POWER LOSS VERSUS ENGINE FAILURE

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BY TOM CLEMENTS • APRIL 5, 2019

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Ask the Expert

(http://www.kingairmagazine.com/wp-content/uploads/2015/04/AskExpert.png)

Let's see a show of hands: How many of you have experienced an honest-to-goodness engine fire in a King Air? As I expected, no hands are up. How about an honest-to-goodness engine failure, such as a main bearing going bad, or the RGB (Reduction Gearbox) uncoupling, or the high-pressure, engine-driven fuel pump failing, or an FCU (Fuel Control Unit) runaway? Yes, I see a smattering of hands now. Finally, hold up your hand if you've experienced a significant rollback in power, a rollback that caused no engine damage. Wow! Now I see a lot of hands are raised! (You didn't know that I could see you through these pages, did you?)

For every true engine failure in the PT6-powered world, I believe there have been at least 10 times as many power rollbacks. Heck, maybe it's 100 times as many. Of these rollbacks, a sizable number have been due to mechanical problems beyond the pilot's control. These mechanical malfunctions include such things as: an open P3 supply line to the FCU, an open P_y line between the FCU and the fuel topping governor, a slipping connection between the power lever cable and the beta cam box, and some internal FCU metering valve malfunction.

However, compared to these reasons for a loss of engine power that are beyond the pilot's ability to control, there is one malfunction that leads to more rollbacks than any other and it is indeed within the pilot's ability to control. Most of you know what I am going to give as the reason, don't you? It is Power Lever Migration, the tendency for the power lever to spring back toward idle caused by a spring on its connection to the beta cam box.

The pilot action that prevents the spring from always pulling the power lever toward idle is ensuring that the power lever's friction control is exerting enough resistance to the spring force.

I have addressed the importance of proper power lever friction setting in *The King Air Book*, in past magazine articles, in classes that I have taught and in a lot of replies written on the great BeechTalk website. I won't belabor the point further here in this venue. Instead, I want to emphasize the proper steps of "The Drill" for when an engine problem is encountered in your King Air.

On the BeechTalk forum, in its Beech Twins section, there is a superb thread entitled *Martin Pauly Video, Twin Training, "The Drill."* Martin travels to Mason City, Iowa, to receive training with Doug Rozendaal in Doug's B55 Baron. Doug is an exceedingly accomplished pilot and instructor. Our getting to observe this training via the video is both enjoyable and educational. Even though it is dealing with a piston twin, King Air pilots will benefit from watching it. Take time to view it. It will be time very well spent.

https://www.beechtalk.com/forums/viewtopic.php?f=3&t=162213&hilit=The+Drill

The Drill starts with setting the proper pitch attitude and then doing the mantra most of us learned during our initial multi-engine training. It starts with: "Mixtures, Props, Throttles, Flaps, Gear." In the King Air, it has one less step: "Power, Props, Flaps, Gear." I call those "Your Four Friends" and I consider them so important that I made their discussion the very first chapter in *The King Air Book*.

Let's see what the POH has written concerning engine problems for the most populous King Air model, the B200. The first one in *Emergency Procedures, Section 5,* is titled "Emergency Engine Shutdown." Here is what the POH states:

EMERGENCY ENGINE SHUTDOWN

- ENGINE TORQUE INCREASE – UNSCHEDULED (Ground or Flight)
  (Not responsive to Power Lever Movement)
- ENGINE FIRE IN FLIGHT
- ENGINE FAILURE IN FLIGHT

Affected Engine:

1. Condition Lever – FUEL CUT OFF
2. Propeller Lever – FEATHER
3. Firewall Shut-off Valve – CLOSED

4. Fire Extinguisher (if installed) – ACTUATE
   (if required)

There are four more steps that deal with shutting off the generator and some other things.

Now let's look at this procedure from that same section of the POH:

ENGINE FAILURE AFTER LIFT-OFF (If Conditions Preclude an Immediate Landing)

1. Power – MAXIMUM ALLOWABLE
2. Airspeed – MAINTAIN (takeoff speed or above)
3. Landing Gear – UP
4. Propeller Lever (inoperative engine) – FEATHER (or verify FEATHER if autofeather is installed)
5. Airspeed – VYSE (after obstacle clearance altitude is reached)
6. Flaps – UP

The POH procedures for other models are usually almost identical to the ones written here.

Where is *The Drill* in these procedures? In the second one, an argument could be made that at least most of the steps in *The Drill* are there. First step – Power? Yes, that is step one. But if you already know that an engine failure has occurred – and it seems as if the checklist writers assume this to be the case since "Engine Failure" is in the title – then it seems that ensuring power is at "Maximum Allowable" would involve only the remaining powerplant. If this "failure" is due to Power Lever Migration and we attended to only the other engine's power lever, we have not addressed this easily-correctable problem! Not to mention, of course, that autofeather requires both power levers to be well-advanced for *either* side to automatically feather.

Second step of *The Drill* – Props? Nowhere to be seen here. "Don't be a nitpicker, Tom! The prop levers are already full forward for takeoff!" Are they? A lot of model 300 pilots have made a takeoff with them back at the minimum speed decent (1,450 RPM) because the POH tells you (quite stupidly in my opinion) to have them there for all ground operations.

Third step of *The Drill* – Flaps? This doesn't get mentioned until Step 6, but I am satisfied with that. The takeoff performance charts are quite thorough for the 200-series and if we have decided to use approach flaps for takeoff – to gain the benefit of a lower V_2 speed and a shorter accelerate-go distance – then it is proper procedure to leave them alone until attaining both 400 feet and VYSE.

Fourth step of *The Drill* – Gear? Yes, it's in the procedure correctly.

Now let's examine the first of these two POH procedures that I have presented: Emergency Engine Shutdown. The first two reasons for doing this procedure make good sense: Torque runaway and fire. (I am still waiting to hear of any in-flight PT6 fire.) The third reason, "Engine Failure in Flight," however? How do we (already a bit shook up by a loss of some power) really know that the engine has failed? What if it is merely a

case of Power Lever Migration that would be immediately corrected if we only did Step 1 of *The Drill*?! Would it not be horribly embarrassing to pull the condition lever into fuel cutoff when the only thing wrong was that the power lever slipped back a bit?

"You're being OCD about this, Tom! Any pilot is going to notice the power lever moving back and will then push it forward!" Oh, how I wish you were correct on that opinion! Yes, I bet seeing the migration and reacting properly to it has happened thousands of times with no bad outcome at all. What about that one-in-a-thousand times, however, when the motion was not seen? When the pilot was looking out the windshield or at the instruments intently when he moved his hand away from the power levers to reach for the landing gear handle and hence missed seeing the motion? I am convinced more than one fatal takeoff crash has resulted.

This is why I emphatically wish that*w* were always the first four steps when a loss of power is suspected. If, after moving both power levers and both prop levers fully forward and making sure the flaps and gear are where you want them to be, we now still have an obvious lack of power, then proceed with the rest of *The Drill* … the "Identify, Verify and Feather" steps.

The "Four Friends" that I have been discussing here in relation to a suspected power loss also lend themselves perfectly to three other King Air procedures. For an IFR missed approach or a VFR Balked Landing, "Power, Props, Flaps and Gear" is a great procedural memory jogger. An emergency descent uses the same four steps, albeit with some different actions.

Let me tell you of an event I observed in which a perfectly good engine was shut down by mistake. One of my King Air recurrent training students – an experienced, capable pilot – was flying "under the hood" during our recurrent flight training session. I asked him to pretend that we were encountering icing conditions so he turned on all of the ice protection items. I pulled the left condition lever into fuel cutoff and after a couple of seconds pushed it back up to low idle. Since auto-ignition was armed and hence the ignitors had started sparking as torque went below 400 ft-lbs, the engine did a lovely windmilling relight and was spooling up to normal operation. As soon as the sudden loss of power was felt, the pilot began by doing *The Drill*. Both power levers got advanced, both prop levers went full forward, and the flaps and gear were verified up. Meanwhile, the left engine had returned to normal operation, matched with the right. The pilot was still pushing quite hard on the right rudder pedal and the skid ball was well to the left.

I am sure some will accuse me of doing a "dirty trick" and certainly I realize that the pressures of flying on instruments during recurrent training – when you know bad things are going to happen because of that evil instructor beside you! – are a huge factor. Nevertheless, forgetting to extend the ice vanes in icing conditions could lead to ice ingestion causing a flameout followed by a relight. That is what I had tried to replicate here.

In the student's mind, having felt the sudden loss in power, he "knew" that I had given him an engine failure and he proceeded with the rest of *The Drill's* steps: Identify, Verify, Feather. Identify? There was no dead engine now but there was a dead foot since he was still stomping on the right pedal, causing a very uncoordinated flight condition! The poor fellow pulled the left power lever back – failing to notice that indeed

power was being reduced dramatically – pulled the propeller lever into feather, and even continued to start to pull the condition lever into cutoff. I blocked his hand to prevent that from taking place, took the controls, and had him remove the hood. I pointed out the condition we were in … a perfectly good left engine at idle with its propeller feathered, turning about 400 RPM.

The big mistake was not executing the "Identify" step of *The Drill* correctly. I think, in his mind, he had identified the left engine as the dead one the instant he felt the initial yaw toward the left. He never considered that the sneaky CFI (me!) would reintroduce fuel and the engine would come back to life.

Another one of my students was almost snail-like in conducting *The Drill* when I gave him an engine failure during cruise. He did each step so very, very slowly, it was almost excruciating to watch. But you know what? I never saw him make a mistake in the procedure throughout our numerous training sessions over the years. What's the adage? "Haste Makes Waste." Golly, is that ever true!

I am realistic enough to realize that my opinions and beliefs will not cause every POH's emergency procedures to be revised, maybe not even one. Nevertheless, in my dreams I would prefer the concept of "Engine Failure" be replaced with the concept of "Suspected Power Loss." Until you've done *The Drill* how do you know that the engine has truly failed? Give it a chance to return to normal operation before you shut it down!

The article entitled "The Amazing History of BB-1" that appeared in the January 2019 issue included mention of when she was used as an air ambulance mock-up. Gerald Mobley – whom I had tried to contact, without success, while writing the report – read the article and was thoughtful enough to offer a more accurate history of this phase of BB-1's life. Here is what I should have written:

(http://www.kingairmagazine.com/wp-content/uploads/2019/04/BB-1C.jpg)

"In the 1980s, Gerald Mobley was chief pilot and director of aviation for Deaconess Medical Center in Billings, Montana, an air ambulance operation that was using two King Air 200s and two C90s.

(http://www.kingairmagazine.com/wp-content/uploads/2019/04/BB-1B.jpg)

Mobley approached the medical center with the idea that they could increase their air ambulance and doctor outreach flights if the general public realized the planes being used were state-of-the-art, not the small, cramped, unsafe, lightweight aircraft perceived by the public. He was convinced that if Deaconess could display a mock-up of the actual King Air 200 ambulance interior to the end-users – exhibiting the stabilized stretcher installation and showing the roominess of the cabin, including seats for the flight nurses and a patient relative – the medical center could attract patients from many areas of Montana and neighboring states.

(http://www.kingairmagazine.com/wp-content/uploads/2019/04/BB-1A.jpg)

In his quest to find a 200 fuselage to make into a mock-up, Mobley contacted Beech – from whom he had just purchased two B200s to use in this program – and convinced them to give him BB-1. The wings and tail were removed, the left side of the fuselage was cut away and it was housed in a specially designed trailer that traveled to rural clinics and hospitals as well as health fairs. Mobley reported that the program was quite successful in alleviating the public's concerns."

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ABOUT THE AUTHOR

Tom Clements (http://www.kingairmagazine.com/author/tom-clements/)

King Air expert Tom Clements has been flying and instructing in King Airs for over 46 years, and is the author of "The King Air Book." He is a Gold Seal CFI and has over 23,000 total hours with more than 15,000 in King Airs. For information on ordering his book, contact Tom direct at twcaz@msn.com. Tom is actively mentoring the instructors at King Air Academy in Phoenix. If you have a question you'd like Tom to answer, please send it to Editor Kim Blonigen at editor@blonigen.net.

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