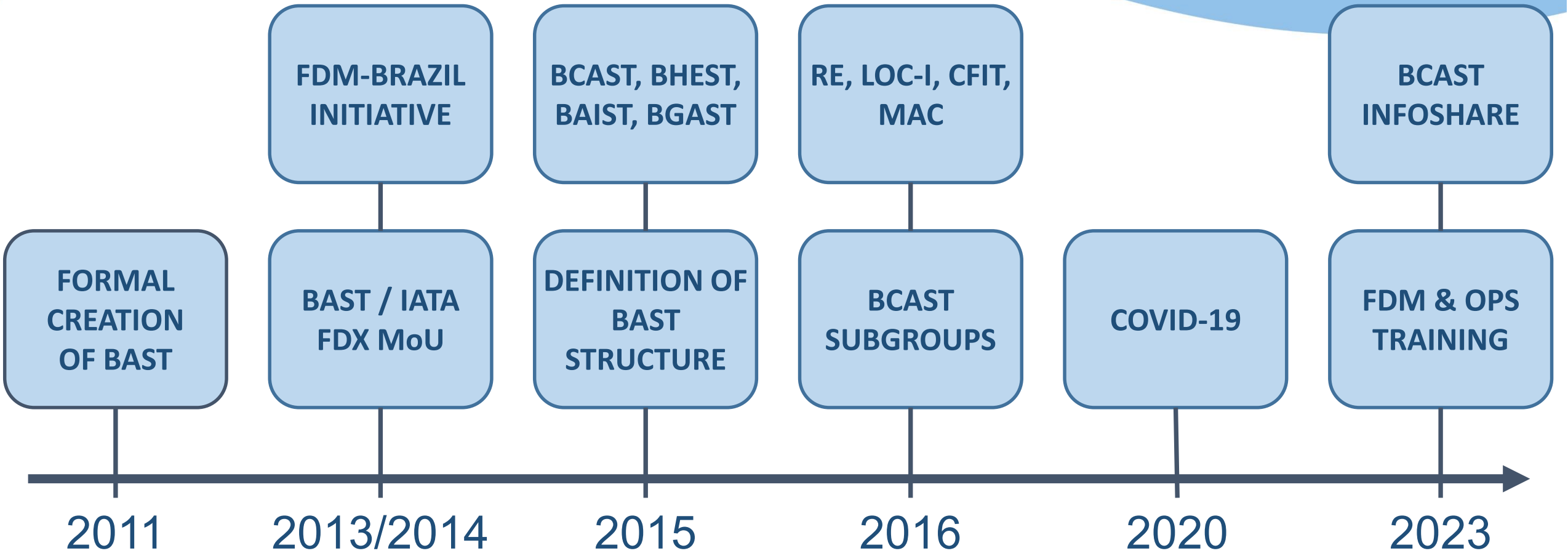
LOC-I Working Group

FLIGHT SAFETY FOUNDATION

History

BCAST
BRAZILIAN COMMERCIAL AVIATION SAFETY TEAM



Participants overview

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Government			Industry					
ANAC	DECEA	CENIPA	Airlines				Manufacturers		Associations	
PA-RAST Bridge			Azul --- Passaredo	GOL --- LATAM	Modern --- SIDERAL	TOTAL --- MAP	Embraer --- Airbus	Boeing --- ATR	ABEAR --- IATA --- ALTA	SNA --- IFALPA --- ASAGOL

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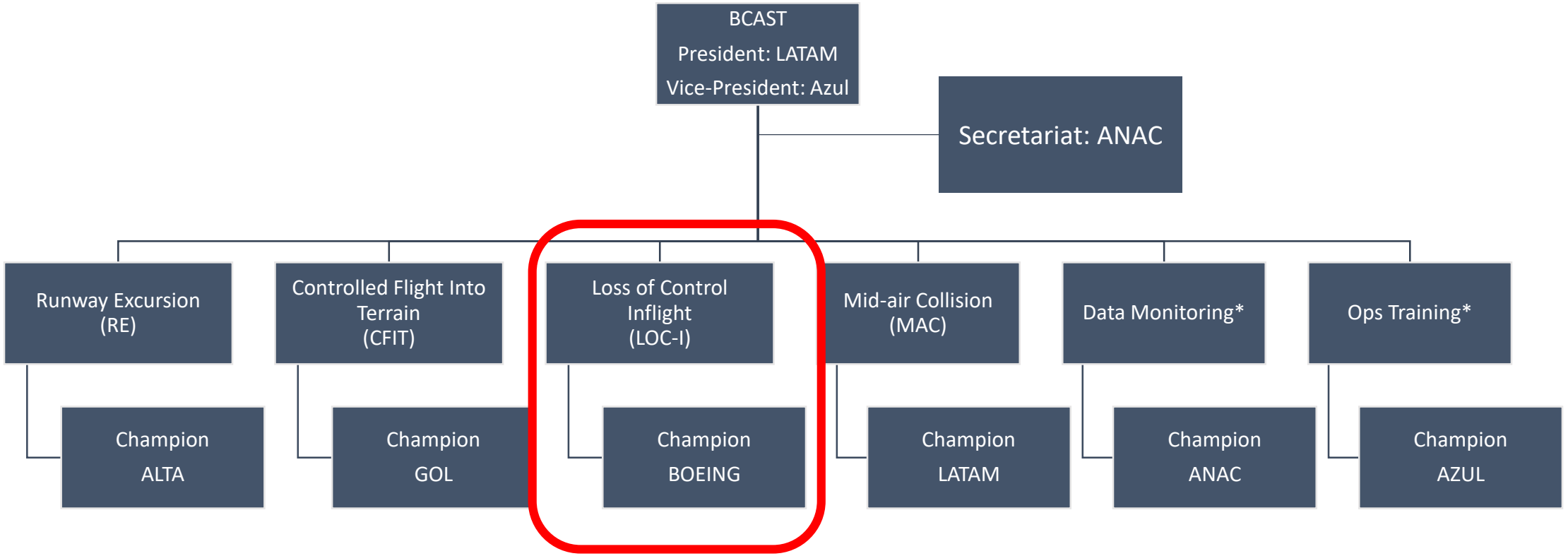
BCAST structure



*New sub-groups

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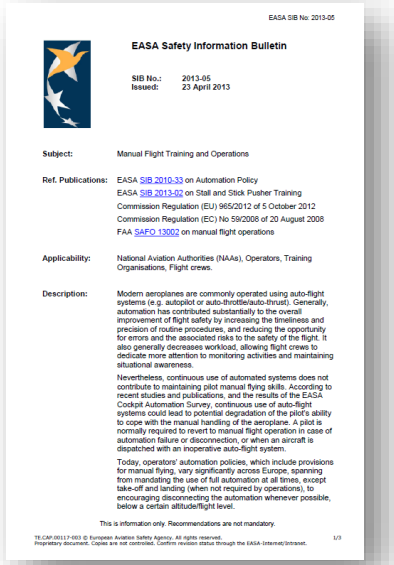
Incentive to Manual Flight Operations (MFO)

- Survey with 1,900 pilots from the main Brazilian airlines on manual flight practices
  - 71% of the pilots feel comfortable in flying manually with the current policies in place
  - Half of the pilots were discouraged to fly manually by a teammate, mainly first officers
  - Self-assessment on manual flying skills:
    - 22% on level 5
    - 66% on level 4
    - 10% on level 3
    - None on level 1 or 2
  - Factors that degrade the manual flight proficiency: fatigue and automation dependence
  - Fear of having an *exceedance* that would trigger a FOQA/FDM event was an aspect that showed up in different questions

Manual Flight Operations (MFO)

- FAA Safety Alert for Operators (SAFO) 13002 – Manual Flight Operations
- EASA Safety Information Bulletin (SIB) 2013-05 – Manual Flight Training and Operations
- FAA Safety Alert for Operators (SAFO) 17007 – Manual Flight Operations Proficiency
- FAA Advisory Circular (AC) 120-123 – Flightpath Management



EASA SIB No: 2013-05

EASA Safety Information Bulletin

SIB No.: 2013-05
Issued: 23 April 2013

Subject: Manual Flight Training and Operations

Ref. Publications: EASA SIB 2010-33 on Automation Policy
EASA SIB 2013-02 on Stall and Stick Pusher Training
Commission Regulation (EU) 965/2012 of 5 October 2012
Commission Regulation (EC) No 59/2008 of 20 August 2008
FAA SAFO 13002 on manual flight operations

Applicability: National Aviation Authorities (NAAs), Operators, Training Organisations, Flight crews.

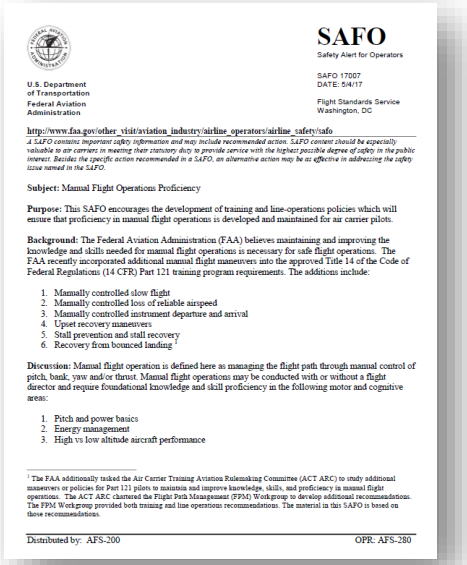
Description: Modern aeroplanes are commonly operated using auto-flight systems (e.g. autopilot or auto-throttle/auto-thrust). Generally, automation has contributed substantially to the overall improvement of flight safety by increasing the timeliness and precision of routine procedures, and reducing the opportunity for errors and the associated risks to the safety of the flight. It also generally decreases workload, allowing flight crews to dedicate more attention to monitoring activities and maintaining situational awareness.

Nevertheless, continuous use of automated systems does not contribute to maintaining pilot manual flying skills. According to recent studies and publications, and the results of the EASA Cockpit Automation Survey, continuous use of auto-flight systems could lead to potential degradation of the pilot's ability to cope with the manual handling of the aeroplane. A pilot is normally required to revert to manual flight operation in case of automation failure or disconnection, or when an aircraft is dispatched with an inoperative auto-flight system.

Today, operators' automation policies, which include provisions for manual flying, vary significantly across Europe, spanning from mandating the use of full automation at all times, except take-off and landing (when not required by operations), to encouraging disconnecting the automation whenever possible, below a certain altitude/flight level.

This is information only. Recommendations are not mandatory.

1/3



SAFO
Safety Alert for Operators

SAFO 17007
DATE: 5/4/17

U.S. Department of Transportation
Federal Aviation Administration

Flight Standards Service
Washington, DC

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo

A SAFO contains important safety information and may include recommended action. SAFO content should be especially valuable to air carriers in meeting their statutory duty to provide service with the highest possible degree of safety in the public interest. Besides the specific action recommended in a SAFO, an alternative action may be as effective in addressing the safety issue named in the SAFO.

Subject: Manual Flight Operations Proficiency

Purpose: This SAFO encourages the development of training and line-operations policies which will ensure that proficiency in manual flight operations is developed and maintained for air carrier pilots.

Background: The Federal Aviation Administration (FAA) believes maintaining and improving the knowledge and skills needed for manual flight operations is necessary for safe flight operations. The FAA recently incorporated additional manual flight maneuvers into the approved Title 14 of the Code of Federal Regulations (14 CFR) Part 121 training program requirements. The additions include:

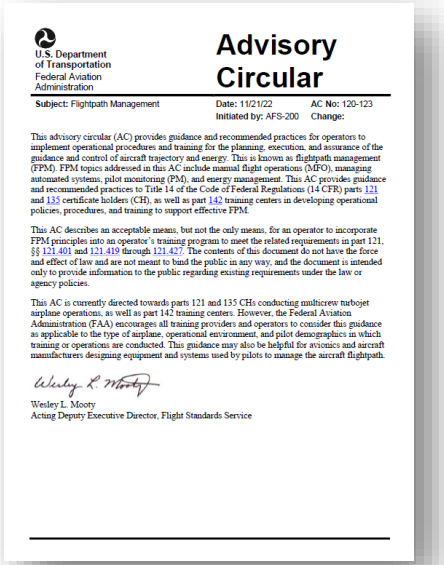
1. Manually controlled slow flight
2. Manually controlled loss of reliable airspeed
3. Manually controlled instrument departure and arrival
4. Upset recovery maneuvers
5. Stall prevention and stall recovery
6. Recovery from bounced landing [1]

Discussion: Manual flight operation is defined here as managing the flight path through manual control of pitch, bank, yaw and/or thrust. Manual flight operations may be conducted with or without a flight director and require foundational knowledge and skill proficiency in the following motor and cognitive areas:

1. Pitch and power basics
2. Energy management
3. High vs low altitude aircraft performance

[1] The FAA additionally tasked the Air Carrier Training Aviation Rulemaking Committee (ACT ARC) to study additional maneuvers or policies for Part 121 pilots to maintain and improve knowledge, skills, and proficiency in manual flight operations. The ACT ARC chartered the Flight Path Management (FPM) Workgroup to develop additional recommendations. The FPM Workgroup provided both training and line operations recommendations. The material in this SAFO is based on those recommendations.

Distributed by: AFS-200 OPR: AFS-280



U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Flightpath Management
Date: 11/21/22 **AC No:** 120-123
Initiated by: AFS-200 **Change:**

This advisory circular (AC) provides guidance and recommended practices for operators to implement operational procedures and training for the planning, execution, and assurance of the guidance and control of aircraft trajectory and energy. This is known as flightpath management (FPM). FPM topics addressed in this AC include manual flight operations (MFO), managing automated systems, pilot monitoring (PM), and energy management. This AC provides guidance and recommended practices to Title 14 of the Code of Federal Regulations (14 CFR) parts 121 and 135 certificate holders (CH), as well as part 142 training centers in developing operational policies, procedures, and training to support effective FPM.

This AC describes an acceptable means, but not the only means, for an operator to incorporate FPM principles into an operator's training program to meet the related requirements in part 121, §§ 121.401 and 121.419 through 121.427. The contents of this document do not have the force and effect of law and are not meant to bind the public in any way, and the document is intended only to provide information to the public regarding existing requirements under the law or agency policies.

This AC is currently directed towards parts 121 and 135 CHs conducting multicrew turbojet airplane operations, as well as part 142 training centers. However, the Federal Aviation Administration (FAA) encourages all training providers and operators to consider this guidance as applicable to the type of airplane, operational environment, and pilot demographics in which training or operations are conducted. This guidance may also be helpful for avionics and aircraft manufacturers designing equipment and systems used by pilots to manage the aircraft flightpath.

Wesley L. Mooty
Acting Deputy Executive Director, Flight Standards Service

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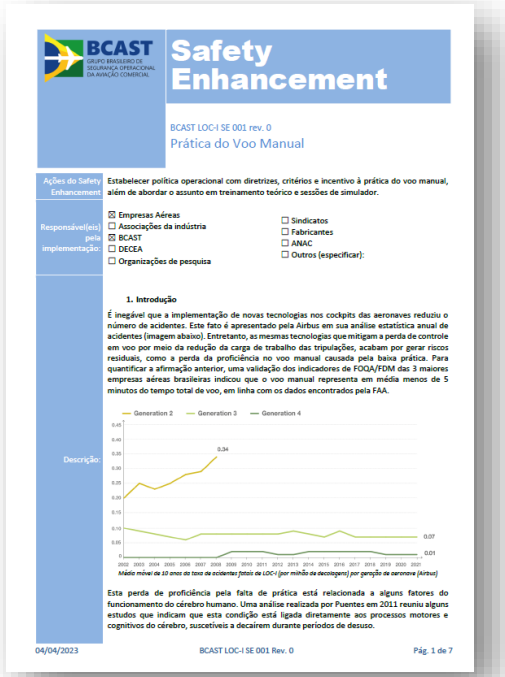
Incentive to Manual Flight Operations (MFO)



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GRUPO BRASILEIRO DE SEGURANÇA OPERACIONAL DA AVIAÇÃO COMERCIAL

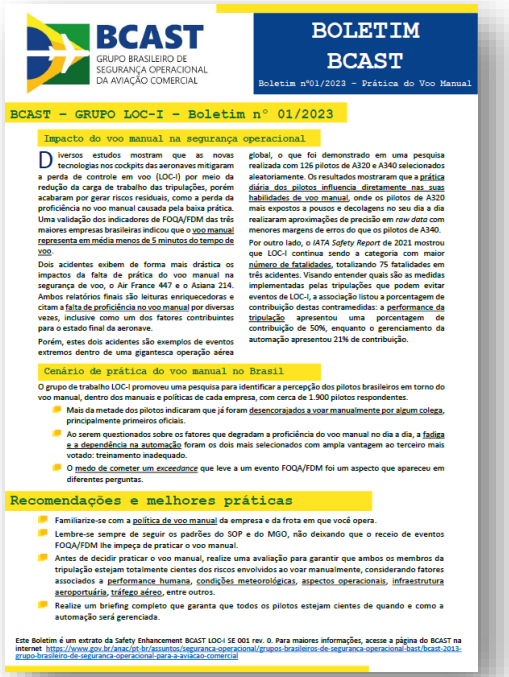
Safety Enhancement

BCAST LOC-I SE 001 rev. 0

Prática do Voo Manual

Ações do Safety Enhancement	Estabelecer política operacional com diretrizes, critérios e incentivo à prática do voo manual, além de abordar o assunto em treinamento teórico e sessões de simulador.
Responsável(eis) pela implementação:	☒ Empresas Aéreas ☐ Associações da indústria ☒ BCAST ☐ DECEA ☐ Organizações de pesquisa ☐ Sindicatos ☐ Fabricantes ☐ ANAC ☐ Outros (especificar):
Descrição:	**1. Introdução** É inegável que a implementação de novas tecnologias nos cockpits das aeronaves reduziu o número de acidentes. Este fato é apresentado pela Airbus em sua análise estatística anual de acidentes (imagem abaixo). Entretanto, as mesmas tecnologias que mitigam a perda de controle em voo por meio da redução da carga de trabalho das tripulações, acabam por gerar riscos residuais, como a perda da proficiência no voo manual causada pela baixa prática. Para quantificar a afirmação anterior, uma validação dos indicadores de FOQA/FDM das 3 maiores empresas aéreas brasileiras indicou que o voo manual representa em média menos de 5 minutos do tempo total de voo, em linha com os dados encontrados pela FAA. Generation 2 — Generation 3 — Generation 4 0.34 0.07 0.01 *Média móvel de 10 anos da taxa de acidentes fatais da LOC-I (por milhão de decolagens) por geração de aeronave (Airbus)* Esta perda de proficiência pela falta de prática está relacionada a alguns fatores do funcionamento do cérebro humano. Uma análise realizada por Puentes em 2011 reuniu alguns estudos que indicam que esta condição está ligada diretamente aos processos motores e cognitivos do cérebro, suscetíveis a decairem durante períodos de desuso.

04/04/2023 BCAST LOC-I SE 001 Rev. 0 Pág. 1 de 7



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BOLETIM BCAST
Boletim nº01/2023 – Prática do Voo Manual

BCAST – GRUPO LOC-I – Boletim n° 01/2023

Impacto do voo manual na segurança operacional

Diversos estudos mostram que as novas tecnologias nos cockpits das aeronaves mitigaram a perda de controle em voo (LOC-I) por meio da redução da carga de trabalho das tripulações, porém acabaram por gerar riscos residuais, como a perda da proficiência no voo manual causada pela baixa prática. Uma validação dos indicadores de FOQA/FDM das três maiores empresas brasileiras indicou que o voo manual representa em média menos de 5 minutos do tempo de voo.

Dois acidentes exibem de forma mais drástica os impactos da falta de prática do voo manual na segurança de voo, o Air France 447 e o Asiana 214. Ambos relatórios finais são leituras enriquecedoras e citam a falta de proficiência no voo manual por diversas vezes, inclusive como um dos fatores contribuintes para o estado final da aeronave.

Porém, estes dois acidentes são exemplos de eventos extremos dentro de uma gigantesca operação aérea global, o que foi demonstrado em uma pesquisa realizada com 126 pilotos de A320 e A340 selecionados aleatoriamente. Os resultados mostraram que a prática diária dos pilotos influencia diretamente nas suas habilidades de voo manual, onde os pilotos de A320 mais expostos a pousos e decolagens no seu dia a dia realizaram aproximações de precisão em *raw data* com menores margens de erros do que os pilotos de A340.

Por outro lado, o *IATA Safety Report* de 2021 mostrou que LOC-I continua sendo a categoria com maior número de fatalidades, totalizando 75 fatalidades em três acidentes. Visando entender quais são as medidas implementadas pelas tripulações que podem evitar eventos de LOC-I, a associação listou a porcentagem de contribuição destas contramedidas: a performance da tripulação apresentou uma porcentagem de contribuição de 50%, enquanto o gerenciamento da automação apresentou 21% de contribuição.

Cenário de prática do voo manual no Brasil

O grupo de trabalho LOC-I promoveu uma pesquisa para identificar a percepção dos pilotos brasileiros em torno do voo manual, dentro dos manuais e políticas de cada empresa, com cerca de 1.900 pilotos respondentes.

- Mais da metade dos pilotos indicaram que já foram desencorajados a voar manualmente por algum colega, principalmente primeiros oficiais.
- Ao serem questionados sobre os fatores que degradam a proficiência do voo manual no dia a dia, a fadiga e a dependência na automação foram os dois mais selecionados com ampla vantagem ao terceiro mais votado: treinamento inadequado.
- O medo de cometer um exceedance que leve a um evento FOQA/FDM foi um aspecto que apareceu em diferentes perguntas.

Recomendações e melhores práticas

- Familiarize-se com a política de voo manual da empresa e da frota em que você opera.
- Lembre-se sempre de seguir os padrões do SOP e do MGO, não deixando que o receio de eventos FOQA/FDM lhe impeça de praticar o voo manual.
- Antes de decidir praticar o voo manual, realize uma avaliação para garantir que ambos os membros da tripulação estejam totalmente cientes dos riscos envolvidos ao voar manualmente, considerando fatores associados a performance humana, condições meteorológicas, aspectos operacionais, infraestrutura aeroportuária, tráfego aéreo, entre outros.
- Realize um briefing completo que garanta que todos os pilotos estejam cientes de quando e como a automação será gerenciada.

Este Boletim é um extrato da Safety Enhancement BCAST LOC-I SE 001 rev. 0. Para maiores informações, acesse a página do BCAST na internet https://www.gov.br/anac/pt-br/assuntos/seguranca-operacional/grupos-brasileiros-de-seguranca-operacional-bast/bcast-2013-grupo-brasileiro-de-seguranca-operacional-para-a-aviacao-comercial

1. Daily flight operations
2. Simulator sections

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Incentive to Manual Flight Operations (MFO)

- 11 recommendations to the airlines
  - ✓ Operational policy for manual flight operations
  - ✓ Conditions and scenarios or criteria for the practice of manual flight
  - ✓ Specific SOPs to maintain focus on flight path management
  - ✓ Scenarios in the simulator sessions that encourage manual flight in degraded controllability conditions
  - ✓ Theoretical training
  - ✓ Demystify the fear that manual flying will result in punishment
  - ✓ FOQA/FDM policy with greater acceptability of the variation of flight parameters

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Incentive to Manual Flight Operations (MFO)

- 6 recommendations to pilots
  - ✓ Be familiar with the manual flight policy
  - ✓ Follow SOP and Flight Operations Manual standards
  - ✓ Don't let the fear of FOQA/FDM events stop you from practicing manual flying
  - ✓ Fully understand the automation modes of the fleet you operate
  - ✓ Perform a Threat and Error Management (TEM) of the respective flight
  - ✓ Thorough briefing

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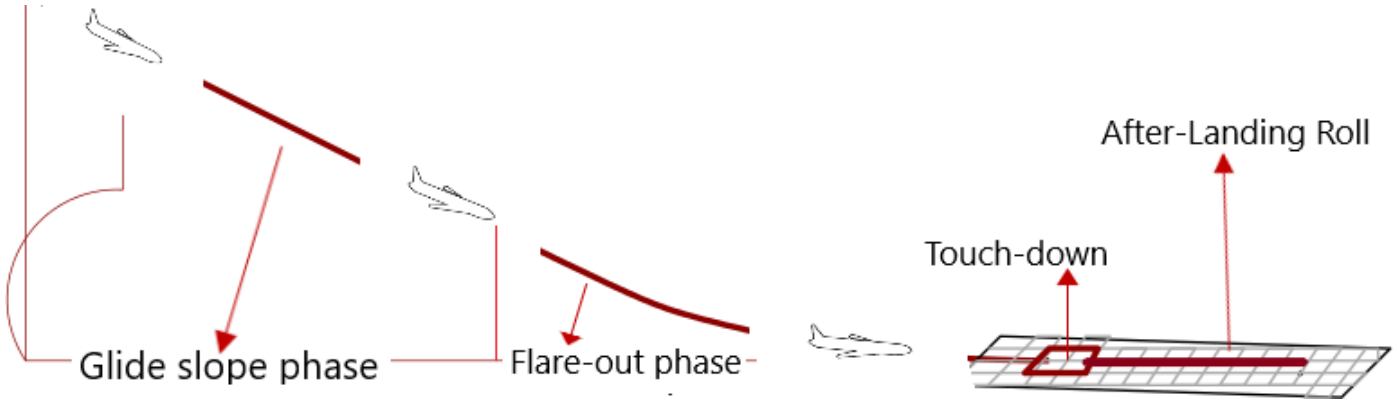
Incentive to Manual Flight Operations (MFO)

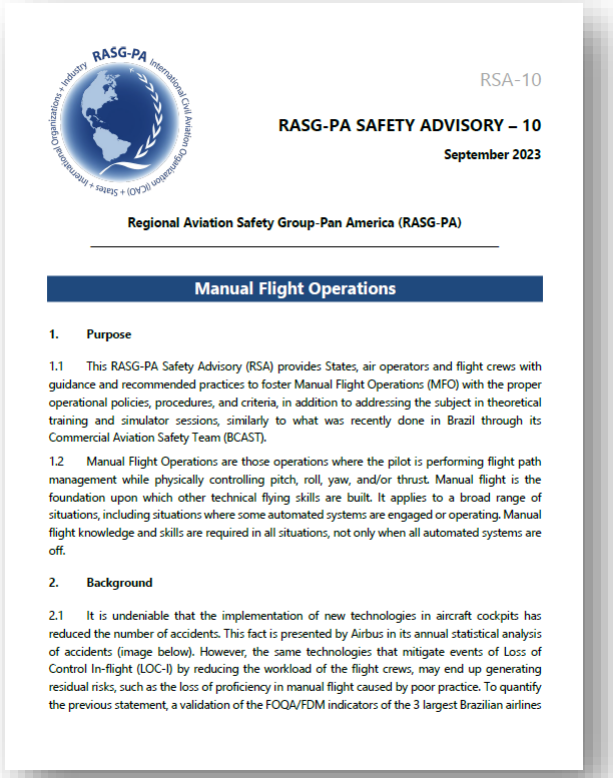
- Monitoring the implementation
  - Harmonized among airlines through FOQA/FDM
  - Automation disconnection time (min/FC)
    - Level 1 = AP off
    - Level 2 = AP+FD off
    - Level 3 = AP+FD+AT off
  - Approach phase until touchdown
  - Monthly basis



ICAO RASG-PA Safety Advisory (RSA) Manual Flight Operations

https://www.icao.int/RASGPA/Pages/RASGPA-SA.aspx

Document name	Publication	Format	Size	Links
RSA-06 Key Safety Areas to Watch	01/06/2020	PDF	1M	ES PT EN
RSA-07B Mitigations for Controlled Flight Into Terrain	10/09/2023	PDF	1M	EN
RSA-08 Compatibility Issues Between Required Landing Performance and Touchdown Zone Definition	21/12/2022	PDF	1M	EN
RSA-09 Mode Awareness and Energy State Management Aspects of Flight Deck Automation	21/12/2022	PDF	1M	EN
RSA-10 Manual Flight Operations	09/10/2023	PDF	1M	EN



RSA-10

RASG-PA SAFETY ADVISORY – 10

September 2023

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

Manual Flight Operations

1. Purpose

1.1 This RASG-PA Safety Advisory (RSA) provides States, air operators and flight crews with guidance and recommended practices to foster Manual Flight Operations (MFO) with the proper operational policies, procedures, and criteria, in addition to addressing the subject in theoretical training and simulator sessions, similarly to what was recently done in Brazil through its Commercial Aviation Safety Team (BCAST).

1.2 Manual Flight Operations are those operations where the pilot is performing flight path management while physically controlling pitch, roll, yaw, and/or thrust. Manual flight is the foundation upon which other technical flying skills are built. It applies to a broad range of situations, including situations where some automated systems are engaged or operating. Manual flight knowledge and skills are required in all situations, not only when all automated systems are off.

2. Background

2.1 It is undeniable that the implementation of new technologies in aircraft cockpits has reduced the number of accidents. This fact is presented by Airbus in its annual statistical analysis of accidents (image below). However, the same technologies that mitigate events of Loss of Control In-flight (LOC-I) by reducing the workload of the flight crews, may end up generating residual risks, such as the loss of proficiency in manual flight caused by poor practice. To quantify the previous statement, a validation of the FOQA/FDM indicators of the 3 largest Brazilian airlines

Thank You

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