King Air

A MAGAZINE FOR THE OWNER/PILOT OF KING AIR AIRCRAFT

FEBRUARY 2024 • VOLUME 18, NUMBER 2 • $6.50

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King Air
February 2024 Volume 18 / Number 2
A MAGAZINE FOR THE OWNER/PILOT OF KING AIR AIRCRAFT

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

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COVER PHOTO

The King Air 90 prototype on its very first flight, Jan. 20, 1964. (Special Collections and University Archives, Wichita State University Libraries)

The King Air 90 prototype takes off from Beech Field, Jan. 20, 1964. There were five aircraft in the test program and FAA type certification was granted on May 27 of that same year.
(Textron Aviation)

LONG LIVE THE KING

Our favorite turboprop family reaches a milestone anniversary

by Editorial Staff

Sixty years ago, on Jan. 20, 1964, Beech Aircraft Corporation pilots flew the first official flight of the conforming prototype of the Beechcraft King Air Model 90. Thousands of spectators – from employees to area residents and local and state dignitaries – watched as the aircraft took off from Beech Field on the east side of Wichita, Kansas.

That aircraft and four others took part in an accelerated flight test program. The King Air achieved type certification from the Federal Aviation Administration (FAA) four months later on May 27. In July, one of the five flight test aircraft became the first King Air Model 90 delivered to a corporate owner. Company president Olive Ann Beech personally handed over the keys to John MacNeil, chief pilot for United Aircraft of Canada Ltd. flight operations, the precursor to Pratt & Whitney Canada that had shipped its first production PT6 engines in December 1963, making the new airplane possible.

“More than 7,700 King Air models have been delivered to customers around the globe, making it the best-selling business turboprop family in the world.”

Mrs. Beech greets first flight pilot-in-command Jim Webber and co-pilot Gregg Vaughn as they step off the King Air 90 prototype, while company executives Frank Hedrick shakes Webber’s hand and Jim Lew looks on. (Textron Aviation)

It was a celebratory, whirlwind start to what would evolve into a royal family of turboprop-powered, cabin-class airplanes. More than 7,700 King Air models have been delivered to customers around the globe, making it the best-selling business turboprop family in the world. The fleet has surpassed 64 million flight hours over six decades, with King Airs being flown by individuals, serving corporate and special mission roles, as well as flying for all branches of the U.S. military.

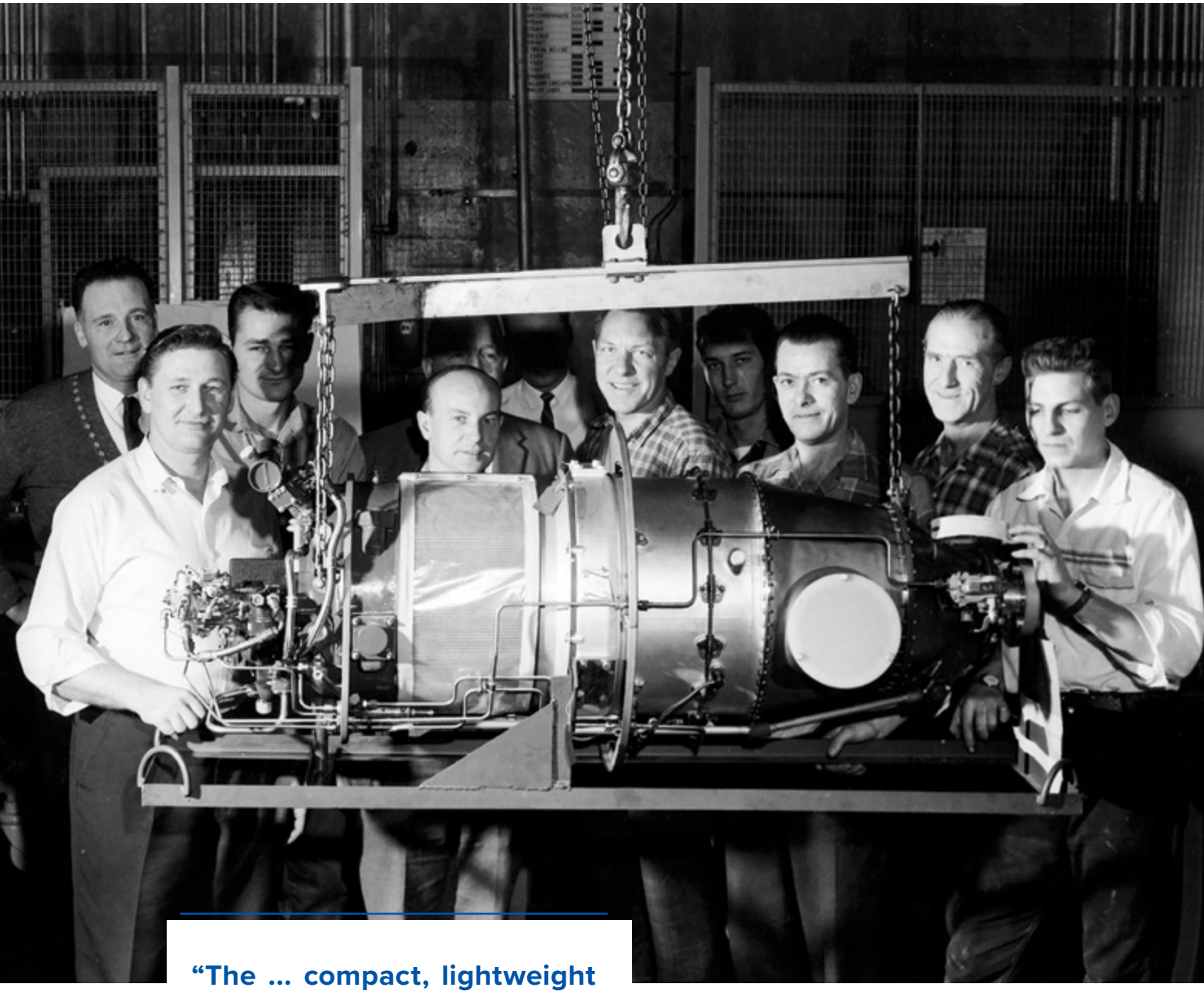
When Textron Aviation, the current manufacturer of Beechcraft products, announced in 2021 it had ceased production of the King Air C90GTx, a version of the 90-series had been manufactured for 57 years. The factory in Wichita continues to produce three variants: the King Air 260, King Air 360 and King Air 360ER.

To commemorate the King Air's 60th anniversary, we're sharing some historic photographs as well as a portion of aviation historian Ed Phillips' account of the arrival of the legendary turboprop. This article by Ed, a former Beechcrafter who has published eight books on aviation history, was first published in 2011.

The King Arrives

In 1961 Olive Ann Beech listened intently to her loyal corps of vice presidents and engineers as they advocated a bold, new step for the company. …

It centered on marrying the proven and robust airframe of the Model 80 series Queen Air with the gas turbine power of Pratt & Whitney's new, innovative PT6A turboprop engine. The PT6 was a major design and technical breakthrough in gas turbine technology that promised to deliver significantly more power than was available using reciprocating engines. Although highly reliable, the large displacement, turbocharged engines built by Continental and Lycoming would remain in demand for years to come; they were approaching the limit of their development in terms of horsepower. The New England-based company's compact, lightweight and powerful PT6A was among the earliest turboprop engines developed specifically for the general aviation segment (which included business aircraft) and delivered 550 shaft horsepower (shp) for takeoff and 500 shp for continuous operation. In addition, it could deliver more than 1,000 pound-feet of torque to the propeller via a simple, reliable planetary-type reduction gearbox.



“The … compact, lightweight and powerful PT6A was among the earliest turboprop engines developed specifically for the general aviation segment (which included business aircraft) … ”

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

Although development of turbojet engines had begun in the late 1930s, accelerated quickly during World War II and continued into the 1950s, the focus of engine manufacturers was primarily tied to military and commercial airframes, not business aviation. With the advent of the PT6A, however, gas turbine technology that was forged in the "Jet Age" was finally beginning to "trickle down" to the general aviation market. As far as Beechcraft's senior engineers were concerned, the Queen Air airframe was a logical match for Pratt & Whitney's powerplant. All that remained was to convince Olive Ann Beech. After a thorough investigation of the facts and input from her officials, she gave a green light to what would become known as "Project King Air."

Originally conceived in 1961 as the 300-mph Beechcraft Model 120, the new airplane was officially introduced on July 14, 1963, and made its first flight on January 20, 1964. The company's engineering department had grafted the PT6A onto the Queen Air airframe, which had been modified to allow the cabin and cockpit to be pressurized to 3.4 psid (pounds per square inch differential). Pressurization was not new in aviation, having been developed late in the 1930s and employed successfully on airplanes such as Boeing's Model 307 Stratoliner airline transport. But in 1963, it was a novel concept for a small business airplane designed to carry four to six passengers and two pilots, yet the engineers and Beechcraft marketing officials believed it would put the company far ahead of the competition – exactly where Olive Ann Beech wanted it to be.

It should be mentioned that the first airplane built with PT6A engines, designated as the Model 87 and carrying serial number LG-1, had been undergoing rigorous flight tests at the Wichita, Kansas, factory since May 1963. Throughout the airplane's nearly 10 months of intensive testing, company engineers gradually worked out the inevitable "bugs" associated with any new design, especially one that represented a major leap in technology involving not only an entirely new type of engine, but also a highly modified airframe that came with its own set of unique challenges from the pressurization system.

Designated NU-8F by the Army, the airplane was delivered to Fort Rucker, Alabama, in March 1964 when it began an in-depth evaluation by Army pilots, maintenance officers and mechanics. Prompted in part by the service's success with the L-23F, of which

Beech Aircraft company leaders and first flight test pilots, from left to right: Jim Lew, vice president of Engineering; Mrs. Olive Ann Beech, CEO; Gregg Vaughn, co-pilot of the first flight; Jim Webber, chief engineer of Flight Test and pilot-in-command of first flight; Frank Hedrick, soon-to-be president; and Wyman Henry, head of Sales and Marketing. (Textron Aviation)

" ... the engineers and Beechcraft marketing officials believed it would put the company far ahead of the competition – exactly where Olive Ann Beech wanted it to be."

71 examples were delivered from 1960-1963, the Army brass wanted an opportunity to take a hard and long look at Beech Aircraft's latest creation and investigate its potential for military service.

Meanwhile, back in Wichita, preparations were underway to begin production of the Model 90 King Air. With a wingspan of 45 feet, 10.5 inches; a length of 35 feet, six inches and a height of 14 feet, 2.5 inches to the top of its swept vertical stabilizer, the Model 90 had a maximum gross weight of 9,300 pounds and a fuel capacity of 122 gallons of jet fuel carried in nacelle-mounted tanks with another 262 gallons in wing tanks. Three-blade, constant-speed, full-feathering propellers were standard equipment (early production aircraft were not fitted with reversible propellers).

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First flight of the Super King Air 200 on October 27, 1972, from left to right: 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)

The 50th anniversary of the first flight, Jan. 20, 2014, with the current production King Air models at that time, the King Air C90GTx, the King Air 250 and the King Air 350i.

"With the introduction of the King Air, Olive Ann Beech and the Beech Aircraft Corporation launched business aviation into the "Jet Age" and set yet another standard for the industry to follow."

By comparison with current pressurization systems that are fully automatic and often digitally controlled "set-and-forget" installations, the Model 90 had to make do with a single, mechanical Roots-type supercharger mounted in the left nacelle that supplied adequate airflow to inflate the passenger compartment. The primary reason for this necessity centered on the PT6A engine that, in its early configuration, did not have sufficient capability to produce rated power and "spare" enough bleed air from the compressor section to pressurize the cabin – a less than desirable situation that was remedied with more powerful versions of the engine. A pressure relief valve was set to vent cabin air overboard if pressurization exceeded 4.0 psid.

In terms of performance, the Model 90 increased cruise speeds to nearly 300 mph and the Beechcraft marketing department lost no time in espousing the many virtues of the King Air. As aviation pioneer Clyde V. Cessna once said, "Speed is the only reason for flying," and customers were soon selling or trading in their venerable Model 18s or Queen Airs for the ultra-modern, 280-mph King Air. The airplane was enthusiastically embraced by every corporation and company that took delivery of the "jet prop" executive transport. Pilots long accustomed to managing piston engines had to

“The airplane was enthusiastically embraced by every corporation and company that took delivery … ”

learn how to handle the PT6A-6 powerplant as well as the pressurization system. They were, however, soon singing the praises of the Model 90’s quiet cabin, fuel-efficient engines, ease of handling and its superior climb and cruise performance compared with the Queen Air or competitor’s airplanes.

The company produced 112 Model 90 King Airs from 1964-1966 when production switched to the upgraded Model A90 that first flew on November 5, 1965. …

With the introduction of the King Air, Olive Ann Beech and the Beech Aircraft Corporation launched business aviation into the “Jet Age” and set yet another standard for the industry to follow. The highly popular King Air series, however, was only beginning to flex its sales muscle and the years ahead would witness development and introduction of an entire “royal family” of turboprop-powered, cabin-class airplanes that served with distinction in both the corporate and military marketplace.

There is still a strong market for King Air models produced in the past and those in production today, and it doesn’t look like it will be slowing down anytime soon.

Long live the King Air! KA

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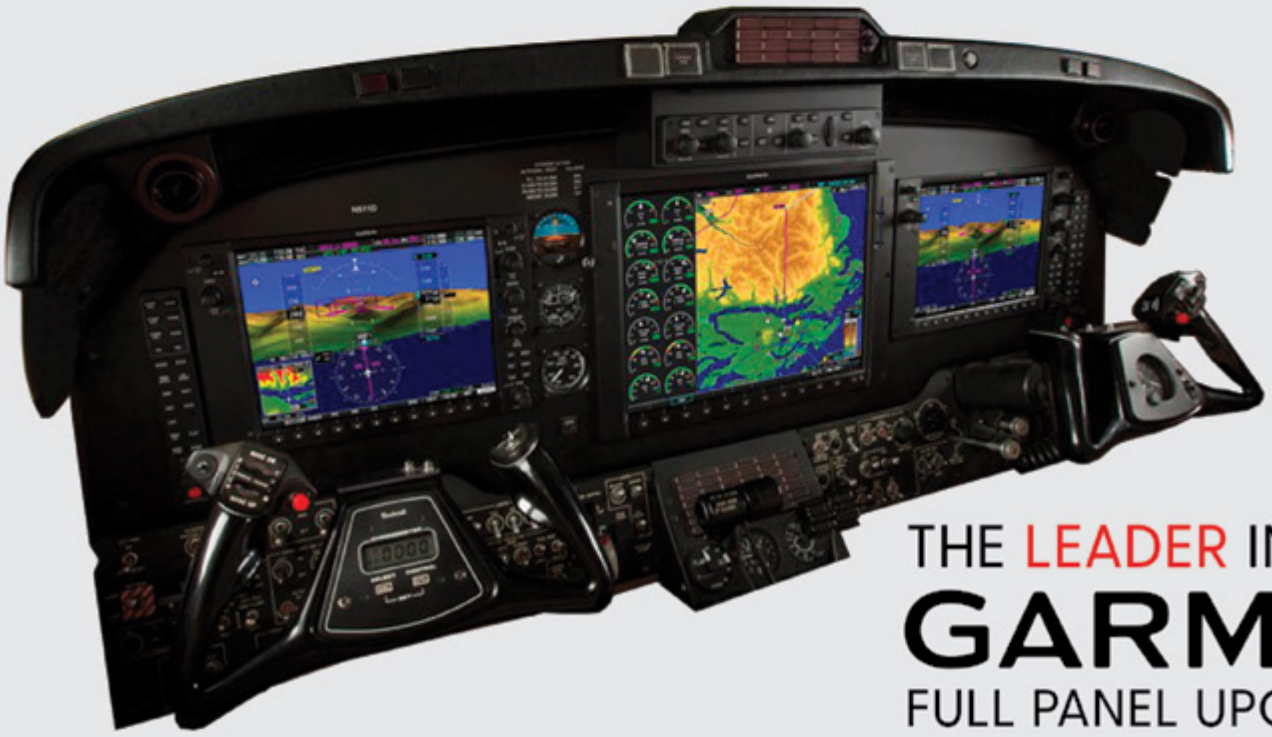

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Registration for King Air Gathering (KAG) 2024 is scheduled to open Feb. 12. Taking place at The Greenbrier, located near White Sulphur Springs, West Virginia, the event will be held Wednesday, May 15 through Saturday, May 18 with a variety of speakers and educational seminars, as well as vendor exhibits and social activities. It is expected to be a sold-out event, so register soon!

A National Historic Landmark, The Greenbrier resort has been operating since 1778 and has been dubbed as "America's Resort" due to hosting 28 U.S. presidents. It sits on 11,000 acres providing a variety of offerings from championship golf courses, a variety of other outside activities, historical tours, spa services, a fitness center and so much more.

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agenda. The airport offers airline service, as well as general aviation facilities providing business and personal aviation support including ground handling, fuel servicing, aircraft tie-down and hangar services and more. Go to *https://mylwb.com/about/general-aviation* for additional airport information.

For more details about the event and to register, go to: *https://kingairnation.com/gathering-2024.*

Make plans now to attend King Air Gathering 2024, May 15-18 at The Greenbrier. KA

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Mount Rainier's 14,410-foot peak, known as Columbia Crest, as viewed from the south slopes. In this early June photo the summit was still snow covered. In recent years, the summit rock becomes visible in the warmest summer months, as the glaciers receded up and down the slopes.

The Upper Left Corner

Part 2:

Flying To and Touring Washington State's National Park Lands

by Matthew McDaniel

In Part One, we flew to the greater Seattle area and toured the National Park Service (NPS) lands northeast and northwest of the Seattle metro area. That included North Cascades National Park (NCNP), Olympic National Park (ONP) and the various associated National Recreation Areas and NPS lands. In this section, we'll continue our tour of NPS lands in the Pacific Northwest, south and southeast of Seattle.

A Hot Ticket

The Cascade mountain range in the Pacific Northwest is best known for its string of massive volcanoes, most of which are still considered active. From the most northern Mount Baker, just south of the Canadian border, to northern California's Lassen Peak, the range is home to over a dozen stratovolcanoes. These steep-sided volcanoes are prominent landmarks during any flight in visual conditions and, on clear days, can often be seen from well over 100 miles away. None are considered even dormant, much less extinct, and all are monitored for seismic activity by multiple scientific organizations tasked with evaluating any hazards and issuing warnings to the surrounding population.

In the Seattle area, airports providing access to the most famous and accessible peaks are on the metro area's southern reaches. Mount Rainier National Park (MRNP) and Mount Saint Helens National Volcanic Monument (MSHNVM) are southeast and south of Seattle, respectively. While access to those areas is certainly easy enough from the major airline hub of Seattle-Tacoma Int'l Airport (KSEA), it would seldom be the primary choice of King Air category aircraft. South of KSEA, several airports are far more likely to host corporate and charter traffic, in general, and King Air traffic, in particular. The closest of those is Tacoma Narrows Airport (KTIW), a Class D airport under the lateral limits of the Seattle Class Bravo. Tacoma offers two full-service FBOs, rental cars and multiple Instrument Approach Procedures (IAPs) at both ends of its single 5,000-foot x 100-foot paved runway. Located immediately adjacent to the famous Tacoma Narrows Bridge, pilots and passengers will have quick access across Puget Sound to the city of Tacoma and the NPS sites which lie beyond. Slightly further southwest is another Class D airport, Olympia Regional (KOLM). Olympia is Washington's capital city and offers many reasons to visit for business or pleasure. But, as a regional airport, it is also well suited. It provides a 5,500-foot x 150-foot paved runway with IAPs to both ends and a 4,100-foot x 150-foot crosswind runway for those days when the winds are howling in from the Pacific coast. Two pilot-controlled fields are also adequate for King Air operators and positioned within reasonable driving distance of both MRNP and MSHNVM: Chehalis-Centralia Airport (KCLS), located between its namesake cities and South Lewis Co. Airport (KTDO), just outside the town of Toledo, Washington. As always, use caution when planning, as both offer suitable runways and IAPs, but the latter lacks rental car services and Jet-A fuel.

A Decade Volcano

Mount Rainier (also referred to as Tahoma Mountain) is considered one of the most visually magnificent, yet approachable, mountains in the U.S. The darker side of it is the reality that it's considered well overdue for a major eruption. This makes it a "decade volcano" (one

Narada Falls, a 188-foot waterfall located on the south face of Mount Rainier, is the easiest to access within MRNP due to its proximity to Mount Rainier Highway.

Deep gorges are everywhere along the Stevens Canyon Road or MRNP. In this area, the water level within the gorge is 150-feet below the tops of the sheer walls that line both sides.

considered likely to experience a major eruption within a decade). But that doesn't seem to keep the tourists away any more than it did in the years and months leading up to the eruption of Mount Saint Helens. With the lack of seismic activity warning an eruption is imminent, there appears little reason to avoid visiting the Pacific Northwest, in general, or MRNP, in particular. Indeed, seismologists and volcanologists believe the mountain will provide adequate warning leading into its next eruptive cycle.

The NPS has long been dedicated to making such areas more accessible to the public while protecting the land, animals, plants and resources from various forms of exploitation. Without the NPS, areas like MRNP would remain inaccessible to all but the most ardent outdoorsman. Thankfully, for those of us who are less "hardy" but equally enamored with nature's wonders, places like MRNP can be enjoyed. The closest entrance into MRNP is at the park's northwest corner, known as the Carbon River Entrance. A Ranger Station fronts this way into the park, and the paved road ends at the park's boundary. Beyond that, hikers, mountain bikers and campers have miles of trails to enjoy, but wilderness and camping permits are required. As a result, the more popular entrance is at the park's southwest corner, the Nisqually Entrance, off Highway 706.

Exploring MRNP by road is limited to the southern and eastern areas. Although there is a road and park entrance on the west side, its primary purpose is to allow access to the White River camping area (elevation: 4,400 feet MSL) and the Sunrise Visitor Center & Day Lodge (at 6,400 feet MSL, the highest point in the park reachable by car). However, those areas and the roads leading to them are typically only open July through September due to frequent and abundant snowfalls making the road impassable the rest of the year. In contrast, the

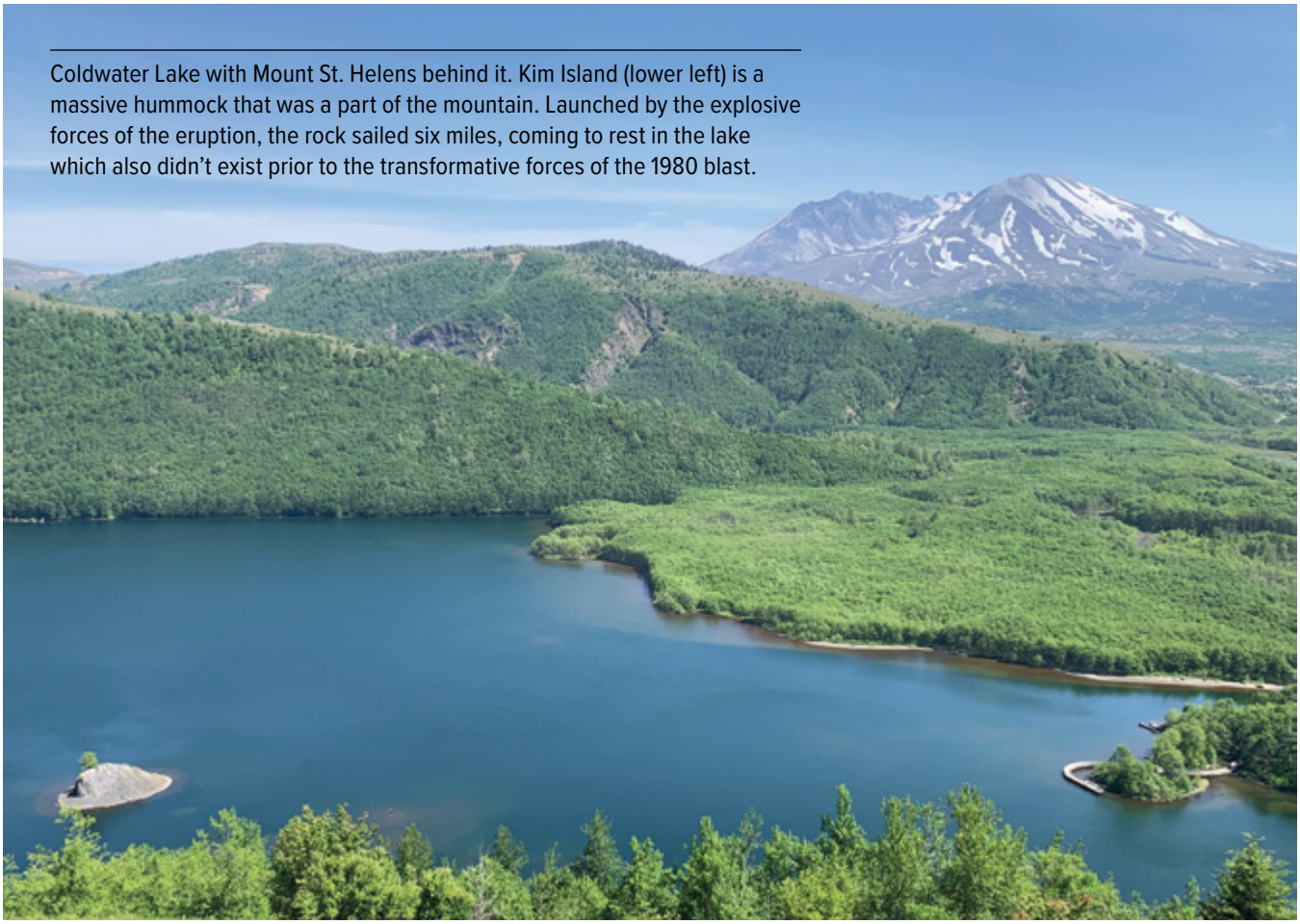
Stevens Canyon Road is open year-round in the park's southwest corner, where visitors can tour the Longmire Museum and stay at the National Park Inn. Through the park's southern sections, the road can usually open sooner and remain open later, providing a much longer season to visit the Henry M. Jackson Visitor Center and the Paradise Inn (elevation: 5,400 feet MSL). From there, visitors can walk to and upon a glacier and to several waterfalls, alpine lakes and meadows painted with vibrant wildflowers.

Like any national park, Mount Rainier is most rewarding when the car is parked and one ventures deeper into the park's interior on foot, and opportunities to do so are plentiful in MRNP. Short loop trails are available from almost every visitor and information center within the park. As one travels west on Hwy 706 (Stevens Canyon Road), there are places to stop and view or hike through a box canyon, multiple waterfalls and a grove of giant trees. These are all easy hikes suitable for most fitness levels. For serious multiday or thru-hikers, the park includes sections of the famous Pacific Crest Trail (PCT) along its eastern border. The Wonderland Trail is entirely within the park, encircling the volcano and covering some 93 miles of stunning scenery. While it is considered one of the most scenic trails in the U.S., it is also categorized as "strenuous" because it has almost no flat terrain. Between its low point of 2,320 feet and its high point of 6,750 feet, hikers can expect to climb or descend continuously for cumulative elevation gain of almost 22,000 feet!

Capping It Off

Just a short drive further down I-5, the notorious Mount Saint Helens awaits. While not a national park, but a National Volcanic Monument, and not as developed as a result, it is still very much worth a visit. The May 1980 eruption which leveled 150 square miles of forest,

The Grove of the Patriarchs Trail in the southeastern corner of MRNP allows visitors to get up close and personal with some of the largest trees in the park. This trail is also very near the Stevens Canyon entrance to the park, for anyone entering the park from the east side versus the more popular southwest entrance.



Coldwater Lake with Mount St. Helens behind it. Kim Island (lower left) is a massive hummock that was a part of the mountain. Launched by the explosive forces of the eruption, the rock sailed six miles, coming to rest in the lake which also didn't exist prior to the transformative forces of the 1980 blast.

The Science & Learning Center at Coldwater sits high above Coldwater Lake, with Mount St. Helens behind. The gap in the mountain's cone is the north face, blown out by the 1980 eruption.

killed 57 people and shortened the mountain by 1,300 feet remains the most destructive volcanic event in modern-day North America. Two years later, 110,000 acres were protected allowing MSHNVM to respond and recover naturally.

Exiting I-5 at Castle Rock and driving Route 504, visitors can first tour the MSH Visitor Center (a Washington State Park site) to learn about the historical eruption, its legacy and how the area has since recovered. Resorts and small lodging choices dot the route for those with enough time to spend a night or two in the area. Book in advance though, as most choices sell out early and close in the offseason.

It was the author's intention to drive Route 504 all the way to its end point at the Johnston Ridge Observatory for the best view of MSH (looking at its north face, the side opened during the eruption). However, amazingly, 43 years later (in early 2023), the eruption was still

impacting the area. Leftover debris from the eruption unexpectedly broke loose and, as it flowed downstream, washed out a bridge on the only road to the observatory. Thus, the Coldwater Lake Recreation Area and Science & Learning Center are (as of this writing) the upper limit of public access along Route 504. But that area offers a great view of MSH's north face on a clear day and some fascinating and easy hiking among many of the hummocks deposited during the eruption. Coldwater Lake was created by landside debris damming a creek during and after the eruption. The small Kim Island in the lake is a single hummock, or a former piece of MSH, deposited over 6 miles away by the power of the eruption.

Although MSHNVM might not hold the prestige of a National Park, it is a perfect place to be reminded of the power of nature. While the events here in 1980 were cataclysmic, life remains resilient and the landscape is recovering faster than anyone predicted. It is different, of course, but alive and thriving, nonetheless. It should also be noted that while Portland, Oregon, was not the focus of this article, it is closer to MSHNVP than Seattle is. Portland has its own international airport (KPDX), two Class D reliever airports and multiple small pilot-controlled fields. Any one of them could serve as an excellent launching point into MSHNVP or MRNP to the north or the Columbia River Gorge National Scenic Area to the south. The latter of which is deserving of an article of its own. KA

Matthew McDaniel is a Master & Gold Seal CFII, ATP, MEI, AGI, & IGI and Platinum CSIP. In 34 years of flying, he has logged over 21,000 hours in total, over 5,800 hours of instruction given, and over 5,000 hours in various King Airs and the BE-1900D. As the owner of Progressive Aviation Services, LLC (www.progaviation.com), he has specialized in Technically Advanced Aircraft and Glass Cockpit instruction since 2001. Currently, he is also a Boeing 737-Series Captain for an international airline, holds eight turbine aircraft type ratings and has flown over 135 aircraft types. Matt is one of less than 15 instructors in the world to have earned the Master CFI designation for 11 consecutive two-year terms. He can be reached at matt@progaviation.com or 414-339-4990.

Cold Weather Checklist

by Dean Benedict

I've been corresponding with a King Air owner about an oil temp problem he has wrestled with for awhile. On one engine, the oil temp is not warming up to where it should be. Initially he worried about icing in the oil-to-fuel heater, but we have since ruled that out. This started my thinking about King Airs in winter conditions and a good time to reiterate points on my recommended Cold Weather Checklist.

All the items I have in mind are addressed at some point in one of the four Phase Inspections and some are addressed at every one. But if you're like the majority of owner-operators flying less than 200 hours per year, your King Air is on the alternate phase program: You take it to your shop once a year for two phases plus the additional scheduled items coming due. For many, their phases are done during mild or hot weather every year, when cold weather readiness is less of a concern. Regardless of when your inspections come due, it never hurts to double check these cold weather items to make sure they are ready to go when you really need them.

I suggest you choose a day when your King Air is not scheduled to fly and the OAT is below 75°F. This way you are not cramming a bunch of extra items into your pre-flight checklist and distracting yourself from your normal routine – never a good idea. Do it in February – make a date with your King Air and show it a little love.

Deice Boot Check

Starting with a good walk-around, take a very close look at all the deice boots. Pay particular attention to the leading edge where splits and cracks are most likely to occur. Don't forget the horizontal stabilizer. For a model 90 you'll need a 6-foot ladder, but for T-tails, if you don't have a safe way to get up there, you'll have to leave it to your shop. You can at least check the wings and make note of any cracks or splits observed on the boots as you'll need to have those addressed by maintenance.

After the visual inspection, run the aircraft at high idle and select auto cycle on the deice switch while

keeping an eye on the vacuum and pneumatic gauges. You want to see those gauges drop and then come back up. The deice switch (auto cycle) opens the pneumatic deice valve and allows air into the boot, causing the gauges to drop. Once the boot is inflated and the air is trapped, the pressure goes back up and so do the gauges. You are looking for 16-18 psi after the drop. If you don't get it, you should be worried about leaks in the boots. Take a closer look for cracks or weather checking and alert your shop accordingly.

Obviously if a boot doesn't inflate properly, it can't bust the ice off the leading edge. In the case of most cracks, your shop can patch them with no problem. The sooner you catch a crack in a boot, the easier it is to patch. A properly installed patch should last a long time; but if it starts to come loose, it usually can be redone. Multiple patches on a boot are not uncommon. Eventually, however, boots need replacement. They are not cheap and it is a labor-intensive job, so paying attention to your boots on a regular basis is good preventative maintenance.

A stern warning about boot dressing: ***Never use anything but the manufacturer's recommended product to dress the boots on any aircraft.*** If you want your King Air to gleam in the sun with shiny black boots, you must rethink this obsession. Any product not specifically designed for your aircraft deice boots will surely hasten their demise, if not utterly destroy them.

I have seen people use car wax and even floor wax on their deice boots. Such products dry out boots faster than no product at all. Likewise, tire dressing products are designed for automobile tires, not aircraft pneumatic boots. Make sure whoever cleans your King Air understands implicitly which product they may use on the deice boots and that no substitutes are allowed. I cannot emphasize this point strongly enough.

External Heat Items

Windshield Heat: To test windshield heat, start with the battery on and select windshield heat. The different King Air models have a variety of windshield heat switches; the point is to cycle the switch through its various positions with a hesitation between each selection. While doing this, look at your magnetic compass – you'll want to see it swing a couple of degrees with each change of position. The compass won't swing if the OAT is too hot. It needs to be 75°F or below for this to work properly. If it's cool outside and the compass doesn't swing, then your windshield heat is not coming on. Have your shop look into it.

I have written articles on windshields and windshield heat for this magazine. See "Windshields 101" in the Mar/Apr 2010 issue [Volume 4, Number 2] and "More on Windshields" in the April 2015 issue [Volume 9 Number 4]. Send me an email if you can't find them.

Fuel Vent Heat: These are the tubes on the bottom of the wings just outboard of the nacelles. They tend to erode on the leading edge and sometimes the fine wires come unglued causing failure to heat. With the battery on, feel the tubes for heat but be careful not to burn your fingers. If it doesn't get hot, add it to your squawk list.

Pitot Heat: As long as you are checking your fuel vents, you might as well check your pitot tubes. *Just remember to take the pitot covers off before flipping that switch or you will have a big, melted mess on your hands!* Believe me, I've done it myself and it's a miserable experience.

There is nothing worse than having a routine and minor check turn into a major fiasco in a matter of seconds. My preventative measure is to take the pitot covers off and put my cell phone and car keys on top of them. This ensures that I put the covers back on when I'm done and I don't get distracted by my phone while focusing on the aircraft.

Stall Warning Heat: On King Air 200s, 300s and 350s the stall warning vane only gets half heat on the ground because the squat switch reduces the heat to compensate for lack of airflow. On those models, if the tab gets warm, but not hot, you are good to go.

Stall warning heat on the model 90s is completely different. Its stall warning heat systems vary from aircraft to aircraft. It requires maintenance manual research by aircraft serial number to ascertain what configuration your 90 has. Suffice it to say, some 90s heat the vane all the time and others cycle the heat on and off. Allow ample time for heating in case yours is on a cycle, but don't just go up and grab it. You could burn your fingerprints off! Especially if your stall warning heats continuously.

If a couple minutes have gone by and you haven't blistered your fingers, add stall warning heat to your squawk list. And while you are at it, make a note for your shop to research what kind of stall warning system is on your 90.

Prop Heat: Although the prop heat boots are an external heat item, you are better off checking this in the air. The manual check done on the ground takes two people – one to turn the prop and feel the prop boots

> **“ … it never hurts to double check these cold weather items to make sure they are ready to go when you really need them.”**

while the other is in the cockpit operating the system and monitoring the gauges. Although recommended by the maintenance manual, I’ve seen this test fall short on many occasions.

I’ve also written articles regarding prop heat and problems with this test specifically. See “Prop Heat” in the February 2019 issue and “Heated Argument – More on Prop Heat” in the April 2019 issue [Volume 13, Numbers 2 and 4 respectively].

Testing your prop heat in flight requires a clear understanding of the type of system installed in your King Air and keeping a keen eye on your prop amp gauge.

FCU Heat: This tube located inside the engine cowl connected to the fuel control carries compressor discharge air (P3 air) which is super hot. This is the least crucial of the external heat items due to the extremely hot air running through it – freezing is highly unlikely. In fact, King Airs with 60-series PT6s (such as 300s, 350s and those with a 60-series Blackhawk mod) do not have FCU heat.

In 200s, the FCU heat comes on when the condition levers are moved forward. The same is true for later model 90s. Earlier 90 models have an FCU heat switch for each engine in the cockpit.

The only time a malfunction of FCU heat becomes an issue is in reverse or in an over-torque situation. FCU heat is checked at every Phase Inspection.

Battery Off

As a friendly reminder, after checking all these items, *don’t forget to turn your battery off.* It’s easy to overlook this when you are poking around your aircraft and not following a preflight or postflight checklist. After years of waking up at midnight and wondering if I left a battery switch on, I came up with a surefire remedy. When working on a King Air with a dual bus system, I leave the beacon switch in the “on” position. The flashing beacon is a constant reminder that the battery is on.

Try it yourself. As you get ready to leave the hangar and you look back at the aircraft on your way out the door, if that beacon is still going, you will happily turn your battery off and be thrilled you didn’t drain it dead. When I’m working on a King Air with a triple feed bus, I use the nav lights as my “battery reminder” since the beacon bus is not powered with the battery on. KA

Dean Benedict is a certified A&P, AI with 50 years of experience in King Air maintenance. He was an inaugural inductee to the King Air Hall of Fame. He’s the founder and former owner of Honest Air Inc., a “King Air maintenance boutique” (with a sprinkling of Dukes, Barons & Bonanzas). Currently, with BeechMedic LLC, Dean and his wife, Lisa, consult with King Air owners and operators on maintenance issues, troubleshooting and pre-buys. Dean performs Expert Witness work on request. He can be reached at *dr.dean@beechmedic.com* or 702-524-4378.

Using Big Numbers

by Tom Clements

Years ago, I was conducting recurrent King Air 200 training with the two experienced and professional pilots of a Midwest corporation. As part of their takeoff briefing, they used the phrase, "We'll use big numbers."

"What did you say?" I asked. "What does that mean?"

Their explanation made a lot of sense to me then, as it does now. It is a procedure that I have adopted and use regularly. I believe it adds a degree of safety that helps to stack the deck in our favor. With one very minor exception – that I will address later in this article – I can see no detriment or downside to it whatsoever. Let me explain.

Not all King Air models have differing takeoff speed numbers depending on conditions. The fine E90 model, for example, bases all of its takeoff data on using a rotate speed of 95 KIAS (knots indicated airspeed) and a 50-foot speed of 100 KIAS. Although Beech does not use the terms V_1 and V_2 for the E90 – reflecting its date of certification, its weight and the rules that then applied – those two numbers would be the 95 and 100. These speeds apply to all airport elevations, all outside air temperatures and all weights. I appreciate the simplicity they provide. Although they may not be "perfect" for all situations, the E90 is such a fine performer that it does very well using them in all situations.

As the King Air history evolved and the larger and heavier model 200 appeared – with first deliveries in 1974 – takeoff numbers became more elaborate. Although I have written and spoken about my disagreement with Beech's choice of V_1/V_R for the 200, I have no problem whatsoever with their V_2 choices. V_2 varies from a low of 99 KIAS – while using approach flaps for takeoff at a light weight of 9,000 pounds – to a high of 121 KIAS – clean, at the maximum gross weight figure of 12,500 pounds. Similarly, the 300-series use a wide range of V-speeds that vary based on flap setting and weight.

Here's the idea of the "big numbers": The day that I first learned of this technique – with the two pilots of

the 200 in the Midwest – we were about to depart from an elevation of 800 feet, at 11,500 pounds, with an OAT of 20°C and about an 8-knot headwind component. However, the crew – years before in the comfort of their hangar office – had worked out a lot of takeoff performance problems for their own home-base airport as well as other airports they frequently used. In all cases, they did the exercise based on worse-than-expected conditions. In this home-base case, they used 1,000 feet elevation, 45°C temperature, 12,500 pounds, no wind, no flaps. They found that both Accelerate-Stop and Accelerate-Go distances were less than the 8,000-foot runway they would be using.

If the airplane can perform satisfactorily using these worse-than-actual conditions, then is it not correct to believe that the actual performance will be better than (and certainly no worse than!) the performance numbers the POH provides even if we use the higher V-speeds for the higher weight? After all, we will reach those speeds in less time and our climb rate, using the higher V_2, will be greater than the chart presents since we are at a lighter weight. As a side benefit, our margin above V_{MCA} and V_S will be greater than what the chart assumes, again due to our lighter weight. In effect, our margin for error is improved when "big numbers" are used. Even if we over-rotate and fall a bit below the "big number" V_2, we may still be at or above the actual V_2 for our real conditions.

The only detriment that comes with using the higher speed appropriate for a greater weight is increased tire wear, since we will be rolling on the runway to a higher speed. Personally, I am very willing to accept the slight extra maintenance cost, thinking the safety benefit it provides makes the cost worth it.

Awhile back, I was involved in transitioning a Phoenix-based flight department from their B200 into their newly purchased 350. The 350 had been extensively upgraded by Stevens Aerospace and Defense Systems (formerly Stevens Aviation) in Nashville as part of the purchase. The upgrades included the Blackhawk XP67A engine swap and installing the Garmin G1000NXi package … making a great airplane even greater!

Being based at Cutter Aviation on the south side of Phoenix's Sky Harbor Airport, the runway we were usually assigned was 7R – 25L, 7,800 feet long. Using the POH, as modified by the Blackhawk STC, I worked a takeoff performance problem using 2,000 feet Pressure Altitude (field elevation is 1,135 feet), 45°C OAT, 15,000 pounds takeoff weight (the maximum limit), Approach Flaps and no wind. Takeoff Field Length came out to be 5,672 feet, more than 2,100 feet less than what we had available. The "big numbers" associated with these conditions were 104, 105 and 109 KIAS for V_1, V_R and V_2. My suggestion was to use these numbers for all of our KPHX takeoffs giving us a safety cushion, since rarely

would all the variables conspire to be as bad as my assumed conditions.

As a side note: With the acceleration this rocket-ship of a King Air has, if the pilot can truly differentiate V_1, V_R and V_2 he/she has better eyesight and reaction times than I!

Before I close, I want to emphasize that all the King Air models up to and including the 200-series are "light twins." Only the 300-series fall into a category in which engine failure on takeoff needs to be officially considered. Although the POMs/POHs for the non-300-series do indeed present data based upon engine failures during takeoff, none of this is FAA-required information.

Consider the E90 again. Just because it uses a V_1/V_R of 95 KIAS and a V_2 of 100, should you always use them? I emphatically answer "No!" Using the long runways – 7,000 feet or more, for example – at most major airports, I would operate the E90 the same as I'd operate an Aztec or Baron or 414. Namely, I'd allow the airplane to fly "when it's ready," having lightened the nose with the correct amount of elevator force. There would be no definite, firm, sudden rotation. The landing gear would be retracted when at least blueline (V_{YSE}) airspeed has been reached. Then the pitch would be raised to about +10°, knowing that if an engine does indeed quit this attitude will eventually yield a speed close to blueline. I would have the HSI's heading bug set on runway heading and I'd be prepared to use my feet to "step on the heading" if I felt asymmetrical thrust. My briefing to the other pilot about engine failure would be, "If the gear has not started up, we are chopping power and stopping. If the gear has started up, we're going."

As I have said more than once recently in articles here, "Just because you can, doesn't mean you should." Treat a King Air's takeoff like a FAR Part 25 Transport Category jet? In some cases, we can. But should we? 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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