



**U.S. Department  
of Transportation  
Federal Aviation  
Administration**

# SAFO

Safety Alert for Operators

SAFO 17007  
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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 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<sup>1</sup>

**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

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<sup>1</sup> 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.

4. Aircraft type-specific factors with an impact on handling (e.g., effects of swept- vs straight-wings, turbojet vs turbo prop vs piston prop engines, underwing vs tail mounted engines, trimmable stabilizer vs trimmable elevator, etc.)
5. Timing, coordination, anticipation
6. Steps required and corresponding instrument display changes that occur as automation levels are changed for manual flight operations

An air carrier's training policy should incorporate the following:

- All curricula should be designed in accordance with the philosophy that manual flight is the foundation upon which other technical flying skills are built. Therefore, the primacy of manual flight should be emphasized throughout all flight training syllabi, while recognizing that manual flight operations involve more than motor skills
- All curricula should include training and proficiency assessment of manual flight operations.
- Potential training scenarios for manual flight operations, in addition to the new part 121 training requirements, could include the following:
  1. Out of trim conditions – how to recover
  2. Workload management during manual flight (as it pertains to both the pilot flying (PF) and pilot monitoring (PM))
  3. Go-arounds initiated at other than minimum descent altitude (MDA)/decision altitude(DA)
  4. Visual approaches in various weather or light conditions
  5. Operations in all approved combinations of automation based on aircraft equipage, e.g.,
    - Flight director (FD) on, autopilot (AP) off, autothrottle/autothrust (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

An air carrier's line operations policy should permit and encourage manual flight operations and should incorporate the following:

1. Encouragement to manually fly the aircraft when conditions permit, including at least periodically, the entire departure and arrival phases, and potentially the entire flight, if/when practicable and permissible.
2. When deciding to fly manually, crews should apply basic threat and error management principles and take into account the various factors affecting operational workload. Factors to consider include:
  - Weather conditions, terrain, and/or other environmental threats
  - Time of day
  - Psychological and/or physiological factors
  - Level of crew experience
  - Traffic density
  - Condition of the aircraft, and/or any non-normal conditions
  - Air Traffic Control and/or instrument procedural challenges
  - Any other operational threats

3. Allow pilots to conduct manual flight with all approved combinations of automation based on aircraft equipment, e.g.,
  - FD on, AP off, AT on
  - FD on, AP off, AT off
  - FD off, AP off, AT off
  - FD on, AP on, AT off
4. A clear statement that the pilot in command (PIC) must use good judgment to consider the factors described above and to decide, on a case-by-case basis, when it is appropriate to conduct manual flying.

Policy guidance for manual flying during line operations should *avoid*:

1. Overly general statements, such as “shall never manually fly at night,” or “shall always manually fly in day visual meteorological conditions (VMC).” The policy should allow the PIC to weigh all the factors based on the situation and to apply his/her good judgment.
2. Quotas for manual flying, unless based on scientific evidence (e.g., “shall fly manually at least 10 hrs. /month”).

**Recommended Action:** Directors of Operations, Program Managers, Directors of Training, Training Center Managers, Check Pilots, Training Pilots, and flightcrews should be familiar with the content of this SAFO. They should work together to ensure that the content of this SAFO is incorporated into operational policy, provided to pilots during ground training, and reinforced in flight training and proficiency checks.

**Related Guidance:**

FAA SAFO 13002, Manual Flight Operations

European Aviation Safety Agency (EASA) SIB 2013-05, Manual Flight Training and Operations

FAA Advisory Circular 120-109A, Stall Prevention and Recovery Training

FAA Advisory Circular 120-111, Upset Prevention and Recovery Training

National Aeronautics and Space Administration (NASA) Study, “The Retention of Manual Flying Skills in the Automated Cockpit”

**Contact:** Questions or comments regarding this SAFO should be directed to the Air Transportation Division’s Air Carrier Training Systems and Voluntary Safety Programs Branch, AFS-280, at (202) 267-8166.