King Air

A MAGAZINE FOR THE OWNER/PILOT OF KING AIR AIRCRAFT

APRIL 2024 • VOLUME 18, NUMBER 4 • $6.50

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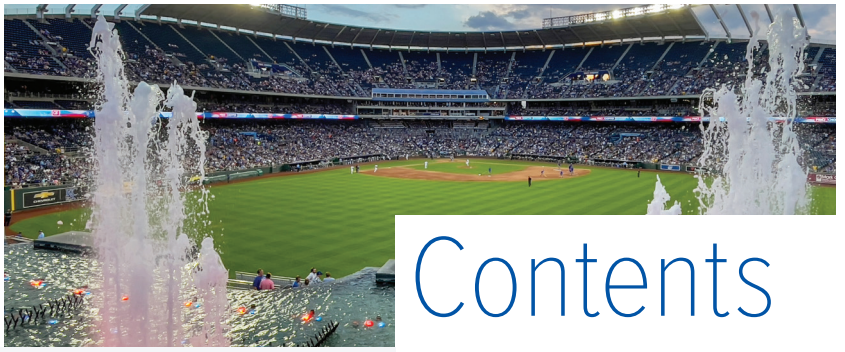

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April 2024 Volume 18 / Number 4
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Contents

EDITOR
Kim Blonigen

EDITORIAL OFFICE
2779 Aero Park Dr.,
Traverse City MI 49686
Phone: (316) 652-9495
E-mail: editor@blonigen.net

PUBLISHERS
Dave Moore
Village Publications

GRAPHIC DESIGN
Rachel Coon

PRODUCTION MANAGER
Mike Revard

PUBLICATIONS DIRECTOR
Jason Smith

ADVERTISING DIRECTOR
Jenna Reid
King Air Magazine
2779 Aero Park Drive
Traverse City, MI 49686
Phone: 816-699-8634
E-mail: jenna.reid@vpdcs.com

ADVERTISING ADMINISTRATIVE COORDINATOR AND REPRINT SALES
Betsy Beaudoin
Phone: 1-800-773-7798
E-mail: betsybeaudoin@villagepress.com

SUBSCRIBER SERVICES
Rhonda Kelly, Mgr.
Jessica Meek
Jamie Wilson
P.O. Box 1810
Traverse City, MI 49685
1-800-447-7367

ONLINE ADDRESS
www.kingairmagazine.com

SUBSCRIPTIONS

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Courtesy of Textron Aviation

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Correction to Pressurization article

Some of the text in Tom Clements' "Pressurization Basics" article featured in the March 2024 issue of King Air magazine was mistakenly left out between pages 19-20. The text that was missing is below in red.

Our apologies to Mr. Clements and to the readers for any confusion this may have caused.

Inflow

The flow packs attempt to provide constant air mass flow regardless of altitude, outside air temperature or compressor speed (N1 or Ng). If compressor speed is too low, however, the flow cannot keep supplying the pounds of air that it should ... the air pump isn't turning fast enough. A quick and unscientific check of your inflow and outflow is this: Can you maintain maximum ΔP with both power levers pulled back far enough to just trigger the landing gear warning horn? If the answer is no, then you can be sure that your air inflow is too low (weak or dead flow pack) or your air outflow is too high (excessive leaks) or a combination of both.

As you reduce power aggressively for a descent – either to comply with an ATC request or to keep the speed down due to turbulence – you may observe the cabin starting to climb. In fact, I tend to watch the cabin's vertical velocity indicator (VVI), more than torque or fuel flow, when I reduce power significantly. You may need to push the power levers back up a bit to keep supplying enough inflow to prevent the cabin from ascending. On the other hand, if you need to come down steeper, it's time for landing gear extension and maybe, if it's not overly turbulent, approach flaps too. Remember that the maximum allowable load factor limit is reduced when flaps are extended. KA


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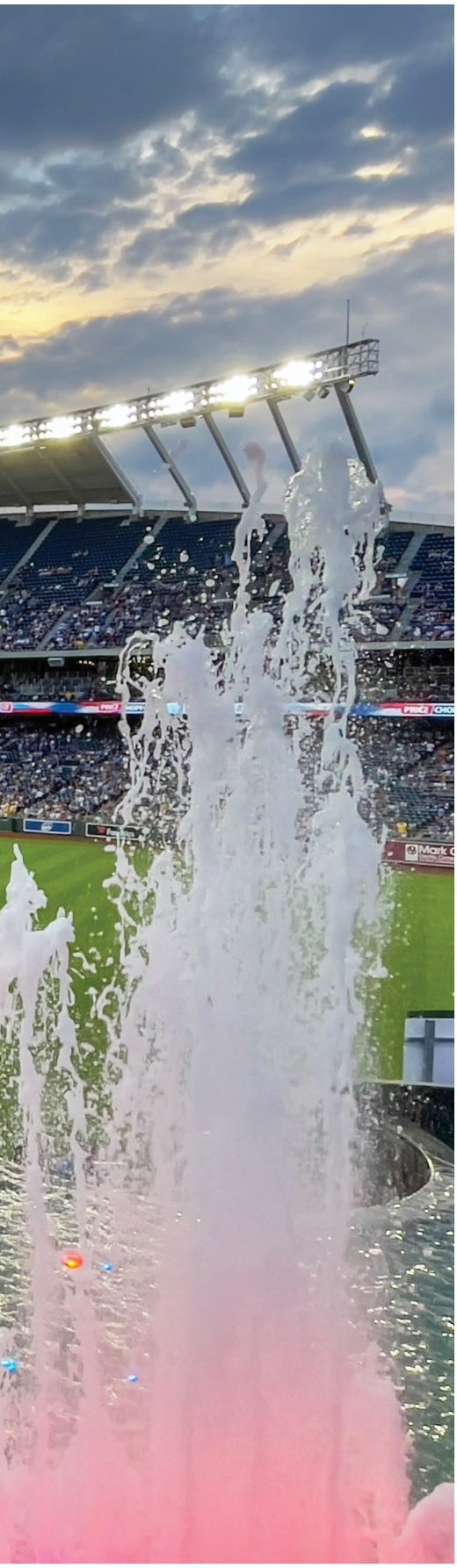
Owner Ewing Kauffman brought the Royals to Kansas City in 1969 as an expansion team, and they've played at the stadium now named for him since 1973. Among the ballpark's unique features are the multi-tiered, 322-foot-wide outfield fountains – they cycle through light effects and water heights reaching up to 70 feet throughout the game.



FLY BALL

Make plans to fly in for a game in 30 MLB cities

by MeLinda Schnyder

All photos credited to author unless otherwise stated

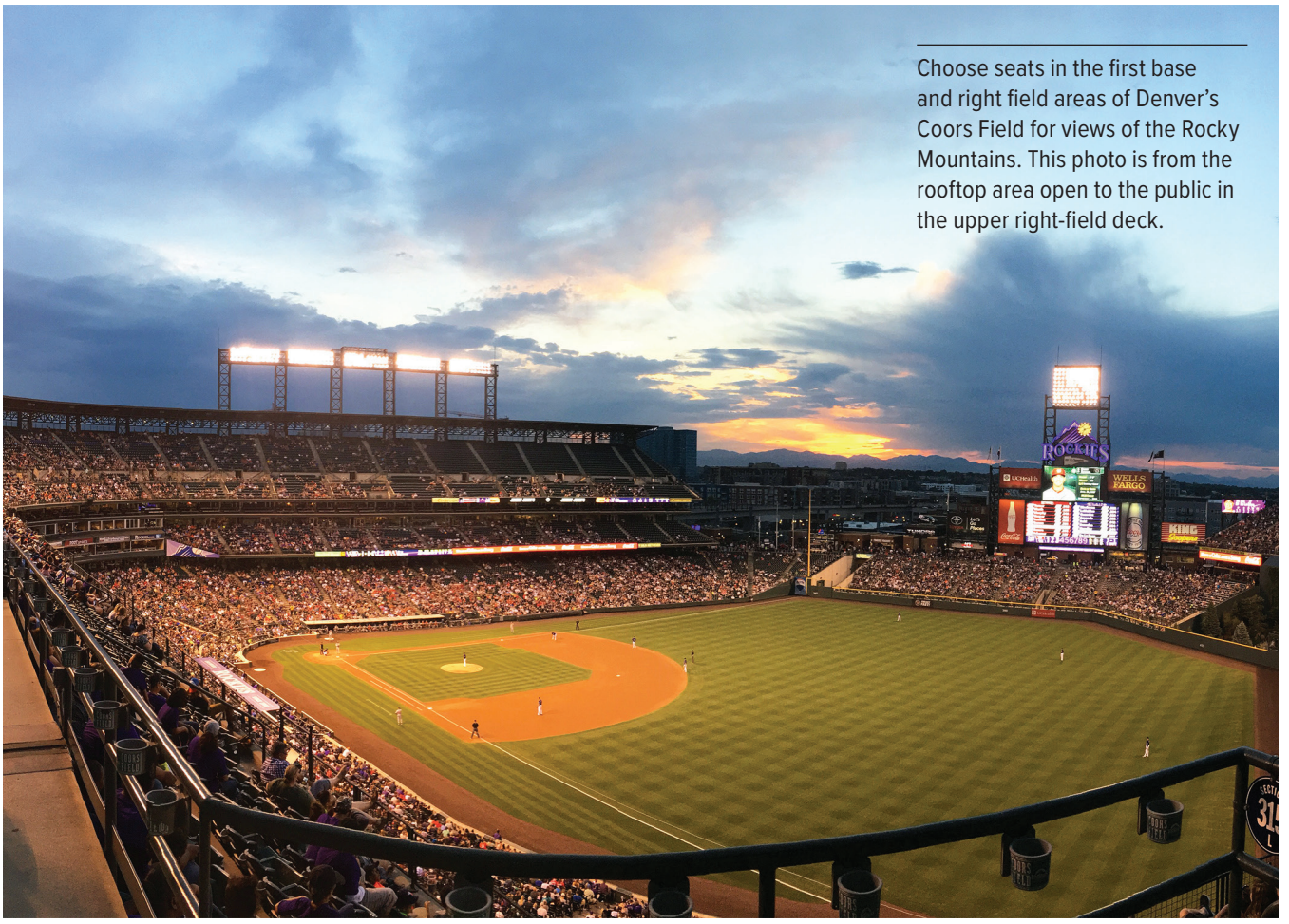
By the time my husband, Lee, had turned 25, he had watched a game in just three Major League Baseball (MLB) stadiums – Kansas City, Houston and Arlington, Texas. That makes it even more impressive that in the next 18 years he would manage to complete his goal of seeing a game in every city with an MLB team.

Although he is a lifelong baseball fan, he grew up in a family that rarely traveled. After college he started to travel for work, and he realized he could often squeeze in a game. It helped that I also liked traveling and going to baseball games. We married when we were both 27 years old and started planning at least one trip a year around seeing a new stadium.

Lee notched No. 30 in 2014, when a monthlong road trip from Kansas to Maine included a detour to Rogers Centre, the domed home of the Toronto Blue Jays. I have just one ballpark left to visit – the Cleveland Guardians' Progressive Field – to also be able to say I've seen a game in every city with a major league team. The quest will continue indefinitely for both of us, however, with teams building new ballparks or in some cases moving to new cities.

Sure, there have been people who have made it to all 30 current MLB stadiums faster – you can logistically hit them all in one season, especially with access to a private airplane – but for us it wasn't about rushing to home plate, instead a slow jog around the bases so we could enjoy the journey. That includes seeing legendary players and performances, discovering history within ballpark museums and monuments, witnessing the traditions each team's fans keep alive and sampling local flavors at the concession stands.

We've experienced chapulines, toasted grasshoppers served in four-ounce cups with savory chili-lime salt seasoning at a Seattle Mariners home game, enjoyed a Chicken & Waffle Cone with mashed potatoes & honey mustard drizzle in Houston, and split among four people the



Choose seats in the first base and right field areas of Denver's Coors Field for views of the Rocky Mountains. This photo is from the rooftop area open to the public in the upper right-field deck.

crazy Atlanta Braves concoction known as burgerizza: a 20-ounce burger patty sandwiched between two 8-inch pepperoni pizzas.

We saw St. Louis Cardinal Mark McGwire put on a batting practice exhibition (higher elevation and lower air density) at Coors Field in Denver, Colorado, and register home run No. 35 on the way to 65 in 1999. Twice, we've orchestrated seeing two ballgames at two different stadiums in the same day: a day game at the Cubs followed by a White Sox night game in Chicago and in New York, a daytime Yankees game followed by an evening at the Mets' Citi Field.

Eventually, meeting in a different baseball city became an annual reunion with fellow baseball-loving friends who had moved halfway across the country from our home in Kansas. Our 16th trip with these friends will be to Washington, D.C., in August.

Ready to start adding new stadiums to your logbook? Opening day was March 28 and the regular season concludes Sept. 29. Here are suggestions on choosing where to go among the MLB's 30 clubs.

Choose One of Our Favorite Ballparks

First, let's admit that a list like this is entirely subjective, influenced by teams you grew up rooting for or largely based on personal experience at the ballpark, such as seeing a great game and favorable weather conditions. Here are our top six favorite still-active stadiums, west to east.

Oracle Park, San Francisco: From nearby San Carlos Airport (SQL) or Metropolitan Oakland International Airport (OAK), head to the home of the San Francisco Giants. The stadium opened in 2000 with an outfield perfectly framing San Francisco Bay. Besides the incredible views, we loved the upscale food options (including some using ingredients grown at the in-park garden beds you can tour), artwork, historical displays and interactive play areas for all ages.

Coors Field, Denver: Land at Centennial Airport (APA) or Rocky Mountain Metropolitan Airport (BJC), then head to downtown Denver for a Colorado Rockies game. Spend some time on the upper right-field deck for mesmerizing views of the Rocky Mountains. There's plenty to see within the ballpark, too: The SandLot Brewery, which opened in 1995 as the first brewery inside an MLB ballpark, one row of purple seats in the upper sections marking 1 mile above sea level and food options ranging from a food court to Helton Burger Shack.

Kauffman Stadium, Kansas City: There's some movement to relocate the Kansas City Royals to a downtown stadium, but for now you'll head 10 miles from

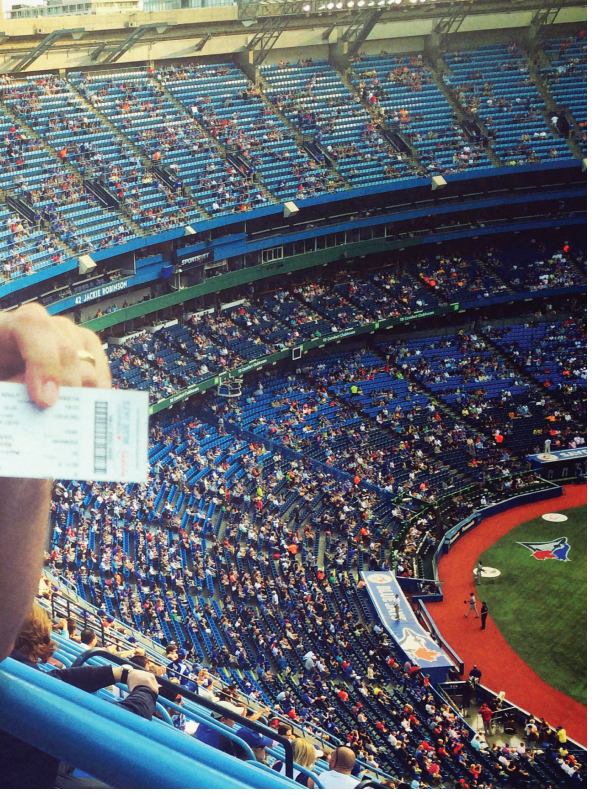
Charles B. Wheeler Downtown Airport (MKC). Known as "The K," it's been home to the Royals since 1973. Beautifully illuminated fountains dance just beyond the outfield fence, a massive crown tops the center-field scoreboard and there's plenty of craft beer and barbecue. Don't miss the free 7,000-square-foot Hall of Fame Museum with multimedia exhibits on baseball history as well as Royals artifacts.

Wrigley Field, Chicago: Chicago Executive Airport (PWK), Chicago Midway International Airport (MDW) and Chicago O'Hare International Airport (ORD) are among the places to land for a trip to see the Chicago Cubs. The ballpark first opened in 1914 and is among the country's iconic stadiums with an amazing list of historic moments. Take your photo in front of the main entry marquee and walk around the outside of the park to see statues of four Cubs legends. Take in the history displays throughout the stadium, notice the ivy-covered brick outfield walls and watch the manual scoreboard update throughout the game. Have a Chicago-style hot dog or an Italian beef sandwich. Be sure to sing "Take Me Out to the Ballgame," the now widespread tradition during the seventh inning stretch that started here in 1982.

In front of the iconic red marquee at the main entrance of Chicago's Wrigley Field during 2019 visit. (courtesy photo)

Among the nods to the history of the New York Yankees are these banners of past players hanging in the Great Hall of the new Yankee Stadium opened in 2009.

Lee Schnyder holds the game ticket before the start of the Toronto Blue Jays game at Rogers Centre that completed his quest to see at least one game in every city with a Major League Baseball game.



BE AWARE OF SPORTING EVENT TFRS

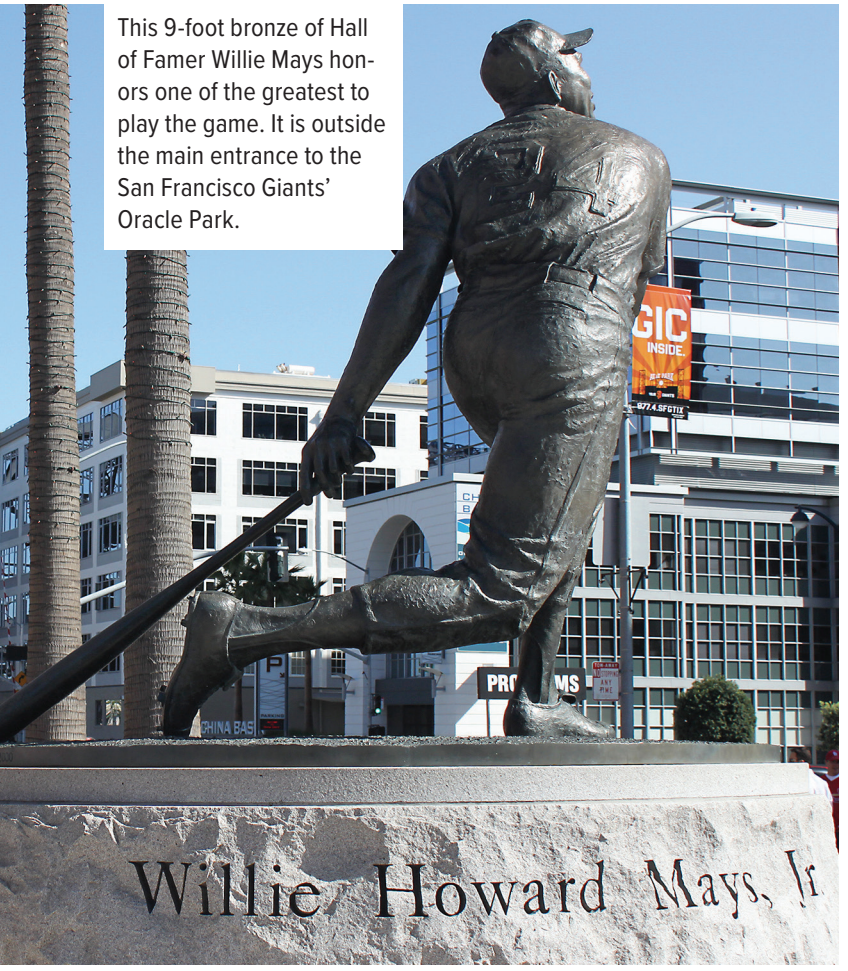
Baseball is included in game-related temporary flight restrictions that could be in place before, during and after games. “All aircraft operations, including parachute jumping, unmanned aircraft and remote-controlled aircraft are prohibited within a 3NM radius up to and including 3,000 feet AGL of any stadium having a seating capacity of 30,000 or more people where either a regular or post season Major League Baseball, National Football League or NCAA division one football game is occurring. This NOTAM also applies to NASCAR Sprint Cup, INDYCAR and CHAMP Series races excluding qualifying and pre-race events.”

Fenway Park, Boston: Norwood Memorial Airport (OWD) is about 20 miles from the home of the Boston Red Sox since 1912. It feels magical being in the country’s oldest MLB park, and both the stadium and the surrounding neighborhood are brimming with history and personality. Give yourself time for Jersey Street and the rest of the pregame experience before heading inside to see the Green Monster, Fenway’s iconic 37-foot-tall and 240-feet-wide left-field wall. Better yet, schedule one of their tours for a guided history lesson and behind-the-scenes access.

Yankee Stadium, New York City: Even non-New York Yankees fans like us couldn’t resist visiting the old ballpark as well as the new Yankee Stadium that opened in 2009. The stadium celebrates the 27-time World Series champions’ storied history. Monument Park, in center field, recognizes legends who have played there; plan accordingly as it closes 45 minutes before first pitch. The free New York Yankees Museum is also inside the park and is open until the end of the eighth inning. Among the general aviation airports close to the metro area are Essex County Airport (CDW), Westchester County Airport (HPN) and Linden Airport (LDJ).

See the Superstars

Another way to choose which stadiums to visit is to plan on seeing the generational talent currently playing. Catch these superstars, most of whom are considered likely future Hall of Famers, at home or on the road:



This 9-foot bronze of Hall of Famer Willie Mays honors one of the greatest to play the game. It is outside the main entrance to the San Francisco Giants' Oracle Park.

" ... for us it wasn't about rushing to home plate, instead a slow jog around the bases so we could enjoy the journey."

At Turner Field in its final season (2016) before the Atlanta Braves moved to Truist Park. This was during the era of wild menu items at ballparks, and we split among four people the $26 burgerizza: a grilled 20-ounce beef patty, five slices of cheddar cheese, bacon and two 8-inch pepperoni pizzas as the bun. (courtesy photo)

Look for tours and in-stadium museums. Entry to Royals Hall of Fame Museum is included with your ticket and has baseball history and Kansas City displays. This one honors Hall of Famer George Brett, who wore No. 5 while playing his entire career for Kansas City, with 3,154 baseballs—one for each of his career hits—along with the bat used for his 3,000th hit.

Shohei Ohtani has been called a once in a century baseball player because the 29-year-old is a rare two-way player, dominating as a pitcher and a hitter. He signed a league-record $700 million contract in the offseason to become a Los Angeles Dodger.

Three-time National League Cy Young Award winner Clayton Kershaw is 56 strikeouts from reaching 3,000 for his career, which he has spent with the Dodgers. He would be just the 20th pitcher to strike out 3,000 batters and the third to reach the milestone while playing for only one team. The left-hander had surgery in the offseason so keep an eye on when he'll return to the mound.

Zack Greinke is another active pitcher on the 3,000-strikeout watch list. The American League Cy Young Award winner has struck out 2,979 batters. He's a free agent and hasn't yet come to terms with a team for 2024 at our press deadline.

Two active pitchers have hit the 3,000 strikeout mark and are a good bet to watch on the mound: Max Scherzer of the Texas Rangers and Justin Verlander of the Houston Astros. They are two of only four pitchers in Major League history to win multiple World Series championships, receive multiple Cy Young Awards, throw multiple no-hitters and earn multiple All-Star selections. Both are entering the 2024 season recovering from injuries but should be in the rotation soon.

If it's hitting you're interested in seeing, among the best still swinging is Mike Trout, center fielder for the Los Angeles Angels. He's an 11-time MLB All-Star, three-time American League Most Valuable Player, nine-time winner of the Silver Slugger Award and considered a future Hall of Famer.

Pick an MLB special event

In addition to flying to see a game at one of the above stadiums, here are several special dates on the 2024 MLB schedule to consider.

June 20: MLB at Rickwood Field is a special regular season game between the St. Louis Cardinals and San Francisco Giants. It is part of Juneteenth celebrations and happens at the country's oldest professional baseball park, Rickwood Field in Birmingham, Alabama, the former home of the Birmingham Black Barons of the Negro Leagues.

July 12-16: The 94th MLB All-Star Game and festivities are at Globe Life Field in Arlington, Texas.

Aug. 18: The MLB Little League Classic features the New York Yankees and Detroit Tigers playing at Historic Bowman Field in Williamsport, Pennsylvania, in the evening, after Little League World Series games during the day.

Late October: MLB World Series KA

KING AIR GATHERING

New Announcements: King Air Gathering

The Greenbriar, May 15-18, 2024

Time is running out to register for the King Air Gathering (KAG) being held at The Greenbrier located near White Sulphur Springs, West Virginia, Wednesday, May 15 through Saturday, May 18.

King Air Nation and co-host BLR Performance Innovation are providing an event you won't want to miss. The agenda is full of educational seminars, prominent keynote speakers, specialized breakout sessions, vendor exhibits, an afternoon at the airport and evening social events.

Since last month's issue, more information has been announced.

The live auction after dinner Friday night, May 17, is developing into one you can't miss! BLR is again donating their winglets with LEDs and Whisper props and Haven Aviation Services Group (formerly Flight Mechanix) will include the installation for free! Raisbeck is providing a set of its popular Crown Wing Locker System, Luma Technologies is supplying two separate LED Caution/Warn/Advisory panels and Gear Status Lights, there are two PT6A Fuel Nozzle Services by Mint Turbines and a High Altitude Diluter Demand Mask from Aerox. There will be many more items offered as they're still coming in.

The companion activities were still being finalized at press time so check the King Air Gathering website for specifics on the special events planned for them.

You'll want to stay through Saturday afternoon and partake in the **vendor-sponsored Greenbrier Experiences** which include: golfing on one of the four resort courses – each "with its storied history in the sport"; fly fishing with experienced fishing guides; shooting at a combination trap and skeet field or a sporting clays course; a friendly game of croquet

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One of articles to bid on at the live auction, taking place after dinner Friday night, is BLR's winglets and whisper props with free installation by Haven ASG.

The Greenbrier offers four golf courses in which to play, each with unique features.

“The agenda is full of King Air-specific learning opportunities and vendor exhibits.”

on the resort’s groomed lawn and some offering select bourbons that can only be found at The Greenbrier.

KAG attendees who plan to personally fly to the event will use Greenbrier Valley Airport (LWB) conveniently located just minutes from The Greenbrier. You can book your room by going to the same site that you register for the KAG at: **https://*kingairnation.com/gathering-2024*.** If you’d rather make the reservations by telephone, call 888-335-5056 and press option 2.

The agenda is full of King Air-specific learning opportunities and vendor exhibits. Don’t miss it!

For more details, the agenda, to book your room at The Greenbrier and to register, go to https://*kingairnation.com/gathering-2024*

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Oil Migration

by Dean Benedict

Imagine you are pre-flighting your King Air, checking the oil and on one engine the oil is off the stick! What do you do? For many, the first instinct is to dump a couple quarts in that side and check the stick again. Just make sure you have plenty of rags in the aircraft because there's a good chance the oil you just dumped in will be all over your flaps and gear doors at the end of your trip. It's what happens when you over-service the oil.

Oil is the lifeblood of any engine, so when it's suddenly off the stick, it gets your attention and rightly so. But before you add oil, I suggest to try motoring that engine for about 30 seconds and check the stick again. Chances are you'll find the oil back on the stick, at the level you typically expect for that engine. If so, you're good to go.

What you have is a minor oil migration problem on that engine which can be easily remedied at the next Phase inspection. Until then, whenever you check the oil on that side (when the engine is cold, as in before a flight), you'll want to motor that engine briefly before checking the stick. Then put it on your squawk list for your next maintenance visit.

Checking Cool or Checking Hot?

Pratt & Whitney says you should check the oil level on each engine within 20 minutes after shutdown, but in

reality, who does that? First of all, after only 20 minutes your engines are still piping hot; and even though you may have shut everything down and buttoned everything up, there's still baggage and passengers, instructions for the line guy, maybe a rental car or just a long drive home. Let's face it, at the end of a trip, checking the oil on a hot engine is not very practical.

Far more important in my book is just *checking the oil, period!* (Those of you out there who never check your engine oil – ever – I'm begging you to start now.) I don't care whether you check it post-shutdown on a hot engine or if you check it before the first flight of the day, on a cold engine. Just keep doing it that way consistently.

In addition to simply verifying oil is present, you are discovering the preferred oil level for each of your engines.

Engine Oil Levels

I've mentioned engine oil levels many times in this column, but I get calls on this subject all the time, so it bears repeating: The PT6s on your King Air are *not*

"In addition to simply verifying oil is present, you are discovering the preferred oil level for each of your engines."

identical twins. They each have their own quirks and tendencies, including the oil level they prefer. I've found many a PT6s that run consistently at 2-3 quarts down. (*To be abundantly clear – that's between the second and third hash marks below Max Cold on the stick, on a cold engine.*) Some engines stay at 3 or even 3.5 quarts low. Many times there is a disparity between your engines – the left side is happy at 2 quarts down, but the right side prefers 2.5 down. Learn the oil level for each of your engines.

More on Migration

As an engine cools after running, the oil collects in the oil tank located above the oil filter housing. However, if the oil is able to get around the housing and travel down to the accessory gear box and the bearing areas below, it will go there. Then you come along, checking the oil before your next trip and – surprise! – the oil is off the stick. It looks like you suddenly lost all the oil on that side. But take a look around – check the floor, look inside the cowl – if you don't see obvious evidence of an oil leak then it's still inside the engine. Motor it for 30 seconds and check the stick again.

Here's what happens: During every phase inspection the oil filters and chip detectors are pulled, inspected and reinstalled. Some oil filters are less cooperative than others. If they're tough to get out, they're tougher to get back in. The process of removing and reinstalling a stubborn oil filter can jostle the oil filter housing ever so slightly. If that happens, the O-rings between the filter housing and the engine case can lose a bit of their seal. If you have an oil migration problem, these O-rings are the likely culprits. But 30 seconds of motoring gets the scavenge pump to move the oil back into the oil tank, and then it shows on the stick.

The funny thing about Pratt & Whitney's recommendation, if you only check your oil levels when the engines are hot, you would never know whether or not you had an oil migration problem. It could go undetected for years.

Mass Migration

Oil migration is an oil leak inside the engine. The good news is that the engine is still full of oil and will operate properly.

If you opened your engine cowl and saw oil dripping out of the compressor inlet, you have reason for more concern. This indicates a larger amount of oil is leaking out of the tank and accumulating inside the engine where the bearings are. When the oil reaches the level of the shaft, it leaks out. You want to get that addressed.

Hopefully you are checking your oil faithfully. If it is suddenly off the stick on a cold engine, just motor that engine for 30 seconds and check again. You should be good to go. KA

Note: A similar article with the same name ran in the October 2015 issue.

" ... if you only check your oil levels when the engines are hot, you would never know whether or not you had an oil migration problem."

Dean Benedict is a certified A&P, AI with 50 years experience in King Air maintenance. He was an inaugural inductee to the King Air Hall of Fame. He owned and ran Honest Air Inc., a "Beechcraft maintenance boutique" with a strong following of King Airs, for 15 years. Currently, with BeechMedic LLC, Dean and his wife, Lisa, consult with owners, pilots and mechanics on King Air maintenance issues, troubleshooting and pre-buys. Dean also performs expert witness work on request. He can be reached at 702-524-4378 or via email at *dr.dean@beechmedic.com.*

King Air Crossfeed Basics

by Tom Clements

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, t*ransfer* 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!

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 check valve. 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 check valve.

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

King Air 350 fuel panel.

King Air F90 fuel panel.

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 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 check valve 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 check valve 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 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 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 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

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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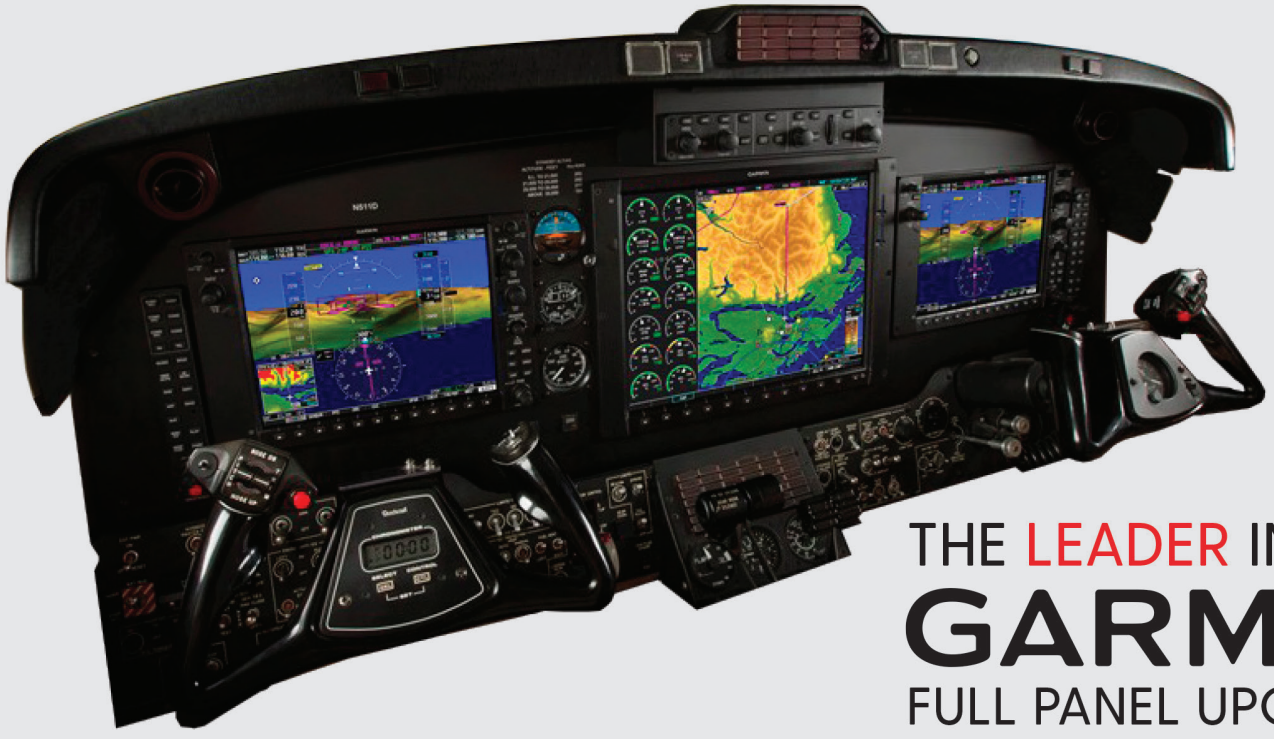

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King Schools Celebrates 50 Years

John and Martha King outlast Nixon, Rubik, Skylab and sideburns

In 1974, Richard Nixon was president, Erno Rubik invented his eponymous puzzle cube, U.S. astronauts were orbiting earth on the nation's first space station Skylab, and John and Martha King started building their aviation training empire.

"2024 marks 50 years since John and Martha began what has turned into a lifelong passion and an exceedingly successful business," Barry Knuttila, King Schools CEO, said. "Not only have they helped millions of pilots achieve their training goals, but they also guided the company and the curriculum through countless regulatory changes and technology transformations."

Through that half-century and all its turbulence, John and Martha have acquired a few wrinkles, some gray hair (or in John's case, lost some hair … and the sideburns), a hangar full of awards and recognitions and a lot of fans. Theirs is a story of hard work, shrewd decisions, a few mistakes and a skillful ability to explain complex concepts in a clear, simple and fun way that resonates with aviation pros and learners alike.

"It's humbling to see that our little idea has turned into something so successful and enduring," Martha King said. "We love to hear from pilots across the country and

around the world who have used our courses to learn something new and pursue fulfilling aviation careers. That's what keeps us going."

John and Martha got their start traveling to far-flung cities and towns to conduct in-person ground school courses for aspiring private pilots. Today, King Schools is the world's premiere supplier of print, video and computer-based instructional materials covering every aspect of flight training and safety both for written test preparation and guidance in practical flight operations. More than half of all pilots in the United States have used one or more King Schools courses as part of their aviation training.

The secret to King Schools' longevity?

"When we paired up, we decided to be equal partners in everything we would do," John says. "In 1974, that was probably a little unconventional or even revolutionary. But ever since then I have been struggling to be an equal partner to Martha. When it was apparent that Martha and I were serious about each other, Martha's father told me that Martha was the most stubborn person he had ever known. I said, "I already know that." I didn't take it as stubbornness, but determination. I wanted to take full advantage of that, and as a result, the business has thrived. Fifty years later our partnership is still pretty unique, and that has been the key to our success."

The overhead projectors and chalkboards in hotel conference rooms in the early days of traveling ground school soon gave way to video instruction – VHS cassettes and DVDs sent by snail mail, which brought John and Martha directly into learners' homes, allowing learning pilots to study from the comfort of their living rooms. Early this century, the King Schools' library moved online to streaming, making it even easier, more convenient and more cost-effective for the Kings to deliver instruction to anyone, anywhere, in any time zone.

John and Martha King have also written two books: "LIFT" in which they share their thoughts on entrepreneurship and "Sky Kings" which details their aviation adventures and wisdom gained by trial and error over the past 55+ years. They still fly their Falcon 10 jet themselves and maintain a busy schedule of conference appearances and talks, in addition to developing new courses.

And they continue to rake in the awards. Already inducted into the Flight Instructor Hall of Fame, the National Aviation Hall of Fame and the International Aviation Hall of Fame, last year they were welcomed into the Women in Aviation International's Pioneer Hall of Fame with John being the first and only man to gain this distinction. Later this month they will be honored with the 2024 Richard G. McSpadden General Aviation Safety Award at AOPA's Hoover awards reception. "This recognition means so much to us, and we are deeply honored to be the first recipients," Martha said. "Richard McSpadden was a great friend and teacher, and we all benefited from his incredible knowledge, openness and experience."

King Schools has launched a year of celebration to mark the half-century milestone, which will include events, appearances and speeches, as well as special offers on King Schools courses and curricula. The website and King Schools' social media sites will be regularly updated with details.

"In 2024, Nixon, Rubik, Skylab and John's sideburns are long gone, but John and Martha King are still educating pilots with insights gained during a lifetime of learning and experience, delivered in their signature style with candor and humor," CEO Knuttila said. "We're not letting them retire quite yet – so watch to see what they'll be up to during King Schools' next 50 years." KA

Source: King Schools

COURTESY: HARTZELL

Hartzell Propeller Service Center Doubles Warranty Length

The Hartzell Service Center's warranty on work performed at the Federal Aviation Adimintration (FAA)-certified repair station in Piqua, Ohio, is now two years or 2,000 flight hours, whichever occurs first, extended from one year or 1,000 flight hours, whichever occurred first.

As the Hartzell factory-owned repair station for the overhaul and repair of Hartzell props and governors, the Hartzell Service Center offers a sizable propeller exchange inventory supporting numerous aircraft. To provide convenience and to prevent longer flight downtimes, it is expanding its propeller exchange program to include more aircraft which includes the Beechcraft King Air 200 and 300 series, the Raisbeck Beechcraft King Air 200 and 300 series and the Beechcraft E90, C90 and C90GT. Customers are encouraged to contact the Hartzell Service Center to schedule the delivery of an exchange propeller to meet their maintenance schedule needs.

In addition to a propeller exchange program, the Hartzell Service Center is now offering propeller governor exchanges for customers requiring minimum flight downtimes. A governor exchange also can be arranged ahead of scheduled service.

The Hartzell Service Center offers product support, engineering expertise and factory-level repairs. The service center's proximity to Hartzell Propeller's aluminum and composite propeller manufacturing operations means parts are available quicker, without the added time and expense of shipping.

Located near the Piqua Airport/Hartzell Field, the Hartzell Service Center enables fly-in customers to take advantage of Ohio's sales tax exemption for maintenance and repair of general aviation aircraft. Customers may also choose convenient pickup and delivery options and global shipping is available.

To schedule a service appointment or inquire about turning in used exchange cores, customers can call (937) 778-4201 or complete a contact form at *https://hartzellprop.com/contact/.*

SmartSky® First Article Installation on Beechcraft King Air 350

SmartSky, provider of the most advanced inflight air-to-ground (ATG) connectivity for business aviation, announced that sales and installation partner Davinci Jets Services has completed a first-article installation of the award-winning SmartSky LITE™ system on a Beechcraft King Air 350 and the aircraft has returned to service. The expected supplemental type certification by the FAA will make 18 additional King Air models certified to be equipped with SmartSky (including per the company's website the C90, 200, B200 and 300).

The SmartSky team will be attending the 2024 King Air Gathering scheduled for May 15-18 at The Greenbrier resort and will be available to talk to members of King Air

Nation interested in learning more about how SmartSky can transform their flying experience.

A list of SmartSky STCs, current and in progress, can be found at *smartskynetworks.com/STC*.

Banyan Air Service Becomes Starlink Dealer

Banyan Air Service located at the Fort Lauderdale Executive Airport (KFXE) announced it has become a dealer for Starlink's system for aviation. Starlink's advanced satellite technology, leveraging a constellation of LEO satellites, aims to deliver high-speed connectivity and reliability to aircraft flying across the U.S. skies and beyond. This advanced system enables passengers to stay connected with internet access during flight, catering to a broad range of aviation needs.

The introduction of the Starlink system aboard aircraft offers a variety of advantages, including:

- **Unprecedented Speeds:** Enjoy lightning-fast internet speeds that transform how passengers work, communicate and relax while airborne.
- **Global Coverage:** With a vast constellation of satellites, Starlink ensures consistent and reliable internet access to the U.S. and beyond, including previously underserved areas.
- **Low Latency:** The use of LEO satellites significantly reduces latency, providing high-speed communication capabilities.
- **Easy Integration:** The system is designed for straightforward installation on a wide range of business aircraft, minimizing downtime and ensuring a seamless upgrade path.
- **Cost-Effective:** Starlink's competitive pricing model makes advanced satellite internet access more accessible for business aviation, offering substantial value without compromising on quality or performance.

Per Starlink's website, there is already an STC available for the system on the King Air 200 and 300 models.

Garmin Announces New FRAT and Reporting Capabilities for FltPlan SMS

Garmin recently announced enhancements for its FltPlan safety management system (SMS) with updates to the Flight Risk Assessment Tool (FRAT) and a completely new safety performance dashboard. The redesigned FRAT requires less input from pilots and now includes the ability for operators to customize FRATs for different pilots and aircraft. The new reporting dashboard allows operators to more easily monitor safety performance indicators (SPI) and other safety trends with the ability to tailor the data to the specific needs of their company.

FRAT enhancements

Flight risk assessment submissions have been simplified to allow pilots to quickly complete a FRAT before a flight. The FRAT can automatically ingest data regarding a

COURTESY: GARMIN

flight, including weather, terrain and runway conditions and combine it with pilot fitness questions. The flight risk score is presented after submission, and if applicable, risk mitigation strategies are presented to the pilot. Flights are automatically re-scored one hour before departure and pilots are alerted if there is a change in factors that could negatively affect the flight's risk such as wind or weather. Individual operators can define how often FRATs are re-scored.

For pilots not filing flight plans with FltPlan.com, the new quick flight option allows users to enter basic flight details and submit a flight risk assessment. The FRAT is mobile optimized for convenient submission via smartphones or tablets.

Additionally, the FRAT includes an enhanced rules engine for better customization. Flight departments can now create custom rules to apply specific flight risk questions based on pilot profiles, aircraft profiles, weather conditions, airport conditions and more. Profiles and rules can be tied together to create higher level rules. For example, a low-time pilot flying a specific airplane type can have pre-assigned risks populated into the FRAT.

Safety performance dashboard

To help flight departments identify areas where they may need to improve safety, FltPlan SMS now features a safety performance dashboard that allows operators to view reports to assess the effectiveness of their safety program. The dashboard includes pre-configured reports designed by SMS experts, but also allows flight departments to modify or create custom reports to best fit their needs. The predesigned reports will enable flight departments to easily view safety performance without building reports of their own.

Reporting can be grouped by risk level, report type, category, etc., and reporting dashboards specific to different departments of an operation can be created and customized. For example, one reporting dashboard can be set for flight department management while a second dashboard can be designed for company leadership. All reports can be exported to Microsoft Excel or printed for additional analysis.

ASAP reporting enhancements

For participating flight departments, employees can file an Aviation Safety Action Program (ASAP) report directly from FltPlan SMS. Operators have the option to self-manage with an internal Event Review Committee (ERC) team, or departments can have the Air Charter Safety Foundation (ACSF) act as a third party reviewer.

The FltPlan SMS updates are available now. To learn more, visit Garmin.com/FltPlanSMS KA

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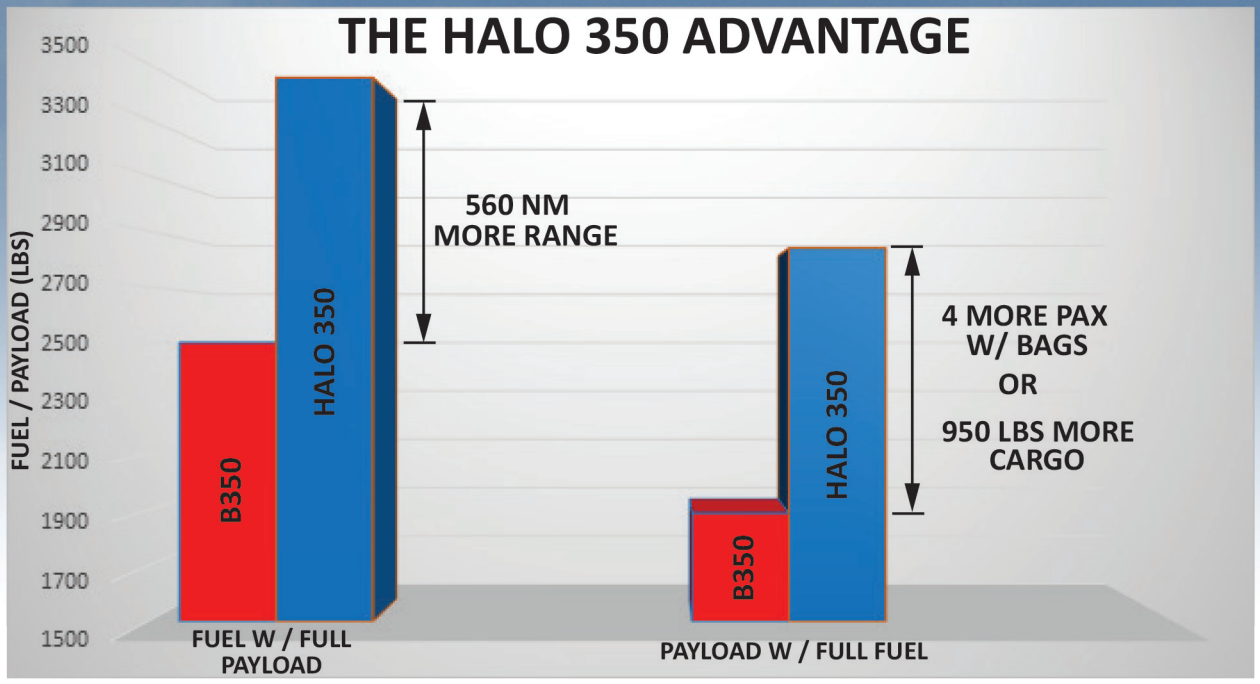

HALO 350 Information Chart

Increase Max Ramp Weight	15,000 to **16,050**
Increase Max Takeoff Weight	15,000 to **15,950**
Max Landing Weight	No Change **15,000**
Max Zero Fuel Weight	No Change **12,500**
Payload Increase	**950**

Weight and payload shown in pounds.

HALO 350 STC Kit:

The Halo 350 STC kit includes the STC, installation drawings and instructions, AFM Supplement, instructions for continued airworthiness documents, and the required parts and components (except common hardware items) for converting and operating a King Air 350 series airplane at a maximum takeoff weight of 15,950 pounds.

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