King Air

A MAGAZINE FOR THE OWNER/PILOT OF KING AIR AIRCRAFT
JANUARY 2018 • VOLUME 12, NUMBER 1 • $6.50

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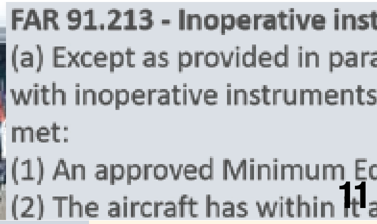

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For Science's

by MeLinda Schnyder

The University of Wyoming owns two Beechcraft King Air aircraft – a 1977 King Air 200T and a 1983 King Air B200 – operated by the Department of Atmospheric Science and based at Laramie Regional Airport.

Personnel at the university use the B200 for transportation while the uniquely-instrumented 200T is the only atmospheric research aircraft in the National Science Foundation-supported fleet operated by a university. Scientists funded by the National Science Foundation can apply to use the King Air for airborne atmospheric science research.

About 50 percent of the research conducted with the 200T, tail number N2UW and equipped with numerous specialized meteorological sensors and data recording equipment, is related to understanding how clouds

s Sake

UW's King Air 200T is the only atmospheric research aircraft in the National Science Foundation-supported fleet operated by a university

The University of Wyoming's 1977 King Air 200T and 1983 King Air B200 in front of the Donald L. Veal Research Flight Center.

National Science Foundation-supported scientists can apply to use the University of Wyoming's King Air 200T for airborne atmospheric science research. N2UW flies about 180 hours per year, supporting three to five projects each year.

University of Wyoming researchers and UW's King Air research aircraft were part of a study that found intense snowstorms in upstate New York just east of Lake Ontario are fueled by a well-organized air circulation driven by the heat released by the lake. While there, they studied one episode of intense snowfall, including one storm that dropped 40 inches in 24 hours.

and aerosols form and how they affect the earth's energy balance.

"The demand for N2UW has been fairly steady at a yearly rate of about 180 hours, supporting three to five projects each year. Recently, there has been much interest in studying wild fire chemistry and a renewed interest in weather modification," said Alfred Rodi, professor in the Department of Atmospheric Science in the university's College of Engineering and Applied Science.

"Our King Air is equipped with many instruments, making it a multi-mission aircraft. Supporting such a facility, which is competitive with research aircraft operated in federal labs, is beyond the scope of what is possible at most universities. The University of Wyoming was fortunate to have started its work with atmospheric research in the 1960s and built up both the engineering capability and operational infrastructure to make this possible."

History of airborne atmospheric science at UW

Rodi is also director of the university's Donald L. Veal Research Flight Center, which houses the King Airs. About 15 individuals are involved with the support of the aircraft, including engineers, technicians, support scientists, pilots, mechanics, a scheduler and office staff. Additionally, several faculty are closely involved with airborne research and with the development of new capabilities.

The University of Wyoming has operated aircraft for atmospheric research for the past 50 years, using three different Beechcraft platforms. Airborne research started at the university in the 1960s when a twin-engine Beechcraft C-45 supported research funded by the U.S. Bureau of Reclamation on the effects of cloud seeding. A doctorate-granting Department of Atmospheric Science was established in 1971, the same year a Beech Queen Air replaced the C-45. The scope of department research broadened in the 1970s, with the aircraft, faculty and staff supporting the National Science Foundation's National Hail Research Experiment and the World Meteorological Organization's weather modification verification projects in Spain.

The university purchased the King Air 200T new in 1977, initially supported through funds from the

The external instrumentation visible on N2UW in this photo includes nose boom, radar mirror and wing tip cloud probe pods. (PHOTO COURTESY OF VANDA GRUBIŠI)

U.S. Bureau of Reclamation for weather modification cloud verification studies through the mid-1980s. It has been heavily modified with a nose boom, large ports for downward viewing using radar and lidar, and many probe locations including the wing tips, where a factory-installed modification was made for fuel tanks but instead of tanks they have mounted instruments.

"The sophistication of the aircraft and instrumentation had increased so much by that time that the faculty realized it could not on its own continue to support the King Air at the high level it had attained," Rodi said. "The solution was found in 1987 when UW negotiated a cooperative agreement with the National Science Foundation (NSF) to make the Wyoming King Air available as a national facility. The Wyoming Cloud Radar was added to the agreement in 2004, the Wyoming Cloud Lidar was added in 2010, and we are presently in the seventh NSF/UW cooperative agreement. NSF-supported scientists are eligible to apply for deployment of these facilities."

Since the cooperative agreement began in 1988, N2UW has supported about 75 projects for the atmospheric sciences community in conjunction with an array of universities and principal investigators.

"We also have a close relationship with the Research Aviation Facility at the National Center for Atmospheric Research in Boulder, Colorado, which operates a C-130 and Gulfstream V under NSF support," Rodi said.

These assets are part of the National Science Foundation's Division of Atmospheric and Geospace Sciences Lower Atmospheric Observing Facilities program. The program oversees a suite of research platforms that are called national facilities and available for use by NSF-funded scientists for research on a wide range of atmospheric phenomena, from severe weather to drought to air quality.

N2UW prepares for one of 24 flights to conduct four- to eight-hour intensive observation periods in Idaho in 2017. UW led the SNOWIE Project (Seeded and Natural Orographic Wintertime Clouds – the Idaho Experiment), which involved collecting measurements to understand the impact of silver iodide released in the clouds. The project was in conjunction with Idaho Power, which is interested in putting more snow on the ground in the mountains, which leads to more water in the rivers and, ultimately, more power generation capability throughout the year.

The Wyoming Cloud Radar is one of the cutting-edge, remote-sensing instruments developed at the University of Wyoming that is often used on N2UW. It provides unprecedented detailed data on cloud kinematics and structure.

The Department of Atmospheric Science at the University of Wyoming has operated aircraft for atmospheric research for more than 50 years, starting with this twin-engine Beechcraft C-45 acquired in 1965.

A quarter of N2UW's projects are in support of Wyoming faculty using funding from other agencies. The university has other atmospheric science assets as well: the Wyoming Air Quality Assessment Monitoring Laboratory and the Mobile Air Chemistry Laboratory, a heavily instrumented Sprinter van, are used for mobile and longer-term monitoring and observation. Together, the laboratories and the King Air facilitate the gathering of and interpretation of atmospheric measurements directly relevant to the state and region.

UW's Department of Atmospheric Science also operates an observing facility at the 11,000-foot level on a mountain near Laramie. The team has also conducted extensive high-altitude balloon launches to study the aerosol composition of the upper atmosphere in Laramie, Antarctica, Europe, Africa and South America.

How N2UW is employed

The aircraft's scientific payload is reconfigured for every project to suit each unique mission. The team can restructure instruments internal to the cabin and external probes that mount in the wing pods and nose extension. N2UW is commonly configured to accommodate Wyoming Cloud Radar and Wyoming Cloud Lidar, cutting-edge, remote-sensing instruments developed at the University of Wyoming that complement in-situ observations at aircraft flight level.

"Our instrumentation is non-standard, so we have versatile engineers and technicians who we put a lot of effort into training," Rodi said. "We also have two FAA-Designated Engineering Representatives (DER) who work with our Inspector Authorized A&P mechanic to implement electrical and structural modifications to the aircraft to support scientific missions."

N2UW has supported a wide range of atmospheric missions across the continental U.S., in Hawaii and Alaska, as well as internationally in Japan, Saudi Arabia, U.K., Finland, Martinique and Dominica. The largest body of work is the study of clouds, which involves flights in and around clouds of different types ranging from wintertime stratus to summertime thunderstorms. UW also regularly conducts low-level probing of the atmosphere near the earth's surface in measuring fluxes of moisture, heat and momentum exchanges between the surface and the atmosphere.

Other project types include studying the dynamics of how clouds form using a sophisticated system to measure winds, and monitoring the atmospheric effects of wildfires. There also have been endeavors related to aviation, from studying the meteorology and turbulence around the approaches to Juneau, Alaska, to microburst and wind studies in Colorado and conducting research on the microphysics of aircraft icing in various types of clouds.

"One very important activity is exposing students to this facility, encouraging the next generation of airborne scientists," Rodi said. "We have done several education-only deployments.

When asked for an example of how the King Air 200T performs in research situations, Brett Wadsworth, UW's chief research pilot shares this anecdote:

"We were flying over the Snowy Range Mountains in southeast Wyoming at the minimum IFR altitude during a snowstorm. We had been airborne for about three hours flying a holding pattern while collecting data. Obviously, during the flight we had burned over 2,000 pounds of fuel and the throttle had slowly been adjusted back to maintain research airspeed of 160 KIAS. We had encountered relatively light to moderate ice during the flight, but the de-ice boots were cleanly shedding with activation and the growth of ice on unprotected surfaces was reasonable and expected. On the next-to-last lap of the pattern, we encountered a new pocket of super-cooled moisture that had moved into the area. The plane shuddered slightly as we hit the pocket. The windshield iced over somewhat, and the wing boots had to be activated as over one-half inch of ice had developed. Aircraft performance remained normal with no power changes required. We decided to make one more lap. When we encountered the pocket of moisture again, the conditions had grown more significant. The aircraft shuddered again, the windshield iced over, and airspeed instantly started to decrease. After pushing up the props to 2,000 RPM and the throttles to max, the airspeed decreased and

finally stabilized at 140 KIAS. The aircraft handling qualities were unchanged, for a heavy aircraft, the engines performed flawlessly and, needless to say, we had had enough research for the day and went home."

Wadsworth's account sums up why the King Air has been the best aircraft to build the university's atmospheric research capabilities during the past 40 years.

"While more engine power would have been greatly welcomed in this instance," he explained, "the aircraft performed flawlessly. N2UW has proven to be an ideal aircraft for the type of operations we conduct. Its reliability, hardiness and predictable handling characteristics are great features when we are planning to investigate more challenging weather conditions."

A typical flight ranges from 3.5 to 4 hours, preserving standard IFR reserve fuel. The aircraft is flown single-pilot, allowing the co-pilot seat to be occupied by a scientist who ensures the desired data is collected during the mission. A UW support scientist sits behind the cockpit to operate the data acquisition system, and one or two seats further back are for scientific observers, typically students. Additionally, there is dedicated UW ground support during field deployments.

"The pilot, principal investigator and system scientist work as a team in flight to adjust profiles to meet mission objects," Rodi said. "We do not just fly boxes based on waypoints, the aircraft is an interactive platform. Our missions usually are highly interactive with the pilot and scientific crew communicating on a hot mic system. While we have a thorough pre-flight briefing, this allows decisions to be made in-flight as the conditions are encountered."

The department's experienced pilots are capable of complex flights that involve decision-making related to potentially hazardous weather and frequent in-flight interactions with the scientific crew and the FAA to modify flight plans.

The King Air's PT6-42 engines are critical because the aircraft has been approved to operate at a 14,000-pound takeoff weight and missions often take the aircraft into icing conditions. The aircraft had 300-amp generators installed originally in 1977. In 2004, the Raisbeck Ram Air Recovery System was incorporated. In 2010, TCAS II, Universal UNS-1Lw FMS and a satellite link were added as well as four-blade Raisbeck/Hartzell propellers. ADS-B installation is scheduled for early 2018.

Rodi said the department would like to find funding to replace N2UW with a new or late model used King Air 350 with the heavy weight option for a 17,500-pound takeoff weight. The King Air platform, though, will continue to play a role in atmospheric science research because of its performance and the accessibility of parts and factory support – even during long, international deployments. KA

Nick Mahon, a senior engineer for the University of Wyoming, removes a cloud spectrometer from one of the wing-tip canisters on the King Air 200T used for atmospheric research.

MELs and the Part 91 King Air Owner-Operator

by Clint Coatney

You are looking forward to taking your King Air out for a flight – the weather is clear, and your passengers are just as excited to get in the air as you are. However, during your preflight walkaround, you notice that one of your strobe lights is not working. Uh oh! There's a possibility you won't be making this flight after all. You start wondering if you are even legal to depart with this inoperative item. We'll come back to this dilemma, but first let's dust off the Federal Aviation Regulations and see what they have to say about flying with inoperative equipment.

FAR 91.213 - Inoperative instruments and equipment
(a) Except as provided in paragraph (d) of this section, no person may take off an aircraft with inoperative instruments or equipment installed unless the following conditions are met:
(1) An approved Minimum Equipment List exists for that aircraft.
(2) The aircraft has within it a letter of authorization, issued by the FAA Flight Standards district office having jurisdiction over the area in which the operator is located, authorizing operation of the aircraft under the Minimum Equipment List. The letter of authorization may be obtained by written request of the airworthiness certificate holder. The Minimum Equipment List and the letter of authorization constitute a supplemental type certificate for the aircraft.

Figure 1: FAR 91.213 (partial)

(d) Except for operations conducted in accordance with paragraph (a) or (c) of this section, a person may takeoff an aircraft in operations conducted under this part with inoperative instruments and equipment without an approved Minimum Equipment List provided—
(1) The flight operation is conducted in a—
(i) Rotorcraft, non-turbine-powered airplane, glider, lighter-than-air aircraft, powered parachute, or weight-shift-control aircraft, for which a master minimum equipment list has not been developed; or
(ii) Small rotorcraft, nonturbine-powered small airplane, glider, or lighter-than-air aircraft for which a Master Minimum Equipment List has been developed; and

Figure 2: FAR 91.213 (partial)

A quick review of FAR 91.213 (see figure 1) reveals that "no person may take off in an aircraft with inoperative instruments or equipment installed unless the following conditions are met: (1) An approved Minimum Equipment List exists for that aircraft. (2) The aircraft has within it a letter of authorization, issued by the FAA Flight Standards district office…"

You're probably wondering … "Even for a King Air?" Yes! FAR 91.213 further states that the only time you don't need to have a Minimum Equipment List (MEL) and still be able to legally fly with inoperative equipment is if you are operating a *nonturbine-powered small airplane* (see figure 2). The King Air is definitely a turbine-powered airplane, so in order to fly with an item that is inoperative, you're going to need to operate our aircraft with an MEL.

"MEL" is short for Minimum Equipment List, but the name is a little misleading because an MEL comprises of many different items besides just a list. It makes more sense to refer to an MEL as a system used to obtain relief from the Federal Aviation Regulations which require that all installed equipment be operative for flight. An MEL will ultimately consist of a Letter of Authorization from the FAA allowing you to utilize an MEL, a list of equipment that may be inoperative, and other documents (Definitions, Preamble, Discrepancy Sheets and Placards) required for a complete MEL system.

For a Part 91 owner-operator, it's quite common and expected to utilize a Master Minimum Equipment List (MMEL) as an MEL. The MMEL contains the items that may be inoperative yet still allow your aircraft to be considered airworthy. The MMEL is developed for a specific make and model of aircraft (i.e., B90, B200) and not for a specific aircraft. It lists the required procedures that must be followed to operate with the inoperative equipment. The bulk of the MEL is contained in this document.


Revision: 14
Date: 09/16/2008

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C.

For Part 91 Operations Only

MASTER MINIMUM EQUIPMENT LIST

BEECHCRAFT MODEL 200 AND F-90

Applicable Models:
200 / 200C / 200CT / 200T / A100-1 / A200 / A200C / A200CT
B200 / B200C / B200CT / B200T / B200GT / B200CGT
and
F90

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DOT Building
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Kansas City, MO 64106-2641

Telephone: (816)-329-3233
FAX: (816)-329-3241

Figure 3: An example of an MMEL that can be found by searching *faa.gov.*

MMELs can be found at *faa.gov* by doing a simple search for "MMEL" (see figure 3). For many pieces of equipment listed in the MMEL, if the equipment is inoperative the item is deferred (or "MEL'd" in pilot speak) in a pretty straightforward manner. But, for others, there may be some "O" and/or "M" procedures that must be followed before the

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
MASTER MINIMUM EQUIPMENT LIST

AIRCRAFT: Beechcraft Model 200 and F-90	REVISION NO: 14 DATE: 09/16/2008	PAGE NO: 33-1

1. SYSTEM, SEQUENCE NUMBERS & ITEM	REPAIR CATEGORY	2. NUMBER INSTALLED	3. NUMBER REQUIRED FOR DISPATCH	4. REMARKS AND EXCEPTIONS
33 LIGHTS				
1. Cabin Lights Systems	C	-	-	(O) Individual lights may be inoperative provided: a) Cabin Emergency Lighting is operative, b) Sufficient Lighting is available for crew to perform required duties and c) Sufficient Lighting is operative for passenger carrying operations at night.

Figure 4: In the MMEL, under section 33, inoperative cabin lights requires "Sufficient lighting is available for crew to perform required duties …"

inoperative item is MEL'd. "O" is short for "Operator" and, in most cases, will be the pilot. The "O" symbol indicates a requirement for a specific operations procedure which must be accomplished in planning and/or operating with the listed item inoperative. An example would be cabin lights that may not be working. In the MMEL, under section 33, we see that inoperative cabin lights requires that "Sufficient lighting is available for crew to perform required duties…" (see figure 4). This would be left to the flight crew to decide if the lighting is adequate and there would need to be a procedure on how that determination is made. Similarly, there is the "M" symbol that indicates a requirement for a specific maintenance procedure which must be accomplished prior to operation with the listed item inoperative. An example of this would be an inoperative fuel flow indicator. Under section 73, in the MMEL, we find "May be inoperative provided both Fuel Quantity Indicating Systems are inoperative" (see figure 5). This procedure would involve maintenance personnel having to make this evaluation. In addition, there are sometimes inoperative items that involve both "O" and "M" procedures (see figure 6, opposite page).

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
MASTER MINIMUM EQUIPMENT LIST

AIRCRAFT: Beechcraft Model 200 and F-90	REVISION NO: 14 DATE: 09/16/2008	PAGE NO: 73-1

1. SYSTEM, SEQUENCE NUMBERS & ITEM	REPAIR CATEGORY	2. NUMBER INSTALLED	3. NUMBER REQUIRED FOR DISPATCH	4. REMARKS AND EXCEPTIONS
73 ENGINE FUEL & CONTROL				
1. Fuel Flow Indicators	B	2	1	(M) May be inoperative provided both Fuel Quantity Indicating Systems are operative.

Figure 5: An example from the MMEL with an "M" symbol that indicates a requirement for a specific maintenance procedure which must be accomplished prior to operation with the listed item inoperative.

The MMEL states that appropriate procedures for the "O" and "M" items are to be published as part of the operator's MEL. Forewarning that this is the part of developing an MEL which requires the most legwork! While the MMEL tells us we may need to perform an "O" and/or "M" procedure, the MMEL doesn't tell us *how* to do that. The *how* will be in our very own "O" and "M" procedures document that is part of the MEL system. These "O" and "M" procedures must be created by the operator. If you fly a relatively newer King Air, you may be in luck! At a recent King Air Gathering a Textron Aviation representative informed the attendees that "O" and "M" procedures exist that have already been created for newer King Airs (I'm sorry he wasn't specific on years and/or serial numbers) that are yours for the taking. Just contact Textron with that request. For earlier King Airs, you're on your own in having to create the "O" and "M" procedures. The operator procedures should be fairly straightforward for the pilot, but the maintenance items may require you to work closely with your maintenance technician/department in creating any of those procedures.

Lastly, the MEL needs to contain a method of documenting any discrepancies that are deferred. The method doesn't need to be too fancy, but it must be a written entry describing the inoperative item.

Once all written documentation is complete, all "O" and "M" are complied with (if applicable), and the PIC has made a final safety of flight determination, a placard is placed on or near the inoperative item's switch or other prominent location where the pilot may see that an item is being deferred. The placard can be something as simple as a sticker with a legible "INOP" written on it.

To summarize, a complete MEL will contain the following items (hopefully in a nice binder):

- Letter of Authorization (LOA) from the FAA allowing you to operate with an MEL
- Definitions (Policy Letter 25)
- Preamble (Policy Letter 36)
- Master Minimum Equipment List (MMEL)
- Operator and Maintenance Procedures
- Discrepancy Log Sheets
- Placards

(Note: The Policy Letters and MMEL are free to download from *faa.gov*.)

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
MASTER MINIMUM EQUIPMENT LIST

AIRCRAFT: Beechcraft Model 200 and F-90	REVISION NO: 14 DATE: 09/16/2008	PAGE NO: 30-4

1. SYSTEM, SEQUENCE NUMBERS & ITEM	REPAIR CATEGORY	2. NUMBER INSTALLED	3. NUMBER REQUIRED FOR DISPATCH	4. REMARKS AND EXCEPTIONS
30 ICE AND RAIN PROTECTION				
10. Engine Inertial Ice Vanes (Continued)				
2) Engine Inertial Ice Vane Actuators				
a) Dual Motor System (200 series only)	C	2	0	(M)(O) The Actuator on the Intake System may be inoperative provided: a) Inertial Ice Vanes are secured in the EXTENDED position, b) Performance Data with Ice Vanes Extended is used, and c) Ambient surface temperature is 15 degrees Celsius or below for takeoff and flight operations.

Figure 6: Some inoperative items involve both "O" and "M" procedures, and the MMEL states that appropriate procedures for the "O" and "M" items are to be published as part of the operator's MEL.

Back to the Original Question …

Returning to whether you can fly with your inoperative strobe light. An MEL Decision Making Tree is always helpful in guiding you through the process (see figure 7). Luckily for you, you do fly with an MEL! You consult your MMEL and see that the inoperative strobe light is allowed to be deferred, and it's actually a simple one involving no "O" or "M" procedures. With a little magic of your pen, you're able to "write up" the strobe light and decide that the lack of a strobe will present no safety of flight issues. With a placard in place next to the strobe light switch, you let your passengers know that you'll be well on your way in no time!

In conclusion, remember that unless every installed item is working on your King Air, your aircraft is not considered airworthy. To get the ball rolling on operating with an MEL, you'll need to contact your local FSDO and let them know your intent. The FAA inspector will then be able to let you know the next step in your request. It's certainly my hope that this article takes out some of the mystery of MELs and gives you a head start on utilizing one. Having an MEL simplifies your operation in the long run and you'll find that the MEL allows you the flexibility to fly with inoperative equipment while staying safe and legal. KA

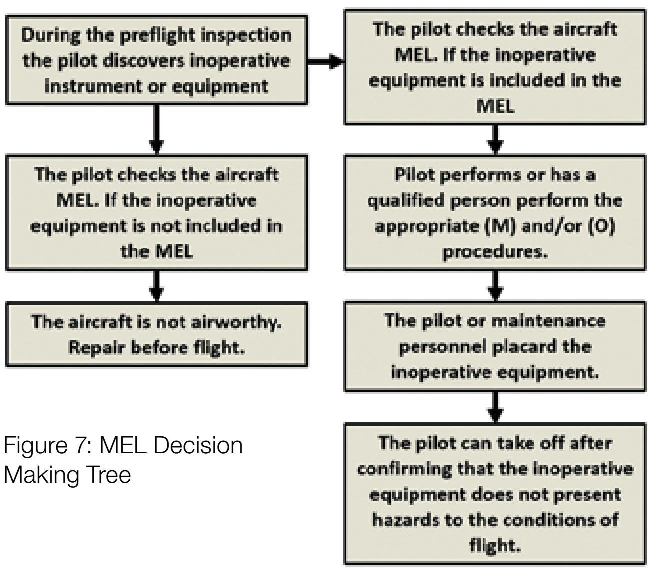

Figure 7: MEL Decision Making Tree

Clint Coatney is an ATP-rated pilot typed in both jet and turboprop aircraft. His diverse aviation background includes Check Airman duties at a regional airline and thousands of hours as an instructor specializing in turbine aircraft operations. Clint is an instructor pilot at King Air Academy and can be reached at *clintcoatney@gmail.com*.

News Update

by Kim Blonigen

Tax Reform Bill Signed into Law Commended for Aviation-related Provisions

The new tax overhaul package referred to as the "Tax Cuts and Jobs Act" was signed into law by President Trump on December 22, 2017. Two key provisions that aviation leaders are praising are the immediate expensing of both factory-new and pre-owned (used) aircraft, as long as it is the taxpayer's first use of the aircraft. Businesses had been depreciating aircraft over a five-year period, and it did not include used aircraft.

Under the legislation, starting in 2023, there will be a phasedown of bonus depreciation in increments of 20 percent each year for qualified aircraft purchased and placed into service before January 1, 2027.

The other aviation-applauded provision for the general aviation industry is the managed aircraft measure, which has been a disputed item over airline ticket taxes being improperly imposed on aircraft management fees. Under the new legislation, business aircraft owners that hire a management company to provide support services will pay the non-commercial aviation fuel tax, and not the 7.5 percent Federal Transportation Excise Tax.

The tax legislation does repeal the "like-kind" exchanges for business property, in which businesses could defer taxes on sales of equipment if they were purchasing new equipment. According to the NBAA, it "plans to work through a broad coalition to seek an extension of immediate expensing and the reinstatement of like-kind exchanges of business equipment."

House Passes Bill to Strengthen GA Security

In mid-December, the House of Representatives passed the "Securing General Aviation and Commercial Charter Air Carrier Service Act of 2017" (H.R. 3669) sponsored by Rep. Ron Estes (R-4-KS) that would improve security procedures for general aviation and commercial charter air carriers with the following:

- Require the Transportation Security Administration (TSA) to conduct a cost and feasibility study of establishing web-based access to the Secure Flight system for commercial charter operators.
- Authorize the TSA to provide screening services to commercial charter operators in areas other than primary passenger terminals, if the carrier makes that request through the airport's federal security director.
- Require the TSA to provide Congress with an implementation plan for general aviation recommendations approved by the Aviation Security Advisory Council.
- Authorize the TSA to designate at least one employee to be responsible for issues and stakeholder engagement related to general aviation.
- Require the TSA to issue a report to Congress on the feasibility of requiring security threat assessments for all candidates seeking flight school training to operate any aircraft with a maximum certificated takeoff weight of more than 12,500 pounds in order to increase vetting of such candidates.

A report on the bill by the House Committee on Homeland Security said that because general aviation and commercial charter air carriers represent a small fraction of TSA's stakeholder community, the industry's issues and concerns often "fall to the bottom of the agency's priorities. This bill seeks to elevate some of these important, but often overlooked, security issues."

The bill is currently with the Senate and has been referred to the Committee on Commerce, Science, and Transportation. KA

Rambling Replies

by Tom Clements

When readers send a question to me or Kim Blonigen, our editor, I try to respond directly without delay. Some questions concern a specific item that affects so few operators that publishing the reply here in my monthly column would merely be wasting ink. However, some questions lend themselves to a wider audience. This month I am publishing some of those questions and my responses in the hope that they will be of interest to most of our King Air owners and operators.

Starting Procedure for Newer versus Older 200s

This question comes from Xandi Newell in Charlotte, North Carolina:

We have a question for Tom Clements regarding the King Air B200's electrical system. We operate two King Air B200s: serial numbers BB-1246 and BB-1613.

On serial numbers prior to BB-1444, the generator is turned off prior to cross-starting the second engine to prevent blowing a current limiter. This requirement is not necessary for BB-1444 and after. There is much debate among our pilot group as to why the difference exists, with some speculating that the GCU prevents the operating generator from producing excessive current during *generator-assisted cross-starts, but we cannot find any documentation that states this directly.*

Could Mr. Clements shed some light on this for us?

This was my reply:

Yes, just as you theorized, the GCU limits the output of the operating generator whenever the opposite start switch is activated. This current limiting began with the 300-series, but was added to the 200-series at BB-1444.

With a department such as yours that operates 200s that fall both before and after the change date, I suggest that the earlier procedure – generator-assisted start, not a generator cross-start – be used as SOP for all the 200s you fly. Leaving the generator on increases the chance of experiencing a current limiter failure during the cross-start on the earlier airplanes, whereas doing the Off-On procedure does not harm the later aircraft in any way. In fact, I think it marginally reduces starter-generator drive spline and brush wear, as well as reduces the ITT rise slightly on the operating engine. By standardizing on the earlier procedure, it eliminates the "Which one am I in today?" thought process.

One additional comment, as discussed in my book: If the stabilized N_1 speed of the first engine, on the battery, exceeds 16 percent – i.e., "Meets your expectations" – then you are wasting time and effort to charge the battery between starts. It's certainly not *incorrect* to do so, but rather is unnecessary. So get to High Idle on the first engine, turn its start switch off, activate the other start switch, then turn the first generator switch on (Reset - Pause - On) as the second N_1 gets past 12 percent or so. It saves time and can be done for *all* models of the 200-series. Only if the first stabilized spool-up is less than 16 percent do you need to do battery charging between the starts.

Thanks for the good question and never hesitate to ask if I can help with other questions.

My reply sparked a follow-up question:

Good morning to you, Tom!

Thank you very much for the quick response regarding the GCU on starting the different King Air 200s. It was such a delight hearing directly from you and I really appreciate the time you took delving into the differences.

I do like the notion of keeping things consistent when operating the *two different serial numbers. So far, (where's that wood upon which to knock?) I have been able to keep the two separate by always verbalizing the elements of the starts as I go along, but we all know there will be that one time… Since it's not hurting anything, I'll adopt that standardized procedure right away. Thanks!*

I have a copy of your book, so I do indeed recall your mention of charging the battery between starts being unnecessary if we see spool-up upwards of 16 percent. What I do wonder, however, is why we wouldn't need to introduce fuel on the second engine prior to turning on the generator of the first engine. You write: "So get to High Idle on the first engine, turn its start switch off, activate the other start switch, then turn the first generator switch on (Reset - Pause - On) as the second N_1 gets past 12 percent or so." *Our checklist for the BB-1246 King Air B200 has the step of bringing condition lever on second engine to Low Idle when we get past the 12 percent, and then turning on first engine generator.*

*I noticed this in both your book and a video I saw on the **King Air Academy's** YouTube channel, so I was curious about that.*

Cheers! Xandi

My reply:

Hello again, Xandi. On a scale of one to 10, what I am about to write is probably a two or three, so not critical at all. Doing it either way is fine. But …

I choose to get as much N_1 – and hence as much airflow – through the engine before I ever introduce fuel. By doing so, I guarantee the coolest possible start because of the extra cooling air. You will notice the Beechcraft checklist says that on the first start you can bring in fuel at 12 percent N_1 or above. I disagree and think it should state "when the N1 stabilizes," to get more airflow and hence a cooler ITT peak. Also, this lets you have a better feel for battery health: Does the N_1 stabilize at 14 percent or 18 percent?

As long as the first engine's generator is off when the starter switch for the second engine is activated, the chance of blowing a current limiter is basically zero. The huge peak amperage flow only occurs when the engine is stopped; no rotation. When rotation begins, the amperage demand drops off rapidly and significantly. So, by getting the first generator on now and allowing it to spin the starter faster – we see maybe 20 percent or even more when N_1 stabilizes versus the approximate 16 percent with battery alone – we achieve a much cooler starting ITT peak.

So, as I said, either method works fine, but my goal is to keep temps as low as practicable and my technique does that.

More 200 (C-12) Questions

C-12 Instructor Pilot Galen Collins, of the Navigator Development Group, in Dothan, Alabama, asked the following four questions. My responses follow each question:

Thank you for your receptiveness to answering questions about King Air equipment. I have a few questions below if you have the time. I am flying US Army C-12s (King Air B200C).

As part of the engine oil cooling system, there is a vernatherm valve that will automatically open and close a small door below the engine oil cooler. The mechanism to operate the door would appear to be based on the temperature of the oil itself as I have physically seen the door in action without the engine operating. Our operating manuals do not discuss this feature and I was wondering if you might have any further information about it – how does it operate and at what temperatures makes it work?

All aircraft oil systems contain the vernatherm valve, the purpose of which is to control oil temperature by directing oil to either flow through the passages of the oil cooler or to bypass around them. During a typical start, for example, the oil cooler bypasses until oil temperature starts coming up. In the development stages of the 200, it was found that the location of the oil cooler – in conjunction with the then new design of the cowling – did not permit sufficient oil cooling under hotter conditions due to insufficient airflow. So, the oil cooler door was added to permit increased air flow across the cooler's fins. You are correct, the oil temperature itself works a mechanism that overcomes the spring that is tending to hold the door closed. You have probably observed that the door may be wide open at the start of a lunch break, but then is closed an hour or two later. (When it's closed, you can pull it open with your fingers.)

I wish I understood and could present the exact working of the mechanism better, but I do not have that detailed knowledge. All I can state is that once the vernatherm is directing all oil through the cooler – the bypass going closed – now the next step is to start opening the door.

We have various models of the C-12, but all are with the PT6A-42 engines. Aircraft equipped with the three-bladed prop system use TGT for the engine temperature gauge and the aircraft equipped with four bladed props use ITT on their gauges. ITT versus TGT – why are these different when they both get their temperature sensing at the same position in the engine?

If I recall correctly, the very first C-12 models did indeed mark the temperature gauge as TGT (Turbine Gas Temperature). It was "funny" in that those models that first appeared in 1976 were supposed to be "off the shelf" standard 200s, yet they incorporated many, many, changes that the folks at Ft. Rucker desired and this was one of them. As time passed, the later C-12 models became much more standardized with the civilian ones and the old familiar ITT came back into use. Exactly when that happened, I do not know. My guess would be that four-blades versus three blades has nothing directly to do with the TGT/ITT debate, but rather merely shows that most of the later models were built with standard four-blade props. If a previous model were upgraded to four-blades, I speculate that TGT would remain.

In reference to the autofeather system, why was 90 percent N_1 chosen as the setting for when the system becomes armed versus any other setting?

The whole purpose of those left and right power lever switches is to allow the autofeather system to differentiate between a desired and commanded power reduction – as should happen when the power lever is retarded – versus an uncommanded power reduction that happens when the engine rolls back even while the power lever has not been retarded.

N_1 and power go hand-in-hand, but is not even close to a linear relationship. At sea level, 90 percent N_1 typically is closer to 50 to 60 percent power, not 90 percent power. By using this value, it almost guarantees that there will not be "nuisance" activations of feathering. Expressed another way, when less than 60 percent power is being carried, almost always flight conditions would not be as challenging as when very high power was required, i.e., takeoff and go-around.

I should probably add that if a significantly higher N_1 switch setting were specified, then it increases the chance that autofeather would not arm during a low-altitude, cold-day takeoff. The values that I quoted above are ones applicable to sea level where 100 percent of rated engine power can be achieved. As you know, N_1 is going up every time we push the power levers forward in the climb. So, as odd as it first seems, one of the lower N_1s we will observe when high power is requested is the one at takeoff, not the one in cruise flight at altitude. If the switches were set for, say 95 percent, there are lots of low altitude, winter takeoffs in which autofeather would not arm.

In reference to the starter, when it is engaged and the N_1 accelerates during the start sequence, is the starter physically turning so long as the start switch is engaged, or at some point does it become freewheeling, or maybe just "along for the ride?" I'm *not aware if there is a clutch feature inside the starter. It seems that the higher speed of the N_1 would at some point drive the starter.* The starter is located on the accessory gearbox. *Does it direct-drive the compressor or is there a series of gears involved?*

Realize that the starter is also the generator. There is no clutch and it never disengages from the accessory gearbox (AGB) unless the mechanic removes the nuts on the studs! Typically, the engine becomes self-sustaining – where the energy from the exhaust gases causing rotation of the compressor turbine is enough to run the engine, without starter motor assistance – in the low 40 percent N_1 range, so after that it can be said that the starter is indeed "going along for the ride" even though it is still connected. One never wants to be in a hurry to turn the starter switch off since doing so before self-sustaining speed is attained will result in N_1 rollback and a hot start, if fuel is not immediately cutoff. The starter time limits do not apply once exhaust flow starts. The only problem with leaving the start switch on is, of course, that the generator circuit is prevented from operating! The POH says to turn the starter off at "50 percent or above," but I encourage people to wait until full low or high idle stabilization has occurred. As you said, there comes a time that the starter is not doing the driving but is being driven by the AGB … when that happens, it is setting the stage for it becoming the generator.

I thank Xandi and Galen for these interesting questions and encourage other readers to send questions my way whenever I may provide some clarification or guidance. KA

King Air expert Tom Clements has been flying and instructing in King Airs for over 44 years, and is the author of "The King Air Book." He is a Gold Seal CFI and has over 23,000 total hours with more than 15,000 in King Airs. For information on ordering his book, contact Tom direct at *twcaz@msn.com*. Tom is actively mentoring the instructors at King Air Academy in Phoenix.

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

Beechcraft's First Light Twin

Impressed by the success of Piper's PA-23 *Apache* and Cessna's Model 310, in 1956 Beech Aircraft Corporation entered the emerging light twin-engine market with its Model 95 Travel Air.

by Edward H. Phillips

In postwar America, general aviation's "Golden Age" was born in the late 1940s and by the early 1950s was maturing rapidly, attracting thousands of would-be aviators yearning to fly. In the nation's "Air Capital of the World," Wichita, Kansas, airframe manufacturers such as Beech Aircraft Corporation and the Cessna Aircraft Company were thriving, reaping the benefits of a commercial market that had not been so vibrant since the end of the "Roarin' Twenties."

A look at records from Beech Aircraft Corporation for the year 1953 reflects the public's growing interest in aviation. That year the company introduced the D35 *Bonanza* – the latest edition of its highly successful, single-engine Model 35, and the much larger Model B50 *Twin Bonanza.* The latter filled a gap in the product line between the Bonanza and the venerable Model 18 (nearly 1,000 of the stalwart "Twin Beech" had been built for feeder airlines and executive transport since 1945), and President Olive Ann Beech anticipated that worldwide commercial and military sales for 1954 would exceed $80 million.[1]

Beech Aircraft, however, was not the only airframe manufacturer reaping the benefits of America's resurgent love affair with flying. Across town, the Cessna Aircraft Company had built more than 1,800 new monoplanes in 1953, and overall sales had increased 55 percent by comparison with 1952. The nation's third major light airplane builder, Piper Aircraft Corporation, based in Lock Haven, Pennsylvania, reported a 48 percent increase in sales, thanks in part to expanding use of aircraft expressly for business flying. Company officials

The Model 95 *Badger* lightweight twin was renamed "Travel Air" when it was introduced in 1956, chiefly to avoid confusion with the Russian TU-16 bomber code-named "Badger" by the U.S. Air Force. The Model 95 not only filled a gap in the Beechcraft product line between the Model 35 Bonanza and the Model 50 Twin Bonanza, it offered Beechcraft customers an alternative to the Piper *Apache* and the Cessna Model 310. (WICHITA STATE UNIVERSITY LIBRARIES, SPECIAL COLLECTIONS AND UNIVERSITY ARCHIVES)

Beechcrafters had built more than 300 Model 95 twins before production shifted to the B95 for the 1960 model year, followed by the B95A in 1961. The Travel Air was a logical choice for Bonanza owners desiring to step up to a twin-engine Beechcraft for night and IFR flying. Only 81 of the B95A version were built, making it a relatively rare Beechcraft. (WICHITA STATE UNIVERSITY LIBRARIES, SPECIAL COLLECTIONS AND UNIVERSITY ARCHIVES)

reported that the increasing popularity of Piper airplanes acquired exclusively for executive flights grew by more than 67 percent in 1953 compared to only 40 percent two years earlier.[2]

The majority of airplanes being sold were single-engine models, chiefly because they were smaller, more affordable than twin-engine models that were larger and far more expensive to own and operate. By the early 1950s, however, some industry officials, particularly Howard "Pug" Piper and his brother Thomas, both senior executives at Piper Aircraft, realized that their company's product line needed a low-price, small, all-metal, four- or five-place twin-engine design that would be Piper's flagship. As of 1952, nobody in Wichita had plans to build such an aircraft because little or no demand existed.

Until the early 1950s, Piper Aircraft was known almost universally as the company that built the legendary J-3 *Cub* and marketed a host of similar single-engine, conventional-gear airplanes burdened with 1930s-era welded steel tube airframes with fabric covering. One man, Pug Piper, knew the time had come to leave the obsolete Cub and its siblings behind and develop a new, modern aircraft featuring aluminum alloy construction and two dependable engines. When discussions began Pug eagerly championed developing concepts for a twin-engine airplane.[3]

Pug realized that thousands of pilots and businessmen were using small aircraft to help sell their products, but as the rate of utilizing those airplanes increased, there was a growing cry for multi-engine redundancy. By 1952, the absence of, and increasing demand for, a low-priced, economical, light twin-engine airplane was the major impetus for development of the *Apache*. Piper, however, was not alone in its quest for a small twin-engine monoplane. West of the Mississippi River in Kansas, Cessna Aircraft President Dwane L. Wallace already had his engineers working on a new design that would become the Model 310, and Beech Aircraft had flown its new Model 50 Twin Bonanza late in 1949.

Unlike Beech Aircraft and Cessna Aircraft that had manufactured thousands of twin-engine monoplanes during World War II, Piper Aircraft's engineers had little or no experience designing or producing that type of airplane. Undaunted, chief engineer Walter C. Jamouneau and his staff tackled the project with enthusiasm. By early 1952 his team had designed and built an engineering prototype designated the PA-23. It first flew on March 4, 1952, 14 months after development had begun. In its original configuration, the PA-23 was a mixture of old and new technologies that reflected the company's inexperience with modern airplanes.

As with all Piper models at that time, the Apache's fuselage was constructed of welded steel tubing with fabric covering, and the empennage featured twin vertical stabilizers that resembled those used on the Beechcraft Model 18 (later replaced by a single vertical stabilizer borrowed from the aborted Piper PA-6 *Sky Sedan*). The wings were aluminum alloy except for the outer panels, and a tricycle, retractable landing gear system was installed.

During 1953, the Apache was gradually redesigned to make it a truly modern, marketable airplane. Although

More improvements were made to the Travel Air for the 1963 model year, including a larger third cabin window shared with the twin-engine A55/B55 "Baron," and a redesigned nose section. Price for a standard-equipped D95A was $49,500. (WICHITA STATE UNIVERSITY LIBRARIES, SPECIAL COLLECTIONS AND UNIVERSITY ARCHIVES)

the welded steel tubing surrounding the cabin structure was retained, the entire fuselage was covered in sheet metal. On July 29 of that year, the PA-23 production prototype made its first flight and seven months later, on January 29, 1954, the Civil Aeronautics Authority (CAA) certified the Apache. In keeping with Piper's reputation as the general aviation industry's price and value leader, the PA-23 sold for $32,500 – significantly lower than the projected price of Cessna's Model 310 ($49,000), and far below the Beechcraft Model 50 that sold for a stout $70,000.

In the PA-23, Piper Aircraft Corporation had succeeded in designing a comfortable four-place, high-performance twin-engine airplane that provided a cruise speed of 170 mph and a maximum range of 700 statute miles. Pilots liked the Apache. It was easy to fly thanks in part to its low wing loading, and the two four-cylinder Lycoming engines were economical to operate and boasted an 800-hour time between overhaul (TBO).

Meanwhile, in Wichita on January 3, 1953, Cessna Aircraft engineering test pilot Hank Waring took the prototype Model 310 aloft for 30 minutes on its maiden flight. The sleek, all-metal twin-engine Cessna represented a new beginning for the company that had begun as early as 1950 when officials realized that a growing number of pilots wanted a fast, modern, twin-engine airplane capable of flying cross-country at night and under instrument flight rules. The Model 310 was Cessna Aircraft's first lightweight twin since the prewar Model T-50 *Bobcat,* which was built in large numbers for the Royal Canadian Air Force and the United States Army Air Forces and Navy as the Crane I/Crane 1a and the AT-8/AT-17/JRC-1, respectively.[4]

After engineers and marketing personnel completed a design study during May-July 1951, an airframe mockup was built followed by the engineering prototype. When the airplane flew that day in January 1953, there was nothing else like it in the skies. Flight testing progressed rapidly, and a second prototype soon joined the first in an accelerated flight test program that led to CAA certification in March 1954 – three months after CAA approval of Piper's Apache. The first production run of Cessna's Model 310 began rolling down the assembly line in April followed by initial deliveries in May.

The 310 was powered by six-cylinder Continental O-470-B opposed piston engines, each rated at 240 horsepower and equipped with constant-speed, full-feathering propellers. Two wing tip fuel tanks held 100 gallons of avgas, and the electrically-operated tricycle landing gear featured a steerable nosewheel. Maximum speed was more than 220 mph with a service ceiling of 20,000 feet. As with the Apache, the Model 310 was the right airplane at the right time and the marketplace embraced it with gusto. Production ceased with the 1981 Model 310R after Cessna had built more than 5,400 commercial and military versions of its popular light twin.

Finally, in 1956, management at Beech Aircraft Corporation decided the company needed a light twin of its own. Sales of the Apache and Model 310 were strong and Bonanza owners wanting to step up to higher performance had no choice but to consider a Cessna or Piper product. In addition, Beech Aircraft's product line lacked an airplane to fill the gap between the Model G35 Bonanza and the Model 50 Twin Bonanza.

Using their usual "cookbook" process, Beech engineers borrowed heavily from the Bonanza's fuselage, cabin and wing structure to create to Model 95 *Travel Air*.[5] The name was a throwback to the halcyon days of the 1920s when the Travel Air Company was among the nation's most prolific manufacturers of open-cockpit biplanes and enclosed-cabin monoplanes. Both Walter H. Beech and Olive Ann Mellor (Beech) had "learned the aviation business" at Travel Air. They never forgot the lessons it taught them when they bravely co-founded the Beech Aircraft Company in 1932, smack in the middle of the worst economic debacle America had ever faced. During the years 1925-1932 the company built more than 1,500 aircraft, including the famous Type "R" racer that won the 1929 Thompson Cup at an average speed of more than 194 mph.

Progress on design and development of the Model 95 progressed smoothly during 1955 and into 1956. The latest Beechcraft would seat four in a comfortable cabin that shared its large windows with the G35 Bonanza. Two, four-cylinder Lycoming O-360-A1A opposed, carbureted piston engines were selected to power the Model 95. Each engine was rated at 180 horsepower and turned two-blade, constant-speed, full-feathering propellers.

An engineering prototype was ready for flight in the summer of 1956, and first flew on August 6. Certification testing continued through 1956 and into early 1957, with the CAA issuing Type Certificate 3A16 on June 6 of that year. In terms of performance, the new Beechcraft was competitive with its two adversaries from Lock Haven and across town in Wichita, with a maximum speed of 208 mph compared with the Model 310 at more than 220 mph and the Apache's 183 mph. As for price, the Beechcraft cost $49,500 – about equal with the Model 310 but more than the Piper Apache at less than $35,000.

Maximum gross weight of early production Model 95 airplanes, which began rolling off the assembly line for the 1958 model year, was 4,000 pounds. The wings held 112 gallons of useable fuel that gave the Travel Air a range of more than 1,400 statute miles. The two-engine service ceiling was 19,300 feet and rate of climb was 1,350 feet per minute. In addition, the Model 95 could maintain an altitude of 8,000 feet, at gross weight, with one engine inoperative.

Beechcrafters built 173 airplanes in 1958 and another 129 in 1959 before production changed to the improved Model B95 and B95A for the 1960 model year (by comparison, Cessna built 228 Model 310B and 262 Model 310C during 1957-1959, and when production of the Apache ceased in 1962, Piper had built more than 2,000 examples of the PA-23).

Additional upgrades to the D95A created the Model E95 – the final version of Beech Aircraft Corporation's popular light twin. By 1968, however, customer demand for the larger, more powerful Beechcraft Model B55 Baron ended production of the Model 95 series after more than 700 had been built over a 10-year period. (WICHITA STATE UNIVERSITY LIBRARIES, SPECIAL COLLECTIONS AND UNIVERSITY ARCHIVES)

The light twin market was always highly competitive, and to keep the Model 95 a stronger contender, in 1960 the company introduced an upgraded version designated Model B95. The most salient change was a 19-inch extension of the cabin section to provide more leg room for rear seat passengers, while total area of the horizontal stabilizer and elevators was increased to improve pitch control. Beech engineers also added a swept dorsal fin forward of the vertical stabilizer that enhanced the airplane's visual appeal.

Maximum gross weight was increased by 100 pounds to 4,100 and useful load climbed to 1,465 pounds. Priced at $51, 500 for a standard-equipped airplane, the factory produced 150 B95 twins before it was replaced by the Model B95A for the 1961 model year. The chief upgrade was installation of fuel-injected Lycoming IO-360-B1A powerplants each rated at 180 horsepower, and a higher maximum speed of 210 mph. Price remained at $49,500 but only 81 of the B95A were built.

The next version to enter production was the Model D95A that debuted in 1963. It featured the larger, curved third cabin window used on its single-engine cousin, the Model N35/P35 Bonanza. The forward baggage compartment was enlarged to 19 cubic feet of volume, and the nose section of the fuselage was more tapered than those of earlier production airplanes. As with all the Travel Air twins, a combustion heater in the nose section provided warmth in the cabin, and the tricycle landing gear was electrically operated. Despite these upgrades, price remained at $49,500 for a D95A with standard equipment.

As the lightweight twin-engine market continued to evolve in the early 1960s, pilots, and in particular businessmen who flew their own airplanes, wanted more speed, cabin comfort, range and utility. In response, in 1960 Beech Aircraft took the basic Model 95 platform, enlarged the airframe and installed more powerful engines to create the Model 95-55 *Baron*.

Soon, the Baron was outselling the smaller Travel Air and by 1968 the decision was made to terminate production of the Model 95. The final version was the E95, of which only 14 were built that year. The E95 received only minor improvements that included refined cabin interior appointments, a one-piece windshield that was first used on the S35 Bonanza in 1966, and more tapered propeller spinners. The final Travel Air built was serial number TD-721.

Although not built in large numbers as were the Model 310 and PA-23, for 10 years the Model 95 series lightweight twin held its own against the competition and successfully filled a niche in the company's production line until bigger and better Beechcrafts arrived on the scene. KA

NOTES:

1. *The Aircraft Year Book* – 1953; Aircraft Industries Association of American, Inc., Lincoln Press, Inc., Washington, D.C.
2. Ibid
3. Of William Piper's three sons, Pug was chiefly responsible for introducing new aircraft designs into the company's product line. As one engineer who knew him well said, "He was always willing to give a concept a try, no matter where it came from. He would pursue promising ideas but if they failed, he immediately stopped working on them and looked at other alternatives."
4. During 1941-1944 the company manufactured more than 5,300 of these airplanes, many of which were sold as war surplus and helped to form America's postwar air transport industry. The airplanes served with small feeder airlines and air taxi/charter operators that sprang up across the nation, and for basic corporate transportation.
5. Beech Aircraft initially designated the Model 95 as the *Badger* but soon dropped that moniker to avoid confusion with the American code name for the Soviet Tupolev TU-16 bomber.

Ed Phillips, now retired and living in the South, has researched and written eight books on the unique and rich aviation history that belongs to Wichita, Kan. His writings have focused on the evolution of the airplanes, companies and people that have made Wichita the "Air Capital of the World" for more than 80 years.

Garmin Announces Approval of Additional G5 Electronic Flight Instrument Capabilities

Garmin announced it has received Federal Aviation Administration (FAA) and European Aviation Safety Agency (EASA) approval of additional G5 electronic flight instrument capabilities, including the installation of G5 in place of an existing directional gyro (DG) or horizontal situational indicator (HSI) in select certified fixed-wing general aviation aircraft. When paired with select VHF NAV/COMMs or GPS navigators, the G5 can be considered primary for displaying magnetic heading, VOR/LOC guidance and/or GPS course guidance, as well as distance and groundspeed. The installation of dual G5 electronic flight instruments can also eliminate the dependency on a failure-prone vacuum system in aircraft for attitude and heading information. Garmin has also completed an amendment to the existing G5 supplemental type certification (STC) that allows certificated aircraft owners to mount the G5 flush with their instrument panel. Additionally, utilizing the new GAD 29B adapter, the G5 electronic flight instrument is also now compatible with a wide range of third-party autopilots.

EASA approval of G5 as a DG/HSI comprising of a bright, 3.5-inch sunlight readable liquid crystal display (LCD), the G5 electronic flight instrument is approved for installation in place of the aircraft's existing DG/HSI via a Garmin-held STC for hundreds of certificated fixed-wing aircraft models. Utilizing the new cost-effective magnetometer, the G5 electronic flight instrument displays magnetic heading. A dedicated rotary knob allows pilots to easily select and adjust course and make heading bug selections. Suitable for installation in place of a standard 3-1/8-inch (79 millimeters) flight instrument, the G5 measures 3-inches (76 millimeters) in depth with the back-up battery so it can easily be integrated into a wide range of aircraft. The G5 electronic flight instrument is also approved for flight under VFR and IFR conditions.

When paired with the GTN 650/750, GNS 430W/530W, non-WAAS GNS 430/530 or GNS 480 navigators, the G5 is approved as a primary source to display vertical and lateral GPS/VOR/LOC course deviation when available, as well as groundspeed and distance to the next waypoint[1]. In a G5 configuration that is paired with the GNC 255 or SL 30 NAV/COMM radio, the G5 is approved as a primary source to display lateral and vertical course deviation[2] when available. Additionally, a single magnetometer is capable of supplying magnetic heading information to two G5 electronic flight instruments simultaneously.

The G5 electronic flight instrument offers a wide range of flexible panel configuration options, along with the reliability associated with a modern electronic flight instrument. Installation configurations vary as up to two

G5 displays can be incorporated into a single aircraft panel in several approved combinations, including the attitude, DG/HSI or turn coordinator positions. In dual installations, a secondary G5 can revert to display attitude information in the unlikely event of a failure in the primary attitude indicator position. A pilot-selectable menu on the G5 DG/HSI enables the manual selection and interchange between the attitude indicator and DG/HSI display. Each G5 is also paired with a four-hour back-up battery for use in the event of an aircraft electrical system failure. In dual G5 configurations, customers receive dual ADAHRS and dual back-up batteries, offering safety-enhancing redundancy.

Third-party autopilot compatibility for FAA and EASA-registered aircraft utilizing the new GAD 29B adapter, the G5 DG/HSI can interface with a variety of autopilots to provide heading and course error to drive the autopilot. With a compatible navigation source, the G5 can also interface with select autopilots for coupled flight in heading and navigation modes. Additionally, when interfaced with a GTN 650/750 or GNS 430W/530W, the G5 can provide GPSS roll steering navigation from the navigator to the autopilot. Pilots can simply select GPSS on the G5 and heading mode on the autopilot and the autopilot will fly smooth intercepts, holding patterns, procedure turns and more.

Garmin and third-party autopilot support includes the following autopilots:

- Century I/II/III
- Century IV (AC), IV (DC)
- Century 21/31/41

- Century 2000
- Cessna 300B, 400B
- Garmin GFC 600
- Honeywell (Bendix King) KAP 100/150/200
- Honeywell (Bendix King) KFC 150/200
- Honeywell (Bendix King) KAP 140
- Honeywell (Bendix King) KFC 225
- S-TEC 20/30/40/50/55/60-1/60-2/65
- S-TEC 55X

The G5 electronic flight instrument is FAA and EASA certified and is available immediately for installation in hundreds of certified fixed-wing aircraft models. The G5 DG/HSI electronic flight instrument for certificated aircraft can be purchased through the Garmin authorized dealer network starting at $2,449 USD, which includes the install kit, magnetometer, back-up battery and the STC. When interfaced with a compatible GPS navigator, the G5 DG/HSI electronic flight instrument is available with the GAD 29B adapter starting at $2,975 USD. The G5 is also supported by Garmin's award-winning aviation support team, which provides 24/7 worldwide technical and warranty support. For additional information, visit: *www.garmin.com/aviation*.

1. Requires GAD 29B and GMU 11 magnetometer.
2. Requires the GMU 11 magnetometer.

Blackhawk Names Western Aircraft as Authorized Dealer

Blackhawk Modifications, Inc. recently welcomed Western Aircraft to their global network of Authorized Dealers. Located in Boise, Idaho, Western Aircraft is an FAA authorized service center, certified aircraft repair station (FE6R532N), and worldwide distributor of parts and avionics for many of the world's top aircraft manufacturers and OEMs including Beechcraft. The addition of Western Aircraft expands Blackhawk's Dealer Network to 84 Authorized Dealers worldwide.

Western Aircraft said as a full-service modification center for King Airs, they believe their customers will benefit greatly from the relationship and all that Blackhawk has to offer. The service center is currently installing a Blackhawk XP52 Engine+ Upgrade on a King Air B200 at their facility in Boise. As a result, this B200 will see a 31 percent increase in available horsepower which translates into a 27-knot gain in cruise speed, increased high/hot takeoff performance, and an approximate operating cost savings of more than $45,000 per year.

For more information, visit *www.blackhawk.aero* and *www.westair.com*.

Advent's eABS Receives STC for King Air 300/300LW Variants

Advent Aircraft Systems continues to increase the aircraft count certified to accept its groundbreaking anti-skid braking technology. The FAA has granted an STC for the Advent eABS™ for all King Air 300 and 300LW aircraft. These aircraft variants join the King Air B300 and B200 variants that were STC'd in February 2016 and June 2017 respectively. The STC applies to Beechcraft King Air 300/300LW series aircraft equipped with Rockwell Collins Pro Line GPS 4000S or Garmin G1000/430W/530W avionics.

Beechcraft built 230 model 300/300LW variants. The 300LW, with its lower take-off gross weight, was purpose-built to comply with European regulations.

Advent said that creating a wide base of aircraft which can use its technology has been part of the plan from the outset, and this STC is just one more step in that process. As already received for the B200/B300, the company expects EASA, TCCA and other certifications for the 300/300LW to follow shortly.

Advent eABS sales to date have included installations on the King Air B200, B300 and B300C, including heavy weight, high flotation gear and CAT Soft Touch tire variants.

The Advent eABS may be ordered through all Textron Aviation company-owned service centers as well as select independent authorized King Air service facilities. In anticipation of the STC and winter weather, Advent has produced a limited number of eABS units that are available for immediate shipment to service centers.

All eABS components are approved for on-condition maintenance, with a minor inspection at 1,500 hours, and are listed in the MMEL for King Airs. System installed weight is 29 pounds.

For further information or to order, operators may contact Tom Grunbeck, VP-Marketing and Sales, (203) 233-4262, *Tom.Grunbeck@AircraftSystems.aero* or their preferred Advent authorized dealer.

PWI

Be BRILLIANT.

LED Lighting Provider PWI Partners with Rose Aircraft Services

PWI announced they have made Rose Aircraft, a premier FBO operating in Mena, Arkansas, as an Authorized Installation Center for their products.

The products that will be available by Rose Aircraft include PWI's latest offering of LED reading lights, which feature PWI-exclusive, heat-reducing technology that allows the lights to run cooler than incandescent and competitors' LED products. PWI reading lights have a vastly increased lifespan from their incandescent counterparts, as well as a brighter and more directed light for better illumination.

ROSE

AIRCRAFT SERVICES

PWI's line of LED cabin lighting retrofits for King Air 300, 200, 100, and 90 series aircraft will be offered as well. These retrofits are "plug 'n play" style, so they are designed to be simply swapped out for the existing lighting fixtures and power supplies. This removes the need to remove the interior or rewire the aircraft.

All products can be purchased directly through PWI, and are also sold through their Authorized Installation Centers and Distributors, all of which can be found on the company's website at *pwi-e.com*.

For more information, you can visit the PWI website listed above, call (316) 942-2811 or email *sales@pwi-e.com*. More information about Rose Aircraft can be found at *www.roseaircraft.com*. KA

Technically...

RECENT SERVICE BULLETINS, ADVISORY DIRECTIVES AND SAFETY COMMUNICATIONS

From Multi-Engine Turboprop Communiqué # ME-TP-006

Date: December 2017

ATA 28 – Special Airworthiness Information Bulletin (SAIB) HQ-18-08

The FAA has released Special Airworthiness Information Bulletin (SAIB) HQ-18-08, [information shown below], for a fuel contamination on 36 civilian aircraft. Some of the affected aircraft are Textron Aviation turboprops. (*Editor's Note:* King Airs included on SAIB are listed below for your convenience/reference.) If your aircraft is called out as one of the affected aircraft, it is Textron Aviation's recommendation that you inspect the fuel cells for a dry white powdery substance (reference photo shown). Contamination may only be visible in a dry fuel cell. If this substance is found, please contact Turboprop Technical Support at 1 (800) 429-5372 or *teamturboprop@txtav.com* for further instructions.

FAA's SPECIAL AIRWORTHINESS INFORMATION BULLETIN, #HQ-18-08

Subject: Engine Fuel and Control – Operation with Contaminated Jet Fuel

Date: December 20, 2017

King Airs Affected were Fueled by TAC Air (KOMA), Nov. 16-21, 2017:

Date	Registration	Model	S/N	Fuel Qty (gals)
11/17/17	N50VP	BE-C90A	LJ-1185	105 & 108
11/17/17	N846BE	BE-300	FA-16	119
11/18/17	N813JB	BE-C90	LJ-899	131
11/19/17	N200RS	BE-200	BB-1481	330
11/19/17	N793DC	BE-200	BB-1404	299
11/20/17	N460EM	BE-C90A	LJ-1593	210

This is information only. Recommendations aren't mandatory.

Introduction

This Special Airworthiness Information Bulletin (SAIB) advises airplane operators, Fixed Base Operators (FBOs), FAA repair stations and Flight Standard District Offices (FSDOs), and foreign civil aviation authorities of certain airplanes that operated with jet fuel contaminated with diesel exhaust fluid (DEF). This SAIB also requests feedback regarding any service difficulties or operational anomalies of the identified airplanes and recommends that the owners of those airplanes consult with the original equipment manufacturers (OEMs) of their airplane, engine, and auxiliary power unit (APU) to determine the appropriate inspection and corrective maintenance actions on their airplane.

At this time, the airworthiness concern is not considered an unsafe condition that would warrant airworthiness directive (AD) action under Title 14 of the Code of Federal Aviation Regulations (14 CFR) part 39.

Background

During the period between November 16 and November 21, 2017, 36 airplanes with civilian registry identified [King Airs listed left] along with 17 other airplanes were serviced with jet fuel containing DEF at Eppley Air Field Airport, Omaha, Nebraska (KOMA). The DEF was inadvertently used instead of fuel system icing inhibitor (FSII) on two refueling trucks at KOMA and injected into the fuel with each truck's FSII injection system. Only those airplanes identified in Appendix 1 received the contaminated fuel.

DEF is a urea-based chemical that is not approved for use in jet fuel. When mixed with jet fuel, DEF will react with certain jet fuel chemical components to form crystalline deposits in the fuel system. These deposits will flow through the aircraft fuel system and may accumulate on filters, fuel metering components, other fuel system components, or engine fuel nozzles. The deposits may also settle in the fuel tanks or other areas of the aircraft fuel system where they may potentially become dislodged over time and accumulate downstream in the fuel system as described. Several of the identified airplanes have already experienced clogged fuel filters and fuel nozzle deposits that lead to service difficulties and unplanned diversions.

The crystalline deposits are not soluble in fuel, so they cannot be removed by flushing the airplane fuel system with jet fuel. The deposits are soluble in methanol and other polar solvents, but use of these chemicals may have adverse consequences on airplanes and engine fuel system materials. Consequently, OEMs should be contacted to develop inspection techniques and corrective maintenance actions appropriate for each specific aircraft model type.

Jet fuel that has been contaminated with DEF no longer meets the aviation fuel operating limitations of airplanes certificated to operate on Jet A fuel, and therefore cannot be used on those airplanes. Jet fuel that has been removed from airplanes listed should be downgraded to other non–aviation fuel grades and not used on airplanes in the future.

The FAA is monitoring the situation to determine if additional action is required. We are requesting that any service difficulties and maintenance and inspection findings on the aircraft identified be reported to us in support of this effort.

Recommendations

The FAA recommends the following:

1. Owners or operators of airplanes identified contact their airplane, engine, and APU OEMs to determine the appropriate inspections and maintenance actions to remove urea-based crystalline deposits from the fuel system. This may include the removal and replacement of fuel system parts or components affected by exposure to these deposits.
2. Owners or operators of airplanes identified report to the FAA any service difficulties (including fuel filter bypass and clogging incidents), fuel system repairs, and fuel system inspection results related to the presence of these urea-based crystalline deposits.
3. Jet fuel suspected of being contaminated with DEF that has been removed from the airplanes listed be downgraded to other non-aviation fuel grades, and not be used on airplanes.

Paperwork Reduction Act Burden Statement: A federal agency may not conduct or sponsor, and a person is not required to respond to, nor shall a person be subject to a penalty for failure to comply with a collection of information subject to the requirements of the Paperwork Reduction Act unless that collection of information displays a currently valid OMB Control Number. The OMB Control Number for this information collection is 2120-0731. Public reporting for this collection of information is estimated to be approximately five minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, completing and reviewing the collection of information. All responses to this collection of information are voluntary. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to the FAA at: 800 Independence Ave. SW, Washington, DC 20591, Attn: Information Collection Clearance Officer, ASP-110.

For Further Information Contact

Mark Rumizen, Senior Technical Specialist, FAA, 12 New England Executive Park, Burlington, MA 01803; phone: (781) 238-7113; mobile: (781) 402-4609; fax: (781) 238-7199; email: *mark.rumizen@faa.gov.*

The above information is abbreviated for space purposes. For the entire communication, go to www.txtavsupport.com.

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