

ASK THE EXPERT: KING AIR “GOTCHAS”



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BY TOM CLEMENTS • MAY 7, 2018

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This article originally appeared in the September 2013 issue of this magazine. Some questions that I have recently received lead me to believe it is time for a repeat. Additionally, I have added a comment about the Shock Link in the nose wheel steering mechanism.

I am often asked by pilots transitioning into a King Air for the first time, “What should I look for? What systems or operations or mistakes commonly cause difficulties? If you were to make a list of things that could hurt me and/or the airplane, what would they be?”

To address those types of questions, this article will try to present a few important things that can **get you** if you’re not careful ... some King Air “Gotchas.” They are to be studiously avoided!

First, **Oil Dipstick Security.** It takes little time for most PT6 engines to blow enough oil out of a loose or missing dipstick such that oil pressure drops out of the normal operating range, getting low enough, quickly enough, that engine damage is almost assured ... unless the problem is recognized and an immediate return for landing or an in-flight shutdown is accomplished.

Most PT6s manufactured after about 2000 contain a ball checkvalve in the oil filler tube designed to prevent oil venting when the dipstick is missing – a nice improvement! You can recognize that your engine has this improvement by observing a shorter dipstick that only goes to “4 Quarts Low” instead of the longer “5 Quarts Low” older style dipstick.

Surprisingly, most King Air models do *not* contain a low oil pressure warning annunciator. Yes, the 300-series and F90-series do, but it is rare to find that useful light in other models. I believe both the British and French certification authorities required it to be added before the King Air could be approved in their countries, so some airplanes that originally went overseas, but have since returned and been recertified in the United States, have the annunciators.

Since it seems the time required to blow enough oil out of the tank to be problematic usually elapses soon after takeoff, get in the habit of doing a very careful scan of engine instruments as part of your *After Takeoff* flow pattern and checklist. None of us can fly a King Air without spending time looking at ITT, Torque, and Propeller Speed (N_p) gauges. However, the remaining ones – at the bottom of the vertical stack, or over on the right side in the early birds with a horizontal row of gauges – attract our attention rather rarely. So now is the time to force ourselves to carefully scan those remaining three: Oil Temperature and Pressure, Fuel Flow, and Compressor Speed (N_1 or N_g).

What’s that I see? Dang, the left Oil Pressure is low! Is there any supporting indication? Could it be merely a faulty gauge? Oh, double-dang! There’s oil streaming out of the aft seam of the cowling!

Not all, but most, King Air emergency checklists direct us to reduce power significantly when the oil pressure drops out of the green arc, but not necessarily to shut the engine down until it hits the lower redline limit. Why is that?

It seems logical that if the engine were not receiving the lubrication that it should, we should not run it hard ... and perhaps that plays a role in the directive to reduce power. However, there is a more significant reason.

Remember that the torque instrument is actually an oil pressure gauge, reading the pressure in the torque chamber in the nose case of the engine, but displaying the pressure not in pounds per square inch (psi) but in the foot-pounds (ft-lbs) of twisting force on the propeller shaft that caused the psi value. (How that all works is a miracle of engineering, but it is a marvelous, mostly trouble-free, system.) When oil pressure drops too low, there comes a time when the torque meter becomes incapable of working correctly. Specifically, it will be limited in its ability to measure and display existing torque. For example, it may never read above 600 ft-lbs no matter how much more torque exists! This is the main reason for reducing torque when you observe low oil pressure.

Sometimes an unexplained decrease in torque indication has been the first thing that caught the pilot’s attention and led him or her to *then* notice a low oil pressure reading.

Since any gauge or sensor is capable of providing a false reading, it is always a good idea to attempt to get some verification before responding to the situation. For example, if you are fortunate enough to be operating a model with the Low Oil Pressure annunciator, and it illuminates, check the gauge. Is it showing a low reading? If the answer is “Yes,” you should throttle back and return for landing, even securing the engine if/when the oil pressure hits the red line. On the other hand, if the gauge reads properly, you may have only a faulty annunciator. Now’s the time to check the cowling carefully. Nice and dry, no oil seeping out? If so, you are rather sure there is no true oil pressure anomaly.

The next Gotcha is a badly bent **Nose Wheel Steering Stop Block**. I hope on your exterior preflight inspections that you are giving this item the attention it deserves. This is the metal tab with the three holes in it, located on the back side of the nose gear strut. Its purpose is to limit how far the nose wheel can turn when we make a tight turn while taxiing. Use of differential braking and/or differential power allows the pilot to turn the airplane “on a dime,” and when this is done the stop block is what is preventing any damage to the nose strut and steering linkage. It is strong enough that the pilot cannot force any further movement.

However, the leverage created by a sturdy tug and a long tow bar can easily overcome the resistance of the stop and permit a careless tug operator to go beyond the limits. When this takes place, not only will the stop block be deformed, but there is a chance that the strut itself will be fractured and/or that the nose wheel steering connection back to the rudder pedals will suffer damage. So, if ever you find the block distorted, I would suggest not flying until an A & P has inspected the strut and steering linkage carefully and given you a thumbs up that you’re good to go.

While you are down by the nose gear checking the stop block, occasionally also look up on the left sidewall of the wheel well and locate the shock link, the spring-in-tube assembly that is in the forward part of the nose wheel steering mechanism. Make sure that you can see and/or feel all four 90-degree spaced “ears” of the clip that prevents the spring from being released from its tubular housing. If the shock link comes undone, you lose nose wheel steering and may end up with the wheel deflected fully to one side. That makes the after touchdown rollout very exciting!

The third Gotcha is **Loose Power Lever Friction Knobs**. The vernier controls in Bonanzas, the one-friction-knob-controls-all-levers in Barons and Dukes ... because of this past experience, a lot of pilots transition into a King Air without really having been taught much about friction locks. I would estimate that over 50 percent of King Air pilots pay scant attention, if any at all, to their friction knobs’ settings. This isn’t good!

Concerning the two power levers on King Airs, do you realize that a fairly hefty spring is attempting to pull each one back to idle at all times? As with any spring, the further it is stretched, the more force it applies ... in this case, a force trying to return the power lever to idle.

If any work is done inside the cowling that involves the condition, power, or propeller cables, it is routine for the mechanic to turn the four cockpit friction knobs all the way counterclockwise, probably four or five complete 360-degree rotations, loosening them totally. By doing so, now he can move the engine-end of the cable easily, while the cockpit-end of the same control can move fore and aft with little resistance.

But woe be to the poor pilot who picks up the plane from the shop and does not do a thorough cockpit check, does not follow every checklist step, and who fails to retighten those power lever friction knobs! When his hand leaves the power levers to reach for the landing gear handle after liftoff, it is common now to find both power levers moving themselves back toward idle! In most cases, due to the shorter length of cable to the left engine than the right engine – and the resultant less resistance in the cable run – the left engine will lose more power than the right.

For those pilots who notice the power lever movement, the problem is rather easily corrected ... the hand is moved back to the levers and returns them to the takeoff position. It can be almost comical to see the poor pilot trying to fly, keep the levers forward, get the gear handle up, and tighten the friction knobs all at the same time!

But if the operator does not notice this *power lever migration* toward idle, God help him! Suddenly the airplane is not climbing and accelerating as it should, rudder force is required to keep it straight, and autofeather (if installed) isn't working! (Remember that autofeather is disarmed when either or both power levers move back.) I am positive that more than one fatal King Air takeoff accident has been caused by this very scenario.

To decrease the wear on the friction mechanism caused by moving the controls when the friction is tight, I personally fiddle with the friction knobs a lot ... having them rather loose on the ground and then making sure they're snugged up prior to adding takeoff power. When setting propeller speed for climb or cruise, for me it is a three-step process: twist the friction knob a half-turn or so counterclockwise, move the propeller levers, then snug the knob back up. When acting as a co-pilot or instructor in the right seat, I always have the index and middle fingers of my left hand resting at the base of the power levers when they are being pushed up for takeoff by the left-seat pilot ... lightly enough that I won't interfere with a possible abort, but firmly enough that there's no way those levers are going to creep when the pilot's hand leaves them to raise the gear or turn off the landing lights

Other pilots rarely ever change a friction setting and that's fine, presuming they were set properly initially. Sure, maybe this causes fractionally more wear in the mechanism, but in the overall scheme of things that's a tiny worry. But what about the pilot who is in the habit of not adjusting friction and then he or she flies another King Air, one that either just came out of maintenance with loosened friction or one operated by a pilot who routinely loosened them for ground operations? Unless the pilot tightens them back up to the position he is used to using prior to takeoff, the deck has been stacked for an embarrassing, comical, boo-boo soon after liftoff at best, or dead people and a destroyed airplane at worst!

Gotcha number four is the **Upper Forward Cowling Not Properly Secured**. It is not uncommon that one of the four latches that secure the upper forward cowling in place fails to engage properly when this cowling piece is installed. On my walk-around inspections, I use the palms of both hands to give this piece a firm upward hit, on each side, making sure that I cannot dislodge it. This is especially important if I know the cowling has been removed and reinstalled prior to this flight.

Even having done so, however, there may come a time or two when the air loads imposed on the cowling in flight cause the incorrectly fastened latch to finally let go. As you do your *After Takeoff* checks, you notice the upper forward cowl is lifted up an inch or so! I suggest you do three things.

First, slow the airplane down. The faster you fly, the more air loads are created and the chance of the cowling actually departing the airplane are increased, so keep the indicated airspeed down to no more than, say, 140 KIAS. Second, extend the ice vanes. The engine anti-ice system, the inertial separator, creates a venturi effect in the cowling when extended, reducing the inlet air pressure considerably. You will almost assuredly observe the loose cowling suck down a bit once you've extended the vanes. Third, return for landing. Taxi in, shutdown, and get a half-inch, thin walled socket and use it to tighten that temperamental latch properly.

Getting Too Slow at MDA is Gotcha number five. More and more, as WAAS-corrected GPS units allow us to have vertical guidance on almost every instrument approach, we are doing less of the non-precision, "dive and drive" type of approach. But if and when you find the need to level off with approach flaps and landing gear extended, there is a trap here waiting for the unwary.

The King Air exhibits considerable momentum, such that we can level off without adding sufficient power, yet the rate of airspeed decay is so slow and insidious that it can go undetected until we find ourselves far on the backside of the power curve, nearing stall speed. Close to the ground, perhaps still in IMC ... this is not good! It has caused fatal accidents.

Here's where knowing the "magic numbers" for your airplane is very important. If this term is unfamiliar to you, where have you been during training?! Anyway, the same power setting that yields 160 KIAS, clean, level, will be almost exactly what is required to hold about 120 KIAS, level, with flaps at approach and the landing gear down. (90-series, about 800 ft-lbs; 100-series, about 900 ft-lbs; F90 and 200-series, about 1,000 ft-lbs; 300 and 350 series, about 40 percent. All of these presume the propeller speed is at the normal cruise setting for the model.)

This magic number is important even on a severely clear day. You come abeam the touchdown point on your downwind leg, lower the gear in anticipation of starting down and turning base, and then the tower directs you to extend your downwind due to straight-in traffic. Don't hesitate, just push the power levers up to the magic number, hold altitude, and continue ahead. It is comforting to know that your use of the correct power setting will never allow the airspeed to stray too far from exactly what you want.

Well, there you have them: My *top five King Air Gotchas*. There are others, certainly, but of decreasing frequency of occurrence. As we know, the King Air is an easy-flying, forgiving airplane in almost all respects, yet it, too, has the capability to bite the unwary. Be safe!

If you have a question you'd like Tom to answer, please send it to Editor Kim Blonigen at editor@blonigen.net (<mailto:editor@blonigen.net>)

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POWER LOSS VERSUS ENGINE FAILURE



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BY TOM CLEMENTS • APRIL 5, 2019

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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:



(<https://i0.wp.com/uhs.msv.mybluehost.me/wp-content/uploads/2019/04/BB-1C.jpg?ssl=1>)

"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.

(<https://i0.wp.com/uhs.msv.mybluehost.me/wp-content/uploads/2019/04/BB-1B.jpg?ssl=1>)

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.



(<https://i0.wp.com/uhs.msv.mybluehost.me/wp-content/uploads/2019/04/BB-1A.jpg?ssl=1>)

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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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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WHERE'S YOUR RIGHT HAND AT ROTATION?



WHERE'S YOUR RIGHT HAND AT ROTATION?

BY TOM CLEMENTS • OCTOBER 12, 2020

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As I write this near the end of August 2020, the “ADS Crash” thread on the *BeechTalk* forum is approaching 100 pages. As most of you know, in June 2019 a tragic accident occurred at Addison airport (KADS) in Dallas, Texas. A nearly new King Air 350i departing on a flight to Florida, crashed into a hangar on the airport just seconds after liftoff from Runway 15. All 10 people aboard – eight passengers and a crew of two – died. The NTSB preliminary docket was just released. This document presents their findings thus far concerning the facts of the case, but no conclusion of the cause has yet been found nor presented.

As you may imagine, this tragedy impacted most of us in the King Air community very strongly and it is easy to understand why the thread on *BeechTalk* is as large as it is. One of the many discussion points that has been raised is the position of the pilot’s right hand at rotation. Let’s discuss that.

Not until I received my Learjet type rating back in 1978 was I ever exposed to the procedure of “Right hand moves from throttles to control wheel at V_1 .” The Lear was the first airplane that I ever flew that was certificated under the rules of FAR Part 25 ... the “big airplane” rules. Here, an engine failure during takeoff had to be considered and charts/procedures had to exist to allow either a successful abort or a successful continued one-engine takeoff, depending on the speed at which the engine failure was recognized. That is, Accelerate-Stop and Accelerate-Go distances, both had to be possible in the distances available on the runway.

With the relatively stellar single-engine performance of the Lear, the “Going” procedure lacked the drama that we experience in a light, piston-engine twin trainer. It is difficult to make a cogent argument for aborting the takeoff after V_1 when the airplane can continue so well even with an engine failed. In fact, high speed aborts were riddled with unsuccessful outcomes – going off the end or side of the runway, incurring major damage and, often, resulting in death to the occupants.

The procedure I was taught by the FlightSafety team in Wichita was to reposition my right hand from the thrust levers (“throttles” for us piston-trained types) onto the control wheel when the V_1 call was made by the PNF (Pilot-Not-Flying). That helped to ensure that the thrust levers would never be erroneously retarded to initiate a *stopping* procedure after Decision Speed (the name for which V_1 is the abbreviation) was reached ... when the *going* procedure was the correct and expected reaction to the recognition of a power loss.

I can definitely see the benefit of repositioning the right hand as airspeed passes Decision Speed for airplanes that have guaranteed capability to continue on the remaining engine. All the airliner jets, certified under FAR 25 rules, do it this way and rightly so. How about King Airs?

What King Air are you operating? Just counting standard, civilian models there are over 25 different types, each with its own flight manual. The certification rules decide what performance charts must be in that manual. As years pass, as rules change, as aircraft categories change, as maximum takeoff weight changes ... all of these variables have an impact on what performance charts are presented in the flight manual. Heck, most King Air models don't even list a V_1 speed!

From a legal standpoint, must the operator comply with all of the charts in the POM (Pilot's Operating Manual) or POH (Pilot's Operating Handbook)? Surprisingly, the answer is no. With the exception of the 300-series, all King Airs are "light twins" since their maximum takeoff weight does not exceed 12,500 pounds. Unlike the heavier airplanes that fall in the Transport Category of rules, there is no requirement for a light twin to have the ability to continue a takeoff with an engine failure. Yes, Beech does the flight testing that allows performance charts to be created that give both Accelerate-Stop Distance and Accelerate-Go Distance under differing conditions of weight, OAT and wind. But they are for information only with no requirement to operate off runways that are long enough to meet these distances. That's a darn good thing, too! Taking your B90 into that 3,000-foot-long strip located near the boss's lakeside cabin would not be possible if "big boy" rules applied.

As we all should know, there is a calculated risk factor associated with many of the runways we use: There will be seconds of time during the takeoff when we will be going fast enough that we will go off the end of the runway if we abort and yet we are still slow enough that we won't be able to climb enough on one engine to clear the obstacles beyond the runway. With the reliability of turbine engines, the risk that an engine will fail during these critical few seconds of time is a risk most of us are willing to take.

However, what if the unlikely but possible event *does* occur? What if one of our PT6s does indeed have a catastrophic failure at, say 95 knots? If we abort under these assumed conditions, use the brakes to their maximum and maintain directional control, we will perhaps still be going 30 knots when we hit the ditch. But if we try to fly at 95 knots?! We are still more than 10 knots below single engine best-rate-of-climb speed (V_{YSE} , Blue Line), we have not yet started retracting the gear, and unless we are equipped with autofeather we still have tons of windmilling propeller drag. If we try to continue it will be very likely we will lose airspeed as we try to climb in this impossible situation and quickly encounter the deadly VMC loss of control. At best, if we keep the nose down to maintain airspeed and control, we hit the trees still going 90 knots. Abort, hit the ditch at 30. Try to continue, hit the trees at 90. Let's see: Three times the speed is nine times the kinetic energy to dissipate. There is a *lot* more chance we will live through the 30-knot hit into the ditch, eh?

So, where I am going with this is to state that my right hand is staying on the power levers at least until I am above nearby obstacles and the airspeed is at least at V_{YSE} . Why? So, I can readily pull the power levers to Idle to initiate the abort. Isn't this exactly what we should do in most other light twins? Due to the King Air's increased single engine climb capability compared to a Baron, our seconds of exposure to bad risk during takeoff from short runways is less than in a Baron but it is still there.

So when does my right hand leave the power levers? If I am flying single-pilot, it does so when I reach for the landing gear handle. And when is that? When continuing looks more favorable than stopping. But as soon as the gear handle is up, I return my hand to the power levers. With the exception of the brand-new, just announced King Air 360 model, no other King Airs have any power limiters except for the human controlling those power levers. It is the pilot's job to adjust the levers to get the torque or ITT value that is desired. As the airplane climbs, adjustments will have to be made. Hence, the right hand spends a lot of time on the power levers. It is not a "select the correct detent and forget" as in the FADEC-equipped turbines. (FADEC? Full Authority Digital Engine Control)

I hope that almost all who are reading this article are familiar with the phenomenon of "Power Lever Migration," (PLM). That action may have played a role in the crash at KADS. For sure, it has contributed to other fatal King Air takeoff accidents. A spring at the engine-end of the power lever cable is always trying to retard the Fuel Control Unit (FCU) to its idle setting. Why? To ensure that the engine is not damaged when subjected to torque and temp limits that would be exceeded if/when the power lever cable malfunctions/disconnects and tells the FCU to go to maximum N_g speed. Because (1) the Power Lever (PL) connects to the FCU on the right side of the PT6 and (2) the cockpit end of the PL sits slightly left of fuselage centerline, the left PL cable is significantly shorter than the right. Hence, it tends to move more freely, to have less "stiction"... a combination of friction and stickiness. If the individual PL friction knobs are not both sufficiently "snugged up," it is probable that both PLs will move, migrate back toward idle when unattended. Since the force a spring exerts increases as it is lengthened from its resting position, the pullback force increases as PLs are advanced.

Try it yourself in your hangar on your actual King Air. Turn both friction knobs fully counterclockwise (the looser direction) and push the PLs fully forward then take your hand away. Some of you will see no result, some will see one or both PLs move aft a little, and some will likely see the left lever move most of the way to idle and the right lever come maybe halfway back. It all depends on the "stiction" in your actual airplane. Before you leave the cockpit, remember to turn the friction knobs clockwise enough to ensure they are "snugged up" to where you want them!

If the checklist step of setting proper PL friction before takeoff is overlooked and if the friction is too loose, the stage is set for a huge surprise when the pilot releases the power levers to reach for the gear handle! In most cases (thank you, Lord!) the outcome is more humorous than scary. Of course the pilot sees the levers move and he immediately puts his hand back on them and advances them as desired ... probably with the gear still down. Now it's a matter of taking his left hand off the control wheel long enough to (A) get the gear up if the handle is on the left side of the cockpit as it is in all newer KA models, (B) tighten the friction knobs and (C) go back to flying the airplane with his left hand.

If the PL migration aft is *not* noticed, however? It sets the stage for tragedy.

Realize the following facts. First, power lever position controls the engine's compressor speed (N_g) directly, not torque. Of course, torque and ITT are what we watch as we adjust power but the reason they change is because we selected a new N_g speed. It's said that about the last 50% of available power is all achieved in about the last 12% of N_g . Thus, it takes relatively little PLM to cause a major loss of power. In the case of the left PL moving nearly to idle while the right PL comes back only one-fourth of the way, we would have close to no power on the left and maybe only 50% on the right.

Second, the marvelous autofeather system must be able to know that a loss of power is *unintentional* not intentional. It achieves this knowledge by looking at PL position. If the PL is moved back, the autofeather "thinks" that the resultant power reduction was requested by the pilot and feathering the propeller would not be appropriate. But if the PL is still well-advanced yet little power is being produced ... something's wrong and autofeather will ride to the rescue and feather the propeller to reduce the drag. Therefore, when PLM occurs, autofeather is rendered inoperative. In fact, if *either* PL is retarded *both* propellers are incapable of automatically feathering.

Third, the +10-degree pitch attitude we have been taught to hold after takeoff (the 350's POH is the only one that actually states that value but it works rather well for all KA models) will not be correct with the windmilling prop and, probably, reduced power on not only the left but also, to a typically lesser extent, on the right as well. Airspeed will rapidly decay if that attitude is maintained.

Keeping the right hand on the power levers obviously eliminates the possibility of PLM. I am so used to doing this in piston-twins as well as King Airs, personally I do not reposition my hand when Decision Speed is reached even in the 350. Don't get me wrong: I am not saying that I'd pull power back and abort above V_1 in a 350, but the hand stays on the PLs. I have no argument whatsoever with those 350 pilots who *do* move their hand to the wheel at V_1 .

But folks, I beg you ... always prevent Power Lever Migration! How? First, by snugging up those friction knobs! How do you know they're set properly in a King Air that is new to you? One way is to lift your hand just slightly above the PLs after you have set takeoff power. Did anything move? No? Then put your hand back down and continue. Did a lever start to retard? Depending on the length of the runway, either pull both back to idle and taxi back for another try, now with tighter friction, or turn the friction knob clockwise a little more before you reset the desired power as you continue rolling. And please realize that takeoff power should be set well before 60 KIAS. I'm not implying that you do this quick release of the PLs near rotation!

How about when flying as a crew of two? The earlier King Air models have the landing gear handle on the co-pilot's side so there is never a need for the left-seater to release the PLs right after liftoff. Even when the handle is on the pilot's side, some crews have the co-pilot reach across to activate it. The only thing I, personally, have against this procedure is that the reaching across looks rather weird and unprofessional. To guarantee no PLM if the pilot will raise his own gear, merely ensure that the co-pilot's hand is positioned such that the PLs cannot migrate aft. I strongly advocate that this be standard operating practice (SOP). It is so simple for the right-seater to rest his hand on the power quadrant with the tips of his first and middle

fingers touching the base of the right and left PLs. As the left-seater adds power, the right-seater's hand slides forward to maintain light contact with the PLs. In the event of an abort, the co-pilot's hand can be instantly withdrawn. After liftoff, after the gear is raised and the pilot's hand returns to the PLs, then the co-pilot can move his left hand as desired.

As stated before in this article, no conclusion has yet been reached by the NTSB on the cause of the Addison crash. The cockpit voice recorder, sadly, shows that proper crew-coordination procedures were non-existent. No checklist was ever verbally requested. No briefing was ever given before takeoff. What happened, in my view, jibes perfectly with a Power Lever Migration scenario that was not noticed and not corrected. In addition, airplane control was not maintained. The airplane was allowed to yaw badly to the left and the airspeed was allowed to get too slow, leading to the loss of control. My condolences to the families and friends of those killed.

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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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