Flight Path Management for Safe Operations

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Overview

► FAA/Industry work
► Flight Path Management Policy
► Monitoring - What is it?
► Operator Guidance for Monitoring
► Safe, Controlled Approaches
Flight Path Management” is the planning, execution, and assurance of the guidance and control of aircraft trajectory and energy, in flight or on the ground.
Flightcrew Operational Use of Flight Path Management Systems

Data Sources

- 734 ASRS Reports (2001 – 2007)
  including 2200 narratives regarding “use of automation” marker

28 Findings
18 Recommendations

- Findings were conclusions based on one or more data sources
- NOTE: Findings were not specific to a particular manufacturer, operator, or other organization
Flight Path Management

► Manual flight operations
► Managing automated systems
► Flight path monitoring and intervention
► Managing energy state
► Operating in the airspace
► Training
► Monitoring
► Stabilized approach
► Go-around decision and implementation
Other FAA/Industry work
Relevant Guidance

AC 120-109A

Advisory Circular

Subject: Stall Prevention and Recovery Training

Date: 11/24/15
AC No: 120-109A

This advisory circular (AC) provides guidance for training, testing, and checking pilots to ensure correct responses to impending and full stalls. For air carriers, Title 14 of the Code of Federal Regulations (14 CFR) part 121 contains the applicable regulatory requirements. Although this AC is directed to part 121 air carriers, the Federal Aviation Administration (FAA) encourages all air carriers, airplane operators, pilot schools, and training centers to use this guidance for stall prevention training, testing, and checking. This guidance was created for operators of transport category airplanes; however, many of the principles apply to all airplanes. The content was developed based on a review of recommended practices developed by major airplane manufacturers, labor organizations, air carriers, training organizations, simulator manufacturers, and industry representative organizations.

This AC includes the following core principles:
- Reducing angle of attack (AOA) is the most important pilot action in recovering from an impending or full stall.
- Pilot training should emphasize teaching the same recovery technique for impending stalls and full stalls.
- Evaluation criteria for a recovery from an impending stall should not include a predetermined value for altitude loss. Instead, criteria should consider the multitude of external and internal variables that affect the recovery altitude.
- Once the stall recovery procedure is mastered by maneuver-based training, stall prevention training should include realistic scenarios that could be encountered in operational conditions, including stalling stalls with the autopilot engaged at high altitudes.
- Full stall training is an instructor-guided, hands-on experience of applying the stall recovery procedure and will allow the pilot to experience the associated flight dynamics from stall onset through the recovery.

This revision of AC 120-109 reflects new part 121 regulatory terms and incorporates the full stall training requirement of Public Law 111-216. Considerable evaluation of the full flight simulator (FFS) must occur before conducting full stall training in simulation. Reference Appendix 5 for FFS evaluation considerations.

John S. Duncan
Director, Flight Standards Service

AC 120-111

Advisory Circular

Subject: Upset Prevention and Recovery Training

Date: As of AFS-200
AC No: 120-UPRT

This advisory circular (AC) describes the philosophy and recommended training for airplane Upset Prevention and Recovery Training (UPRT). The goal of this AC is to provide recommended practices and guidance for academic and flight simulation training device (FSTD) training for pilots to prevent developing upset conditions and ensure correct and consistent recovery responses to upsets. The AC was created from recommended practices developed by major airplane manufacturers, labor organizations, air carriers, training organizations, simulator manufacturers, and industry representative organizations. This AC provides guidance to Title 14 of the Code of Federal Regulations (14 CFR) part 121 air carriers implementing the regulatory requirements of §§ 121.419, 121.421, 121.423, 121.424, and 121.427. Although this AC is directed to air carriers to implement part 121 regulations, the FAA encourages all airplane operators, pilot schools, and training centers to implement UPRT and to use the guidance contained in this AC, as applicable to the type of airplane in which training is conducted.

Although a stall is categorized as an upset, this AC does not cover stall prevention and recovery training. This training, which includes the requirement for full stall training, is contained in the current edition of AC 120-109, Stall Prevention and Recovery Training.

Core principles of this AC include:
- Enhanced instructor training on the limitations of simulation.
- Comprehensive pilot academic training on aerodynamics.
- Early recognition of divergence from intended flight path.
- Upset prevention through improvements in manual handling skills.
- Progressive intervention strategies for the pilot monitoring.

CAUTION: Prior to commencing UPRT, air carriers should review and implement Guidance Bulletin 11-05, FSTD Evaluation Recommendations for Upset Recovery Training Maneuvers to ensure FSTDs are specifically evaluated for UPRT maneuvers. Otherwise, negative transfer of training could occur.

John S. Duncan
Director, Flight Standards Service
Relevant Guidance

Airplane Upset Recovery Training Aid
Revision 2 – November 2008

Includes High Altitude Supplement
Relevant Guidance

- **SAFO 10012  July 6, 2010**
  - “Minimal loss of altitude” or “Maintaining Altitude” during a stall recovery should be eliminated as a training and checking evaluation criteria.
  - Proper evaluation criteria should consider the multitude of external and internal variables which affect the recovery altitude.
  - Aircraft manufacturer’s recommended stall recovery techniques and procedures take precedent and must be followed.

- **InFo 10010  July 6, 2010**
  - FAA strongly recommends incorporation of applicable sections of the *Airplane Upset Recovery Training Aid* into training programs.
SUBJECT:
Roles and Responsibilities for Pilot Flying (PF) and Pilot Monitoring (PM)

PURPOSE:
Guidance for Operators for defining operational roles and responsibilities for PF and PM
Relevant Guidance - Monitoring

A Practical Guide for Improving Flight Path Monitoring

Monitoring Matters
Flight Path Management Policy


► FAA AC 120-74 (2012)- FlightCrew Procedures during Taxi Operations
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Operator Guidance for Flight Path Management

Operational Guidance for Flight Path Management, not Automation Policy

► Focus on managing the flight path of the airplane, not the automated systems
► Identify opportunities for manual flight operations
► Automated systems are tools for the pilot to use
► Defined Monitoring Policy
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Monitoring - What is it?

► The purpose of monitoring is to support meaningful action.

► It includes the process of observing and creating an understanding (mental model), by seeking out available information to compare actual and expected state.
Skills?

Technical
- Aircraft Systems
- Flight Path
- a/c + ATC
- Modes
- Rules of thumb
- Manual
- Recovery

Non Technical
- CRM / NTS
- Intent / Challenge
Monitoring - What is it?

- Monitoring is an overarching process requiring tasks and skills which all pilots on the flight deck should demonstrate to maintain operational awareness.

- Requires the pilots to observe, interpret and understand all relevant data (i.e., configuration, energy-state, parameters, automation modes, automated systems, behavior of flight crew, and information) related to the phase of flight,
Monitoring - What is it?

► Involves a cognitive comparison against expected values, modes and procedures,

► Requires flexibility to allow pilots to adapt and handle variability in the changing conditions of flight,

► Requires communication and means to alert when significant deviations occur, and

► Includes intervention in a timely manner when the situation requires.
Monitoring - Key Concepts

► Protecting Flight Path is Primary
► Both pilots are Flying (shared responsibility)
► Both pilots are Monitoring (shared)
► Monitoring as a Task, as a Role
► Functional Roles / Assigned Roles
► Technique of Individual Monitoring
► Technique of Crew Monitoring
Monitoring

Good Monitoring relies upon effective

- Task Management
- Making time for monitoring

Effective monitoring requires exercising good

- Good Monitoring
- CRM
- TEM
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Operator Guidance for Monitoring

- Operator Flightpath Management Policy
- Operator policy concerning use of automation, manual flight operations, communication, etc.
- Monitoring SOP’s described in FCOM and FCTM (OEM documentation oriented)
- Crew Resource Management and TEM
- Operator Training policy
Operator Guidance for Monitoring

- Monitoring duties and responsibilities of all flight crewmembers on the flight deck, to include relief pilots, safety observers, and check Airmen.

- Operator policy concerning items such as Briefing, competencies, CRM, TEM, etc.

- Properly trained and qualified instructors

- Intervention Strategies
Communication and Intervention Strategy

- **Ask**
  - Aircraft state OK
  - No time pressure

- **Suggest**

- **Direct**
  - Aircraft state not OK
  - Time available

- **Take Over**
  - Aircraft state not OK
  - Immediate action required
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Safe, Controlled Approaches

- Stabilized Approach Criteria
- Non-stabilized Approach Criteria
- Calling for Go-Around
- Landing Bias
- Crew Monitoring
- Stall and LOC-I prevention and Recovery
British Airways 38, Jan 2008
Concluding Remarks

Obtain and use industry documents to:

► Develop Flight Path Management Policy
► Understand Monitoring
► Define Monitoring Policy that includes
  ▪ Tasks, roles and responsibilities
  ▪ Communication and Intervention strategies
► Implement safety enhancements to achieve safe, controlled approaches
Flight Path Management for Safe Operations

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