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FLIGHT SAFETY FOR THE CANADIAN ARMED FORCES

14 December 2018



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ENDORSEMENT BY THE CHIEF OF THE DEFENCE STAFF

The Defence Administrative Orders and Directives mandate commanding officers to “conduct their own general and specialist safety programs in accordance with the General Safety Program and specialist safety programs.” One vital specialist program that is well recognized nationally and internationally is the Canadian Armed Forces (CAF) Flight Safety Program.

The Flight Safety Program, which I strongly champion and support without reservation, reaches all elements of the CAF. Within the CAF, the Commander Royal Canadian Air Force is responsible for flight safety policy while the Director Flight Safety (DFS) administers the program as a whole on his behalf.

A capital element of the program stems from the Minister of National Defence designating DFS as the Airworthiness Investigative Authority (AIA) as required by the Aeronautics Act. With this designation comes the authority and responsibility to investigate all matters concerning aviation safety, independently of the chain of command. Moreover, on Ministerial Direction, I have issued a CDS Order to the AIA delegating additional responsibilities to carry out this function within the Flight Safety and Airworthiness Programs.

With the introduction of unmanned aerial vehicles in different organizations of the CAF and the contracting out of many aircraft maintenance and support activities, a vigorous Flight Safety Program that spans to all elements of our organization is critical. Aviation assets, including aircraft and unmanned aerial vehicles, are expensive and hard to replace. Also, our personnel are critical to mission success. It is vital that our resources be well preserved through a proactive flight safety program to ensure the operational viability of the CAF, at home and abroad. The program is a key component to support any operational deployment where aviation assets are involved.

I expect commanding officers involved with operating or supporting aviation assets to allocate the right balance of resources to have in place an effective Flight Safety Program. Furthermore, commanding officers have to demonstrate leadership and engagement in the program so our aviation assets are well protected.

A handwritten signature in blue ink, appearing to read 'J. Vance', written over a horizontal line.

General J.H. Vance, CMM, MSC, CD
Chief of the Defence Staff

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FOREWORD

1. The A-GA-135-001/AA-001 *Flight Safety for the Canadian Armed Forces* (CAF) is issued by the Chief of the Air Staff on the authority of the Chief of the Defence Staff. A suitable number of up to date copies of this publication shall be available to personnel of units of the CAF in conducting or supporting air operations, including Unmanned Aircraft Systems (UAS).
2. The OPI for this publication is DFS 3 Prevention. The minimum review cycle for this publication is every three years with new amendments issued as required. Suggestions for amendments are to be forwarded through normal channels to the Director of Flight Safety, attention: dfs.dsv@forces.gc.ca.
3. The A-GA-135-002/AA-001 *Occurrence Investigation Techniques* is issued as a separate publication with limited distribution. DFS 2 is the OPI for this publication.
4. The A-GA-135-003/AG-001 *Airworthiness Investigation Manual* delineates the Airworthiness Investigative Authority's policies with details regarding standards, procedures and instructions for investigation interaction within the Department of National Defence and with persons, agencies, companies or authorities outside of the Department. It is issued electronically as a separate publication. DFS 2 is the OPI for this publication.

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LIST OF AMENDMENTS

This publication supersedes A-GA-135-001/AA-001 dated 6 July 2015. The official and most current version of this publication is available electronically on the DFS Intranet and Internet websites or from the National Defence Publications Depot. Any amendment will be advertised electronically by DFS and details will be published on the FS Intranet and Internet websites.

NOTE
 A vertical line in the margin shows where the publication was amended from the previous version.

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CHAPTER 1 – FLIGHT SAFETY PROGRAM DESCRIPTION

- References:
- A. A-GA-135-003/AG-001 *Airworthiness Investigation Manual (AIM)*
 - B. B-GA-100-001/AA-000, *National Defence Flying Orders*
 - C. A-GA-005-000/AG-001 *DND/CAF Airworthiness Program*
 - D. B-GA-297-001/TS-000 *Safety Orders for CF Air Weapons Systems*
 - E. A-GA-135-002/AA-001 *Occurrence Investigation Techniques for the Canadian Forces*

GENERAL

1. The Flight Safety Program (FSP) is a program of accident prevention through safe behaviour, education, promotion and the investigation and analysis of matters concerning aviation safety. The Flight Safety (FS) badge is a visual reminder of the two distinct FSP activities of prevention (white) and investigation (black).
2. The FSP is a force multiplier for the Department of National Defence and the Canadian Armed Forces (DND/CAF). The FSP contributes to mission accomplishment by preventing accidental loss of aviation resources, while accomplishing missions within an acceptable level of safety.
3. FS prevention activities are detailed in this manual and include education, training, promotion, continuous monitoring of hazards and the provision of FS advice to the chain of command (CoC).
4. FS investigation activities are detailed in the Airworthiness Investigation Manual (reference A). All FS investigations are carried out under the authority of the Airworthiness Investigative Authority (AIA) and are conducted independently of the CoC.

DEFINITIONS

AIRCRAFT

5. Any machine capable of deriving support in the atmosphere from reactions of the air.

AIR WEAPONS

6. Air Weapons are any ammunition, explosives and/or pyrotechnics suspended, launched, released or fired from an aircraft; it includes any aircraft store, that interfaces with the air weapons system including bombs, missiles, torpedoes, flares, pyrotechnics, survival kit air droppable (SKAD) (excluding the SKAD dropped as cargo), chaff and flares, sonobuoys and airborne targets and banners. This applies to both live and inert weapons.

AIR WEAPONS SYSTEM

7. A system containing armament computers, mechanical, electromechanical and electronic components that is part of an aircraft's permanent equipment or installed as a mission kit and is used to suspend, launch, release or fire ammunition/explosives and/or pyrotechnics in support of the mission being flown.

FLIGHT SAFETY (FS)

8. The state in which risks associated with flight activities, as well as those related to, or in direct support of the operation of the aircraft, are reduced and controlled to an accepted level.

FS HAZARD

9. An existing condition whereby there is possibility of adverse effect on health, property or FS.

FS Risk

10. A FS risk is the projected likelihood and severity of the consequences or outcome from an existing hazard or situation associated with flight activities.

FS OCCURRENCE

11. Any event that involves the operation of a CAF or a military conveyance aircraft, including unmanned aircraft, or involves activities in support to flying operations where FS is compromised. To constitute an occurrence, the event may not necessarily have caused injuries to personnel or damage to materiel or property but had the potential to do so.

MILITARY CONVEYANCE AIRCRAFT

12. A military conveyance aircraft is any aircraft, including a civilian registered aircraft, that is operated by or on behalf of the DND, the CAF, or a visiting force.

OPERATING UNIT

13. An Operating Unit is a unit under whose authority a flight has been authorized in accordance with National Defence Flying Orders (reference B).

PREVENTIVE MEASURE (PM)

14. A PM is any step that can be taken to decrease the likelihood of a FS occurrence.

UNMANNED AIRCRAFT (UA)

15. An aircraft that does not carry a human operator and is operated remotely using varying levels of automated functions. The UA is the aircraft portion of the UAS.

UNMANNED AIRCRAFT SYSTEM (UAS)

16. A system whose components include the unmanned aircraft, the supporting network and all equipment and personnel necessary to control the unmanned aircraft.

GOVERNANCE

17. As detailed in the DND/CAF Airworthiness Program (reference C), the Minister of National Defence (MND) directed the CDS, under subsection 4.3 (1) of the *Aeronautics Act*

to assign Airworthiness Functions to appropriate authorities in the DND/CAF. Under this direction, the CDS delegated the Commander of the Royal Canadian Air Force (Comd RCAF) as the Airworthiness Authority (AA) for DND/CAF. Among the airworthiness functions assigned, the Comd RCAF is responsible for the oversight of the FSP across the full spectrum of DND/CAF operations, at home and abroad.

18. Under amendments to the *Aeronautics Act* of 2014, the MND designated the Director Flight Safety (DFS) as the Airworthiness Investigative Authority (AIA) with the requirements for the AIA to fulfill the obligations listed in Part II of the Act. Further, under subsection 4.3 (1) of the *Aeronautics Act* the MND directed the Chief of the Defence Staff (CDS), to assign powers, duties and functions to the AIA that are necessary for the Airworthiness Program. One of these functions is for DFS to monitor the DND/CAF airworthiness program and advise the Comd RCAF on matters concerning aviation safety for all military conveyance aircraft, including all foreign military aircraft operating in Canada. Further, the AIA is responsible for the independent investigation of airworthiness-related occurrences and the regulation of the airworthiness aspects of the FSP, which are detailed in the AIM (reference A). All FS investigations are conducted on behalf of the AIA and are independent of the CoC. The AA is charged with ensuring that the AIA is not impeded in any way in the investigation of matters concerning aviation safety.

AIM OF FSP

19. The aim of the FSP is to prevent accidental loss of aviation resources while accomplishing the mission at an acceptable level of safety.

SCOPE OF FSP

GENERAL

20. The FSP is directed at military and civilian personnel involved in DND/CAF aviation and its contracted support elements. The DND/CAF shall conduct flying operations and related supervisory and support activities in accordance with this publication. The FSP is applicable to and shall be implemented by:

- a. all DND/CAF operating units conducting flying operations;
- b. all DND/CAF units controlling flying operations including units providing air traffic control and air navigation services;
- c. all DND/CAF units supporting flying operations including units providing aircraft maintenance and logistics services;
- d. all DND/CAF contracted organizations conducting, controlling or supporting flying operations;
- e. contracted facilities where DND/CAF aircraft or engines are being manufactured, overhauled, inspected or repaired; and
- f. each level of command where flying operations are supervised or supported.

AIR WEAPONS SAFETY (AWS)

21. DFS has accepted oversight of air weapons safety (AWS) occurrences as part of the FSP. Every unit with an air weapons capability shall ensure that their FSP encompasses a vibrant Air Weapons Safety Program (AWSP).

22. FS occurrences involving air weapons shall be reported and investigated through the FSP. In general, any event involving an air weapon, from the moment that the air weapon is removed from an approved storage facility with the intent for loading onto an aircraft, until either the delivery of the air weapon to a target or its return to an approved storage facility, is considered as a FS occurrence and is reportable under the FSP.

23. Reference D remains the primary reference for AWS issues. The Airworthiness Investigation Manual (AIM) provides further details on FSP reporting requirements for FS occurrences involving air weapons, as well as guidance as to when reporting should be done under reference D.

UA AND UAS

24. UA are classified as aeronautical products and as such are subject to regulation under the DND/CAF Airworthiness Program (reference C). In addition, UA are authorized for flight under the National Defence Flying Orders (reference B). Therefore operation and control of UA falls within the scope of the FSP. Every unit with a UAS capability shall implement a FSP commensurate with the scope of UA activities of the unit.

25. FS occurrences involving UAS shall be reported and investigated through the FSP. The Airworthiness Investigation Manual (AIM) provides further details on FSP reporting requirements for FS occurrences involving UAS.

AIR CADET FLYING PROGRAM

26. The Air Cadet Flying Program must also comply with this publication. Specific arrangements and associated responsibilities are detailed at Chapter 2. The Air Cadet Flying Program comprises the following sub-programs:

- a. The Air Cadet Gliding Program is a national program consisting of familiarization flights and glider pilot flying training; and
- b. The Air Cadet Powered Flight Program is a national program consisting of familiarization flights and pilot ab-initio flight training.

FUNDAMENTAL PRINCIPLES OF THE FSP

27. The FSP is based on the following five fundamental principles:

- a. the main principle is the prevention of occurrences. Although cause factors are assigned to occurrences, this is only done to assist in the development of effective PMs;
- b. personnel involved in conducting and supporting flying operations are expected to freely and openly report all FS occurrences and FS concerns;

- c. in order to determine the cause of occurrences such that appropriate, effective PMs can be developed and implemented, personnel involved in conducting and supporting flying operations are expected to voluntarily acknowledge their own errors and omissions;
- d. in order to facilitate free and open reporting and voluntary acknowledgement of errors and omissions, the FSP does not assign blame. Personnel involved in a FS occurrence are de-identified in the final report and the report itself cannot be used for legal, administrative, disciplinary or other proceedings; and
- e. the whole FSP is based on the primacy of having a “just culture.” A “just culture” lies between a non-punitive culture and one of sanction and punishment. Free and open sharing of critical safety information between managers and operational personnel, without the threat of punitive action, represents the basis of a reporting culture. Personnel are able to report occurrences, hazards or safety concerns as they become aware of them, without fear of sanction or embarrassment. However, while a non-punitive environment is fundamental for a good reporting culture, the workforce must know and agree on what is acceptable and what is unacceptable behavior. Negligence or wilful, deliberate deviations must not be tolerated by leadership. A “just culture” recognizes that, in certain circumstances, there may be a need for punitive action and defines the line between acceptable and unacceptable actions or activities.

RESPONSIBILITY FOR FSP

OVERALL RESPONSIBILITIES

28. The Comd RCAF is responsible for FS policy in DND/CAF. FS policy is implemented by the chain of command through the establishment of a FSP by all organizations within the scope of the FSP.

MANAGEMENT RESPONSIBILITIES

29. Management responsibilities within the FSP are as follows:
- a. immediately ceasing activities that are deemed unsafe or where an unacceptable FS risk exists;
 - b. notifying higher authorities of unacceptable FS risks and the actions taken to mitigate them or of the need to seek additional resources to mitigate them;
 - c. reviewing and accepting/rejecting the FS risk as per the authority delegated from the Airworthiness Authority (AA), the Operational Airworthiness Authority (OAA) and the Technical Airworthiness Authority (TAA);
 - d. establishing the formation’s / unit’s FS risk control strategy;
 - e. measuring and reporting on the effectiveness of FS risk management activities within the formation / unit; and
 - f. promoting FS risk management activities at the formation / unit level.

INDIVIDUAL RESPONSIBILITIES

30. Personnel at every level are required to participate in and support the FSP. The success of the FSP is reliant upon a commitment to it by all personnel associated with DND/CAF flying operations. This commitment can only materialize if all personnel believe in the value of the program and understand that they have a responsibility to actively participate. In order to facilitate this, the individual shall be able to report any flight activity concerns and occurrences or propose better ways of doing business without fear of retribution.

31. Personnel are responsible for:

- a. immediately ceasing unsafe activities under one's direct control;
- b. notifying their supervisor and the Flight Safety Officer (FSO) of the unsafe activity; and
- c. formally identifying and reporting FS hazards and FS occurrences.

NOTE

It is the responsibility of each individual to cease unsafe activities, regardless of rank or position in the organization

TRAINING ESTABLISHMENT RESPONSIBILITIES

32. All organizations and training establishments for which personnel will be exposed or involved with flying operations must ensure that appropriate training and exposure to the FSP be provided to their personnel. The training provided shall be proportional to the degree of projected exposure to flight operations, but shall cover as a minimum the key principles of "Just Culture" and the requirement to report FS hazards and occurrences.

AIRWORTHINESS AND FS POLICY

DND/CAF AIRWORTHINESS PROGRAM

33. The DND/CAF Airworthiness Program is based upon airworthiness management concepts used world wide by military and civil airworthiness authorities, while being tailored to meet the unique needs of the DND/CAF. The Airworthiness Program contributes to aviation safety by influencing areas related to aeronautical products and their operation. The DND/CAF Airworthiness Program is mandated by the Minister of National Defence (MND) as detailed in Defence Administrative Orders and Directives (DAOD) 2015-0 and DAOD 2015-1 and amplified in DND/CAF Airworthiness Program (reference C). The elements of an effective airworthiness program consist of a full range of aviation activities including design, manufacture, maintenance, materiel support, facilities, personnel and operations.

34. The objective of the DND/CAF Airworthiness Program is to achieve and maintain an acceptable level of safety for military aviation, which is predicated on weighing the safety level desired against the cost and operational capability of the various aircraft fleets. The accepted level of safety varies for the fleet types and roles the aircraft assume because some safety levels for civilian aircraft types and roles are impractical for military operations. The "As Low as Reasonably Practical" (ALARP) principle for risk is primary in the pursuit of these

levels of safety, meaning risk reduction is pursued, but must be weighed against financial and operational impacts of the initiatives. This matches the aim of the FSP to prevent accidental loss of aviation resources while accomplishing the mission at an acceptable level of safety.

35. A regulatory approach is the most common method employed to implement the concepts and principles of any airworthiness program. A regulatory approach means to control by rule and involves using regulations, orders, directives and standards to control airworthiness-related activities. A regulatory approach for controlling airworthiness activities has the following three distinct roles:

- a. Regulator. The regulator develops the airworthiness instrument (rules and standards) for the engineering, manufacture, maintenance, materiel support and operation of aeronautical products and ensures compliance (e.g. Transport Canada for civil aviation);
- b. Implementer. The implementer conducts the aviation activities associated with the engineering, manufacture, maintenance, materiel support and operation of aeronautical products (e.g. airlines, manufacturers and maintenance organizations for civil aviation); and
- c. Investigator. The investigator investigates airworthiness-related safety occurrences and aviation safety issues. The investigator is normally independent from the regulator and implementer. The investigator is also empowered to investigate the role that the regulator and implementer may have had in any aviation occurrence (e.g. Transportation Safety Board (TSB) for civil aviation). DFS is the designated AIA for this program and fulfils the investigator role as described.

36. Unlike civil aviation, where the airworthiness regulator, implementer and investigator are totally independent, the *Aeronautics Act* has assigned DND a self-regulating and self-investigating responsibility for airworthiness.

37. It is important to understand the relationship between the DND/CAF Airworthiness Program and the FSP. As stated in the Airworthiness Program documentation, “the FSP performs the vital role of providing an independent review and assessment of the suitability and effectiveness of the Airworthiness program, including its policies, standards and procedures”. The investigation activities of the FSP form the Airworthiness Investigation Program under the DND/CAF Airworthiness Program.

38. Within the Airworthiness Program, DFS is named as the AIA and charged with independently investigating all matters concerning aviation safety. Details of the powers delegated from the MND, using powers within the *Aeronautics Act*, to the AIA and then onward to all airworthiness investigations are laid out in the AIM. Of note, all activities carried out for FS investigations are carried out on behalf of the AIA/DFS. The FSP integrates the investigation portion of the DND/CAF Airworthiness Program within its activities which are detailed in the Airworthiness Investigation Manual (AIM) (reference A) and the investigation techniques outlined in Occurrence Investigation Techniques for the Canadian Forces (reference E).

RISK MANAGEMENT

39. The identification/recognition of FS hazards is a responsibility shared by all DND/CAF personnel or supporting personnel. As promulgated in A-GA-005-000/AG-001 DND/CAF Airworthiness Program, overall responsibility for managing FS risks rests with COs, DND/CAF managers at all levels, and designated contractor representatives.

40. The Airworthiness Program employs an Airworthiness Risk Management (ARM) process which provides a logical and systematic framework to assess and pro-actively balance airworthiness risk against both mission accomplishment and available resources. The objective of the ARM process is to enhance military aviation capability by ensuring that risk is recognized, mitigated and accepted at the proper level within the command structure. The ARM process is invoked when the level of safety, accepted during the airworthiness clearance of an aviation product, cannot be maintained. A Record of Airworthiness Risk Management (RARM) is the key airworthiness document used to document and manage airworthiness risk.

41. As part of the airworthiness program, the CDS has delegated the AIA to monitor airworthiness activities and functions and to audit airworthiness processes and procedures to ensure aviation safety is not compromised. As part of this monitoring function, the TAA and OAA must keep the AIA up to date concerning all RARMs. While the AIA does not have an approval/acceptance function within the RARM process, the AIA may raise concerns on individual RARMs to the appropriate airworthiness authority and conduct assurance and oversight activities on the RARM process, as required.

NOTE

Involvement of a Division/Formation FSO in the development of a RARM does not fulfill the AIA monitoring requirement. Division/Formation FSOs are advisors to their respective commanders and are not included within the CDS Delegation letter as having a monitoring/audit role.

42. Due to the inherent dangers associated with operating military aircraft, a certain acceptance of FS risk is often required. It is also understood that high intensity operational activities may require the acceptance of higher levels of FS risk, compared to peacetime force generation activities. Risk management in the planning and execution of the DND/CAF mission is fundamental to safe operations. The ARM process provides a logical and systematic means of identifying and controlling safety risks in the decision-making process. In all cases, the decision to accept FS risk must be controlled, balanced and approved at the appropriate command level.

FS STRATEGIC PROCESSES

43. A strategic level conceptual model of FS-related processes for the FSP is provided at Annex A. It describes in a comprehensive manner all the FS processes irrespective of the organizations responsible to execute them. Many organizations or activities contribute directly or indirectly to the processes described in the model's three management pillars in the form of Resilience Management, Risk Management and FSP Management. DFS is the champion of the FSP for the DND/CAF, and maintains close liaison with the organizations carrying out the strategic FS processes. DFS, as the AIA, is responsible to the Minister of National Defence (MND) for FS investigations.

44. Resilience and Risk Management represent the pillars to which most of the critical FS processes and activities gravitate. Resilience Management is considered a proactive form of accident prevention because it reduces the potential or severity of threats to air operations. Risk Management on the other hand is more reactive in that the associated activities are in response to newly identified hazards.

FS AGREEMENTS

45. Canada/DFS is a signatory of several FS agreements at the national and international level. Implementation of these agreements is a key enabler to ensuring the CAF mandate is accomplished when operating CAF air assets at home/abroad or when foreign military air assets operate in Canada. The following paragraphs summarize the principal flight safety agreements in effect.

NATO FS STANDARDS

46. DFS is a member of the North Atlantic Treaty Organization (NATO) Flight Safety Working Group (FSWG) which is responsible for maintaining the suite of NATO FS Standards entitled “Allied Flight Safety Publications (AFSPs)”. Member nations agree to implement AFSPs via NATO Standardization Agreements (STANAGs). The following paragraphs summarize the AFSPs/STANAGs that Canada has agreed to implement and which are incorporated within the FSP. A link to these documents can be found on the DFS intranet under the “*Manuals*” tab.

AFSP 1.0 (AVIATION SAFETY) / STANAG 7160

47. AFSP 1.0 is the first in the AFSP suite of documents and sets out general policy and guidance on aviation safety principles, policies and procedures, in particular those aimed at accident prevention.

AFSP 1.1 (EXCHANGE OF FLIGHT SAFETY INFORMATION) / STANAG 3101

48. The aim of this standard/agreement is to maintain point of contacts for flight safety organizations and establish procedures for the exchange of safety information peculiar to aircraft types, unmanned aircraft systems and missiles in current use by nations.

AFSP 1.2 (FLIGHT SAFETY COOPERATION IN COMMON GROUND/AIRSPACE) / STANAG 3102

49. The aim of this standard/agreement is to establish the requirement for coordination of accident prevention matters when a detachment of one nation operates within or over the sovereign territory of another nation for 8 days or more, or when aircraft of two or more nations participate in combined/joint air operations within the sovereign territory of any NATO nation and/or “out-of-area” air operations.

AFSP 1.3 (SAFETY INVESTIGATION AND REPORTING OF ACCIDENTS/INCIDENTS INVOLVING MILITARY AIRCRAFT,

MISSILES AND/OR UASs) / STANAG 3531

50. The aim of this standard/agreement is to establish procedures for the safety investigation and reporting of accidents/incidents of military aircraft, missiles and/or UAS which involve the equipment, property, facilities and/or personnel of two or more nations.

AFSP 1.4 (WILDLIFE STRIKE PREVENTION) / STANAG 3879

51. The aim of this standard/agreement is to standardize the measures to avoid collisions between wildlife and aircraft and the formats for the exchange of information on the presence of wildlife and wildlife strike reports.

AFSP 2 (AIRCRAFT MARSHALLING SIGNALS) / STANAG 3117

52. The aim of this standard / agreement is to standardize aircraft marshalling signals and the distinctive garment to be worn by aircraft marshallers.

AFSP 3 (PLANNING AND CONDUCT OF LIVE AIR WEAPONS DEMOS) / STANAG 3564

53. The aim of this standard/agreement is to ensure that all factors affecting the safe conduct of any live air weapons demonstration with and without spectators are adequately studied and to specify responsibilities for the planning and conduct of such demonstrations.

AFSP 4 (IN-FLIGHT VISUAL SIGNALS) / STANAG 3379

54. This aim of this standard/agreement is to establish in-flight visual signals and the essential procedures for using them.

AFSP 5 (FLYING AND STATIC DISPLAYS) / STANAG 3533

55. The aim of this standard/agreement is to establish basic safety procedures, regulations and responsibilities for flying and static displays, which involve aircraft of two or more nations.

AFSP 6 (EMERGENCY MARKINGS ON AIRCRAFT) / STANAG 3230

56. The aim of this standard/agreement is to establish parameters for emergency markings on the outside and the inside of aircraft.

ICAO

57. The International Civil Aviation Organization (ICAO) is a specialized agency of the United Nations, established by Member States to manage the administration and governance of the Convention on International Civil Aviation (Chicago Convention). ICAO works with the Convention's Member States and industry groups to reach consensus on international civil aviation Standards and Recommended Practices (SARPs) and policies in support of a safe, efficient, secure, economically sustainable and environmentally responsible civil aviation sector. SARPs provide the fundamental basis for harmonized global aviation safety and are used by ICAO Member States to ensure that their local civil aviation operations and regulations conform to global norms. SARPs are organized and issued by Annexes to the Convention.

58. To promote interoperability within global civilian airspace, DND/CAF aviation activities are generally aligned with ICAO SARPs/Annexes to the maximum extent possible. While DFS is not a signatory to ICAO, the FSP is broadly aligned with the following ICAO Annexes:

- a. Annex 13 - Aircraft Accident and Incident Investigation: Details activities following accidents and incidents wherever they occur.
- b. Annex 19 - Safety Management: Details safety management functions related to, or in direct support of the safe operation of aircraft.

NATIONAL AGREEMENTS

DFS/TSB WORKING AGREEMENT

59. FS investigations conducted by DFS follow a protocol similar to that of the TSB as prescribed by the *Aeronautics Act*. A working agreement exists between DFS and the TSB to provide direction for coordinated DFS/TSB investigations of transportation occurrences. A link to this agreement can be found on the DFS intranet under the “*Manuals*” tab.

SERVICE LEVEL AGREEMENTS

60. Service level agreements have been signed between DFS and other departmental organizations mandated to support DFS during the conduct of investigations. These include agreements with the Quality Engineering Test Establishment (QETE), Defence Research and Development Canada – Toronto (DRDC Toronto), the Aerospace Engineering and Test Establishment (AETE) and the National Research Council of Canada (NRCC). A link to these agreements can be found on the DFS intranet under the “*Manuals*” tab.

FLIGHT SAFETY INFORMATION MANAGEMENT SYSTEM (FSIMS)

61. FSIMS was developed to meet the safety information management needs of the FSP and facilitates FS data collection, analysis and exchange of FS information. FSIMS development and policy is a DFS responsibility with training on the use of FSIMS provided by 1 CAD FSO as part of the FS Course (FSC).

62. The FSIMS is the primary tool used by the FSP to record FS information related to all reported FS occurrences and hazards. FSIMS also provides FSOs at all levels with an ability to track FS information and to develop, monitor and trend FS performance measures to evaluate the effectiveness of the FSP.

63. ICAO also maintains an Accident/Incident Data Reporting (ADREP) system for states to report accidents and serious occurrences. The main interface for entering/retrieving ADREP data is called European Coordination Centre for Accident and Incident Reporting Systems (ECCAIRS). For data comparison and to facilitate exchange of FS information with external civilian aviation safety organizations, FSIMS data may be broadly mapped to ICAO/ADREP/ ECCAIRS data. Annex B details the relationship between the FSP and the ICAO occurrence categorization system.

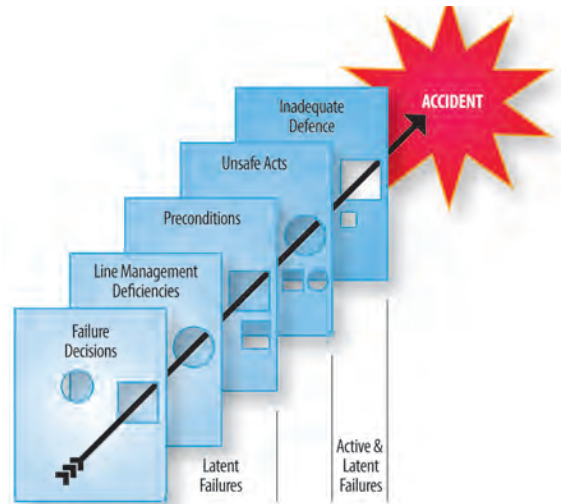
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Annex A
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ANNEX A – FS STRATEGIC BUSINESS MODEL

INTRODUCTION

1. The strategic FS model provides a high level framework and describes the processes involved in the flight safety program. Accident prevention processes can be derived by inverting Reason’s Swiss Cheese model of Accident Causation. Accidents occur because weaknesses or “windows of opportunity” open and align in all levels of the operation, allowing a chain of events to cause an accident. Accidents can be prevented by adding layers of defences through resilience management and patching holes in these defences through risk/hazard management.



FS BUSINESS PROCESSES

2. Appendix 1 to this annex is a graphical depiction of the FS business processes. They are regrouped as follows:
- a. Resilience Management. Resilience management is the process of making the equipment, procedures and personnel resilient to accident-causing conditions, and thus protect operations from unknown hazards.
 - (1) Equipment Resilience Activities. CAF airworthiness organizations employ tools and methods to ensure aircraft and related equipment are acceptable for the operations and flying environment. FS data is provided to improve Design, Modification, and Maintenance airworthiness on current and new aircraft so that the flying operations can better withstand unknown hazards.
 - (2) Procedures Resilience Activities. CAF flying procedures are monitored to ensure that air operations are being conducted in a safe manner. FS surveys are conducted, rules and regulations are reviewed, and periodic inspections are performed in order to continually improve all associated procedures.
 - (3) Personnel Resilience Activities. Personnel are trained to be capable of dealing with known and unknown threats to flight safety. Occurrences, hazards, trends, and many other forms of flight safety data are disseminated to all personnel involved with the support or conduct of air operations so they can better understand the situations and circumstances that can compromise flight safety. This is supported by a comprehensive awards

program to encourage safe behaviour throughout the organization.

- b. Program Management. The FSP provides the administrative framework for the Resilience and Risk Management processes. Program Management includes development of the FS Program, policies and procedures, relevant training and education, and activities that provide feedback to the chain of command. Program Management does not directly prevent accidents, but supports Resilience and Risk Management in doing so.
- c. Risk Management. Risk management is the systematic process of identifying risks, assessing their implications, deciding on a course of action, and evaluating the results. Known risks are those that have been identified and analyzed. Unknown risks, by their nature, cannot be managed, and thus are addressed through resilience management.
 - (1) Identify Hazards. The principle means of identifying hazards is through occurrence investigation, hazard reporting, and trend analysis. A comprehensive reporting system is required to track hazards from initial identification until resolution of any preventive measures.
 - (2) Investigate Hazards. Based on the preliminary information captured when the hazard or occurrence was reported, the nature of the hazard and its severity will be used to determine the level of the investigation and resources that should be employed.
 - (3) Analyze Risk. All available information is systematically reviewed to determine how often specified events may occur and the magnitude of their consequences. Commanders at all levels review investigations within their sphere of responsibility, the associated proposed PM, then make documented decisions on how they will address the hazards.
 - (4) Mitigate Risk. Hazards, whenever possible, are corrected by implementing one or more FS PM. It is critical that the various stages and levels of implementation be tracked and monitored to ensure complete staffing, either full implementation, partial implementation or no implementation (refusal). The latter two options must be endorsed at the proper level in the chain of command and supported by an appropriate record of Airworthiness Risk Management.

FS INFORMATION FLOW

- 3. Appendix 2 describes the interrelationship between the individuals involved in FS and the FS information flow. It represents the major types of information used for flight safety management (Hazards, Risk, PM, etc.) and the relationships that the entities have with each other as the data / information flows through the FS system.
- 4. The information model descriptors are:
 - a. Persons Involved in Air Operations. These personnel include aircrew, groundcrew, maintainers, air traffic personnel, contractors, as well as any other Air Force, Navy, or Army personnel involved with flying operations. They are responsible for identifying and reporting any hazard to flight safety that they find.

- b. FS Staff. FS Staff include Unit Flight Safety Officers (UFSOs), Wing Flight Safety Officers (WFSOs), Formation FSOs, Division Flight Safety Officers (Div FSOs), DFS Flight Safety Officers, and deputies at all levels. They are responsible for validating and investigating reported hazards, for analyzing the hazard risk potential and for proposing possible PM. FSOs and their assistants (FS Non-Commissioned Members, FS Specialist (Weapons) (FS Spec (W), etc.) operate within a FS functional chain of command. As advisors to their respective supervisors, all tiers of FS (deployments, unit, wing, formation, division, contracted unit and DFS) work in a cooperative and functional Chain of Command IAW direction set in this publication.
- c. Chain of Command. Chain of command include unit commanding officers, wing commanders, formation commander, division commander, and supervisors at all levels. These persons are responsible for evaluating the hazards within their organizations, and either formally accepting the risk, or mitigating the risk by implementing PM. By extension, the senior management of contracted organizations have an equivalent chain of command.
- d. Action Agencies. Once the Chain of Command has confirmed the risks associated with certain hazards, they will task Action Agencies to complete PM. These Action Agencies will notify FS Staff when their assigned PM has been completed, as well as provide status reports along the way.

FS BUSINESS MODEL AND FSIMS

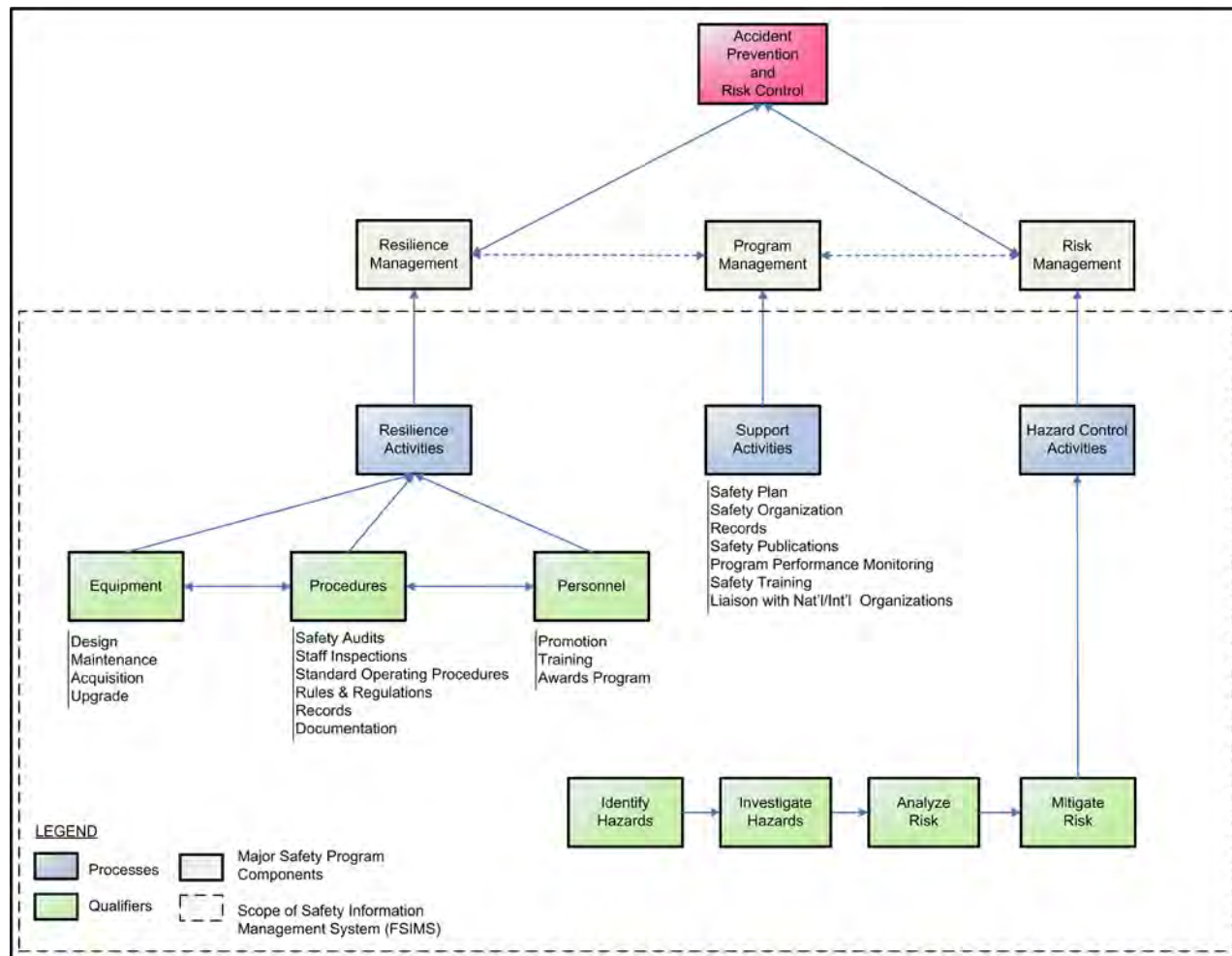
5. The FSP achieves the aim of preventing accidental loss of aviation resources while accomplishing the mission at an acceptable level of risk. This is done by managing the risks associated with air operations, and by making the organization resilient to unknown hazards. Some of the FS processes in the FS business model are the direct responsibility of the Airworthiness Investigative Authority while others are the responsibility of organizations and personnel directly and indirectly supporting air operations.

6. The FS Information Management System (FSIMS) supports the FSP by recording all factual data related to FS occurrences and hazards. It details investigation results including assigned cause factors, recommended PM and disposition of these PM. The collection of data and its systematic analysis helps in the prevention of accidents and the control of risk in a manner that is measurable.

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Appendix 1
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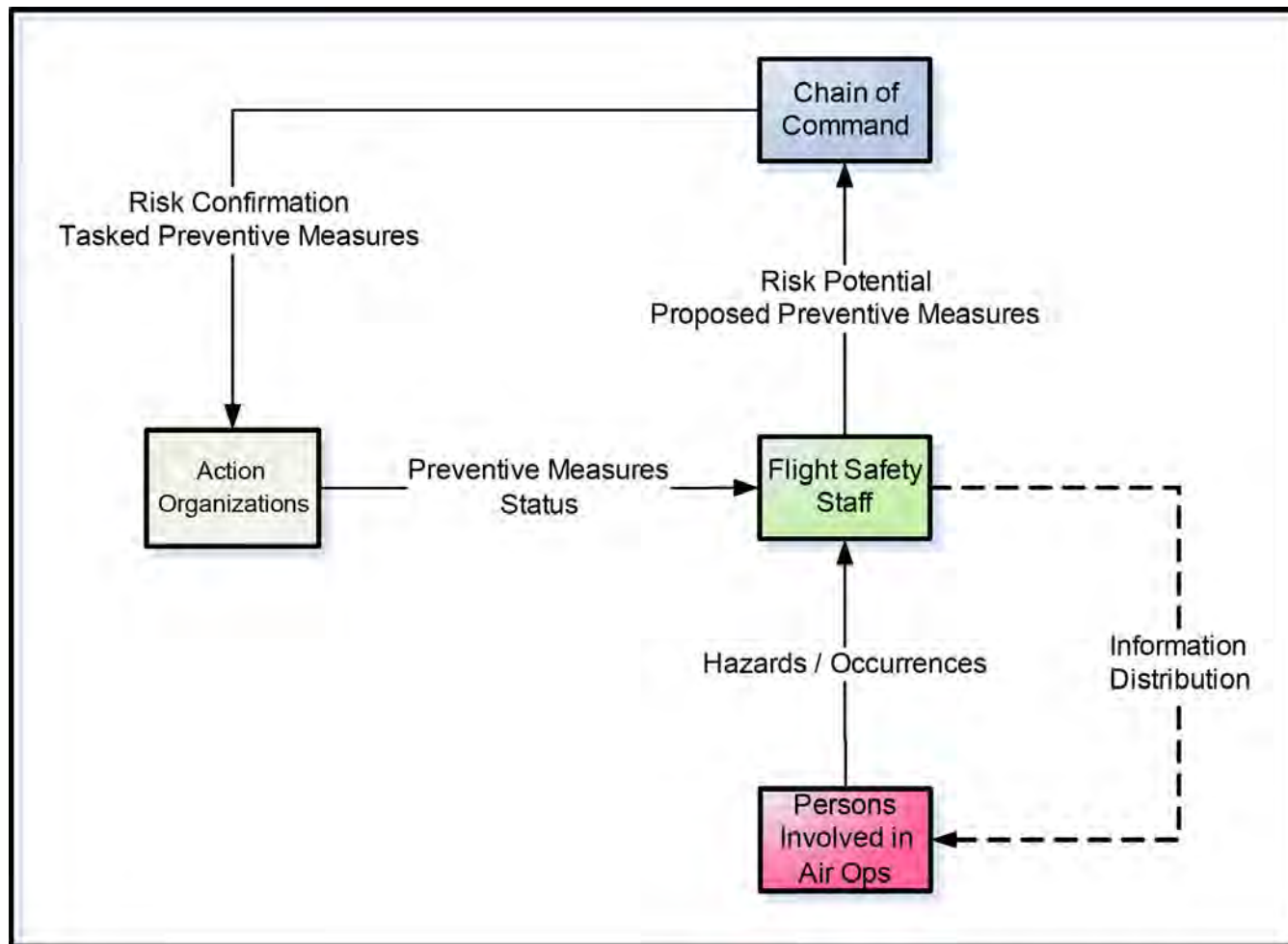
APPENDIX 1 – FS BUSINESS PROCESSES



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APPENDIX 2 – FS INFORMATION MODEL



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Annex B
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ANNEX B – RELATIONSHIP BETWEEN FSP AND ICAO OCCURRENCE CLASSIFICATION SYSTEM

1. For data comparison and to facilitate exchange of FS information with external aviation safety organizations, FSIMS data may be mapped to ICAO/ADREP/ECCAIRS data by considering the FS occurrence category and FS compromise level (FSCL) (see Airworthiness Investigation Manual, Chapter 5).
2. A summary table to convert FS occurrences to the ICAO classification system is provided below:
 - a. Accident (Occurrence Class: 100). Any FS occurrence classified as an accident (FS Occurrence category of “A”, “B” or “C”). Accidents are subject to mandatory reporting IAW ICAO Annex 13;
 - b. Serious Incident (Occurrence Class: 200). Any FS occurrence classified as an incident (FS Occurrence category of “D” or “E”) and having an FSCL of “Extreme”, “High” or “Medium”. ICAO, Annex 13 contains a non-exhaustive list of examples of serious incidents which is provided at Annex B, Appendix 1 for reference purposes. Serious incidents are subject to mandatory reporting IAW ICAO Annex 13; and
 - c. Incident (Occurrence Class: 300). Any FS occurrence classified as an incident (FS Occurrence category of “D” or “E”) and having an FSCL of “Low”. Incidents are subject to voluntary reporting IAW ICAO Annex 19.

FS OCCURRENCE CATEGORY	FLIGHT SAFETY COMPROMISE LEVEL (FSCL)	ICAO OCCURRENCE CLASS
A	YES	100 ACCIDENT
B		
C		
D, E	EXTREME TO MEDIUM	200 SERIOUS INCIDENT
D, E	Low	300 INCIDENT

Table 1 - Relationship between FSP and ICAO Occurrence Classification Systems

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APPENDIX 1 – EXAMPLES OF ICAO SERIOUS INCIDENTS

1. The incidents listed below are typical examples of incidents that are likely to be serious. The list is not comprehensive and only serves as guidance to the definition of serious incident.
 - a. Near collisions requiring an avoidance manoeuvre to avoid a collision or an unsafe situation or when an avoidance action would have been appropriate;
 - b. Controlled flight into terrain only marginally avoided (near CFIT);
 - c. Aborted take-off on a closed or occupied runway;
 - d. Take-off from a closed or occupied runway with marginal separation from obstruction;
 - e. Landing or attempted landing on a closed or occupied runway;
 - f. Gross failure to achieve predicted performance during take-off or initial climb;
 - g. Engine fire or fire and smoke in the passenger cabin or cargo compartment, even though such fires were extinguished with extinguishing agents;
 - h. Event requiring the emergency use of oxygen by the flight crew;
 - i. Aircraft structural failure or engine disintegration not classified as an accident;
 - j. Multiple malfunctions of one or more aircraft systems seriously affecting the operation of the aircraft;
 - k. Flight crew incapacitation in flight;
 - l. Fuel quantity requiring the declaration of an emergency by the pilot;
 - m. Take-off or landing incidents such as runway undershoot or overshoot or running off the side of a runway;
 - n. System failure, weather phenomenon, operation outside the approved flight envelope or other occurrences that could have made controlling the aircraft difficult; and
 - o. Failure of more than one system in a series of redundant systems mandatory for flight guidance and navigation; and
 - p. the unintentional, or as an emergency measure, the intentional release of a slung load or any other load carried external to the aircraft.

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