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Cruising in the

Hayot flies his King Air C90 about 150 hours a year for business and personal use throughout the Caribbean.

Simon Hayot has over 12,000 total hours in various aircraft models, but says he likes the King Air the best. It maneuvers well in the Caribbean and meets his needs.

French Caribbean

Lifetime Pilot Considers King Air the Perfect Airplane for his Missions

by Kim Blonigen

Simon Hayot has spent a lifetime accumulating over 12,000 flight hours in a variety of aircraft models as a Caribbean aviation pioneer, business owner and published author. According to Hayot, there aren't many King Airs operating in the French Caribbean, but his King Air C90 is the ideal airplane for his personal and business missions, as well as leasing it out to test and calibrate airport navigational aids. He said he doesn't plan on getting rid of his C90 anytime soon … unless it's for a King Air 200.

The fleet of Air Caraïbes aircraft at the start of the business.

A Career Worth Writing About

Hayot has lived his entire life in the French Islands of the Caribbean except for short stints in Miami, where he obtained his U.S. pilot's license, and France, where he received his European pilot certificate. "I knew from a very young age that I wanted to be a pilot, so as soon as I was through school, I went and got my licenses," he said. When he came back, Hayot settled on the island of Guadaloupe and started flying as a commercial pilot.

Hayot said when he was starting out as a pilot in the early 1970s, he flew DC-3s and had many adventures. So many, in fact, that he wrote a book that is currently a top seller in France. He plans to have it translated to English and sell it in the U.S. within the next year. The book's title, "Tower, we've got a bull in the cockpit!" Hayot said, is very representative of what's inside. "All the stories narrated in the book are true, and many photos are included, because otherwise nobody would believe it really happened," he said. "It was a different time back then, with a lot less rules! It wasn't uncommon to have large animals as passengers."

Later, Hayot decided to launch an airline where he saw the need. In all, he began three airlines: Guadaloupe Air Cargo, which used DC-3s; Air Calypso that flew between the islands using Short 360-300s; and Air Caraïbes, which operated many types of aircraft, including Dornier DO 228s, Cessna 208 Caravans, Cessna Citations, and King Air 90s and 200s. This array of aircraft was used for shuttles between islands, air ambulance services and travel to France. Hayot later sold Air Caraïbes, which is still in operation today and is the main operator between France and the French Islands of the Caribbean.

Business, Personal, and Special Mission Operations

Hayot purchased his 1978 C90 from his close friend, Patrick Jean, in 2010. The aircraft was previously operated in France as a charter plane, and Jean bought it in 1996 to use for his business in Guadaloupe. Jean's company, Omi-Fly, manufactured lenses for vision glasses and the King Air was operated to deliver its production throughout the Caribbean. "Since Patrick and I are close friends, I have been flying the C90 since he bought it and have flown the most hours on the aircraft than anyone else – 900 hours of my total 2,500 hours in King Airs," Hayot explained. "When Patrick retired, I bought the aircraft from him."

The King Air C90 is now flown by Hayot about 150 hours a year for personal use, as well as business. After he sold Air Caraïbes, he said he needed a new passion, so he launched his own brand of energy drink called

Hayot has written a book, currently a best seller in France, about his adventures flying DC-3s in his early days of being a pilot and he hopes to bring a translated version to the U.S.

The infamous runway at St. Bart's that Hayot says is a "piece of cake" to land on in his C90.

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One of the King Air 200 models that flew for Hayot's airline, Air Caraïbes.


Hayot's upgraded panel with two GNS 430 WAAS, two Garmin transponders, a New Century autopilot and a new radar.

Long Horn. He uses the aircraft to fly throughout the Caribbean to promote the drink.

One of his family's favorite islands to travel to is St. Bart's. "Their runway is famous for being challenging, as there is a hill on one end and a beach and ocean on the other. With the C90, it's a piece of cake! I've never had a problem," Hayot commented. "The King Air is perfect for me. Besides being able to land on short runways, which are located throughout the French Caribbean Islands, it also has a very roomy cabin. When we travel as a family, we go anywhere in the Caribbean and to Florida."

Hayot also leases his King Air twice a year to the Directorate General for Civil Aviation (DGAC), France's version of the FAA, to test and calibrate the airport navigational aids in the French Caribbean Islands of Guadeloupe, Martinique, Haiti and French Guyana. He invested $150,000 for special wiring to be installed in the King Air so it could support the DGAC's calibration bench test equipment.

Since owning the C90, Hayot has upgraded the panel with two GNS 430 WAAS (one Aspen and one Avidyne EX-5000), two Garmin transponders, a New Century autopilot and a new radar. When asked why he wanted to own a King Air, Hayot explained that when he had the C90s and 200s with Air Caraïbes, out of all of the various aircraft they operated, the King Airs were his favorite. "My dream is to one day own and operate a King Air 200," Hayot said, "and one day I will."

There's no doubt that Hayot will make his vision a reality, as he has done his whole life. KA

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Liability Rising: Use of Another Aircraft

by Kyle White

Have you ever allowed someone else to use your King Air or have you used an airplane you don't own? If you are like many individuals or companies, you have "non-owned exposure." If you are a larger company, you likely have non-owned exposures you don't even know about.

Every time you let someone use your King Air through a dry lease or interchange agreement, it is imperative to review your insurance policy for coverage. Additionally, if you are using an airplane you don't own, whether it is a chartered plane, dry lease or interchange agreement, you need to inform your broker so they can ensure you have the right coverage in place. Consider company employees who are private pilots – are you confident they aren't traveling on business in another aircraft?

About 10 years ago, the risk manager for one of our clients called to report a claim. The company owned two Citations, so I was anticipating one of those aircraft to be involved in the claim he was reporting. However, I was actually informed the employee had been in a Bonanza that crashed on final approach to a small rural airport.

The risk manager was as surprised as I was when he got the initial call. He had no idea employees were using alternate aircraft for business purposes. The employee involved in the claim had been asked to survey a large area of land. To save time, he went to the local airport to see if there was a pilot around who would take him up in their airplane so he could do an aerial survey instead. There was a group of pilots hanging around that day, and one of them said he'd be happy to take him up in his Bonanza. Sadly, neither the pilot nor employee survived the flight – stall/spin on final. Additionally, after the fact, it was discovered the pilot had an expired medical and the Bonanza was out of annual. How would your policy respond to this type of claim? Would you still have coverage with an unairworthy airplane and pilot? What if the aircraft was experimental or a piston-powered helicopter? Not all policies have the proper coverage in place to cover these circumstances.

This scenario might be covered under your policy, but it is important to manage your unknown exposures such as this. If you are a business with employees, most likely you have an employee handbook. This is an excellent place to add a section as it relates to business travel. You may make it as limiting or liberal as you want. You could be extremely limiting by stating, "Employees may only travel on FAA-approved Part 121 airline carriers, company owned and operated aircraft, or fixed wing, multi-engine, turbine-powered aircraft operated by two qualified commercially licensed pilots." It doesn't have to be that restrictive, but that is an example of just how limiting you can be in your corporate travel policy. Any exceptions would then have to be approved, by the company, in writing. You can amend your handbook to whatever risk tolerances you are willing to accept. Once guidelines are in place, you can provide them to your insurance company so they are aware you are attempting

to manage your non-owned exposure; resulting in better pricing for your King Air policy.

A common non-owned exposure companies frequently encounter is using another aircraft while theirs is down for maintenance. If you elect to charter an aircraft that is not of similar size and/or type as your King Air, you could be exposing yourself to an uninsured situation, or in a state that leaves two aircraft policies disputing which should be considered the primary. This can get extremely confusing and frustrating for everyone involved. Managing the exposure, and then obtaining approval from the insurance company prior to signing the contract, can eliminate this enormous headache. A contract is absolutely necessary. Everyone is a friend, until there is bodily injury, death, and/or property damage with millions of dollars at stake. A contract will have everything that is agreed upon, in writing. Additionally, you could jeopardize your insurance policy if you assume liability or waive your insurance company's rights. Hire an aviation attorney to create a contract that states precisely who is responsible for damage to the airplane while it is in your care, custody, and control. Most commonly, the contract will state the aircraft owner's policy is primary and will extend to protect the aircraft against physical damage while being operated by the lessee. Additionally, the liability portion of the policy will extend to protect the lessee, and the lessor's policy should waive its rights to subrogate against the lessee.

There are many ways to be in mutual agreement as to who is responsible for what. A benefit to having the lessor's policy being the primary, and the lessee's policy being excess, is that when damage is found at a later date during a phase inspection (FOD) you, the lessee, won't get a phone call stating you damaged the aircraft and need to get your checkbook out.

Here are two claims to consider: Company One had their aircraft down for maintenance, so they borrowed a King Air 200 from Company Two, located on the field. Company One provided their own pilot. On takeoff, the door came open right after rotation. The cost to repair the aircraft came to $200,000. That doesn't include loss of use, extra expense, and diminution of value! There was no written contract between the two parties, so who is left paying for this claim?

The following is a similar story, but with a different crew situation. Company A had their aircraft down for maintenance and needed to take a trip, so they borrowed the same make and model jet from Company B on the field. One pilot was employed by Company A; the other pilot was an employee of Company B. They took off, ingested a bird and came back around and landed. Now, we have a FOD problem. Whose insurance should pay? Again, there is no written agreement.

I cannot stress enough how important it is to create a contract and have it approved by the insurance company before signing it. When the contract has been signed by both parties, have certificates of insurance and endorsements processed to acknowledge and accept the contract. Spending a couple thousand dollars now on a contract could save you hundreds of thousands of dollars later.

From a policy language standpoint for your known and unknown non-owned liability exposures, review your policy, and most importantly, review the conditions and exclusions. The policy could grant you very liberal coverage, only to take away some of the coverage via an endorsement. Looking at actual policy verbiage will allow you to see where coverage is given for use of a non-owned aircraft, but then limit the coverage later in the policy:

> *We will: a) provide the coverage shown in Paragraph 3 "Use of Another Aircraft" if you fly another aircraft; b) under Paragraph 3 "Use of Another Aircraft," pay for physical loss of or damage to other aircraft for which you are legally responsible. The most we will pay is the cost to repair or replace the other aircraft, not to exceed its fair market value or 125% of the highest aircraft agreed value shown on Item 5 of the Coverage Identification Page, whichever is less. You must first pay or bear the highest in motion deductible for an aircraft shown in Item 5 of the Coverage Identification Page.*

Great, you have coverage for using a non-owned aircraft, put the policy away and go fly, right? Not so fast! That was page 12 of 32 of the policy, you should probably keep reading:

Page 25 of 32 states:

> *If there is an accident or occurrence covered by*


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> *your policy involving Temporary Use of Substitute Aircraft or Use of Another Aircraft, your policy will be excess over any other coverage protecting you.*

This means you shouldn't have agreed to have your policy be primary when using somebody else's King Air unless you have approval from your insurance company. This isn't the end of the policy though, keep reading.

Page 30 of 32 says:

> *What is Not Covered: In addition to what is Not Covered in your policy, we will not cover Temporary Use of Substitute Aircraft, Use of Another Aircraft or Newly Acquired Aircraft:*
>
> *a. Unless the requirements of the Coverage Identification Page regarding Pilots and Use are met;*
>
> *b. Unless it is licensed under a standard airworthiness certificate issued by the FAA;*
>
> *c. If it is a multi-engine aircraft in Item 5 on the Coverage Identification Page is a multi-engine aircraft;*
>
> *d. If it is a turbine-powered aircraft unless an aircraft in Item 5 on the Coverage Identification Page is a turbine-powered aircraft;*
>
> *e. If it is a rotorcraft unless an aircraft in Item 5 on the Coverage Identification Page is a rotorcraft;*
>
> *f. If it is a seaplane or amphibian unless an aircraft in Item 5 on the Coverage Identification Page is a seaplane or amphibian.*

As you can see, insurance policies are complex contracts and need to be read and understood. Not all insurance policies are worded the same. Review your policy to ensure you have the coverage you think you do. If you are using a non-owned aircraft, letting someone else use your King Air, or if you are a business with employees, you should first manage your risk. You can do this with a contract between the lessor and lessee of the aircraft to be used. Then have the insurance companies acknowledge and accept the contract via an endorsement and certificate of insurance. For the unknowns, have a corporate travel policy in your employee handbook so employees know what they can and can't travel on for company business. KA

About the Author: Kyle P. White is the president of Aviation Solutions, LLC, an insurance brokerage and risk management company, and a former professional King Air pilot. He can be reached at e-mail *kylewhite@aviationsolutions.aero.*

Fuel System Operation at Shutdown

by Tom Clements

Marc Wolf, a Southern California long-time pilot, instructor, and *King Air* magazine reader, has requested that I write about the different King Air PT6 shutdown fuel purge systems that have been used through the years. I appreciate the suggestion of this interesting topic and will address it here.

First, realize that kerosene is actually more difficult to burn than most people realize. Did your high school chemistry teacher show you the trick of throwing a lighted match into a bucket of kerosene? It probably boggled your mind that the liquid extinguished the match harmlessly, and that no big "Kaboom!" resulted. Either the liquid must be very hot or atomized into a fine mist before combustion is easily achieved.

The fuel nozzles in the PT6 are the devices that atomize the jet fuel into a fine mist that is easily combusted. For this to occur, a tiny, properly-shaped orifice and very high fuel pressure upstream of the orifice are both necessary. The Minimum Pressurizing Valve in the Fuel Control Unit (FCU) won't permit any fuel to leave the FCU and head for the nozzles without at least 80 psi, and in typical cruise operation we may see pressures near 400 psi.

But when the fuel flow is terminated for the purpose of engine shutdown, very quickly the pressure in the fuel manifold drops dramatically and we lose the shove that sent the fuel through the nozzles with enough force to achieve the desired atomization. Now the remaining fuel merely dribbles though the nozzles, entering the still-hot combustion chamber as liquid instead of atomized vapor. This causes more than one problem. First, the high combustion chamber temperature tends to boil off the lighter weight "hydro" part of this hydrocarbon fuel, leaving the heavier weight carbon behind. That carefully designed and meticulously manufactured nozzle orifice now can become partially clogged with leftover burned carbon residue…called "coke." The overall result goes by the name of "coking" of the fuel nozzles and the result is a bad distribution of fuel, non-uniform temperature distribution in the combustion chamber, and eventual premature and/or expensive hot section repairs.

The second problem caused by having the last vestiges of fuel dribble, not spray, in the combustion chamber is the appearance of disconcerting white smoke coming out of the engine's exhaust stacks following shutdown. Those dribbles of liquid jet fuel hit the hot combustion chamber liner surface and are evaporated or boiled into fuel vapor, or fuel "steam." That is the white smoke we see – vaporized, unburned, jet fuel. The coking of the nozzles that likely preceded the appearance of the smoke is damaging. The smoke is harmless. But, it surely gives

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the passengers second thoughts about the safety of their transport since they've been taught that "Where there's smoke, there's fire."

Recognizing the detrimental effects of allowing the fuel to dribble through the nozzles, turbine engine engineers have made provisions to eliminate this condition. In the Pratt & Whitney PT6, starting right from day one, the engines have incorporated a Dump Valve. This device – between the FCU and the manifold(s) feeding the nozzles, often right on the manifold – is held closed by positive fuel pressure, but opens due to spring force at shutdown when fuel pressure drops. It provides a path of lesser resistance allowing the last bit of fuel to dump harmlessly out of a vent tube onto the ramp. With that easier option available, no fuel dribbles through the nozzles since there is an easier way for it to escape.

The first 10 years of King Air production – like all other turbine engines of the time – had fuel venting onto the tarmac at every shutdown. How much? About a half-cup (four ounces) typically. The Environmental Protection Agency (EPA) was created in 1970 during the years of the Richard Nixon administration and one of its early directives was that all this dumping of raw jet fuel onto the airport ramps and then evaporating into the atmosphere or being washed into the storm sewers could not be a good thing for Mother Earth and her inhabitants. It had to be eliminated.

The King Air model 200 – the best seller of the entire series – was in its certification flight test program from October 1972 to November 1973. Facing the coming EPA mandate, Beech was working to incorporate a new shutdown fuel purge on this airplane. Nearly the entire Beech factory workforce was permitted to leave their normal posts and to move out by the runway at Beech field when the prototype, BB-1, made its maiden flight on October 27, 1972. We watched the white plane takeoff and were there for the landing about 45 minutes later. Ah, success, as the plane taxied up to the parking spot near where Mrs. Beech herself, Chairwoman of the Board, and Frank Hedrick, President, were waiting. As the engines spooled to a stop, it was a bit nerve-racking to see tons of white smoke pouring out of each set of exhaust stacks. Hmm, we all thought, are we going to watch BB-1 go up in smoke after just one flight?! The smoke eventually stopped and the engineers went back to their desks for a little more attention to this area of concern.

The system that was perfected and installed on all early 200s quickly made its way onto the other models of King Airs that were being built. Serial number LJ-672 in the C90-series, LW-124 in the E90-series, and B-208 of the A100-series were the first King Airs, other than the 200 model, to have a factory-installed "Fuel Drain Collector" system. Beech offered a kit to add this system to earlier models to bring them into compliance – known as the "EPA Kit" – and some operators got field-approvals for systems of their own design. This all happened in 1975.

The Beech system is comprised of the following elements: (1) a metal, rectangular, collector tank big enough to accept about 20 ounces of fuel, mounted on the lower portion of the aft cowling fire seal; (2) an Up-On/Down-Off float switch installed in that tank; (3) a line going from the tank to a pump; (4) a small electric fuel pump mounted in the cowling near the tank; (5) a line, containing a check valve, going from the pump back into the nacelle fuel tank; and (6) a vent line from the top of the collector tank going to a universal drain tube that vents (don't tell the EPA!) onto the ramp.

The new fuel drain collector pump needed a power supply. It was found that the Fuel Control Heat circuit breaker/switches had enough unused capacity that the power for the collector pumps could be forthcoming through the respective side's Fuel Control Heat switch. Since the switch is normally off prior to shutdown, the half-cup of fuel sits in the collector tank after shutdown. It does not get pumped into the nacelle tank until the Fuel Control Heat switches are turned on following the next start. This causes no problems whatsoever, so don't buy into the misinformation that you should leave the switches on until after shutdown.

Beginning with serial numbers LJ-738 and LW-248 in 1977, Beech stopped wiring the collector pumps to the switches and began having dedicated left and right Fuel Drain Collector CBs installed on the cockpit's right sidepanel. This is also the case with the F90, the LA-series that appeared in 1978.

With all of its complexity of floats and pumps, the Fuel Drain Collector system has proven to be surprisingly reliable and trouble-free. Malfunctions are rather rare, but when they occur they often take the form of a bad float or bad pump that prevents the tank from ever being emptied by being pumped into the nacelle. Usually it will take four shutdowns or more before the collector tank is so full that the overboard vent comes into play. Although we are now contributing to the ramp's pollution just like in the early days, realize that no harm to the engine is taking place as the dumping fuel overflows onto the ramp. If you notice fuel draining at shutdown, you need to have maintenance find and fix the problem.

The other malfunction that can befall the Fuel Drain Collector system is more of a concern than the venting onto the ramp of a small amount of fuel at shutdown. Heaven forbid you receive the dreaded FBO call at midnight telling you that your airplane is spewing fuel onto their hangar floor and you need to get out there *now* to fix it!

The nacelle fuel tank holds about 60 gallons, most of which sits at a higher level than that 20-ounce collector tank. Remember I wrote that the line from the collector to the nacelle contained a check valve? Well, if that valve gets dirty, or hangs up, or won't prevent backwards flow for some other reason…you're trying to stuff the proverbial 100 pounds into a 10-pound sack. Sometimes you will be lucky enough to flush out the valve and have it reseal properly by making the collector pump do its thing. Battery on, fuel control heat switch on, if applicable, wait a couple of minutes and see if the overflow stops…as it surely will. Now turn the switches off and wait anxiously to see if the problem recurs. If it doesn't, you were successful in cleaning out the check valve. If the flow starts again, better get an A&P on the way!

In 1980, beginning with LJ-901, LW-334, LA-58 and BB-666, Beech replaced the fuel drain collector system with a totally different and simpler design: the Bleed Air Purge system. A new, small line was added to the P3 tap-off from the engine and was routed, through a check valve, to a cylindrical accumulator tank mounted roughly where the collector tank had been installed – in the aft, lower area of the nacelle. A line from that accumulator proceeds through a second check valve to the fuel Flow Divider/Dump Valve assembly.

When the engine is operated at high power settings, high N1 speeds, P3 pressure can reach a level of about 100 psia, somewhat higher in the bigger PT6 models and somewhat less in the smaller ones. Since the pressure in the fuel manifold is usually much greater than this, fuel is always trying to back up into the accumulator tank but is prevented from doing so by the check valve. When fuel flow ceases at shutdown, the pressure in the manifold decreases rapidly such that soon the air in the accumulator can escape into the manifold. This shot of air pressure provides enough force to keep the fuel atomizing as it flows through the nozzles into the combustion chamber. Before all of the air shot is expended, all fuel has been purged into the combustion chamber with good atomization…hence, no worry about coking of the nozzles.

Unlike the collector system that the purge system replaced, now there are no moving parts and no electrical power required. In theory, this simpler system should be more reliable and trouble-free. In actual practice, that does not seem to be the case.

Here are two not-uncommon problems. First, if the check valve between the P3 source and the accumulator tank develops a leak, allowing air flow back into the engine from the tank, that trapped 100 psia of air pressure leaks down to near ambient pressure as the engine is operated at idle while taxiing in after landing. So now insufficient air pressure exists to provide the needed purge action and some or all of the residual manifold fuel does its old dribbling into the combustion chamber…with the consequent coking concern and white smoke. Second, if the *other* check valve leaks – the one between

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the accumulator tank and the fuel manifold – then fuel can partially or totally fill the accumulator, displacing the necessary volume of air needed to provide the proper "shot," providing the same result, smoking and coking.

There is a third problem that's rare, but not unheard of. Namely, what if both check valves leak at the same time? Now the fuel that can migrate from the manifold into the accumulator tank can also find its way into the P3 air system. It can lead to a strong kerosene smell coming into the cabin from the environmental bleed air inflow, most noticeable when high power is added during takeoff.

The last few E90s (LW-334 through LW-347), as well as all of the F90s after LA-58 (but not the F90-1s) almost always exhibit smoking at shutdown even when everything is working properly. Why? Because these models have a unique FCU, unlike the FCU installed in other models. Instead of a single fuel line going from the FCU to the Flow Divider/Dump Valve where it then feeds the primary and secondary manifolds, the -28s on the E90 and the -135s on the F90 have two fuel lines exiting the FCU, going to a device called the Start Control, mounted on the aft accessory case. The Start Control does the sequencing of fuel to Primary and Secondary manifolds and also contains the shutoff valve operated by the Condition Lever. Two lines exit the Start Control to connect to the manifolds, and each of these lines is over two feet long. What this means is that there is a lot more fuel line volume and more residual fuel that must be purged at shutdown, yet the accumulator tank is exactly the same size as in all the other models. I am convinced there is an insufficient air charge to properly purge the last bit of fuel through the nozzles…such that smoking is almost inevitable.

There is a straightforward, but rather odd, procedure that should be used for the E90s and F90s with the bleed air purge system and this same procedure can be used on other models that exhibit smoking until check valve problems can be addressed and corrected. What's the procedure? Merely have the ignition exciters sparking during shutdown by moving the Auto-Ignition switches to Arm before pulling the Condition Levers into Cut-off. Remember to turn Auto-Ignition off before leaving the cockpit. Having the ignition sources active at shutdown allows the dribbling fuel to be ignited and burned, solving the smoke issue.

All 300s and 350s were manufactured with the Bleed Air fuel purge system, none having a fuel drain collector system.

The P3 accumulator will not have enough pressure to provide adequate fuel manifold purging if N1 has never reached a high level. It is very common to see some smoke if the engine is started, reaches only idle speed, and is then shutdown.

Some of our readers have experience with the Honeywell (nee Garrett) TPE331 turboprop engine,

a version of which is used on the King Air B100. All 331s also use a P3 fuel purge system, but theirs is a bit more complex with a normally-closed solenoid valve involved. When the shot of P3 air purges the fuel manifolds at shutdown, it causes so much fuel to be sent through the nozzles that engine speed actually *increases* noticeably before it starts to decrease. This phenomenon rarely if ever happens with the PT6. No N1 surge will be seen. What *will* be observed, however, is a momentary delay between pulling the Condition Lever and seeing N1 start to decrease…maybe just a half-second. It's short but noticeable, and something that is not observed with the older collector tank system. If you do not experience the delay, you did not get a good purge and may expect to see some smoke.

I hope this discussion has increased your understanding of these systems and will help in troubleshooting any problems that may occur.

***Correction:** My article that appeared in the August 2015 issue of* King Air *discussed Pressurization System Abnormalities. One of the components I reviewed was the Preset Solenoid valve, and I stated that it was installed on C90 and later King Air models. No, it made its appearance with the introduction of the B90 in 1968; LJ-318 and after all have Preset Solenoids.*

About the Author: King Air expert Tom Clements has been flying and instructing in King Airs for over 43 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, go to *www.flightreview.net*. 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 kblonigen@cox.net.

Under the Influence

by Dr. Jerrold Seckler

Unlike many relatively incomprehensible FARs, the one dealing with alcohol use is reasonably clear.

FAR 91.17 prohibits any person from acting or attempting to act as a crewmember of a civil aircraft: 1) Within eight hours after the consumption of any alcoholic beverage; 2) While under the influence of alcohol; 3) While using any drug that affects the person's facilities in any way contrary to safety; or 4) While having an alcohol concentration of 0.04 or greater in a blood or breath specimen. Alcohol concentration means grams of alcohol per deciliter of blood, or grams of alcohol per 210 liters of breath.

The regulation goes on to describe when you, as an aircraft crewmember, must submit to a blood or breath alcohol test, and that the results of any such tests may be used in any legal proceedings. These include proceedings to evaluate the pilot's suitability to maintain his or her pilot certificate.

Clearly, the FAA is concerned with the sobriety of pilots, and flying under the influence can lead to direct action regarding your pilot certificate. It is also interested in patterns of alcohol abuse and this is something that is evaluated during your FAA medical examination. In this article, I will discuss how much alcohol is too much according to the FAA standards.

Complying with the eight-hour bottle to throttle rule is easy, but how likely is it that you will meet the 0.04 standard eight hours after your last drink? That depends on two factors; how much alcohol you ingest and how rapidly your body metabolizes alcohol.

In terms of how much you ingest, let's use the "standard drink" as a baseline. This drink contains 14 grams of pure alcohol. In practice, this translates to 12 ounces of beer, five ounces of wine or 1.5 ounces of an 80 proof spirit. These standards are somewhat arbitrary and assume beer to be five percent alcohol by volume and wine to be 12 percent. Many modern versions of these beverages have a slightly higher alcohol content.

Ethyl alcohol, the alcohol found in alcoholic beverages, is absorbed into the bloodstream directly from the stomach and small intestine. Absorption occurs fairly rapidly and as a rule of thumb, one standard drink will raise the blood alcohol level by 0.02 percent. This can take as little as 20-40 minutes. Rates of absorption do vary with the weight of the drinker and the amount of food in the stomach. You absorb alcohol faster if your stomach is empty. Blood alcohol concentration can also

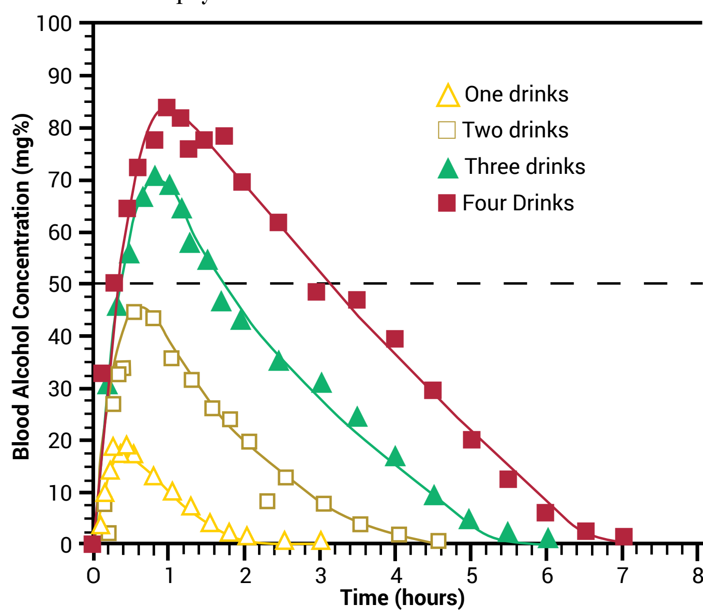

Figure 1: Blood alcohol concrentration (BAC) after the rapid consumption of different amounts of alcohol by eight adult fasting male subjects.

(Adapted from Wilkinson et al., Journal of Pharmacokietics and Biopharmaceuticss5(3):207-224, 1977.)

vary with the sex and size of the individual drinker. Generally speaking, the same amount of alcohol will raise the blood alcohol level more in a smaller person than a larger one, and more in a female than a male.

Another useful rule of thumb is that alcohol is metabolized at a rate of about 0.016 percent per hour. This rate of metabolism is relatively constant among all individuals, but can be slower in persons with liver damage who don't produce normal amounts of the enzyme that is responsible for alcohol breakdown, or persons who, for genetic reasons, produce slightly different and less effective versions of those enzymes. Another way to look at this is to understand that it takes a little over an hour to metabolize one standard drink. So if you drink more than one standard drink per hour, your blood alcohol level will rise faster than your body's metabolism can lower it.

Figure 1 shows the blood alcohol concentrations at various times after ingestion of one, two, three or four drinks over a one-hour period. The results are given in mg percentage. (To convert to BAC concentrations, divide by 1,000 so a concentration of 20 mg percent is equal to a BAC of 0.02.) Notice that it took over four hours for the subjects who had four drinks in rapid succession to get back to the 0.04 FAA standard. Had the person continued to drink over the next few hours, it is quite possible that it would take longer than eight hours from the last drink for their blood alcohol level to drop to below 0.04. In fact, if you had nine drinks over a four-hour period, you would be above the FAA limit eight hours after the last drink. Admittedly that's a lot of drinking, but remember that the FAR also prohibits acting as a crew member when under the influence of alcohol. That could be interpreted in many ways including suffering from a bad hangover that was impairing your performance.

It's clearly important to limit your alcohol intake when a flight is on the horizon. Not only should you consider modifying the eight-hour rule to 12 hours, but you should limit your intake so that all the alcohol is out of your system several hours prior to acting as a pilot. KA

About the Author: *Dr. Jerrold Seckler has recently retired after practicing medicine (urology) for over 40 years and as an active AME for 25 years. He has over 6,000 total hours, 2,200 of those in his 2001 Cirrus SR22. He is an ATP, CFII, former COPA Board Member and a ground instructor at CPPPs.*

The items discussed in this column are related to experiences by Dr. Seckler in his many years as an AME, and made hypothetical for the article. Any information given is general in nature and does not constitute medical advice.

Ted's Twin (Part One)

In 1937, the Beech Aircraft Company introduced its first multi-engine, cabin-class transport that would become the undisputed icon of business aviation and the grand patriarch of the legendary Beechcraft King Air.

by Edward H. Phillips

It had been five years since the dreadful "Black Thursday" of October 1929 had inaugurated the worst collapse of prosperity in American history. Millions of people were out of work. Breadlines and soup kitchens struggled to fill empty stomachs. A new phrase, "Hey, buddy, can you spare a dime?" was heard from coast to coast. Worse yet, the Midwest "bread basket of America" turned into a gigantic dust bowl as layers of precious topsoil were blown as far east as New York City.

Despite these woes there was, however, a dim light at the end of the tunnel: President Franklin D. Roosevelt's often controversial "New Deal" social and governmental programs were beginning to pay off, growing not only the economy, but creating jobs that put food on the table for millions of workers.

The aviation industry was an early victim of the debacle on Wall Street. Among the worst casualties was Wichita, Kansas. In the halcyon days of the "Roarin' Twenties," the city had proclaimed itself the "*Air Capital of the World*," and by 1929 was home to three major airframe manufacturers – the Travel Air Company, Cessna Aircraft Company and the Stearman Division of the Boeing Aircraft Company. Travel Air, under the leadership of Walter H. Beech, became a subsidiary of Curtiss-Wright Corporation in August 1929, but was forced to close its doors in 1931.

In April 1932, Beech, in concert with his wife Olive Ann, engineer Theodore "Ted" Wells and a handful of ex-Travel Air employees, opened for business as the Beech Aircraft Company. Throughout 1933 and into 1934, the infant manufacturer struggled mightily to sell a few Beechcraft Model 17R, A17 and A17FS cabin biplanes. Fortunately, Beech was quick to realize that the bullish, high-horsepower, fuel-guzzling (but magnificent!) biplanes, which sold for about $18,000, were grossly overpriced for a depression-driven market. Wells redesigned the expensive cabin biplanes into a series of smaller aircraft designated the Beechcraft B17. These ships were powered by fuel-efficient radial engines and, more importantly, priced at about $8,000 to fit a restricted market.[1]

As the national economy began what would be a slow, painful, but determined recovery in the mid-1930s, Walter Beech and his worldwide sales organization managed to sell 48 B17 airplanes. The company coffers were still thin, but the red ink that stole away any profit in 1932-1933 had disappeared by 1935. Beech, however, knew the company could not survive with only one product – the Model B17. He needed a new design, one that could compete with a flock of modern twin-engine, all-metal cabin monoplanes that were emerging from the drawing boards.

Although it remains uncertain precisely what prompted Walter Beech to develop a new aircraft, it is probable that a competition held by the Bureau of Air Commerce

In January 1937, a three-man crew took the Model 18A aloft on its maiden flight. Transcontinental and Western Air loaned two of its experienced multi-engine pilots to Walter Beech to conduct the flight test program. The Model 18A was certified in March 1937, but more than a year elapsed before initial deliveries began. (EDWARD H. PHILLIPS COLLECTION)

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The prototype Model 18A was refurbished and sold to the Ethyl Gasoline Corporation, which was one of the earliest operators of Beechcraft airplanes, including the Model 17R1 shown here. The company took delivery of the bullish Beechcraft in 1934, but in December 1935 it was destroyed when it crashed into a mountain in New York.
(EDWARD H. PHILLIPS COLLECTION)

in August 1935, provided that impetus. According to an article printed by the Bureau, the request for bids was intended to "…bring into being a small transport airplane for its own airline inspectors," thereby paving the way for "small operators to purchase similar types from the industry without having to shoulder the initial engineering and development expenses that are involved in all new airplane design projects.[2]

Among the companies intending to bid were the Lockheed Aircraft Company, led by former Travel Air designer Lloyd C. Stearman; Monocoach, the Stinson Aircraft Company, Barkley-Grow and the Kinner Aircraft Company. Of these, the Monocoach, Kinner and Stinson designs featured a single vertical stabilizer. Ted Wells and Walter Beech were familiar with these competitors, and were particularly impressed by the sleek Lockheed Model 12 transport that featured two vertical stabilizers, as did the Barkley-Grow design.[3]

The chief reason the next-generation Beechcraft featured twin vertical stabilizers can be traced to the evolving science of stress analysis, which in the mid-1930s was still not fully understood when applied to all-metal, semi-monocoque airframe structures. Wells had learned about the pitfalls of analysis from a series of errors he made during certification of the Model 17R1 biplane in 1932. When he submitted documentation on the empennage showing how the calculations were made for various forces acting on the welded steel tube structure, his work was criticized in a letter to Walter Beech written by officials of the Bureau of Air Commerce (a division of the Department of Commerce). They alleged that Wells' work bordered on incompetence and ordered him to resubmit the analysis. Ted's 10 years of experience working with welded steel tube airframes were of little help when faced with determining stresses imposed during flight on an all-metal airframe.

In the wake of that experience, Wells decided to build the new Beechcraft's aluminum alloy fuselage around a welded steel tube frame. He considered designing the twin-engine transport with a single vertical stabilizer, but there was a problem: torsional stresses imposed on the aft fuselage during flight with one engine inoperative would be difficult to calculate (such analysis was not fully understood by many aeronautical engineers of that era). Ted's solution was to design the airplane with two vertical stabilizers, analyzing each one separately as a single structure. In addition, mounting the two vertical surfaces outboard on the horizontal stabilizer had the advantage of retaining the total area required for adequate directional control under flight with one engine inoperative.

Walter Beech was known for taking calculated risks that were necessary in the capricious business aircraft industry, but before a final decision was made to proceed with design and construction of a twin-engine monoplane, he used a tactic that had proven useful during the halcyon days of the Travel Air Company. In 1928, he directed a massive marketing campaign to determine whether aviation-minded businessmen would buy a single-engine monoplane whose main feature was an enclosed cabin seating up to eight people.

His efforts were rewarded with a positive endorsement from the marketplace, and design of the Type 6000 was approved. Beech's risk soon paid off handsomely. By late 1929, the Type 6000B and more powerful A6000A accounted for about 50% of the company's production. The Type 6000's growing dominance made it clear that businessmen preferred an enclosed cabin to the rigors of open cockpit flying.

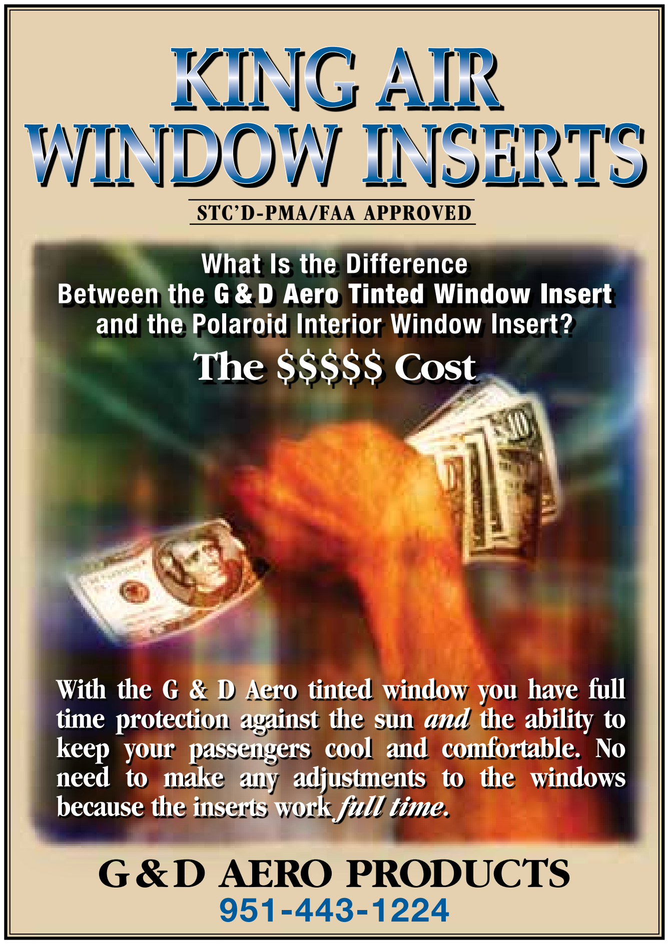
The decision to design and build the Beechcraft Model 18 was made in the autumn of 1935, and preliminary work was already underway by December. In addition to chief engineer Wells, Wilfred Wallace and Dean Burleigh contributed their talents to the process, but a majority of the final decisions were made by Wells. Mr. Beech offered his input as he saw fit.

News of a new Beech airplane soon hit the pages of major aviation magazines. In the December issue of "***Aviation***," journalists reported that "…it is a fair guess that the machine is being prepared to meet the specifications of the Department of Commerce for a transport for feeder airline service." The brief article went on to state that the cockpit would accommodate two pilots, while the cabin would seat up to six passengers. Projected performance included a cruising speed of 185 mph, a service ceiling (two engine) of 20,000 feet and a single-engine service ceiling of 8,500 feet.

As work progressed, the new design was given the designation "Model 18." The choice of engines was relatively easy because only two powerplants, the static, air-cooled radial Wright R-760 and the Pratt & Whitney R-985, met Wells' horsepower requirement. Both engines were highly reliable and benefitted from years of refinement and improvements since they were introduced in the late 1920s, and both had been installed in many Model 17 "***Staggerwing***" biplanes since 1934. Ted chose the seven-cylinder R-760E-2 that was rated at 350 horsepower.[4]

The Model 18A prototype (Beech Aircraft Corporation airframe constructor number 62) was built in the former Travel Air factory complex located on East Central Avenue in Wichita. The facility, which included five large buildings, had sat idle since 1931 when parent company Curtiss-Wright moved production to its campus in St. Louis, Missouri. During 1932-1933, however, Clyde V. Cessna and his son Eldon had leased one of the Travel Air buildings to design and construct (with assistance from engineer Garland Peed) two small, low-horsepower racing monoplanes known as the CR-2 and the CR-3. In an ironic twist of fate, during those two years Cessna was building monoplanes in Walter Beech's biplane factory while Beech was building Model 17 biplanes in Cessna's monoplane factory.

Having selected the engines for the new Beechcraft, Wells and his team began investigating a series of airfoils. It was imperative that the wing produce generous lift with minimum drag, but also had to possess an acceptable lift/drag profile at low airspeeds, and demonstrate safe stall characteristics. To test various airfoils, a wood model was built and suspended in a basic but useful



In 1934, Walter and Olive Ann Beech relocated production of the Model 17 to the former campus of the Travel Air Company. Curtiss-Wright Corporation closed the Wichita factory in 1932 in the wake of the national economic depression that struck America in 1929.

(EDWARD H. PHILLIPS COLLECTION)

wind tunnel located at Wichita State University. After careful analysis, engineers chose the 23000 series design developed by the National Advisory Committee for Aeronautics (NACA).

Plans called for using the 23018 section at the wing root, transitioning to the 23012 airfoil outboard of the engine nacelles all the way to the wingtips. After further testing, the wing chord featured a 3.5-degree twist from the root to the tip that demonstrated good aerodynamic performance at approach and landing airspeed. The twist, known as "wash out" in aviation parlance, meant that the wing root had an angle of incidence that gradually decreased toward the wingtip, thereby promoting a smooth airflow over the ailerons for roll control when the wing stalled.

In addition, electrically-operated plain flaps were installed under the wings, and the ailerons, elevator and rudders were aluminum alloy covered in cotton fabric. The conventional landing gear arrangement was extended and retracted electrically. To reduce drag, the R-760E-2 engines were closely cowled and small blisters were fabricated to clover the rocker boxes. After 13 months of construction, on January 3, 1937, the prototype Model 18A rolled out of the factory and into the Kansas sunshine. Its first flight, however, was delayed nearly two weeks until all components of the retractable main landing gear were completed and installed on the ship.

Ted Wells' twin-engine monoplane was finally declared ready for its maiden flight on January 15, 1937. The flight test crew included company test pilot Homer C. "Ding" Rankin serving as co-pilot, with James N. Peyton occupying the left seat. Peyton was a highly experienced aviator who had worked for the Bureau of Aeronautics and performed flight tests of the Beechcraft A17FS early in 1935. He was familiar with the general flying characteristics and handling qualities of multi-engine aircraft and, when hired temporarily by Walter Beech to fly the Model 18A, was serving as a pilot with Transcontinental and Western Air (later known simply as "TWA").

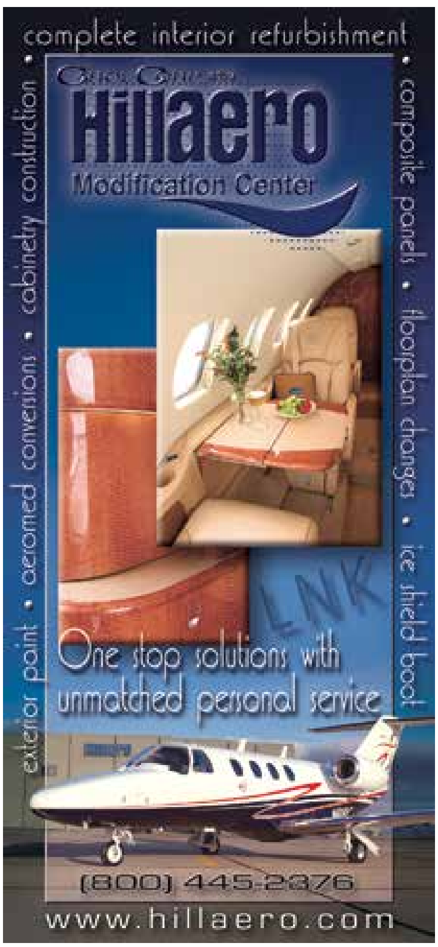
To watch over the two R-760 engines, Wright Aeronautical sent field representative Robert E. Johnson to Wichita, rounding out the flight test crew. Following a multitude of inspections to ensure that the Beechcraft was airworthy, Peyton and his companions took the Model 18A aloft late that afternoon for an uneventful flight that lasted about 50 minutes.[5]

The successful first flight was quickly followed by a series of planned tests including five flights on January 18 that totaled five hours, 10 minutes. Although the prototype Model 18A flew well, there were a number of issues that had to be corrected before the government would grant certification. These included the propellers that occasionally failed to go into high pitch, and the main landing gear gave the crew a scare on January 28 when it jammed in transit. It was a cold, misty day and the low temperatures may have contributed to the problem, but James Peyton managed to extend the gear and land safely at the old Travel Air flying field adjacent to the Beech factory.

In the wake of that incident, Peyton told Ted Wells and Walter Beech that he refused to fly the ship until the main gear operated properly regardless of the weather conditions. During the next two weeks the sleek Beechcraft stayed on the ground, receiving extensive modifications to its main gear under the direction of Wells and his staff. Although the changes addressed Peyton's concerns, in February he was replaced by Jack Thornburg, another pilot flying for Transcontinental and Western Air. In only two weeks Thornburg flew the Model 18A a total of 34 hours to complete a relatively smooth, seven-week flight test program leading to issuance of Approved Type Certificate No. 630 on March 4, 1937.[6]

Thornburg's enthusiasm for the Model 18A prompted him to write a letter to Walter Beech extolling the

The first production Model 18A (S18A when equipped with floats) was purchased by Starratt Airways, located in Hudson, Ontario, Canada. It operated on skis as well as floats and landing gear, and was flown extensively in the Canadian bush country. The airplane was powered by two Wright R-760 radial engines, each rated at 320 hp. (WICHITA STATE UNIVERSITY LIBRARIES, SPECIAL COLLECTIONS AND UNIVERSITY ARCHIVES)



airplane's overall flight characteristics. On March 15, 1937, he wrote: "I enjoyed every minute in the ship and now rate it as my outstanding favorite in its class. It is, indeed, a satisfaction for a test pilot to exceed slightly all of the estimated performance figures. I believe that very few airplanes in the field you are covering have been engineered so perfectly. I could make a great many rather startling statements concerning performance and handling qualities, however, that would run into pages which could eventually be summed up as – the greatest airplane of its kind I have ever flown. I am certain you are assured of success." His words would prove to be highly prophetic.

Theodore "Ted" Wells was chief engineer for the infant Beech Aircraft Company and was primarily responsible for the overall design of the Beechcraft Model 18. Contrary to "hearsay history" that has persisted for the past 75 years, the Model 18A was not a copy of the Lockheed Model 10-A "Electra" but did share some of the Lockheed's design elements, including a twin empennage configuration. (WICHITA STATE UNIVERSITY LIBRARIES, SPECIAL COLLECTIONS AND UNIVERSITY ARCHIVES)

Following certification, the prototype ship was prepared for a lengthy tour of the United States and Canada that was aimed solely at demonstrating the airplane to prospective buyers. Walter Beech, of course, hoped those businessmen and private individuals would line up and plunk down a hefty cash deposit for a new Model 18. The prototype, however, had already been sold to the Ethyl Gasoline Corporation and was scheduled to take delivery in June.

Walter Beech was at the controls of NC15810 for much of the tour, flying the monoplane for five hours before landing in Harrisburg, Pennsylvania, before flying on to New York City and later Pittsburgh, where a series of demonstration flights were made. Later, Beech flew the ship west to the Pacific Aircraft Show held in Los Angeles, California, where it drew admiring crowds and made another round of demonstration flights.[7]

During April, Mr. Beech spent more than 20 hours in the left seat of the Model 18A, flying the ship from Wichita to Dallas, Texas, then to St. Petersburg, Florida, before heading north to the nation's capital, followed by a flight to New York City and eventually north into Canada. The Canadians in Montreal, Toronto, Ottawa and other cities were impressed by the new Beechcraft. In May, Walter Beech happily reported to the company's stockholders that the two-month tour would soon secure orders for the first 10 production airplanes.[8] KA

Part Two of this series will discuss civil and military production of the Model 18 from 1938, through the years of World War II and the beginning of postwar deliveries in 1945.

NOTES:

1. Phillips, Edward H.; "***Beechcraft—Pursuit of Perfection***"; Flying Books, Publishers and Wholesalers, Eagan, Minn.; 1992, Page 4.
2. More than 50 years later, Wells stated that the Bureau's competition served as the primary motivation for development of Model 18. Historian Robert K. Parmerter, however, points out in his book, "***Beech 18—A Civil and Military History***," that Beech Aircraft Company files show a signed order from the Ethyl Gasoline Corporation for a twin-engine cabin monoplane. The order is dated August 1, 1935 – two weeks before the Bureau released its request for bids. The Ethyl Corporation had bought the first Beechcraft Model 17R1 biplane in 1934 and flew the ship on business trips until it was destroyed in a weather-related accident in December 1935.
3. Years later Wells commented that late in 1935 a small group of his engineers drove south to Bartlesville, Oklahoma, (another version states it was Ponca City, Oklahoma) to observe a Lockheed Model 10A "***Electra***" operated by the Continental Oil Drilling Company. As a result, various stories have circulated for 80 years that Walter Beech had Wells copy the ***Electra's*** design, but such claims have no basis in fact. Neither Wells nor Beech needed inspiration from other designers to be innovative. The Model 17R had proven that conclusively.
4. Early production Model 18 monoplanes used a variety of radial engines, including the Jacobs L-5 (285 horsepower) and L-6 (300) as well as the R-760. Introduced in 1939, the Model C18S was powered by the nine-cylinder R-985 rated at 450 horsepower.
5. Parmerter, Robert K.; "***Beech 18—A Civil and Military History***;" The Staggerwing Museum Foundation, Inc., Tullahoma, Tenn.; 2004; Page 23.
6. Ibid; Page 25.
7. Ibid.
8. Ibid.

About the Author: 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.

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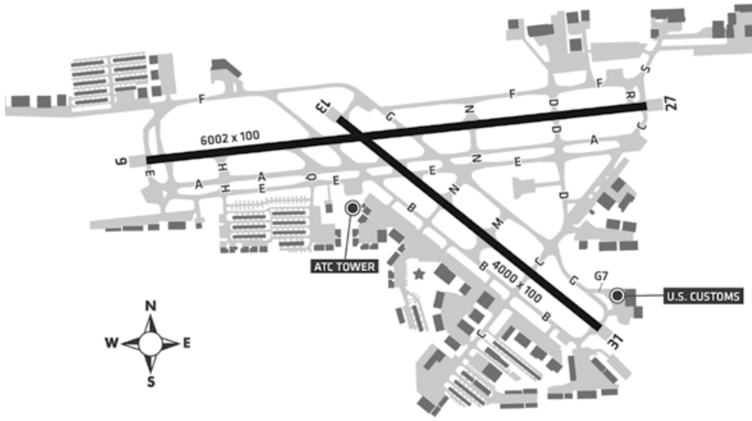
USAIG Adds APS Upset Prevention and Recovery Training to its Performance Vector Safety Initiative

USAIG (United States Aircraft Insurance Group) proudly welcomed Aviation Performance Solutions LLC (APS), a global leader in Upset Prevention and

Recovery Training (UPRT), to its Performance Vector safety initiative. Performance Vector delivers valuable, forward-looking safety support and is available to USAIG policyholders who insure turbine-powered aircraft or place multiple policies with USAIG. Eligible policyholders can choose annually from a range of safety enhancing programs and services delivered by the industry's leading providers.

Foundational to the training delivered by APS is having a cadre of expert instructors teaching in strict compliance with a loss of control in-flight (LOC-I) curriculum that is aligned with the latest ICAO and FAA guidance, best practices, and standards. To generate enduring, life-saving skills, APS combines multiple flight sorties of practical UPRT instruction with focused academics to develop pilots' ability to recognize, prevent and recover from virtually any recoverable airplane upset, unusual attitude or escalating stall/spin condition. APS is an IS-BAO registered Part 141 Flight School with a rigorous quality assurance program ensuring the highest degrees of professionalism and standardization in delivery of its training programs.

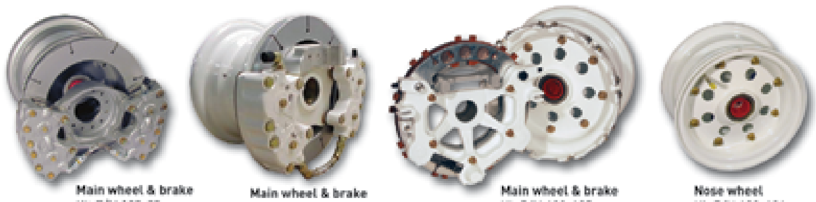
Performance Vector programs meet aviation regulatory requirements, accreditation protocols and industry standards such as FAA, IS-BAO, NBAA's Certified Aviation Manager program and ICAO. For additional information about the USAIG Performance Vector program, contact Paul Ratté, USAIG Director of Aviation Safety Programs, at *safety@usaig.com*.



New Customs and Border Control at FXE

Fort Lauderdale Executive Airport announced the opening of the new Customs and Border Control Facility, as well as expanded facility hours. The new hours are 8:00 a.m. to 12:00 a.m. local time. The new facility is located at the east end of taxiway G, as shown above.

Together, we can support all your King Air braking needs, one landing at a time.



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Management and Monthly Circulation of
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J. Scott Lizenby, Chief Financial Officer

King Air

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