King Air

A MAGAZINE FOR THE OWNER/PILOT OF KING AIR AIRCRAFT

JUNE 2022 • VOLUME 16, NUMBER 6 • $6.50

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Inaugural King Air Hall of Fame Inductees Announced

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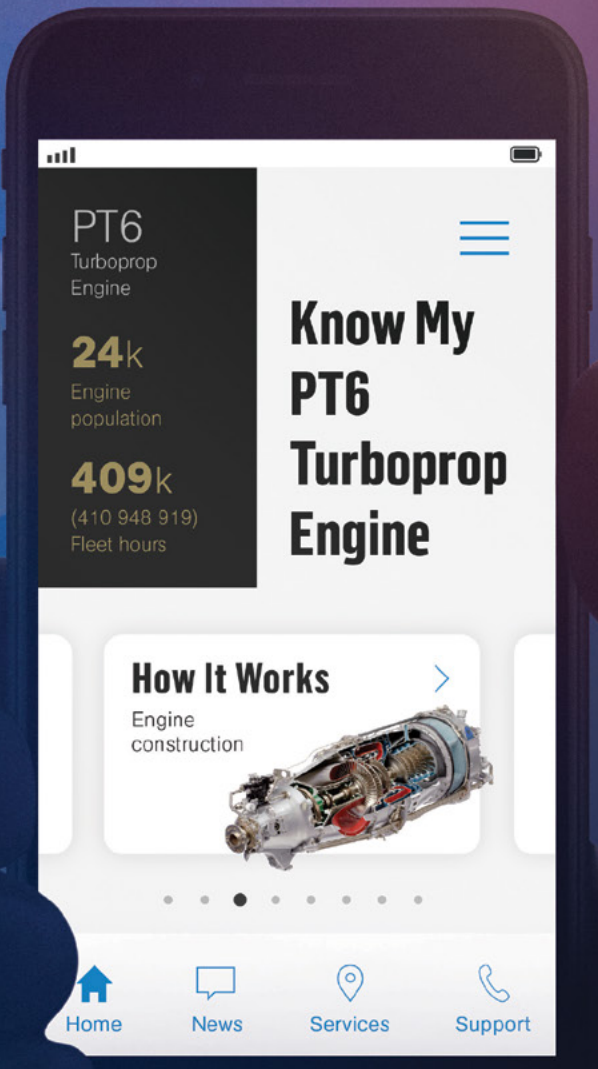


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June 2022 Volume 16 / Number 6

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SUBSCRIPTIONS

King Air is distributed at no charge to all registered owners of King Air aircraft. The mailing list is updated bi-monthly. All others may subscribe by writing to: King Air, P.O. Box 1810, Traverse City, MI 49685, or by calling 1-800-447-7367. Rates for one year, 12 issues: United States $15.00, Canada $24.00 (U.S. funds), all other foreign $52.00 (U.S. funds). Single copies: United States $6.50, Canada/Foreign $9.00.

COVER PHOTO

Courtesy of Textron Aviation

The King Air 90 prototype lifting off the runway on its first flight, January 24, 1964. (Textron Aviation)

Over the years there has been talk about needing a Beechcraft King Air Hall of Fame to honor those who developed the world's bestselling business turboprop and those who continue to support the legion of passionate pilots and operators. King Air B200 owner John Glidewell made it a reality by persisting and convincing King Air Academy's Kevin Carson to get the ball rolling. Kevin reached out to those he thought would have knowledge of the people behind the King Air brand along with owner/operators to give their perspective of who was worthy of recognition.

Overdue Honors

Inaugural King Air Hall of Fame Recipients Awarded

by Kim Blonigen

King Air Hall of Fame selection committee member Kevin Carson presenting the honorees at the King Air Gathering held in May.

Members of the selection committee:

Kim Blonigen: As editor of the *King Air* magazine, I am responsible for the monthly content of the publication. I also have deep roots with Beechcraft as I worked for the company for 13 years in various marketing roles, working my way up to managing all of the company's customer newsletters and magazine.

Kevin Carson: Kevin operates the King Air Academy training center located in Phoenix, Arizona, and is also the founder of the King Air Gathering. He is often accused of being a Beechcraft zealot, as he has owned and/or flown almost every different model of Bonanza, Baron and King Air manufactured. Of special interest, Kevin has owned and flown his T-34 for over 20 years.

Bill Crutchfield: Bill is CEO and founder of Crutchfield Corporation, one of the nation's largest online retailers of consumer electronics products. Bill has owned and operated his King Air C90B for over 25 years; he has accumulated 6,000 flight hours between business and recreational flying. He also holds the FAA's Wright Brothers Master Pilots Award.

Carl Davis: A pilot, A&P mechanic and FAA 145 accountable manger, Carl owns King Air Nation which specializes in selling King Air parts, engines and aircraft. This year Carl and his company have graciously taken over the planning and management of the King Air Gathering.

John Glidewell: A devoted King Air owner, John is president and owner of Sunset Logistics which operates approximately 500 trucks throughout Texas. He has flown his B200 for 11 years and before it, he owned and operated a model E90. He has a total of over 9,000 flight hours with over 6,000 in King Airs. When time is available, he enjoys supporting the King Air educational support groups.

Chip McClure: The president of Jet Acquisitions, Chip is a 20-plus-year veteran of aviation and has found his professional niche helping buyers purchase aircraft. Chip and his wife Amy started the company in 2015 with a focus on King Airs and have expanded to include a wide variety of current production turboprops and jets.

We selected Bill as the chair of the selection committee since he had been on selection committees for various business awards as well as being the recipient of many. The first thing the committee decided was the selection criteria for the Hall of Fame recipients. They needed to meet one of two criteria:

- Would the King Air have ever been made without the recipient?
- And/or would the King Air have become the civilian aircraft with the longest production run in history without the recipient?

The team then took some time to research, ask those they knew who worked at Beech through the years and ›

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PERFORMANCE INNOVATION

First flight of the Super King Air 200 on October 27, 1972, (L to R) **LeRoy Clay, Chief Project Engineer**; George Humphrey, Sr. Vice President; **Bud Francis, Test Pilot; Mrs. Olive Ann Beech, CEO;** J.D. Webber, Chief of Flight Test Research and Development; Frank E. Hedrick, President; J.N. Lew, Vice President Engineering and Jack Marinelli, Vice President Aircraft Research and Development. (Courtesy: Scott Francis)

followed leads to come up with a long list of potential inductees. We discussed each one, made sure they fit our criteria and then narrowed down the list. We decided since this was the first class of the Hall of Fame that we needed to address those who would receive it posthumously, as it has been almost 60 years since the King Air was introduced.

Posthumous Recipients

In hindsight, it's easy to believe that the development of a turboprop executive aircraft was a very logical decision, however, it wasn't in the early 1960s. It was actually counterintuitive considering what was happening in the general aviation industry at the time. From 1961-1963, Lockheed's JetStar was introduced and the first flight of Hawker Siddeley's DH125, North American's Sabreliner, the Lear 23 and Falcon 20 were recorded. The conventional wisdom would have been to develop a pure jet aircraft, but the King Air leaders at Beechcraft did just the opposite. They identified the weaknesses in the emerging jet aircraft, one being the turbojet engines were not only high-priced, but also had high fuel consumption and were noisy. Beechcraft decided to develop a turboprop, executive aircraft known as the King Air 90.

In honoring these counterintuitive leaders, the inaugural posthumous recipients are:

Olive Ann Beech

The most obvious nominee was the CEO of Beech Aircraft at the time the King Air was developed. Mrs. Beech not only approved of but advocated for the King Air 90, which entered service in 1964.

In 1950, after Walter passed away, Mrs. Beech assumed complete control of the company at a time when women weren't considered for company executive positions. CEOs know that it takes guts to make risky business decisions and she could have played it safe. Developing a turboprop, executive airplane when her competitors were developing jet aircraft was very risky; some would argue that it was even dumb.

She led the company for 30 years and continued to support the King Air, backing the development of the many variations of Beech Aircraft's popular turboprop. In 1980, the company was sold to Raytheon and Mrs. Beech retired in 1982. She died at the age of 89 in 1993, but not without an abundance of accolades including:

- Being named one of the 10 Highest Ranking Women in Business by *Fortune* magazine

- Receiving the Wright Brothers Memorial Trophy in 1980
- Induction into the Aviation Hall of Fame in 1981, the American National Business Hall of Fame in 1983 and the Kansas Business Hall of Fame in 1986

LeRoy Clay

Mr. Clay was an early employee of Beech Aircraft, starting before World War II. He has been quoted as saying, "Let's take the Model 88 (Queen Air) and put a turboprop on it." In 1969, he became the chief project engineer for the new King Air 200 and was the one who came up with the idea of using a T-tail. He was especially proud that all five branches of the U.S. military flew various models of King Airs. Over his career, Mr. Clay was involved in every Beech turboprop aircraft including all of the King Airs, the 1900 airliner and the Starship. He retired as the vice president of engineering in 1984 after 45 years of service. (Included in group photo, opposite page)

Bud Francis

Mr. Francis became a Beechcrafter in 1965 after earning a degree in Aeronautical Engineering from the University of Kansas and serving a four-year stint in the U.S. Air Force. Over a span of 32 years that he worked for the company, he spent many as the chief of Experimental Flight Test and test flew virtually every airplane that Beech developed during his tenure. Of special note, he made the very first flights of the Model 200 Super King Air in October 1972, Model 300 Super King Air in October 1981 and the Model 350 Super King Air in September 1988. (Included in group photo, opposite page)

Tom Gillespie

Mr. Gillespie, who served as a marine aviator in World War II and the Korean War, served many roles at Beech Aircraft. Starting as a test pilot and serving in public relations and marketing roles, Mr. Gillespie was very much the marketing influence and a prominent advocate of the King Air. According to many, he is credited with the vision of the turboprop future when other Beech executives wanted to scrap the King Air before it was even produced.

Tom Gillespie

On December 22, 1963, personnel at Pratt & Whitney Canada posed for the camera as the first production PT6A engine was prepared for shipment to Beech Aircraft Corporation. (Pratt & Whitney Canada)

Pratt and Whitney's PT6 Design Team

There is no doubt that a tremendous amount of the credit for the King Air's success must be attributed to Pratt & Whitney Canada. Developing the PT6 engine was another project that was a huge gamble in time and money. In an effort to become Canada's prime engine company by focusing on a small gas turbine engine, Pratt & Whitney Canada's President Ronald Riley ordered engineering manager Dick Guthrie to hire a team of gas turbine specialists to design what would later become the PT6. The new engine first flew in May 1961 and followed on into King Air production and service entry in 1964.

For this amazing accomplishment, posthumous Hall of Fame awards go to Gordon Hardy, Jim Rankin, Fernand Desrochers, Fred Glasspoole, Ken Elsworth, Allan Newland, Pete Peterson, Hugh Lanshur, Jean-Pierre Beauregard, Elvie Smith, Dick Guthrie and Thor Stephenson.

Living Recipients

During the King Air Gathering in May, the following people were personally presented with a King Air Hall of Fame inductee award, which were mounted blades of an authentic King Air propeller.

Dean Benedict

Dean Benedict

Having maintained King Airs for over 47 years, Mr. Benedict started working at a Beechcraft service center straight out of A&P school. He first worked on early King Air 90 models and moved on to the 200, B200 and subsequent models. He worked his way up to facility manager, but customers never let him stray too far from their aircraft. After 10 years he left to be the Director of Maintenance for a corporate flight department that included King Airs and during that time his Beechcraft customers would call him during evenings and weekends ›

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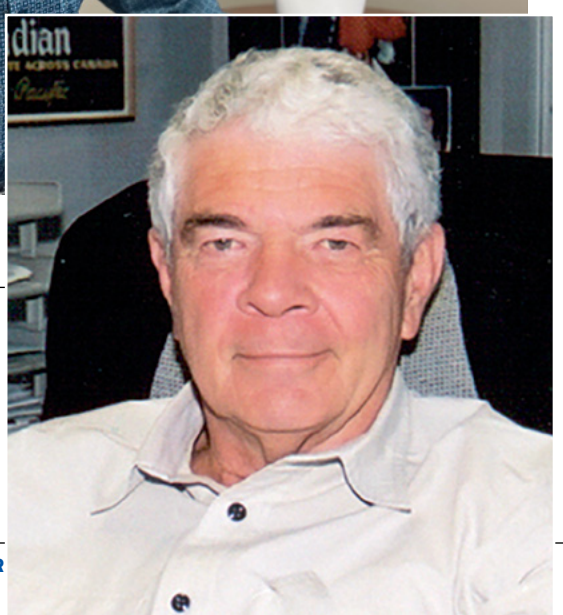

James Raisbeck

for maintenance advice. Mr. Benedict finally opened his own maintenance shop, Honest Air Inc., located in Henderson, Nevada, which quickly became the place to take your King Air for maintenance. After a lease buyout, Honest Air closed in March 2016 and Mr. Benedict now consults King Air owners, pilots, managers and mechanics through BeechMedic, LLC. He also is the author of the regular column "Maintenance Tips" in *King Air* magazine.

Don Cary

After the King Air was introduced, the company needed to prepare for a new era of pilots and more powerful aircraft. Mr. Cary was hired in 1966 by Beech Aircraft as a King Air training specialist when the A-90 had just been introduced. He taught ground training and checked out customer pilots for over two years and then transitioned to manager of the Customer Training Program. He eventually moved up to director of Customer Support, which involved Beech's training program, parts support, technical support and the technical publications department. Don retired from the company 37 years later where his last position was vice president of Customer Relations.

Tom Clements

Mr. Clements has been flying and instructing in King Airs for more than 50 years, beginning his career at the Beech Aircraft Training Center in 1972 and through his own company, Flight Review, which he started in 1979. He has over 15,000 hours in King Air aircraft and is type-rated in the King Air 300 and Beechcraft 1900 models. He is also author of the *The King Air Book* and *The King Air Book Volume II*, as well as a regular contributor with his own column "Ask the Expert" for *King Air* magazine. He also actively mentors the instructors at King Air Academy in Phoenix, Arizona.

James Raisbeck*

Mr. Raisbeck used his aeronautical engineering degree and entrepreneurial spirit to develop a variety of performance enhancing modification systems for production aircraft including the King Air. More than 64% of the King Airs in operation today have at least one Raisbeck Engineering modification. Several of Raisbeck's products have also been incorporated into the production line including Dual Aft Body Strakes and Nacelle Wing Lockers on the King Air 350/360, Ram Air Recovery System on the King Air 250/260 and propellers on the King Air C90.

There are many more people who had a hand in making the King Air the bestselling business turboprop family in the world. This is just the beginning of those who will be honored and inducted into the King Air Hall of Fame … and it's long past overdue. KA

Thanks to Kevin Carson for sharing his research.

**The honorees were selected to be presented at the 2020 King Air Gathering which was canceled due to the pandemic as well as in 2021. Mr. Raisbeck unfortunately passed away before we could personally present him with this well-deserved honor.*


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THE KING AI

R GATHERING
~~2020 2021~~ 2022
at the Beechcraft Heritage Museum

by Kevin Carson

To appreciate this story, I need to share some background information. In 2016 Ron McAlister, Tom Clements, Jack Braly and I were standing outside of one of the hangars at the Beech Heritage Museum (BHM). During conversation, Ron expressed he had always wanted to have a large King Air fly-in but we were unsure of how it would be accepted in the turboprop world and it needed someone to spearhead it. As I recall, Jack was not sure we would get more than 10 King Airs to attend. That was all it took; the glove had been thrown down and the challenge was accepted – the King Air Academy would take the lead.

Now, we had to decide where to host the first "King Air Gathering" (KAG). At the time, Dean Benedict had just moved his King Air maintenance center to Henderson, Nevada, located right outside of Las Vegas. Of course, Tom and Jack were pushing for the BHM, but having it near Las Vegas for the first time was a "safe" decision. If it did not go over well, it was a short drive home with our tails between our legs. When it was time for the event, I recall 27 King Airs flying in and 47 attendees gathered in a small hangar with only a handful of sponsors gathered round. It was a big success and pilots and owners were asking for more … KAG I was in the books.

In previous years Tom and I had attended a function at Fredericksburg, Texas, and thought it would be a great place to host the gathering. Although Tom was still "coaching" me that the BHM was really where we needed to go. However, Fredericksburg had the Hangar Hotel, a conference center and the Pacific Showroom

all on the airport with the Nimitz Museum, breweries and wineries not far away – it was a great venue. After hosting the gathering for two years there, we planned KAG 2020 to be held at Beech Field in Wichita, Kansas, and the 2021 KAG would be held at the BHM. Due to COVID, the 2020 and 2021 gatherings were canceled and it returned this spring.

The first day of the gathering, Thursday, May 12, was scheduled for museum tours during the afternoon, and entertainment by The Bellamy Brothers and cocktails in a large event tent that evening. The museum tours were a complete success with Jack Braly (former Beech Aircraft president), Don Cary (longtime Beech Aircraft executive) and Carl Mariniak (BHM manager) as the tour guides. Imagine that – the old Beechcraft corporate executives providing museum tours; what a treat! The ramp was filling up, the tours were ongoing, sponsors and vendors were setting up and KAG 2022 was officially off and running.

On Friday morning, after some quick welcomes and introductions, Charles Parish of the BHM gave a "welcome" to all the King Air owners and pilots and a brief overview of the museum. The agenda was kicked off by our first speaker, Textron Senior Air Safety Investigator, Peter Basile. This was a not-to-be-missed presentation of aviation-related accidents and how the King Air specifically fares to the industry as a whole. The day continued with varying presentations from the beginnings of the King Air with Don Cary, avionics with Garmin and Genesys Aerosystems, the state of

the aviation insurance industry, using ForeFlight and Garmin Pilot effectively as a King Air pilot and ending the day with the Inaugural King Air Hall of Fame awards (see page 2).

Just when attendees thought that Thursday night could not be surpassed, Friday evening was just as special and had something for everyone: walking by all the King Airs on the flight line; admiring the Blackhawk King Air 350ER and Stevens King Air B200; another stroll around the museum; the dueling pianos in the event tent and what appeared to be a professional level cornhole tournament outside; all the exquisite food and drink; perfect weather and finally getting together as a community of King Air enthusiasts. Friday night at the KAG was embraced by all.

Saturday morning came and day two of the conference was underway. The first speaker was King Air C90B owner/operator Bill Crutchfield whose presentation "Safety, Insurance and the Aging King Air Pilot" could not have come at a better time. With the rising insurance rates and the inability for older pilots to even obtain insurance, Bill laid down his personally proven strategy to flying and staying insured well into your 70s. My guess is you will hear much more about this topic in other articles and at other venues. The day continued with presentations from Textron's Manager, Turboprop Product Support Kim Burton and Tom Grunbeck from IS&S on the certified autothrottle system installed in all new King Airs and available for retrofit on many legacy models. We also tempted fate by having Tom Clements

give his presentation "Misunderstood Systems" to the entire audience remotely and IT WORKED. After Tom's presentation, Rob Winchcomb, Pratt & Whitney YouTube sensation for PT6A engine rigging (check out his videos) shared his insight.

The day could not have ended any better than with our guest speaker, Hoot Gibson. As a naval aviator, test pilot, five-time U.S. astronaut, four-time shuttle commander, F-4 and F-14 fighter pilot, Reno Air Races Unlimited Gold Champion and a hell of a nice guy, we were honored to have him as our final speaker. His recap of flight in space and docking with the Russian Space Station Mir were riveting and led one member of the audience to ask, "Hoot, have you ever done anything boring in your life?" I think Hoot actually had to stop and think.

In closing, King Air Gathering 2022 was a great success. Sponsors, attendees, speakers and museum personnel all had wonderful things to say about the event. The most asked question: When and where is the next King Air Gathering?

Stay tuned for that! KA

Kevin Carson is an A&P and manages the King Air Academy in Phoenix, Arizona, having flown about every King Air model and Beechcraft from T-34s, Bonanzas and Barons for over 30 years. He has been the lead for planning the King Air Gathering since its inception, and is happily transferring organization of the event to King Air Nation. Kevin can be reached at: *kevin@kingairacademy.com* or (602) 551-8100. To learn more about the King Air Academy, go to *www.kingairacademy.com*.

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- *Jeff McClean, Vice President Global Flight Operations, Procter & Gamble*

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Get the Most Out of Your Tires

by Dean Benedict

Quality Counts

Sticker shock is rampant these days, and aircraft tires are no exception. Ten years ago, the list price on four main tires for a King Air 200 with standard gear ran $2,900 – now it's $4,000. I am speaking specifically about Goodyear tires, which have always been my preference because they last longer than Michelins.

Whenever my customers engaged me in the debate of the expensive, longer lasting tire versus the less expensive, short-lived one, I told them this: It takes me the same amount of time to change a cheap tire as it does to change an expensive one. If the cheaper tire wears out faster, it means you'll be back in my shop that much sooner for another tire change. The money saved on an inferior part is lost on the labor required to change or repair it more often.

The problem right now is finding Goodyear tires. With this topsy-turvy, COVID-crazy economy, the Goodyears have become very scarce. Michelins, however, are in good supply. It appears that Michelin is happily meeting the demand and cashing in on a good opportunity because they raised their price. At this moment, Michelins cost more than Goodyears.

Some shops have managed to keep a few Goodyears in stock. If you know you are going to need new main tires, start calling around now to see who has them. I have seen the supply of Goodyear tires ebb and flow before.

To Recap (or Not)

Recaps (retreaded tires) are another option. The maintenance manual doesn't recommend them and neither do I; the manual, however, allows the recaps if they come from an FAA-approved source. If you are going to use recaps, pick your supplier carefully. And don't get too giddy over the few hundred bucks you save on retreads, because when a retread busts apart on landing it's going to cost you far more than you ever imagined. Your flaps are down for landing, and the exploding rubber projectiles rip through the flap structure like shrapnel. The repair/rebuild of your flap will cost many thousands of dollars.

Inflation and Wear

As with your car, improper inflation is the primary cause of uneven or premature wear on your King Air tires. The maintenance manual gives all the pertinent tire pressures for each King Air model; if an STC has been performed (e.g., tundra tires on a B200), it will specify the pressures to be used. The manual also states when to check your tire pressures and when *not* to check them, which is when they're hot.

New tires will stretch a bit in the first few weeks after installation, so they will lose a little pressure. Watch them closely and expect to add nitrogen more than once. If a new tire goes flat, it is usually because of a pinched O-ring. Even the best mechanics pinch an O-ring from time to time when putting the wheel halves back together. It is rare to get a defective tire, but if that happens, the tire should be returned for warranty replacement.

The one tip I offer King Air owners on tire inflation is to keep the main gear tires on the high side – about

5 pounds up. If the manufacturer suggests a range of pressure (say between 100 and 110 psi), choose the higher number.

My observation over the years is that all King Airs sit better on the center of the tread with about five extra pounds in the main tires. This is especially true for King Airs that are routinely operated close to gross weight. I also found that the customers who got the most wear out of their tires were the ones that monitored their tire pressures and kept the mains at the extra 5 pounds up.

Nose Tires

Nose tires are not subject to the punishment of landing. They should last you about 1,000 hours unless the aircraft sits outside. The tip I just mentioned about keeping tires at 5 pounds up is for main tires only, not nose tires. Over-servicing the nose tire causes premature wear in the center treads.

Torque Knees and Uneven Tire Wear

If I'm looking at a King Air with dual truck main gear (the model F90, 100 and up) and I see tires that are worn prematurely around an outside edge, I want to take a look at the landing gear. The tire wear on a new King Air is usually very even; but as the years go by and the landing gear goes through an overhaul (or two or three), sometimes the "toe in" of the main gear can be off.

Too much "toe in" or "toe out" will cause your tires to wear too fast along one edge. If you see this on your main tires, have your shop check the washer arrangement on the torque knees and also have them check for excess play at the center point of the torque knees. Either one of these situations (improper washer setup or too much play) will cause uneven and premature wear on your main gear tires.

Unfortunately for you model 90 drivers, the main tires on the 90s tend to wear unevenly. I can't tell you exactly why and I don't have a remedy for it. It is what it is.

Flat Spots and Double Trucks

Imagine the tires on your R/H gear are about 75% worn and you flat-spot the outboard tire. Many pilots expect to replace the damaged tire only, but the proper thing to do is replace *both* tires. It may look like your maintenance provider it trying to jack up the bill, but they are saving you money in the long run. If you install a brand-new tire right next to a worn tire that's lost three-fourths of its tread, that fat new tire is begging to be squared off!

I had a customer do exactly that – he squared off a tire on his R/H gear but would only replace the one he flat-spotted, thinking he'd save a few bucks. Three months later he was back with another squared off tire on the R/H side; it was the new tire. Again, he had me

replace just the flat-spotted tire, and then he promptly squared off *that* new tire. Finally he got the message and allowed me to install two new tires on the R/H side. That solved his tire problems and I didn't see him again until his next Phase came due.

The maintenance manual specifically addresses this issue and stipulates the tires on dual truck gear to be matched in both manufacturer and inflated diameter. The maximum allowable difference between the inflated diameters of the two tires is 0.25 inches. The moral here is: in the event of a flat-spot, you will save money in the long run by replacing both tires.

Carry a Built-Up Spare

Back to the above example: If you replace both tires after flat-spotting the outboard tire, what happens to that inboard tire with 25% tread remaining? Your shop will dispose of it, you can sell it to a retread shop, or even better, keep it as a spare for an emergency. Buy an overhauled wheel assembly outright and have that partially worn tire mounted. You will have a built-up spare wheel and tire ready to go if the need arises.

Everyone who flies into remote areas, uses strips that are less than pristine or visits airports without maintenance on-site, should give this idea some serious thought. This would work for any King Air. Ignore the complaints about how much space that grimy wheel takes or how much weight it adds. As soon as you blow a tire in the middle of nowhere, the naysayers will be singing a different tune and you will have saved the day. KA

Note: This is an updated version of the article of the same name from March/April 2011.

Dean Benedict is a certified A&P, AI with over 45 years of maintaining King Airs. He's the founder and former owner of Honest Air Inc., a maintenance shop that specialized in Beech aircraft with an emphasis on King Airs. Currently, with BeechMedic LLC, Dean consults with King Air owners, operators and maintenance shops on all things pertaining to King Air maintenance. This includes troubleshooting, pre-buys and maintenance management. He can be reached at *dr.dean@beechmedic.com* or 702-524-4378.

Oh No! Not the Secondary Low Pitch Stop!

by Tom Clements

You younger men and women flying King Airs are lucky: You never had to learn the Secondary Low Pitch Stop (SLPS) system. This hard-to-understand and accident-prone system is a very important necessity on King Airs powered by the PT6A-20 engine, only. That covers all the A90, B90 and early C90 models. But – and here's a very interesting tidbit of information that this article will explain – the SLPS system was also installed on all straight 100s as well as many E90s and early 200s … even though it never should have been! Let's go back in time …

The Primary Propeller Governor on the PT6A-20 – which first appeared on the A90 model – was the first to be associated with a reversing propeller. The propeller blades now moved in a larger range than when non-reversing propellers were the norm. Blade angle – the angle between the chord of the propeller blade and the plane of propeller rotation – went from a number close to 90°, the feathered position, down to something close to 10° in the non-reversing props. The extreme limits of blade angle travel are determined by metal hitting metal. Unless something major breaks inside the propeller hub (which is almost unheard of!) blade angles can never exceed these "hard" limits.

When power or airspeed is reduced, the propeller wants to slow down. A constant speed governor, as you all know, reacts by decreasing blade angle. The "flatter" propeller makes it now have less rotational resistance and thus the speed (RPM) is maintained. A combination of both low power and low airspeed causes the propeller blades to flatten as far as they can go. This situation is shown to the pilot by the propeller slowing down, no longer maintaining constant speed. It typically does not happen in flight except on short final for landing … or when power-off stall practice is conducted.

With reversing props, the blade angle range is increased from about 90° down to a *negative* number, close to -10°, where the air was pushed forward instead of propelled aft. As before, the extreme limits of blade angle travel are determined by metal hitting metal. But when low airspeed and low power occur together – such as on short final – the tremendous increase in drag as the propeller starts pushing air forward very likely would result in loss of elevator control and a hard, short touchdown with a damaged airplane almost assured.

It follows, therefore, that reversing propellers must have a Low Pitch Stop (LPS) that exists on the *positive* side of flat pitch, just like in the non-reversing props. If this new LPS were not *movable*, however, what good would it be? We'd be stuck with a non-reversing propeller again, just like before.

Hence, the LPS on a reversing propeller must be *movable*, must be able to be controlled from the cockpit and operate anywhere in the range of approximately +10° to -10°. How this all happens is part of the reason your initial King Air ground training devoted four hours or more to the propeller system. For now, I am merely going to state that the LPS is repositioned when the power lever is lifted and moved from Idle (+10°) back to Maximum Reverse (-10°). Since it is oil pressure created by a pump inside the governor that is driving the propeller blade flatter, any mechanism that shuts off this supply of oil creates an LPS. To summarize in somewhat technical terms, the LPS is a mechanically activated oil shut-off valve and is movable from approximately +10° to -10°.

The hard-to-find Prop Gov/Idle Stop CB ... with a pull cap.

What happens if the mechanism that operates the "mechanically activated oil shut-off valve" fails to function on the PT6A-20's Primary Propeller Governor (PPG)? The answer: The LPS is totally lost and the only limit to low blade angle travel becomes the metal-on-metal LPS at -10°. Does "scary and damaging landing" come to mind? It should! That's what would happen if power and airspeed were both sufficiently low at the same time.

Aha! What do I see coming over the horizon to rescue us from the clutches of this non-existent LPS? Why, it's *Secondary Low Pitch Stop*. Now that there are two different Low Pitch Stops, the normal one is referred to as the *Primary* LPS and the backup is the *Secondary* LPS: PLPS and SLPS.

Sorry, but it's time for a little technical talk. The valve that regulates the flow of oil into or out of the propeller dome to either decrease or increase blade angle goes by the name of "pilot valve." It moves due to a combination of forces: An upward lifting force caused by spinning flyweights and a downward pushing force caused by a spring called the "speeder spring." The force of the flyweights depends on propeller speed and the force of the speeder spring depends on the position of the propeller levers in the cockpit. When the speeder spring's force is greater than the flyweight force, the pilot valve moves downward and opens the valve to allow more oil into the propeller dome. This is what the PPG does whenever it senses an *underspeed* condition. The additional oil causes the blade angle to decrease, giving less rotational resistance, so an *onspeed* condition is reestablished.

In the same manner, in an *overspeed* condition the upward force of the flyweights is greater than the

The OSG and SLPS prop test switches.

downward force of the speeder spring so the pilot valve moves upward and allows some oil from the propeller to return into the engine's nose case. Less oil, larger blade angle, more rotational resistance, the prop slows down and the *onspeed* condition is restored.

One quick, last thing before we leave the technical talk: To get the oil from a pump inside the PPG to the holes in a spinning propeller shaft is a challenge. If the fit of this connection (officially called a "transfer gland") is too tight, unnecessary energy is consumed in turning the propeller. If the fit is too loose, the oil that escapes into the nose case and never finds its way into the propeller dome can be so bad that blade angle cannot be properly flattened when needed. The designers' goal is to have a rather tight-fitting valve but with a very small oil leakage back into the engine's nose case. This helps to lubricate the stationary-to-moving components.

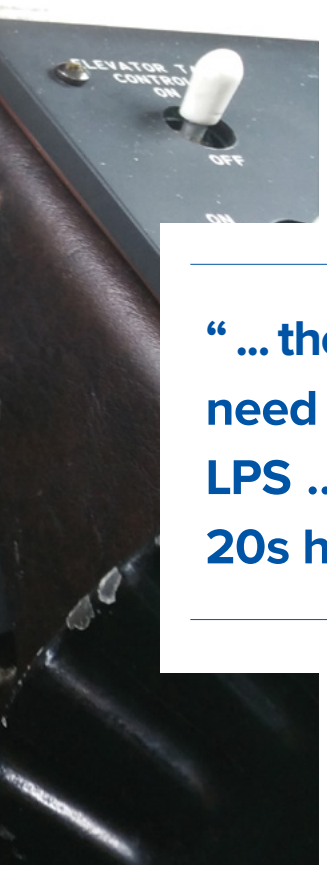
At first thought, it would appear that when a perfectly balanced onspeed condition exists, no oil enters or exits the propeller dome. Hence, the blade angle remains constant, rotational resistance does not change, and all is well. But it doesn't work that way. Why? Because of the transfer gland's slight leakage. Just enough oil must get by the pilot valve to compensate for that leak. If the pilot valve totally shuts off new oil to the prop, the existing prop oil would seep back into the engine, causing blade angle to increase and RPM to decrease. **To summarize:**

Whenever blade angle is remaining constant, the pilot valve is letting just enough oil get by it to balance the leakage caused by the transfer gland.

Now … where were we? Oh yes. Since the failure of the PLPS would never be noticed until we came "off of the governor" in the landing, we would have no way of knowing that our PLPS was no longer there. (If somehow we *were* aware of the PLPS failure, then we could fly a faster and flatter final approach with some power on until touchdown. If we're lucky enough, then perhaps we wouldn't come off the governors and the blades would not go into maximum reverse blade angle until we were on the runway.)

Since in nearly 100% of cases we would never know that our PLPS was missing, there is an urgent and huge need for a *Secondary* LPS … and the PT6A-20s have that additional system.

The SLPS is based on the action of a device called a "lock pitch solenoid." As blade angle flattens to something less than the setting of the PLPS, an electrical signal is sent to this *normally open* (N.O.) solenoid to drive it closed. When it goes shut, the oil from the governor to the prop is terminated and hence blade angle cannot continue going any flatter. The traditionally listed numbers have the PLPS working at a 15° blade angle and the SLPS at 12°. Since these are quite close, it would be unlikely that the pilot would notice that the PLPS had



“ … there is an urgent … need for a Secondary LPS … and the PT6A-20s have that … ”

failed and the SLPS was the one preventing unwanted reverse. Therefore, two red, warning annunciators are installed (left and right) usually labeled “Secondary Low Pitch Stop,” that comes on whenever the SLPS solenoid receives power.

There’s more to our complicated story: The mechanically activated PLPS automatically compensates for the transfer gland’s leakage by not quite closing off all the flow of oil to the propeller. The pilot valve automatically finds the position that will let just enough extra oil flow toward the prop to equalize the amount that is lost through the leakage at the transfer gland.

The SLPS solenoid, on the other hand, has no “almost closed” position. It is either totally open, unpowered, or totally closed, powered. Hence, when the blade angle reaches 12° and the SLPS activates, the blade angle won’t *remain* at 12° but will start slowly going toward the feathered position as oil escapes from the prop back to the engine’s nose case through the leakage at the transfer gland. As soon as blade angle increases from 12° due to the leakage, the switch that had activated the SLPS solenoid is no longer activated, the solenoid relaxes open, new oil rushes in, and the blade angle is again decreased until the SLPS switch gets powered again. When I state that the SLPS works at 12°, I am simplifying the story. The SLPS solenoid’s constant cycling closed and open to compensate for the transfer gland’s leakage, means that

“ ... the SLPS works in a small range of blade angles varying from, maybe, 11° to 13°.”

we could more-accurately say that the SLPS works in a small *range* of blade angles varying from, maybe, 11° to 13°.

Why is this important? You would expect the SLPS annunciator to cycle on and off as the solenoid did its cycling. Starting with serial number LJ-572, when an electro-optic SLPS trigger replaced the mechanical switch, this cycling of the annunciator indeed occurs. Earlier airplanes, however, include a latching circuit and once the SLPS annunciator illuminates it remains on even as the valve loses and then receives power again. This is not good!

Why? First, there must be a method that allows the pilot to finally extinguish the annunciator after the SLPS is no longer working and yet the annunciator is still locked in its illuminated condition. Second, it makes the recognition of a SLPS malfunction more difficult to detect.

Let’s talk about this SLPS malfunction. If you fly these airplanes long enough, I predict that you WILL experience the malfunction at least once! Here’s what happens: The SLPS electrical circuit activates (shorts out) when it shouldn’t, when the blade angle is in cruise well above the 12° triggering angle. Because this is a switch malfunction, there is an excellent chance that the malfunction will remain until an A & P does some work.

With the SLPS solenoid now powered, the oil to the propeller is blocked but the transfer gland leakage slowly but surely sends the propeller blade angle to larger and larger values. Given enough time (maybe 30 seconds or so) the prop will be totally feathered. Of course, unless the power lever was retarded, there is an excellent chance that redline torque will be exceeded.

The indications of this malfunction are (1) the SLPS annunciator illuminates, and (2) RPM starts slowly decreasing and torque starts slowing increasing. What should the pilot do

in this emergency? First, reduce power as necessary to keep torque within limits. Second, remove power from the shorted switch by pulling the system circuit breaker (CB).

Now here's where it gets interesting! There is only one CB that protects the circuit for *both* side's SLPS system. That's the good news: That you don't have to find a left or right CB. The bad news is twofold. First, the CB is not labeled "SLPS" but instead is "Prop Gov Test." You see, Beech uses this same CB to protect both the SLPS wiring as well as the circuit that allows the overspeed governor's RPM to be reduced enough so that it may be tested. I wish the SLPS label were there by the CB also, but it's not. The second piece of bad news is much worse: This CB is in the very worst possible position for the pilot to find it and pull it! Where? It's the one farthest to the left on the second row down on the co-pilot's right subpanel. In this position, it is totally hidden from the pilot's view by the co-pilot's control wheel shaft. Yes, it is easily pulled by stretching across the cockpit, reaching under the co-pilot's wheel, and feeling for the leftmost CB. I *strongly* encourage any readers who are operating a King Air with this system to install a red plastic "pull cap" on that sucker to make it easier to find and pull!

A few paragraphs earlier I wrote: "Starting with serial number LJ-572, when an electro-optic SLPS trigger replaced the mechanical switch, this cycling of the annunciator indeed occurs. Earlier airplanes, however, include a latching circuit and once the SLPS annunciator illuminates it remains on even as the valve loses and then receives power again. This is not good!"

The reason it is not good is because it allows the annunciator to sometimes illuminate when nothing is wrong. Unless the illumination is accompanied by the RPM decrease and torque increase, it merely is the result of some temporary "glitch" that activated the circuit erroneously. Moisture, perhaps? There is no need to find and pull the CB unless you experience the RPM decrease and torque increase.

If the SLPS were not removed when reverse thrust is desired, then we could never achieve reversing. As the power levers are moved through the Beta and Reverse ranges, moving the PLPS to smaller and then negative blade angles, the SLPS would prevent the blades from going flatter than 12°. **The remedy to this predicament is to** eliminate the SLPS whenever the power levers are lifted. Lifting is of course required to get behind Idle and into Beta and Reverse. Lift *either* power lever and *both* SLPSs disappear.

Here is a very common nuisance: The SLPS annunciators, one or both, illuminate and stay illuminated when the power levers are returned to

Idle from Beta or Reverse. Here's what is occurring: The electrical circuit for the SLPS was removed when the power levers were lifted. But if the power levers are moved rather rapidly to Idle when exiting Reverse, the electrical circuit can be reactivated *before* the blade angle becomes greater than 12°. This of course activates the SLPS and causes the annunciator to appear. The transfer gland leakage allows the blades to keep moving up to the PLPS now at 15° (Idle) but that darn latching circuit keeps the annunciators on. The annunciators also illuminate during the run-up test of the SLPS system and latch in the "on" position. How do we get rid of these lying lights? Tap the SLPS test switch down.

The primary purpose of the SLPS test switch is to keep the SLPS circuit alive after the power levers have been lifted. In that manner, we can move the PLPS back to flat pitch and verify that the SLPS activates as it should, stopping the blades at about 12° as they attempt to go flat. The secondary purpose of the switch is to allow clearing of the annunciator after it has activated and locked on.

A piece of trivia: Back in the days of PT6A-20-powered King Airs, the designers decided to have separate test switches for the left and right propellers. These switches are located on the pilot's right subpanel and they are spring-loaded to the center, off position. When held up, they activate the reset mechanism for the OSG to bring its speed down to a value that may be reached without exceeding normal takeoff RPM. When held down to the SLPS test position, as stated in the previous paragraph, they keep the SLPS circuit alive after the power levers have been lifted. The left switch, obviously, activates the left OSG's reset solenoid and the right switch does the same for the right side. But here's the trivia … the bottom position keeps the SLPS circuit alive on BOTH sides. Recall that there is only one CB that supplies the power to both SLPSs and the test switch also keeps power available for BOTH sides. By the way, later King Air models use a single switch to activate both the left and the right OSG's reset solenoids so Beech could easily have decided to have a single switch in the earlier King Airs as well. Tapping *either* switch down will clear a latched-on SLPS annunciator regardless of which side it is. Likewise, *either* switch in the down position will keep the SLPS circuits active for *both* sides.

The PT6A-28 – and all subsequent King Air engines that appeared after 1969 – have a totally new PLPS system that involves the *beta valve*. If any part of the reversing mechanism to this valve fails, the propeller will immediately feather. Even as a King Air instructor at Beech, I did not know this until a significant revelation occurred in 1973. I was with a student in an E90 and we

had the not-uncommon situation of some malfunction taking place in our SLPS system that locked off the oil and caused the propeller to slowly start feathering. Well-trained instructor that I was, I pulled the CB and all returned to normal as we headed back to Beech field to have the malfunction addressed and remedied.

The airplane got pulled into the delivery center hangar and one of the senior Beechcraft A&Ps was assigned to cure the problem. This great gentleman – Red Martin – had probably been a Beechcrafter since Staggerwings were the product. He and I had developed a liking for each other. As he worked on the short-circuited SLPS solenoid, he opined to me that it was stupid why this solenoid was still installed. "Why?" I asked, in my ignorance.

"Because if anything causes the PLPS to fail, the prop will immediately feather" was Mr. Martin's response.

After the conclusion of that flight training session, I rushed back to the Training Center to verify that what Red had stated was correct … and it was! I became an evangelist! I went to the other instructors, to Don Cary, my boss at the Beechcraft Training Center, and with his blessing, I contacted the head of the engine engineering department. To my amazement, this gentleman said "Tom, you're right, we know this. But the Federal Aviation Administration (FAA) won't allow use to remove the SLPS system."

My blood began to boil! It had to be mere ignorance on the FAA's part that keeping this unneeded and problem-prone system was necessary. I asked the head of engine engineering about this and his response was "We've explained it until we're blue in the face, but they just don't buy it."

"Wait!" I said, "you guys are the engineers. We are the training experts. Let us have a crack at convincing the FAA."

And so, a month or so later, I was in front of a "class" of maybe five FAA engineering employees and described to them the working of the beta valve and why the SLPS was unneeded and undesirable. Well, bless their souls! Within a few weeks the SLPS requirement on beta valve type governors was removed and Beech issued a Service Bulletin to direct its removal.

Hence, all 100s, E90s, and 200s that had this unnecessary system installed as factory standard, were allowed to remove it entirely. That explains why these airplanes have switches that are spring-loaded to the center position but have no label nor action when pressed down. Only, the top, OSG Test position, is still hooked up.

Before we end our story, there is one more fact to mention. The A100 model that replaced the straight 100 model in 1971, was the very first King Air to have four-blade propellers as factory-standard equipment. Because of the potential for "reactionless vibration" when idling at too low a speed on the ground, Beech solved this challenge by (1) increasing Idle N1 speed from about 50% to about 60%, and (2) flattening the LPS setting to provide less rotational resistance and thus an elevated propeller speed. But now – wow! – that flatter propeller provided too much drag in the landing flare. The fix? Install anther Low Pitch Stop at a larger blade angle but have it only operate in flight, not on the ground. This was the origination of the Flight Low Pitch Stop (FLPS) and the Ground Low Pitch Stop (GLPS). And to create the FLPS? Why the bad old, unreliable, electric lock pitch solenoid was reintroduced! This system was installed on both the A100 and the earlier F90s but, thank goodness, it was replaced with a simpler and less malfunction-prone system on later F90s and all members of the 300-series.

I hope you now see why I said that you pilots flying later King Airs without the lock-pitch propeller solenoids are so lucky! KA

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.*

New Garmin Pilot Update Adds New Graphical Taxiway and Apron NOTAMs

Garmin recently announced that the latest update (v10.7) for Garmin Pilot is now available. Among many new features, the latest update now graphically displays taxiway and apron closures on the dynamic map – as well as SafeTaxi diagrams.

Other highlights of the 10.7 update:

- **Dynamic map enhancements:** The dynamic map has been optimized to change the visibility and size of navigation data, airspace boundary depictions and airport icons as the user zooms and pans around the map. The company says that when combined, these enhancements provide a clearer view of essential navigation data, airports, airspaces and more.
- **Graphical taxiway NOTAMs:** For airports in the U.S., Garmin Pilot graphically displays taxiway and apron closures. When the NOTAM overlay is enabled, the taxiway or apron closed by the NOTAM is depicted with hashed lines and is color-coded — with alerts for taxiway and apron NOTAMs available throughout the application.
- **Annotate on screen:** Take notes, draw taxiway routings, or highlight weather that may be a concern for your upcoming flight with the new, on-screen map annotation feature — which allows up to 3 pages of saved annotations at once.
- **Decoded NOTAM text:** For quick and easy viewing, NOTAMs are now decoded into plain English whenever available — including on the airport page, radial menu NOTAM options and NOTAMs widget.

- **Expanded third-party support:** Garmin Pilot now supports select Bad Elf GPS models and — when connected to Stratux — can also display ADS-B weather and traffic information as well as backup attitude and GPS position.

Garmin stated that new users can download a free 30-day trial, then enjoy a subscription for as low as $99.99 per year.

Learn more about the 10.7 release at: https://www.youtube.com/watch?v=VBLkKKxARHA.

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