SAFETY ALERT

NTSB National Transportation Safety Board

SA091 | August 2024

AVIATION HIGHWAY MARINE RAILROAD PIPELINE

Know When to Feather Your Propeller If One Engine Loses Power

Don't get locked out

The problem

- Existing pilot training and checklists for multiengine piston airplanes primarily address total engine failures and do not prepare pilots for partial loss of engine power situations.
- This gap in training and awareness can result in critical control issues during flight, especially during single-engine operation scenarios.
- Partial loss of engine power in multiengine aircraft is often improperly managed, leading to increased risk of loss of control.
- Constant-speed, manually feathering propellers on multiengine aircraft are equipped with mechanisms called start locks that keep propeller blades from going into feather position during a normal engine shutdown on the ground, thus making it easier to start the engine with the propeller blades at a low pitch blade angle. These locks' centrifugal latches disengage when the propeller is spinning above a certain rpm. However, start locks can engage in flight if the propeller's rpm drops below this critical threshold.
- Although feathering the propeller of an engine that has lost power is a recommended practice, once the propeller rpm decreases below the speed at which the start locks engage, the pilot will be unable to feather the propeller. Feathering is not possible until the propeller rpm increases above this critical speed (the specific start lock engagement speed varies among propeller makes/models); a mechanical engine malfunction may prevent the pilot's ability to increase propeller rpm. It is imperative, therefore, to feather the propeller before the rpm decreases below the start lock engagement speed.
- Delayed propeller feathering in partial loss of engine power scenarios can dangerously result in drag, compromising control and safety.
- Twin-engine airplanes certificated under Part 23 are not required to provide a positive climb rate with one engine inoperative. Because the minimum control speed for an airplane with one engine inoperative is determined with the propeller windmilling, timely feathering increases your controllability margin beyond certificated performance.

Related accidents

A Piper PA-30 twin-engine airplane on approach to land experienced a total loss of power in the right engine. The pilot subsequently lost control of the airplane and it crashed, resulting in two fatalities. The investigation revealed a malfunction of the right engine fuel injection servo; the right propeller was found with the start locks engaged. **This accident might have been avoided if the pilot had feathered the propeller before its rpm decreased below the critical speed, managed the airspeed properly, and landed immediately on the nearby runway.** (ERA23FA067)

Figure 1. ERA23FA067 accident scene.

Figure 2. ERA19FA060 accident scene.

During an airline transport pilot checkride, a Cessna 310F twin-engine airplane crashed after a partial loss of power in the left engine. The pilot's delayed feathering of the left propeller and failure to maintain airspeed led to a loss of control and subsequent crash in which the pilot was seriously injured and the designated pilot examiner was fatally injured. The left propeller's blades were found at or near the start lock position, indicating the pilot's failure to feather before the critical rpm. **This accident might have been avoided with prompt feathering of the propeller and more effective airspeed management.** (CEN16FA172)

A Cessna 335 twin-engine airplane crashed following a partial loss of power in the left engine after takeoff. The pilot and passenger were fatally injured. The pilot's failure to feather the left propeller following the partial loss of engine power resulted in negative climb performance. **Had the pilot feathered the left propeller following the partial loss of engine power, it is likely that a positive rate of climb could have been attained.** (ERA19FA060)

Figure 3. CEN16FA172 accident scene.

Figure 4. ERA12FA423 accident scene.

A Piper PA-31P twin-engine airplane crashed following a loss of power in the right engine shortly after takeoff. Postaccident investigation found the right propeller in the start lock position, indicating it was not feathered before the engine speed dropped below the critical rpm, contributing to the pilot's loss of control and the subsequent fatal impact with the ground. **The investigation found that the propeller manufacturer's recommendation to feather the propeller before its speed falls below 1,000 rpm was not in the pilot's operating handbook, which also contributed to the accident.** (ERA12FA423)

Figure 5. ERA11FA458 propeller assembly.

The pilot of a Cessna 310Q twin-engine airplane lost control and crashed following a loss of left engine power during takeoff. The pilot was fatally injured. The investigation found the left engine's fuel supply hose B-nut had loosened, which resulted in the loss of engine power. The pilot's delay in feathering the propeller and consequent failure to maintain airspeed caused the accident. **This accident might have been avoided with prompt feathering of the propeller and proper airspeed management.** (ERA11FA458)

What can you do?

- **Review and understand manufacturer procedures for engine failure, including instances of partial loss of engine power. Ensure familiarity with specific criteria and steps for feathering the propellers in your aircraft.**
- **Review your propeller owner's manual to determine the rpm below which feathering the propeller is not possible.**
- **Regularly practice how to handle scenarios of partial loss of engine power in flight training or simulator training sessions, focusing on timely and correct responses, including feathering the propeller before its speed drops too low to feather it.**
- **When conducting preflight checks, ensure all engine controls, including those for feathering, are functional.**
- **Engage in discussions and training sessions with other pilots and flight instructors on aeronautical decision-making, with a focus on developing plans for responding to scenarios involving partial loss of engine power in various phases of flight (takeoff, cruise, and approach), to enhance judgment skills in critical situations.**
- **Stay informed about the latest findings and recommendations regarding engine power management and propeller control in twin-engine aircraft, incorporating insights from resources like Federal Aviation Administration advisories and aviation safety articles.**

Interested in more information?

- The critical rpm before which to feather your engine's propeller may be found in your propeller owner's manual.
- Watch and share the video accompanying this safety alert, which demonstrates how start locks can prevent feathering when one engine loses power.
- The Federal Aviation Administration's Special Airworthiness Information Bulletin CE-05-51 illustrates the drag effects of a windmilling propeller when one engine is inoperative; it further warns about the risk of start locks engaging during attempts to restart the engine, which then precludes feathering.
- The United Kingdom's Civil Aviation Authority has warned about the implications of propellers that cannot be feathered below a certain rpm since 1979 and reissued its advice to pilots in 2019.
- A special study by the National Transportation Safety Board highlights the narrow performance margins of Part 23 light, twin-engine airplanes when one engine is inoperative.