

# Manual Flight in Air Carrier Training and Operations

Presented to:

APATS

By:

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Date:

September 03, 2019



Federal Aviation  
Administration



# Manual Flight Operations

***Manual flight operations are those actions in which the pilot is physically controlling the trajectory and energy of the aircraft***



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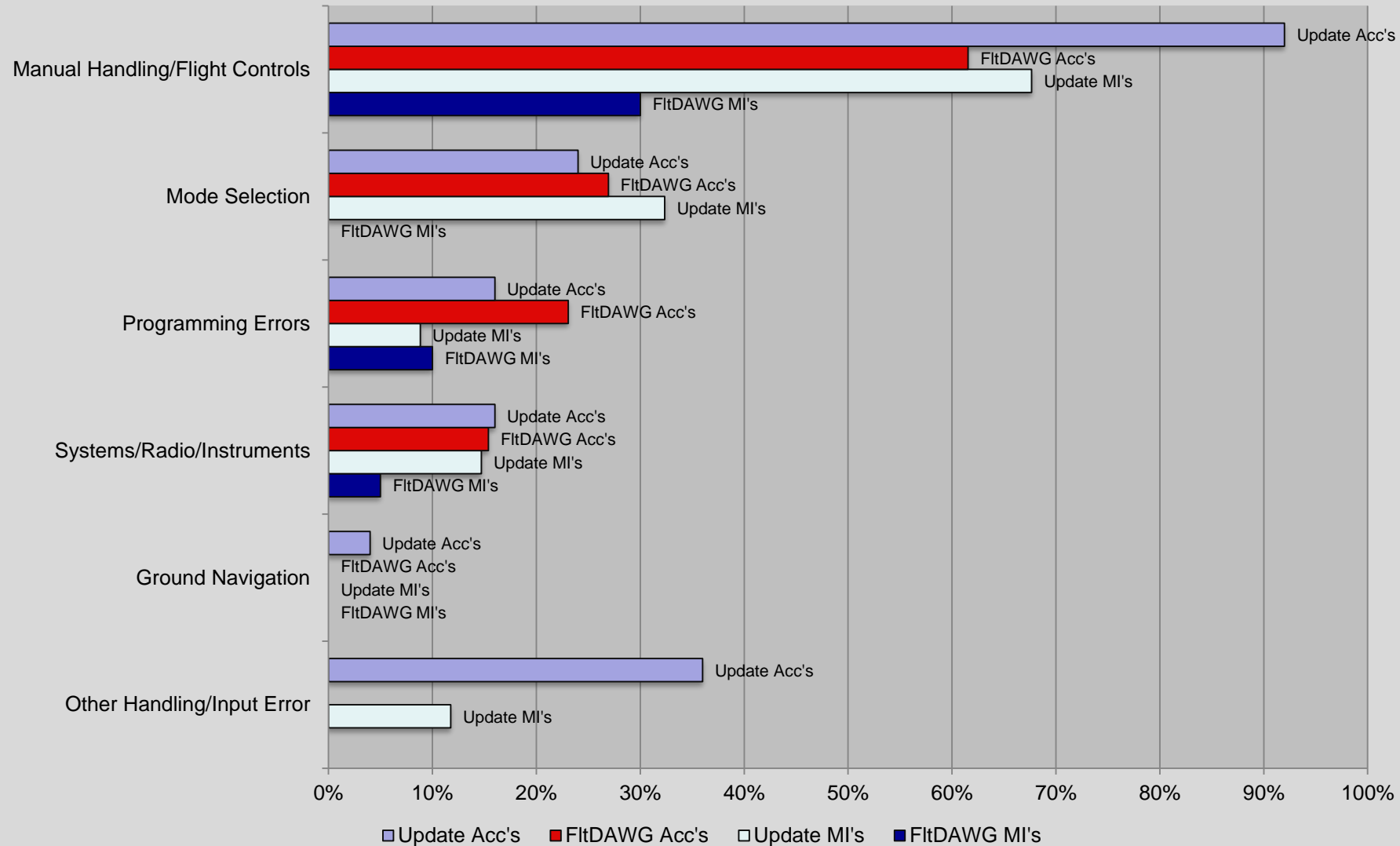
# Training Requirement

## **Additional requirements added to Part 121:**

- Manually controlled slow flight
- Manually controlled loss of reliable airspeed
- Manually controlled instrument departure and arrival
- Upset recovery maneuvers
- Stall prevention and stall recovery
- Recovery from bounced landing



# Handling/Input Errors *Do not distribute*



# Piloting Skills

- **Lots of good research conducted on this and related topics**
- **Piloting capability typically grouped into two broad areas:**
  - **General Aviation and Systems Knowledge**
  - **Skills**



# Piloting Skills

## Psychomotor

- Observable physical actions to control the aircraft's orientation in space
- This is a physical skill, which is innately integrated with our cognitive processes

## Cognition

- Perceiving, planning, predicting, confirming, monitoring, and correcting...and much more
- Pilot must maintain a holistic perspective of where the aircraft is, where it is going, and how it will get there
- Results from previous education, training, experiences, and perceptions of the current and desired aircraft state



# Skill Degradation

- **Psychomotor skills begin to degrade after very short periods of time with non-use**
  - Degradation is slower than the decline of cognitive skills
  - Psychomotor skill degradation quickly returned to a proficiency of 75 percent in as little as five minutes of practice
- **Cognitive skills deteriorate faster than psychomotor and are more difficult to reestablish**



# Contributors to Skill Degradation

- **Directed Use of Automation**

- OEM Standards
- Operator Policy
- Non-US Regulatory Policy

- **Complacency**

➔ **Solution: appropriately targeted training and frequent (as much as practical) practice**







U.S. Department  
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# SAFO

Safety Alert for Operators

SAFO 13002  
DATE: 1/4/13

Flight Standards Service  
Washington, DC

[http://www.faa.gov/other\\_visit/aviation\\_industry/airline\\_operators/airline\\_safety/safo](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

**Purpose:** This SAFO encourages operators to promote manual flight operations when appropriate.

**Background:** A recent analysis of flight operations data (including normal flight operations, incidents, and accidents) identified an increase in manual handling errors. The Federal Aviation Administration (FAA) believes maintaining and improving the knowledge and skills for manual flight operations is necessary for safe flight operations.

**Discussion:** Modern aircraft are commonly operated using autoflight systems (e.g., autopilot or autothrottle/autothrust). Unfortunately, continuous use of those systems does not reinforce a pilot's knowledge and skills in manual flight operations. Autoflight systems are useful tools for pilots and have improved safety and workload management, and thus enabled more precise operations. However, continuous use of autoflight systems could lead to degradation of the pilot's ability to quickly recover the aircraft from an undesired state.

# Air Carrier Training (ACT) Aviation Rulemaking Committee (ARC) Charter

The ACT ARC provides a forum for the United States aviation community to discuss, prioritize, and provide recommendations to the FAA concerning operations conducted under parts 121 (air carrier), 135 (on-demand, incl charters), and 142 (training centers). The general objectives and scope are:

- Develop and recommend to the FAA new or updated guidance material, notices, handbooks, and other related materials for air carrier training and qualification.
- Make recommendations, including necessary rulemaking and additional tasking, to the Administrator through the Associate Administrator for Aviation Safety.
- Discuss global air carrier training issues and develop strategies for international harmonization.
- Provide documentation and technical information to support recommendations.
- Form and provide committee oversight of specialized work groups to research, document, and make recommendations on specific, assigned topics.



# ACT ARC Member Organizations

<b>Aerospace Industries Association (AIA)</b>	<b>Delta Air Lines</b>
<b>Airline Dispatchers Federation (ADF)</b>	<b>FlightSafety International (FSI)</b>
<b>Airline Pilots Association (ALPA)</b>	<b>National Air Carrier Association (NACA)</b>
<b>Airlines for America (A4A)</b>	<b>National Air Disaster Alliance/Foundation (NADA/F)</b>
<b>Association of Flight Attendants (AFA)</b>	<b>National Air Transportation Association (NATA)</b>
<b>Association of Professional Flight Attendants (APFA)</b>	<b>National Business Aviation Association (NBAA)</b>
<b>CAE Inc.</b>	<b>Regional Airline Association (RAA)</b>
<b>Coalition of Airline Pilots Associations (CAPA)</b>	<b>Regional Air Cargo Carrier Association (RACCA)</b>



# ACT ARC Governance

- **Originally chartered on January 21, 2014 for four years**
- **Charter extended on November 16, 2017 for another four years**
  - Maintains existing membership
  - Maintains existing scope and objectives
- **ACT ARC can take on new initiatives at any time as risks and challenges are identified**



# ACT ARC Productivity

Workgroup	Recommendations Submitted to FAA
Air Carrier & Contract Training	16
Education, Training, & Experience Alternatives for an ATP	2
Crew Resource Management	2
Flight Path Management	10
High-Energy Fire Training Enhancement	In Progress
<b>Total Recommendations Submitted to the FAA =</b>	<b>30</b>



# ACT ARC Web Site

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**Flight Standards Service**

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International Program Division

Aircraft Evaluation Division

AIR Transportation Division

National Simulator Program Branch

New Program Implementation Branch

135 Air Carrier Operations Branch

Technical Programs Branch

Policy Integration Branch

Air Carrier Training Systems & Voluntary Safety Programs Branch

FAA Home > Offices > Aviation Safety > Offices > Flight Standards Service > Office of Safety Standards > AIR Transportation Division > Air Carrier Training Systems & Voluntary Safety Programs Branch

## Air Carrier Training Aviation Rulemaking Committee (ACT ARC)

### ACT ARC Products

2017 2016 2015 2014

Recommendations	Title
<a href="#">Recommendation 17-1 (PDF)</a>	Manual Recovery from Unintended Autoflight States
<a href="#">Recommendation 17-2 (PDF)</a>	Guidance for Written Tests Conducted under Part 135 and Part 142
<a href="#">Recommendation 17-3 (PDF)</a>	Guidance for 142 Instructor/Evaluator Training Requirements
<a href="#">Recommendation 17-4 (PDF)</a>	Guidance for 142.53(b)(1) Deviation Requests
<a href="#">Recommendation 17-5 (PDF)</a>	Guidance for Training Center Evaluator Observation Credit
<a href="#">Recommendation 17-6 (PDF)</a>	Training Center Approval Process Efficiencies
<a href="#">Recommendation 17-7 (PDF)</a>	Training Standardization Board Structure and Functionality

ACT ARC Recommendations available at:

[https://www.faa.gov/about/office\\_org/headquarters\\_offices/avs/offices/afx/afs/afs200/afs280/act\\_arc/act\\_arc\\_reco/](https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afx/afs/afs200/afs280/act_arc/act_arc_reco/)



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Federal Aviation  
Administration**

# SAFO

Safety Alert for Operators

SAFO 17007

DATE: 5/4/17

Flight Standards Service  
Washington, DC

**[http://www.faa.gov/other\\_visit/aviation\\_industry/airline\\_operators/airline\\_safety/safo](http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo)**

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**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.



# Manual Flight Operations

## Foundational Knowledge and Skills

- **Pitch and power basics**
- **Energy management**
- **High vs low altitude aircraft performance**
- **Aircraft type-specific factors with an impact on handling Timing, coordination, anticipation**
- **Steps required and corresponding instrument display changes that occur as automation levels are changed for manual flight operations**





# Potential Training Scenarios

- **Out of trim conditions – how to recover**
- **Workload management during manual flight**
- **Go-arounds initiated at other than MDA/DA**
- **Visual approaches in various weather or light conditions**
- **Operations in all approved combinations of automation based on aircraft equipage, e.g.,**
  - FD on, AP off, AT on
  - FD on, AP off, AT off
  - FD on, AP on, AT off
  - FD off, AP off, AT off
  - FD off, AP off, AT on



# Questions?

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