a) Line orientated flight training (LOFT) flights departing and/or landing into airports with high terrain in the vicinity, reviewing what crew can anticipate in these situations;
- (b) non-precision approach procedures (NDB/VOR using CANPA if applicable, and/or circling approaches);
- (c) practice of aircraft type specific terrain avoidance manoeuvres;
- (d) practising visual and circling approaches, emphasising the differences between the two approaches;
- (e) practice of go-arounds, especially during circling approaches; and
- (f) practice of depressurisation induced emergency descents over mountainous areas, highlighting escape routes.