SAFETY ALERT 077

NTSB National Transportation Safety Board

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AVIATION
HIGHWAY
MARINE
RAILROAD
PIPELINE

Stabilized Approaches Lead to Safe Landings

The problem

- **Failing to establish and maintain a stabilized approach, or continuing an unstabilized approach, could lead to landing too fast or too far down the runway, potentially resulting in a runway excursion, loss of control, or collision with terrain.**
- **Regardless of the type of aircraft, the level of pilot experience, or whether the flight is being conducted under instrument flight rules or visual flight rules, a stabilized approach is key to maintaining control of the aircraft and ensuring a safe landing.**

Related accidents

- A Learjet 35A airplane departed controlled flight while on a circling approach and impacted a commercial building and parking lot. The two pilots died. Because neither pilot realized that the airplane's navigation equipment had not been properly set for the instrument approach clearance they received, the flight crew improperly executed the vertical profile of the approach. When the crew initiated the circle-to-land maneuver, the airplane was so close to the airport that it could not be maneuvered to line up with the landing runway under the company's stabilized approach criteria. Neither pilot called for a go-around, and the pilot-in-command continued the approach by initiating a steep turn to align with the landing runway. Radar data indicated that the airplane's airspeed was below the approach speed dictated by company standard operating procedures (SOPs). During the turn, the airplane stalled and crashed about 1/2 nautical mile south of the landing runway threshold. (CEN17MA183)

Security video image of the accident airplane at ground impact (CEN17MA183).

- An experimental, amateur-built Epic LT airplane sustained substantial damage when it impacted terrain during an instrument approach. The private pilot and passenger were fatally injured. Based on radar information and witness statements, the airplane's approach to the airport was unstabilized; the airplane was far left of the runway centerline and had descended below the minimum descent altitude of 440 ft. After breaking through fog about 100 ft above ground level, the airplane reentered the fog and completed a 360° right turn near the approach end of the runway, during which its altitude varied from 100 ft to 300 ft. The airplane then climbed to about 800 ft before radar contact was lost. The airplane stalled and came to rest inverted, consistent with one witness's statement that it descended through the clouds in a spin before impact. (ERA17FA074)

Postcrash photograph of Epic LT airplane (ERA17FA074).

- The pilot of a Piper J5A airplane reported that he approached the landing runway "too high and landed too fast." As runway distance was running out during the landing roll, the pilot decided to go around, but the airplane could not clear trees at the end of the runway, resulting in substantial damage to the airplane. (GAA17CA519)

- A Piper PA-31 airplane was destroyed when it collided with terrain while on approach to the airport. The pilot and the passenger were fatally injured. Radar data revealed that, during the last 2 minutes of the accident flight, the airplane's rate of descent increased from 400 ft per minute (fpm) to greater than 1,700 fpm, likely as a result of pilot inputs. During the final minute of the flight, the descent rate decreased briefly to 1,000 fpm before radar contact was lost. The company's SOPs stated that, if a rate of descent greater than 1,000 fpm was encountered during an instrument approach, a missed approach should be performed. The pilot chose to continue an unstabilized approach in instrument meteorological conditions, exceeding the maximum rate of descent permitted by the operator's stabilized approach criteria, and subsequently descended into trees and terrain. (ERA16FA215)

- A Cessna 210 airplane sustained substantial damage during a runway excursion. The pilot reported that he "didn't get the flaps down" before landing. He further reported that the airplane "didn't want to stop" and it then "ran off the runway." During the runway excursion, the nosewheel collapsed, and the airplane nosed over. A witness reported that the airplane was "high, fast, and downwind." (GAA17CA531)

Overhead view of Cessna 210 and runway (GAA17CA531).
Source: Edwards County Sherriff's Department

What can pilots do?

- **Follow SOPs and industry best practices for stabilized approach criteria, including a normal glidepath, specified airspeed and descent rate, landing configuration (flaps, gear, etc.), appropriate power setting, landing checklists, and a heading that ensures only small changes are necessary to maintain runway alignment. Guidance and tips (see the "Interested in more information?" section) indicate that, in most cases, the approach should be stabilized by 1,000 ft in instrument conditions or 500 ft in visual conditions. If the approach becomes unstabilized at any time after that, go around.**

- **Practice go-arounds and missed approaches so that you are comfortable with the procedures when needed. Remember to establish personal minimums for all types of operations, including go-arounds and missed approaches.**

- **Use effective single-pilot resource management or crew resource management. A stabilized approach begins with an effective approach briefing. Ensure that you understand critical aspects of the approach, such as the minimum safe altitude, hazards, approach conditions, and missed approach procedures.**

- **Do not allow perceived operational pressures (for example, from air traffic controllers, passengers, etc.), continuation bias, or last-minute runway changes to influence your decision to execute a go-around; if your approach is not stabilized, go around.**

- **Never attempt to "save" an unstabilized approach. If the approach becomes unstabilized, conduct an immediate go-around. Remember, when two pilots are on duty, either crewmember may call for a go-around at any time.**

Interested in more information?

- The Federal Aviation Administration's (FAA's) *Airplane Flying Handbook*, FAA-H-8083-3B, Chapter 8, "Approaches and Landings," contains information regarding stabilized approach criteria and lists some common errors in the performance of normal approaches and landings. The FAA's *Instrument Flying Handbook*, FAA-H-8083-15B, contains information about conducting instrument approaches. The FAA's *Risk Management Handbook*, FAA-H-8083-2, discusses the management of hazard and risk, noting some accident examples that occurred during the approach phase of flight.
- FAA Safety Team Fact Sheet "Stabilized Approach and Go-Around" offers data on the importance of maintaining a stabilized approach.
- FAA Advisory Circular 91-79A, "Mitigating the Risks of a Runway Overrun Upon Landing," contains information about how to understand and mitigate the risks during the landing phase of flight to avoid a runway overrun. FAA Advisory Circular 61-98D, "Currency Requirements and Guidance for the Flight Review and Instrument Proficiency Check," offers criteria for stabilized approaches.
- Flight Safety Foundation Approach-and-Landing Accident Reduction Briefing Note 7.1, "Stabilized Approach," provides information about the benefits and recommended elements of a stabilized approach.
- AvWeb Leading Edge #23, "Stabilized Approaches in Light Airplanes," discusses how to "gain the benefits of the stabilized approach concept while flying with the characteristics of light airplanes."
- The International Air Transport Association's *Unstable Approaches: Risk Mitigation Policies, Procedures and Best Practices* (3rd edition) is a collaborative document that addresses the problems surrounding unstable approaches.
- The National Transportation Safety Board (NTSB) report (AAR-14/02) and companion video regarding the accident involving UPS flight 1354, which crashed short of the runway during a nonprecision localizer approach in Birmingham, Alabama, contain valuable information regarding unstabilized approaches.

The reports for the accidents referenced in this safety alert are accessible by NTSB accident number from the Aviation Accident Database link, and each accident's public docket is accessible from the Accident Dockets link for the Docket Management System.

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