## Twin Proficiency:

by **Thomas P. Turner**

# Push & Hold

The U.S. National Transportation Safety Board (NTSB) recently released its final Probable Cause report on the crash of a Beechcraft King Air B200 that occurred at Wichita, Kansas, October 30, 2014. A solo pilot, delivering the airplane to a refurbishment shop after it had just been sold, reported the loss of the big turboprop's left engine immediately after takeoff. The airplane turned left, toward the dead engine, through about 120° of heading change, before impacting in a fiery crash into a simulator training facility. The pilot, and three persons training in a simulator, died in the intense fireball caught on security cameras. Two additional people in the simulator bay suffered extensive burns; four others in the facility endured less-serious injuries.

The NTSB report states the King Air never got higher than 120 feet before descending, nearly wings level but in enough of a slip it was noticed by witnesses on the ground. The gear remained extended throughout the brief flight. Extensive fire damage prevented investigators from determining whether the propeller was feathered, or if the autofeather and rudder boost systems were turned on at the time of the crash. The NTSB's final determination of the cause of the crash is:

The pilot's failure to maintain lateral control of the airplane after a reduction in left engine power and his application of inappropriate rudder input. Contributing to the accident was the pilot's failure to follow the emergency procedures for an engine failure during takeoff. Also contributing to the accident was the left engine power reduction for reasons that could not be determined because a post-accident examination did not reveal any anomalies that would have precluded normal operation and thermal damage precluded a complete examination.

I was shocked with the horror of this thought: When he began his takeoff roll, as he moved the thrust levers forward for takeoff, the pilot and three others affected by his actions had only *two minutes to live*.

### PUSH and HOLD

How could this be possible in a twin-engine turboprop? Because, however unlikely, it still *is* possible. Your required actions are pretty well-defined, and actually quite limited, when an engine quits immediately after takeoff. *The good news* is, that means you have only a few things to train for–you don't have to make it up as you go. If you're prepared, there is no immediate decision to make at the moment the failure occurs. Respond with the correct procedure; your time to make decisions comes (shortly) later.

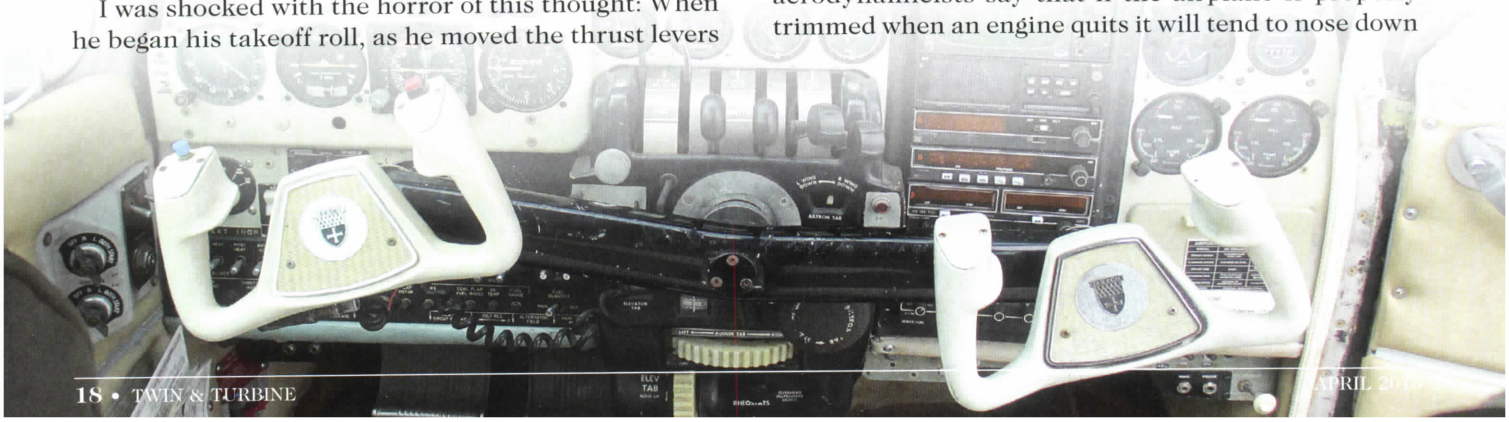
If an engine fails just after takeoff you have only two things to do immediately:

PUSH FORWARD on the controls to maintain the proper, controllable airspeed; and

HOLD HEADING with rudder and wings level.

You PUSH FORWARD to attain the proper attitude for $V_{YSE}$ ("blue line") speed with a windmilling propeller. In all the piston twins I've flown, this is very slightly above level flight…three degrees nose-up in a Beech Baron, for example. Ask your type-specific instructor for the windmilling-propeller pitch attitude for the airplane you fly. The proper attitude assures sufficient airspeed over the control surfaces to prevent a VMC roll and loss of control while approximating blue line speed. This gives you time to choose whether to pull both throttles and land or to maintain this attitude for aircraft control as you perform the memory steps of the Engine Failure in Flight checklist.

I emphasize the *PUSH* in PUSH FORWARD. Strict aerodynamicists say that if the airplane is properly trimmed when an engine quits it will tend to nose down



to remain in one-G flight. This helps maintain the angle of attack, preventing a stall. Unfortunately, there's a pilot holding on to the control wheel. You are subject to what's called "the startle effect." The March/April 2016 issue of *FAA Safety Briefing* contains an article on startle effect, defining it as:

...the result of a sudden shock that can disturb or agitate the recipient [and] can cause a person to have an involuntary physical reaction (e.g., jerking back on the yoke), can induce a significant emotional or cognitive response (e.g., fear, confusion or anger), or can simply cause a person to freeze in place.

At least two, and perhaps all three of those responses, would cause the pilot to involuntarily maintain or even increase angle of attack and reduce airspeed and/or increase induced drag in the seconds after engine failure occurs...supporting a common Loss of Control result.

Studies show the average reaction time to a "startle" event is 2.3 to three seconds. The time from the pilot's input until the aircraft responds is roughly another two seconds. During these five seconds the angle of attack will likely have increased quite a bit, and the airspeed decreased significantly, before the controls are moved. From this condition, you don't need to simply relax the controls; you need to PUSH to make the attitude go to the

right place rapidly. Meanwhile, you need to aggressively HOLD HEADING with rudder and ailerons.

If you do just these two things, PUSH FORWARD and HOLD HEADING, you'll do more to assure your survival, along with the passengers and persons within the impact range of your airplane. If you do *not* do these two things, swiftly and correctly, you have lost command of the aircraft, and (as the Cirrus Pilot Proficiency Program states), loss of *command* is the first stage of loss of *control*.

### Impairment

The NTSB reports one more important fact uncovered in the King Air crash: the pilot was being treated for multiple medical conditions, severe enough to prevent him from working as an Air Traffic Controller for an extended time. He was taking medications that are disqualifying for an FAA medical certificate; he failed to report this to his Aviation Medical Examiner and ground himself. One medication carries a warning that it "may impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery)."

It's tempting and easy to read that portion of the report and say "I'd never do *that*." The NTSB does not even cite pilot medications or conditions as factors in the Probable Cause. Yet, pilot impairment goes a long way to answer the question of why a pilot with multiple type ratings, recent training and FAA evaluation less than two months before the crash, missed basic things like airspeed control, directional control and gear retraction in the two minutes that defined the end of his life (and that of others).

Before you feel that this sort of thing only happens to others, ask yourself before every takeoff…

### What's Your Impairment?

What factors exist right now that could prevent you from PUSHING FORWARD and HOLDING HEADING should an engine fail immediately after takeoff, and then hold these inputs while you perform the emergency checklists? What's the state of your:

**Time in type.** Have you flown this make and model of airplane a lot, but not so much that you're tempted to become complacent? Do you have a lot of experience in this specific airplane or one equipped identically to it? Do you fly lots of different airplane types, which might cloud the type-specific lightning response required to handle an emergency?

**Recency of training.** You may have a lot of point-to-point time in this airplane, but when was the last time you practiced emergency procedures? Could you pass the Practical Test for all the pilot certificates and ratings you hold, in this airplane today?

**Health and medications.** Is there anything going on right now that you hope the FAA doesn't hear about? Are you taking any over-the-counter medications that could affect your coordination, memory and decision-making? Do you feel "under the weather"?

**Fatigue.** When was the last time you got an uninterrupted, eight-hour sleep? How long since you got out of bed on this day? How long will it have been when you shut down the engines at the end of your flight? Do you feel well-rested and alert?

**Personal stress.** Are there external issues that might affect your performance and decision-making? Do you find yourself focusing on family issues or job deadlines, or the presentation or big deal you hope to make on the other end of your coming flight?

**Environment.** Are you taking off into low IMC, low visibility, or night conditions? Are there significant obstacles off the end of the runway or along your departure route? Is the departure ATC frequency likely to be crowded and fast-paced, making it difficult to make and receive calls? Is there a strong crosswind or low-level turbulence?

**Mindset.** Are you simply not thinking about the possibility anything could go wrong, any time you get ready to take off?

Any of these factors can impair your response to an emergency, just as readily as the medicines cited in the King Air Probable Cause report. Quickly evaluate them as part of your fitness-for-flight evaluation...and be willing to ground yourself until those factors are again under control.

You have two minutes to *live* every time you advance the power for takeoff; most airplanes take about two minutes from the beginning of the takeoff roll until the airplane is established in climb. Your actions and decisions in those two minutes, done right, will do everything humanly possible to ensure you, your passengers and everyone under your airplane, will live.

Realizing that my actions in the first two minutes of takeoff are to make me *live*, not die, and that I know to PUSH FORWARD and MAINTAIN HEADING at the first sign of trouble, makes it possible for me to confidently push the throttles forward and fly. T&T

*Thomas P. Turner is an ATP CFII/MEI, holds a Masters Degree in Aviation Safety, and was the 2010 National FAA Safety Team Representative of the Year. Subscribe to Tom's free FLYING LESSONS Weekly e-newsletter at www.mastery-flight-training.com.*