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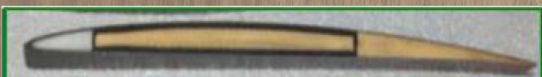
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COVER PHOTO

Dick Bailey's King Air 350ER at Mangareva, a remote island in the South Pacific.

(Courtesy of Bailey)

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Correction

Thanks to longtime Beechcraft employee (and customer*) Bob Conrad who wrote in to point out some items that needed corrected from the Hall of Fame article in the June issue of *King Air* magazine.

The first flight of the King Air was Jan. 20, 1964, not Jan. 24. Apparently that date has been referenced in error before. Also, the Model 80 was suggested by LeRoy Clay to put a turboprop on to form the King Air, not the Model 88.

*Bob's first Beechcraft was a tri-gear H-18 and his last was a King Air A-100. **KA**



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BEAUTY ABOUND

350ER Polar Circumnavigation Puts the World in Perspective

by MeLinda Schnyder



“The beauty of the world seen from the air on a trip like this – you’re just never the same after that.”

Circling the globe in a Beechcraft King Air on an extended five-month mission is a profound and addictive pursuit.

Talking with Inuit people living in the stunning remoteness of Canada’s massive but sparsely populated northern territory of Nunavut.

The happy greeting with smiles visible through hazmat suits in Bangkok, Thailand, after getting the sense an aircraft landing during

the COVID-19 pandemic could be unwelcomed.

Having lunch along the Amazon River at a local family’s remote cabin, adorned with multiple jaguar pelts, after landing in Iquitos, Peru, the world’s largest city that cannot be reached by road.

“The more we travel and the more places we see, the more we realize that the things that bind us all as people and communities across the world are much greater than the things that divide us. We all want the same things: we want our kids to be happy, we want to put bread on our tables,” said Dick Bailey, a 2019 Beechcraft King Air 350ER owner and pilot who earlier in 2022 completed a polar circumnavigation attempt with his daughter and fellow pilot Kelly Hinerava Bailey.

“We live in an absolutely astonishing world. The beauty of the world



“ ... I am grateful for the experience and discovery of this astonishing world we are so blessed to inhabit.”



Dick Bailey's four brothers flew on the King Air 350ER at various times during the round-the-world trip. Here the entire crew (with Dick and Kelly second and third from left) pose for a photo before starting the mission in Seattle, Washington, in September 2021.

seen from the air on a trip like this – you're just never the same after that."

While the father-daughter team wasn't able to accomplish their intended mission of an FAI sanctioned polar circumnavigation – permitting restrictions in Chile due to the pandemic kept them from crossing the South Pole – Dick reports they had "a heck of a lot

of fun" planning and making the trip that spanned five months from September 2021 to February 2022.

They accomplished the trip in three phases so they could return home several times for work and family obligations. They landed in 19 countries and changed time zones 29 times while accumulating 32,445 nautical miles and 121 hours flight time. They praised the comfort,

reliability and performance of the King Air 350ER, which averaged 268 kts ground speed and a 640 lbs/hr average fuel consumption.

"Our trip demonstrated once again the reliability and performance of the storied and legendary King Air," Kelly said. "As a daughter and co-pilot on this amazing journey, I am proud of the skills I acquired as an aviator, and I am grateful for the



The Baileys removed four seats from the cabin of their 2019 King Air 350ER, making room for a crate of spare parts they might need. They still had four seats available for occasional cabin crew to join the expedition.

experience and discovery of this astonishing world we are so blessed to inhabit.”

The Crew

Dick, age 68, has been flying since he was 16 years old. “I have always loved flying and loved airplanes,” he said. “I was out at the hangar walking around in my hometown in Louisiana and an instructor asked me if I wanted a job sweeping the hangars. I was 16 and that was my first job. They paid me \$1 an hour or \$2 an hour if I put it into flying lessons so I put it all into flying lessons.”

He has an ATP certificate and his multi-engine rating, and he’s also a flight instructor. Kelly, age 39, has a commercial pilot’s license, a multi-engine rating and is working on her King Air type rating.

“Kelly’s been my student for many years and now she’s a superb pilot in her own right,” Dick said.

They’ll both be heading to Florida together this month for recurrent training at Flight Safety.

Dick splits his time between Southern California – the plane is based at Camarillo Airport (KCMA) – and Tahiti. He first visited the largest island in French Polynesia with his family as a child and he returned in the early 1970s, after he had earned bachelor’s and master’s degrees from Stanford University and an MBA from Harvard University.

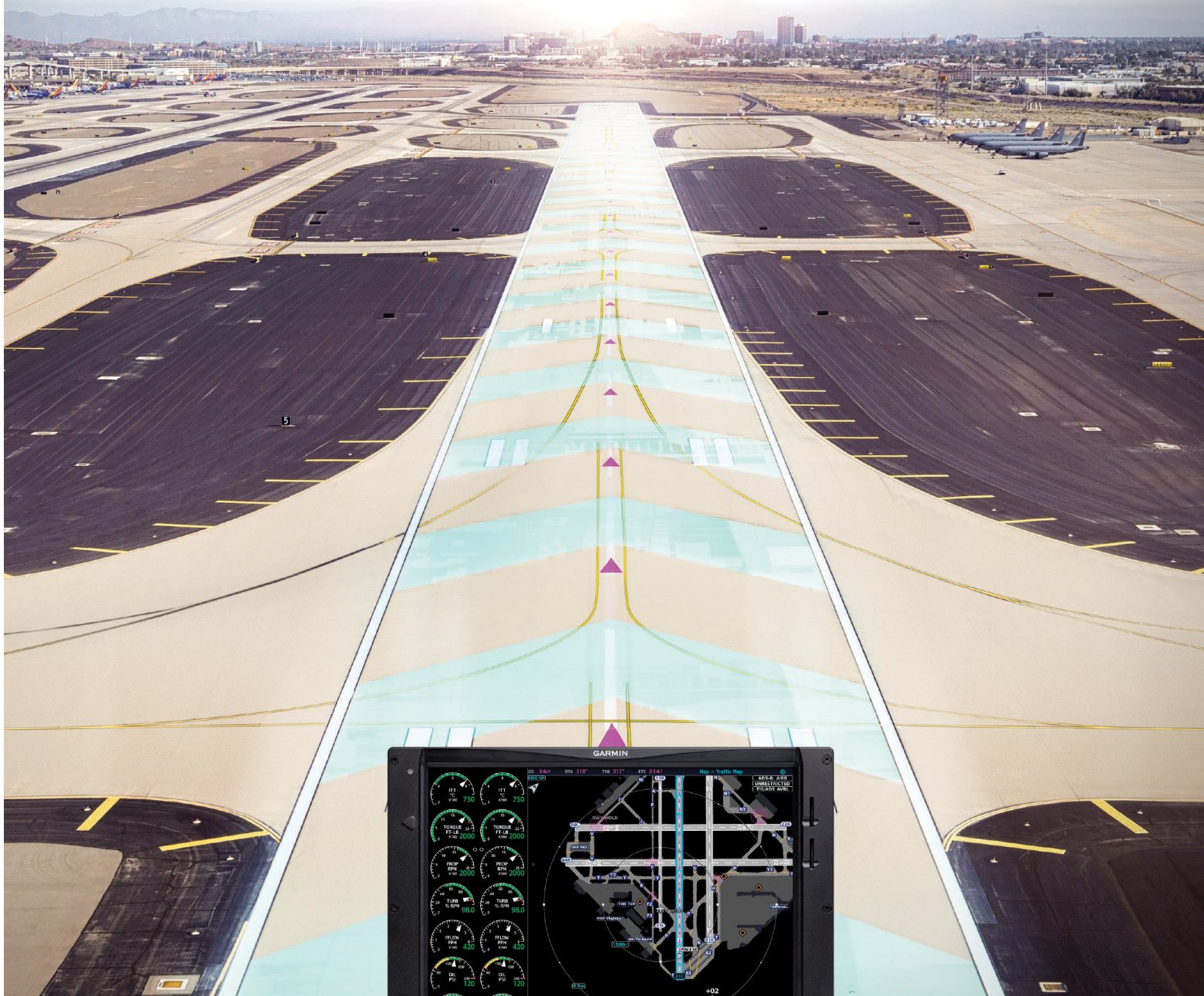
He launched a hospitality company inspired by the idea that luxury travel and environmental and cultural protection needn’t be mutually exclusive that has grown into French Polynesia’s largest luxury

hotel operator. Dick is considered a pioneer in environmental protection and sustainability, and his company owns and operates several resort properties in French Polynesia.

Dick also founded a nonprofit called Tetiaroa Society, dedicated to exploring innovative solutions to the world’s most pressing issues relating to sustainable interdependence, and Te Mana O Te Moana, a nonprofit that strives to protect the Polynesian marine environment. (The Baileys said they purchased carbon offsets for their circumnavigation and used sustainable fuel mixtures where available.)

Kelly grew up on the South Pacific island. She has a Bachelor of Science in Geology from Sonoma State University and earned her MBA from Pepperdine University. She lives in Seattle, Washington, and

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The Baileys and their temporary crew members shared updates throughout the trip via an Instagram account with the handle [bailey_circumpolar](#). The caption accompanying this photo: “We successfully made it to the 75th parallel and landed in Resolute Bay: a gravel runway with no tower and 400 foot ceiling. Pilot and copilot were superstars flying manual for the approach because of undependable magnetic north readings and dropping out of the clouds straight onto the runway!”

operates four jewelry boutiques in the French Polynesian islands that sell a contemporary luxury line of Tahitian pearl jewelry that she designs and creates.

Kelly has been flying with her father since her college days. They flew TBMs for 15 years before moving into the King Air 350 in 2019.

The father and daughter were the only two to fly on this trip, but they did have additional help from family members who served as crew engineers. Dick’s four brothers flew on the airplane at various times during the round-the-world trip. One brought first aid experience (which fortunately wasn’t needed), one mechanical knowledge, and two became certified COVID testers. The Baileys registered their aircraft as a mobile testing unit, allowing them to test themselves and certified COVID test results for any countries that required it.

The Aircraft

After flying Daher TBM aircraft for several years, Dick felt his family had outgrown the single-engine turboprop.

“I have three kids and seven grandchildren, and while I don’t plan

on taking the entire clan all at once it was time to step up to something with a larger cabin, more versatility and two engines,” he said.

He purchased the King Air 350ER new from the factory in 2019, knowing that he’d use the extended range features for trips to Tahiti, domestic flights for travel and tourism events and, of course, a circumnavigation attempt or two.

“Domestically, Kelly and I have flown several trips across the U.S. nonstop. If you’re not in a hurry, this airplane can carry 10 people very comfortably across the country,” Dick said.

He worked with Textron Aviation’s Special Missions group for the engine, landing gear and higher gross weight takeoff upgrades.

The Baileys report that the King Air performed nearly flawlessly on the polar circumnavigation mission.

“We flew two legs that were 2,000 nautical miles each over the Pacific and not many turboprops would have delivered the incredible performance that the King Air gave us,” Dick said. “We landed after each of those 2,000-nautical-mile legs with more than an hour of fuel in the tanks. That’s just amazing performance.”

They said they had one pressurization safety valve malfunction over the Pacific between Easter Island and Santiago, Chile.

“We started to lose cabin pressure over the Pacific,” Dick said. “We had our oxygen masks on while we were troubleshooting the problem. We eventually were able to get the safety valve reset and continue on but we did have a cold sweat for about 30 minutes. When we landed in Santiago, we had their maintenance take a look at it, and they couldn’t repeat the fault. We’ve never had a problem since; sometimes it’s just a ghost in the machine and that’s where your preparation pays off.”

The Route & Highlights

This wasn’t the Baileys’ first circumnavigation. In 2017, they flew the TBM 900 on a mostly overland route.

“We figured our mindset would be OK, done that,” Dick said. “Not at all. All we could think about was doing it again, so it was natural to go for it in the King Air. Now that we’ve done that, all we think about is doing it again. I think we’re going to be serial circumnavigators now.”

Kelly said there were a lot of differences this time around, >



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because they were flying a different airplane and because of the global pandemic.

She said the King Air 350ER was much more robust and comfortable for the long flights (their longest leg was 8.1 hours from Easter Island to Santiago). Having a lavatory was a huge help with staying hydrated; it allowed them to not restrain their water intake as much as they had in the TBM.

They also added a high-frequency radio to avoid the long stretches without communication that they experienced on the last circumnavigation. Next time, they said, they'll also add equipment that allows for true magnetic navigation.

Both pilots said they were better prepared for what to expect, from understanding the slot system many international airports use, to communicating more clearly with different accents and knowing to always get their handler's name and

phone number before leaving the airport.

They also knew to not spend time in advance planning transportation and accommodations because the schedule could too easily shift. That was possible because their temporary crew members assisted with making those arrangements.

They spent a year planning the overflight permits and landing permits but they had to remain flexible as new waves of COVID and other events altered their routes. They relied on the dispatch team at Sun Air Jets, where they hangar their aircraft in Camarillo.

"The logistical planning required a ground team that was available 24 hours a day," Kelly said. "Most of the overflight, landing permit and flight plans were filed without incident, including one that skimmed Afghanistan, and one that diverted us into China, though a few required last minute changes. One

such incident happened between Chile and Peru, leading us to a place none of us had ever heard of: Iquitos, Peru. On the edge of the Amazon River, it is the largest city in the world that cannot be reached by road. Events such as this created an unpredictable and exciting adventure."

COVID presented many obstacles during the planning stages and during the trip. The Baileys delayed the start of the mission by a year, but by mid-2021 it seemed like cases in the U.S. were continuing to lower so they decided to go for it. While their expectation that there would be fewer people traveling was accurate, they hadn't considered that areas of the world were already being hit with the next wave of the virus, well before the U.S. experienced it.

When asked for their most vivid memory of the trip, they both agree it was leaving Easter Island

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Flying over the 75th parallel north they knew to watch the magnetic variation, which was 18 degrees.

in the evening and witnessing the Southern Hemisphere's most epic constellations followed by an amazing sunrise before they landed in Santiago.

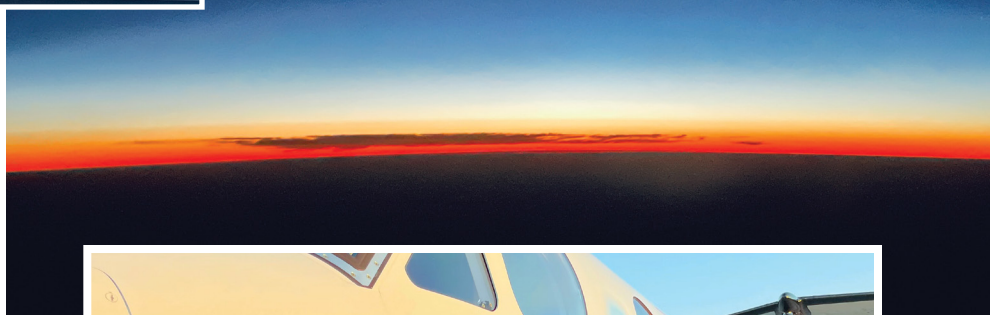
Among their other trip highlights was visiting the Mayan ruins in Belize as well as staying at two Francis Ford Coppola resorts there; exploring museums and culture during an abnormal stay of five days in Helsinki, Finland (waiting on permits); and the views when landing in Churchill, Manitoba; Resolute Bay, Nunavut; Reykjavik, Iceland; Nur-Sultan, Kazakhstan; Ushuaia, Argentina; Jakarta, Indonesia; and Tahiti.

The ultimate highlight, though, was sharing the experience.

"We both love travel, we both love flying and we love the challenge of it," Dick said.

Kelly agreed and added: "My dad is one of the biggest reasons I started flying and we have a lot of fun flying together." **KA**

The most vivid memory from their round-the-world trip was seeing the Southern Hemisphere's most epic constellations followed by this sunrise on their leg from Easter Island to Santiago, Chile.



Daughter and father after completing their journey, posing with the decals they added to their King Air 350ER on a polar circumnavigation from September 2021 to February 2022.

Nose Tire Going Flat?

by Dean Benedict



I got a call from a King Air B200 owner/operator. He had been a regular customer of mine when I had my maintenance shop, but we hadn't spoke for several years. He always made time to chat with me whenever dropping off or picking up his King Air, and I was glad to hear from him. Besides catching up, he wanted my opinion on a persistent squawk: His nose tire kept going flat.

He had been fighting this problem for many months. Everyone involved felt they had attacked the problem from every possible angle and were at their wits end. (In case you're wondering, the tire was being serviced with nitrogen, not air.)

Troubleshooting a Flat Tire

If a tire is low, the first thing I check is the valve core. They are the most susceptible to failure and an easy fix. If that doesn't take care of the problem, I would check the tire for leaks. This is properly done by immersion in a water bath. In a pinch, I've used a spray bottle to drench the tire/wheel assembly, looking mainly for a leak around the bead. I've found many leaks this way, but some leaks are not so forthcoming. There is no substitute for removing the tire/wheel and submerging it in water.

New Tires and O-rings

Whenever any tire – nose or main wheels – is changed on your King Air, it gets a new O-ring as well (at least it should). This large O-ring, sandwiched between the wheel halves, can be tricky to install. If not seated perfectly, they can get pinched between the wheel halves and cause the new tire to lose pressure. Rarely do you get a brand-new tire that is defective. If it's a *new* tire going flat, then you've got a pinched O-ring. The maintenance manual even calls for an "air retention check" on a new tire by letting it sit for 24 hours after mounting.

Running Out of Options

With the old customer's B200, they replaced the valve core, but it didn't help. So, they put it in a water bath and still found nothing. Next, they installed a brand-

new nose tire and waited the obligatory 24 hours and the tire held pressure. But after a few flights, it went flat! I think he tried a couple of brand-new nose tires, all to no avail.

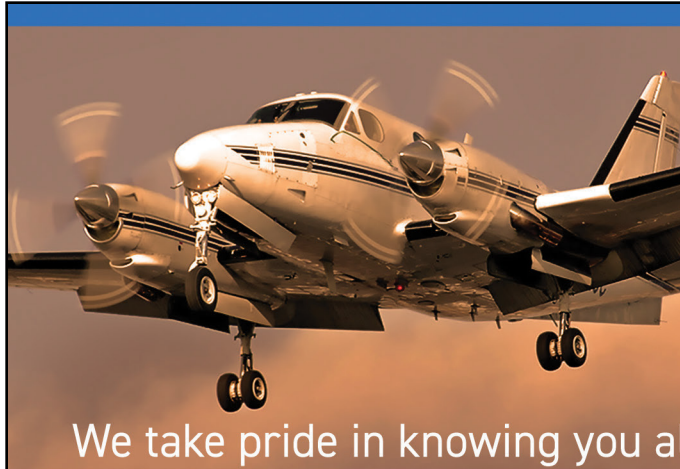
I should mention at this point that this nose tire problem always cropped up at the home hangar. There was no loss of tire pressure due to a change in altitude. By that I mean if you operate most of the time near sea level, then you take a monthlong vacation in Leadville, Colorado, at 9,934 feet, your tire pressures might need a little attention. Finally, out of desperation, the B200 owner/operator bought a brand-new nose wheel assembly and that fixed it.

The Nose Wheel Valve Stem

As I listened to his tale of nose tire woes, I thought about the valve stem. They can leak. On all King Air nose wheels, the valve stem is mounted from the inside of the wheel wall, going to the outside. The inside end of the valve stem is flanged. On the outside, there's a jam nut that screws down and pulls the flanged end snug against the wheel. Sandwiched between the jam

(continued on page 18)

“If a tire is low, the first thing I check is the valve core. They are the most susceptible to failure and an easy fix.”



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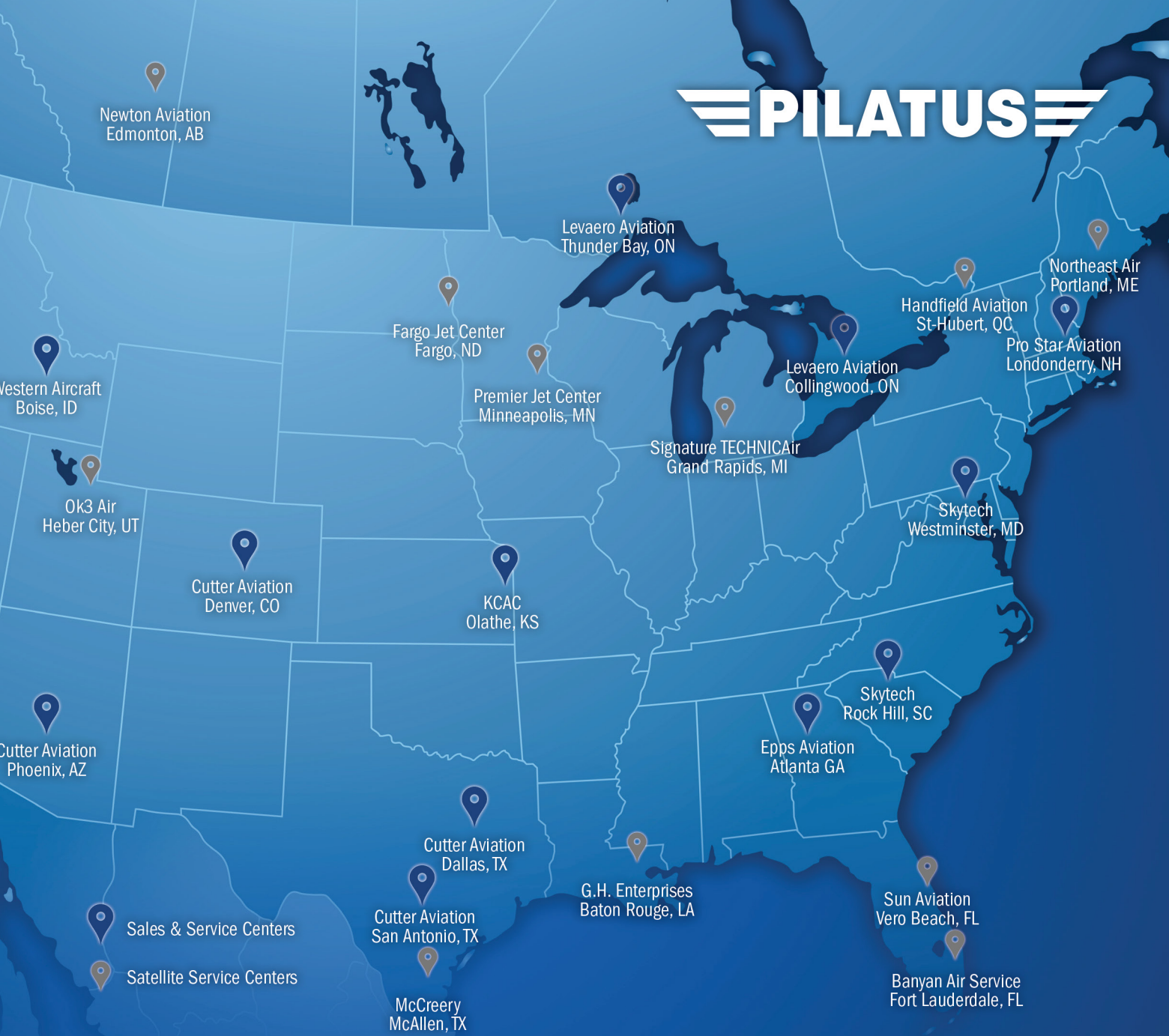


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The nose wheel valve stem with the much smaller valve core next to it. Inset, a close-up of the flange and the grommet/gasket (black). The end flange holds the stem assembly to the inside wall of the wheel when the nut is screwed down and compresses the grommet which forms a seal.

nut and the outside wheel wall is a rubber gasket or grommet; there's another one between the flange and the inside wheel wall. When the jam nut is screwed down, the gaskets compress and form a seal. In the valve stem photo (above) instead of two gaskets (one inside and one outside), there is a one-piece, sheath-like grommet that protrudes slightly at each end. When the jam nut is tightened, the grommet is compressed in the same way at both ends.

My theory is that these valve stem gaskets or grommets shrink in the cold temperatures at altitude and this allows the tire to lose pressure. Back on the ground, the grommets have returned to normal, but the nose tire is low. "Nose tire – low pressure" goes on the squawk list. The tire/wheel gets the water bath treatment, but no leaks are found. Now you are going down the same path as my B200 friend. I wish he had called me *before* he ordered that new nose wheel; so does he.

King Air Tires with Tubes

If putting in tubes sounds wrong to you, then you probably don't have a model 90. All the wheels on the 90 models have the type of valve stem discussed above, not just the nose wheel. I learned early on to keep those valve stems in stock, and that practice stood well with me.

Some 90 owner/operators didn't want to wait for a valve stem to fail and bring down the pressure in one or more tires. Their proactive solution was to put tubes in their tires, including the nose tire. This way they could maintain consistent tire pressure. Any King Air with

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double truck main gear, including the F90, has a different valve stem on all main wheels. It's shorter and it screws directly into the wheel. The O-ring at the end is much smaller than its nose wheel counterpart and is tucked away from exposure. So that's four out of five wheels you don't have to worry about.

Generally speaking, the King Air nose wheel assembly is not a problem-prone area. It does what you want, when you want it to. You can't ask for much more than that. **KA**

Dean Benedict is a certified A&P, AI with nearly 45 years' experience in King Air maintenance. He's the founder and former owner of Honest Air Inc., a "King Air maintenance boutique" (with some Dukes and Barons on the side). Now, with BeechMedic LLC, Dean consults with King Air owners and operators on all things King Air related: maintenance, troubleshooting, pre-buys, etc. He can be reached at dr.dean@beechmedic.com or 702-773-1800.

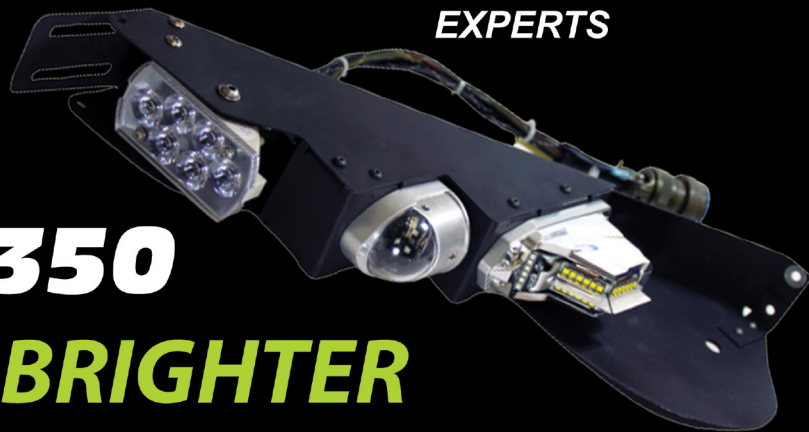
A valve stem on a model 90 King Air wheel. They are all the same type whether it's a main or nose wheel.



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Aviation Business Associations Supporting the Industry

NBAA President Details Items to Strengthen Aviation to Congress

The National Business Aviation Association (NBAA) President and CEO Ed Bolen recently detailed for Congress a policy roadmap for strengthening the general aviation sector in the U.S. and around the world, today and in the years to come.

In testimony before the U.S. House Committee on Transportation and Infrastructure Aviation Subcommittee, he urged lawmakers to facilitate access for emerging technologies, including advanced air mobility, in order to maintain America's leadership in global aviation; partner with the industry to protect the privacy of flight and advance aviation sustainability; and help address workforce challenges as Congress prepares to tackle a five-year Federal Aviation Administration (FAA) reauthorization bill next year.

According to NBAA, Bolen commended Congress for passing several laws during the COVID-19 pandemic that enabled business aviation to continue to support 5,000

communities across the U.S. with 1.2 million jobs and \$247 billion in annual economic output.

“Congressional action in a crisis moment helped put general aviation on a flight path for recovery – there is strong demand for new employees, and our industry is serving small towns and communities across the country,” Bolen said. “Aviation workers are back on the job, and in some cases, we are even seeing a return of worker shortages among pilots, maintenance workers and other aviation professionals.”

Among NBAA's recommendations for Congress:

- Build on the successful implementation of the next-generation air traffic control (ATC) system and maintain congressional oversight, along with the current tax structure to support the Aviation Funding Stability Act and Airport and Airway Trust Fund (AATF).
- Ensure that the FAA takes steps to protect business aviation from 5G telecommunications interference and the privacy of general aviation

travelers, who are easily tracked by “cyber-stalkers.”

- Enact the blender’s tax credit as proposed in the Sustainable Skies Act (H.R. 3440) to increase the production, availability and use of sustainable aviation fuel, which can reduce lifecycle greenhouse gas emissions by up to 80% compared to conventional jet fuel.
- Support transformative technologies so that aircraft can be powered by electric, hybrid and hydrogen propulsion, with legislation such as the Advanced Aviation Infrastructure Modernization Act (H.R. 6270). This act would expand advanced air mobility (AAM) infrastructure, and by clarifying tax rules to allow electric aircraft charging stations to qualify for an existing tax credit applicable to ground vehicles.
- Enact policy changes and recruitment efforts to help the industry meet its need for 600,000 new pilots, technicians and other professionals in the next 20 years.

“Our industry looks forward to continuing engagement with ... Congress as we develop policy solutions that ... maintain the United States as the world leader in aerospace.”

Reflecting on the importance of the FAA Reauthorization for the many technology advancements coming out of business aviation today, Bolen said: “Our industry looks forward to continuing engagement with the committee and Congress as we develop policy solutions that safely embrace new aviation technologies and maintain the United States as the world leader in aerospace.” (Source: NBAA)

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Canada Implements Luxury Tax Affecting Aircraft

The Canadian government recently announced it planned to move forward with the implementation of the Luxury Tax (included in Bill C-19) “for all subject items, including aircraft*” Sept. 1, 2022. The tax will be enforced though on vehicles with written sales agreements of Jan. 1, 2022, and after.

The Canadian Business Aviation Association (CBAA), which represents more than 400 companies and organizations, responded in part by saying, “The recent announcement by the Government of Canada to move forward on the implementation of the so called ‘luxury tax’ for Sept. 1, 2022, is of great concern for Canada’s beleaguered aviation sector and its employees. It will have serious implications for business aviation in particular, at a time when the drivers of our economic recovery and growth are facing challenges that are without precedent in a generation. We urge this government to return to the table and, at the very least, consult with our sector on reasonable timelines for tax policy changes that should not be punitive but indeed supportive for all Canadians.”

“It will have serious implications for business aviation in particular, at a time when ... our economic recovery and growth are facing challenges ...”

For the full press release go to: <https://www.canada.ca/en/departement-finance/news/2022/07>

*Luxury Tax will be excluded on certain aircraft for export. 



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Vice President Global
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King Air Crossfeed Basics

by Tom Clements



King Air 350 fuel panel

My aim in writing this article is not to present anything new but rather to simply review some of the fuel system information that you should have already received. I am sure the fuel system was covered extensively in your initial King Air training course and, if you have been flying King Airs for a while now, I am sure it has been reviewed in some or all of your recurrent training courses.

Regardless of the particular King Air model you operate, three things must exist for fuel crossfeed to take place. Before I present those three things, let's remember this important fact: Fuel never flows from a tank on one side to a tank on the other side ... unless we do something

wrong and unusual. The term is not "CrossFLOW." We are not flowing fuel from tank(s) on one side to tank(s) on the other side. The correct term is "CrossFEED," since we are taking fuel from a tank on one side and feeding it to the operating ENGINE on the other side. (Sadly, I

believe the switch we will be discussing, in some King Air models is, in fact, labeled “Crossflow.” That’s a demerit for the Beech switch labelers!) Additionally, never say “transfer” when you mean “crossfeed.” In a King Air, *transfer* refers to moving fuel from the auxiliary tank into the main tank *on the same side*.

Back to the three things we need for crossfeed. They are: (1) An operating electric boost pump on the feeding side, (2) An open crossfeed line and (3) No opposing electric boost pump pressure on the receiving side.

On every King Air model ever built, the nacelle tank – the one behind the engine’s firewall in the nacelle area above and in front of the main wheel well – is where the fuel that is to be crossfed originates. In the 65-90, A90, B90, C90 (including all of its variants), and straight 100, the nacelle tank has its own filler cap and is labeled “Nacelle.” Duh! A gauge in the cockpit reads its quantity. In the E90, F90, A100, B100, 200 (including all of its variants) and 300 (including all of its variants) it’s not quite so simple. In these models the nacelle tank has no filler cap – with one exception that I will present in a moment – and there is no ability in the cockpit to measure its quantity. Instead, this tank is simply a part of the “main tank.” This combination of tanks includes four rubber bladder tanks and one wet-wing tank in the outboard section of the wing and one bladder tank in the nacelle, all connected so as to drain and vent together. The highest spot in this complex of tanks is at the filler cap near the wingtip and the lowest spot is at the bottom of the nacelle. By filling the cap at the tip, fuel flows downhill into all of the connected tanks, including the nacelle tank, and fills it to the brim. In the cockpit, we can read main tank quantity, but we have no exact way of knowing what is in the nacelle and what is still in the outboard wing. To us, the nacelle is merely a part of the main tank, including the main’s lowest point.

The E90 is the one exception mentioned in the previous paragraph, the one that has a nacelle filler cap even though it doesn’t need one. It was less expensive for Beech to manufacture an identical nacelle for the C90 and E90, with a filler cap, even though the newer fuel system of the E90 filled the nacelle by filling the cap at the wingtip. Never take the E90’s nacelle cap off when the Main Tank is full, unless you want to bathe your nacelle in kerosene!

“On every King Air model ... the nacelle tank ... is where the fuel that is to be crossfed originates.”

Inside the nacelle tank, on its bottom, is a submerged electric boost pump that has a nominal discharge pressure of about 30 psig. This pump feeds into a pipe that exits the nacelle tank on its inboard side and immediately connects to a “T” fitting that has one pipe going forward and one pipe going aft. The forward pipe goes to the fuel firewall shut-off valve, just inches away, and the aft pipe is the start of the crossfeed line. This electric boost pump is the only pump that prevents cavitation of the engine-driven, high-pressure pump on the A90, B90 and C90. There is a secondary electric boost pump in parallel with it on the 65-90 and 100, the Straight 90 and Straight 100. The other models – E90, F90, A100, B100, 200s and 300s – have an engine-driven boost pump so the submerged, electric one in the nacelle is now called the “standby pump.”

Between the submerged pump and the exit pipe from the nacelle is a key element – a checkvalve. This valve permits fuel to exit the nacelle but does not allow fuel to enter the nacelle at this point.

Therefore, concerning the nacelle tank, we have reviewed (1) That its output line can send fuel in two directions: To its own engine and to the crossfeed line. (2) That fuel can *come from* the nacelle tank here but cannot *enter into* the nacelle tank due to a checkvalve.

Both sides, left and right, are as we have presented. This means that there is only one crossfeed line, or pipe that connects the left and right nacelle outlets to each other. This line contains the single crossfeed valve, a Normally-Closed (NC), solenoid-operated valve that uses electric power to open. In all King Air models this valve is located close to the left nacelle tank, not smack-dab half-way under the cabin aisle floorboards.

Assume that the crossfeed valve is open. That would yield a single fuel line connecting the two nacelle tanks together ... a “common fuel manifold” providing fuel to both engines. Also assume, for our discussion now that both side’s electric boost pumps/standby pumps were



King Air F90 fuel panel

“The size of the crossfeed line and the supply capability of the boost pump allows for both engines to be fed from one side’s nacelle tank.”



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operating, were discharging into this common manifold. If both engines were consuming fuel at an identical rate – say, 300 pph (pounds per hour) or 45 gph (gallons per hour) – would both nacelle tanks be decreasing their fuel quantity at the same rate?

At first glance, it seems the answer should be, “Of course!” But that is not correct. Let me explain. Modern King Airs have no cockpit display of the discharge pressure from the electric boost pump. However, that Fuel Pressure gauge exists in the straight 90, A90 and B90. The green arc of normal pressures on this gauge goes from 15 to 50 psig ... quite a wide range! Since the purpose of this pressure is simply to prevent cavitation of the high pressure, engine-driven pump, any pressure in this large range does the job well. It would be highly unlikely that both left and right pumps would have identical discharge pressures. (In fact, that is likely the reason why this gauge was deleted on the C90 and later models: It is bothersome to have all the other engine gauges in close agreement and yet the fuel pressure gauges reading very different values!)

If that crossfeed line – the common fuel manifold that is feeding both engines – were fed on the left end by 20 psi and on the right end by 40 psi, what would happen? No, the answer is not that the right would supply twice as much fuel as the left. The correct answer is that the right would supply *all* of the fuel that both engines are consuming! Think of a tug-of-war game but this time imagine pushing instead of pulling. The stronger side always wins. The manifold, pressurized to 40 psi from the right pump, would cause the left checkvalve to close and thereby prevent any of the 20-psi fuel being sent by the left pump from entering the manifold. The end result is that the left boost pump’s impeller would merely be spinning in its own fuel “wake” with no discharge passing the closed checkvalve while the right boost pump would keep filling the crossfeed line to replenish what both engines were consuming from it. Using our numbers above, the right nacelle quantity would be decreasing at the rate of 90 gph while the left nacelle quantity would be constant, not decreasing at all.

I hope this now makes it obvious why only one electric boost pump can be operating during crossfeed operation. You, the pilot, must control which pump is the stronger and which is the weaker by having one running and the other not running.

“Uh, wait a minute, Tom. You are discussing a situation in which both engines are consuming fuel from one nacelle tank. But that is a violation of a POH limitation. We can only crossfeed when an engine is shutdown in flight!”

You are exactly right: Most POHs do indeed contain this Fuel System Limitation. From an engineering design standpoint, however, I am also right. Namely, the size of the crossfeed line and the supply capability of the boost pump allows for both engines to be fed from one side’s nacelle tank. Please realize, as has been stated by me



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in previous articles that the POH's crossfeed limitation comes from legal, not engineering, concerns. Let's look at this in a bit more detail.

Suppose that one day the FBO's Jet-A truck breaks down after it had topped the filler caps on the left side but had not yet finished filling the right side. We are left with, say, a 500-pound imbalance. The 300-series has a 300-pound imbalance limitation and the C90B and C90GT-series have a 200-pound limit. (Both of which, in my opinion, are unnecessary.) For the other models, we are still good to go with the 500-pound imbalance. So off we go – with a little aileron trim cranked in – and when safely in cruise we decide to balance the fuel. We do this by crossfeeding, sending fuel from the side with more fuel to both engines until the greater fuel quantity equalizes with the lesser quantity. **Step 1:** Make sure the electric pump on the feeding side is on. **Step 2:** Open the crossfeed valve. **Step 3:** Make sure the electric pump on the other side is off. **Step 4:** Monitor the fuel quantity gauges over a period of at least 15 to 30 minutes to verify that indeed the side with more fuel is going down and the side with less fuel is not changing. **Step 5:** Keep monitoring fuel quantity and stop crossfeeding when balance is achieved!

OK, I admit it. You caught me again, caught me in not following the manufacturer's checklist. Realize that

this article is meant to cover *every* King Air model. The individual differences are many. For example, in the F90-, 200- and 300-series, moving the crossfeed switch laterally toward the side to which you want to feed the fuel not only should send power to the NC crossfeed valve and cause it to open but also should turn on the feeding side's standby pump. It does not, however, turn off the receiving side's standby pump if it happened to be already on. Another example of differences: In the C90 and earlier style systems the pilot will definitely have to turn off the receiving side's boost pump since it is normally running at all times. The E90, A100, and B100 probably follow the procedure written above most accurately.

But realize this, readers: There is never a Step 4 or Step 5 in the POH and they are both critically important! There is absolutely no way to truly know that fuel is going from the high side to both engines until the decrease in the higher fuel level is confirmed! Does the POH address this? No! Have you been taught this? Maybe.

As for Step 5, this is where most of the legal team's liability worries arise. Suppose that an asleep-at-the-wheel pilot gets distracted and fails to stop crossfeeding when balance is achieved. In fact, he forgets the fuel panel totally and runs the feeding side's nacelle tank dry. Since this tank is feeding both engines, they both

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2R	105	107	3AB	10005
2S	106	108	3AB	10006
3C	107	109	3AB	10007
3L	108	110	3AB	10008
3Q	109	111	3AB	10009
4B	110	112	3AB	10010
4I	111	113	3AB	10011
4K	112	114	3AB	10012
4M	113	115	3AB	10013
4N	114	116	3AB	10014
4P	115	117	3AB	10015
4R	116	118	3AB	10016
4S	117	119	3AB	10017
4T	118	120	3AB	10018
4U	119	121	3AB	10019
4V	120	122	3AB	10020
4W	121	123	3AB	10021
4X	122	124	3AB	10022
4Y	123	125	3AB	10023
5A	124	126	3AB	10024
5B	125	127	3AB	10025
5C	126	128	3AB	10026
5D	127	129	3AB	10027
5E	128	130	3AB	10028
5F	129	131	3AB	10029
5G	130	132	3AB	10030
5H	131	133	3AB	10031
5I	132	134	3AB	10032
5J	133	135	3AB	10033
5K	134	136	3AB	10034
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5P	138	140	3AB	10038
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quit nearly simultaneously! Darn! I hate it when that happens!

“But wait!” says our hapless pilot. “I still have fuel on the other side. I’ll use that to get the engines running again!”

Quiz time: Is it easier for the engine-driven pump to suck vapor (air) or liquid (fuel)? I think we can all agree that the engine-driven pumps will draw air before fuel. Only if we turn on the electric boost pump/standby pump on the side with fuel remaining – so that our common fuel manifold, our crossfeed line, is full of pressurized liquid and no air – do we have a chance for an airstart to be successful. Hard to do? No! A critical step that is easy to overlook? Yes!

Now let’s review the “proper” use of crossfeed. Suppose we are returning from Europe and on our leg from Reykjavik to Goose Bay we lose oil pressure and shut down the right engine. The airports in Greenland are below minimums and we have enough fuel to continue to Goose Bay. (By the way, in most cases our range just went *up*, not *down*!) As we continue with only the left engine running, the left fuel is decreasing while the right fuel is remaining at the level it had when the engine was secured.

When the left side gets down to, say, 500 pounds, but with the right side still showing 800, we decide to send the fuel from the right side to the left engine. Easy. Right boost pump on, crossfeed open, left boost pump off. Now the right fuel quantity starts decreasing and the left fuel quantity does not change ... just as it should.

A reminder: For you fortunate pilots flying a member of the F90-, 200- or 300-series, the “right boost pump on, crossfeed open” steps mentioned above are both done by merely moving the crossfeed switch left toward the engine we wish to feed.

“But wait, something’s wrong! The right fuel pressure warning annunciator is still illuminated!” Relax. That’s normal. When you conduct your first-flight-of-the-day fuel panel checks it is correct for both left and right fuel pressure annunciators to extinguish. But with the right engine actually shutdown and all of the proper checklist “cleanup” steps completed, the right Fuel Firewall Shut-off Valve has been closed. Thus, the pressure from the operating pump cannot be felt at the pressure switch since it is mounted on the fuel filter downstream of the shut-off valve. So how do we know the right pump is really pumping? For all of the models with engine-driven boost pumps, we don’t know ... until enough time has elapsed to confirm that the proper side’s fuel level is decreasing. (For the C90-style fuel system – the system without engine-driven boost pumps – we know the right pump is operating since the left fuel pressure annunciator remained extinguished after we turned off the left boost pump.)

We fly for another couple of hours and now the gauges read 500 pounds left and 200 pounds right. We stop

crossfeeding and return to feeding the left engine from its own nacelle tank. Ah, there’s Goose Bay! We make an uneventful single-engine landing and now face the hardest task ... getting to the ramp on one engine!

One last point to mention: Do not worry about fuel being lost even if we failed to close the Fuel Firewall Shut-off Valve on the engine we secured. The condition lever being in cutoff will prevent any fuel from reaching the dead engine’s combustion chamber and then draining overboard.

I hope this review has been enlightening. Questions? Please write and ask them; I will be happy to respond. **KA**

Editor’s Note: Previously published in May 2019 issue.

King Air expert Tom Clements has been flying and instructing in King Airs for over 50 years and is the author of “The King Air Book” and “The King Air Book II.” 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 books, 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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Elliott Aviation PDK Now Authorized Garmin Dealer

Elliott Aviation LLC recently announced their fourth MRO location at Dekalb-Peachtree Airport (PDK) in Atlanta, Georgia, is now an authorized Garmin dealer. The company said they “look forward to meeting more operators’ needs by offering an additional location for installations and upgrades.”

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Yingling Aviation in Wichita, Kansas, is now an authorized installation center and dealer for Innovative Solutions & Support (IS&S) ThrustSense Autothrottle systems. It’s a sought-after option that adds safety and convenience for King Air owners and operators.

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