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When Is It Time

If you've been flying over a long, illustrious career, you've no doubt thought about when you're going to hang up the old headset. And maybe you've wondered about the consequences of waiting too long. None of us want to end the symphony on a sour note, but we sure would like to keep playing for as long as we can.

It's all very well to say you'll stay active at the controls as long as you can pass the medical, often phrased "as long as I can keep fooling them." But flying these high-performance airplanes isn't a game, and there are serious considerations to be paid to the people riding with us. Do you really want to keep on plowing through weather and missing ATC calls after your edge has worn dull?

I have to admit, flying these newfangled, positionally-aware, digitally-driven, self-healing machines is a lot easier on the old body than it was back in the day of NDB approaches and vacuum-tube, crank-tuned radios. Now, if I could just remember how to find that start-over page in the FMS…

"Deceit and treachery beat youth and vigor anytime," says the logo on the seasoned-citizen T-shirt, reminding us that we do have hard-won experience on our side. Having been there, done that, and seen it all does count for something. But only up to a point. As we said at the beginning, someday we're going to have to decide: When is it time to quit?

Frequently, we'll get a nudge from our insurer. If you want to keep your coverage, you may have to fly with a copilot; no more single-pilot. Why not make that decision on your own? And don't just fill the seat with a compliant body, forbidden to touch anything. Single-pilot certification or not, use your right-seater as a full team member.

How do you tell when it's time to start heading for the exit? As an instructor, and father-confessor, I've seen familiar clients age, at varying rates, and I'm paid to point out errors. If you've made two or more serious mistakes with an aircraft in the past year, that's enough to warrant a sit-down talk. When you start staring at a box in the panel, trying to recall how to work the thing, consider simplifying your life. When you have grave doubts about your ability to pass a medical, even though the exam is months away, move aside now.

I'm a great believer in the concept of phased withdrawal. We don't have to quit cold-turkey. A King Air can become a Baron or a Bonanza, and an all-weather jet can turn into a VFR-only Skyhawk. My bestie sold his Cessna 340 and bought into a two-seater; he enjoys it but may rebound to a 182. The important thing is to keep flying, at a lower, gentler level. If that's what suits you.

Stay aware of your diminishing capacities, and withdraw on your own terms. Maybe it's no more night IMC, or no more pre-dawn charter-trip launches. Decide to trade down and bank the savings. Perhaps that second engine no longer enhances safety, but is a looming threat, leading to loss of control if it fails.

Just don't stick around until you accidentally quit.

LeRoy Cook

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Cyndi Nadeau, CAM
Assistant Director of Operations, KeyAir

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Making The Rounds In A Sturdy King

by **LeRoy Cook**

Air

The rugged Ozark Mountain region of Arkansas and Missouri is not an easy area to serve with specialized medical care. Roads often wind through wooded hills, adding distance and hours when you have to travel between the small cities dotting the territory. Providing advanced health care in this setting is a challenge. To make the most of their time in clinical service, neurosurgeon Dr. Mark Crabtree and his associates make their rounds across the Ozark expanses to take care of patients by using a King Air 200 turboprop.

Far from sparse and desolate, the scenic Ozarks have attracted a burgeoning population of newcomers in recent times, folks who have discovered the numerous lakes, easy lifestyle and mild climate. Many are retirees, stepping off the treadmill but still active and living their dream. When health care is needed, at a level beyond that of the excellent community hospitals, traveling to a bigger city, like Little Rock, Arkansas or Springfield, Missouri, is a doable, but challenging, task.

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A Better Way

For Dr. Crabtree, the answer is to bring his team to the patient, using the roomy King Air. Built in 1981, BB-820 came off the production line very close to the change to the B200 version; it is, with several Raisbeck Engineering modifications and an upgrade from PT6A-41 to – 42 engines, the equivalent of a B200. The Raisbeck aft-fuselage strakes and Crown Wing lockers add stability and capability and the curved four-blade props create special ramp appeal, along with a performance boost.

Added in 2013, the Raisbeck swept-blade Power Prop propellers are noticeably quieter, according to chief pilot Jack Reynolds, and he says they also make stopping easier on the 3,500-foot runways he sometimes uses. This versatile flexibility is what makes the big King Airs so successful. With the gross weight limited to 12,500 pounds, no type rating is required and operating rules are simplified, yet the cabin can hold up to eight passengers. In addition to making the Ozark-area circuit, the aircraft also makes occasional trips to Colorado and to the West and East Coasts from its Springfield, Missouri base.

The King Air's panel still carries stock Beech-installed equipment, built around Rockwell Collins FD-108 mechanical gauges and AP-105 autopilot, but it's been supplemented by modern conveniences like a Sandel HSI and two GPS-supported units, a Bendix/King KLN90B and a Garmin G-500. Reynolds, a retired Center controller, has been flying for over 50 years, so the comfortable, familiar equipment suits him just fine. In addition to his other duties, he is currently the President of the United States Pilots Association (uspilots.org), a national pilot organization run entirely by unpaid volunteers. USPA, Reynolds says, is all about safety, promoting regular accident-

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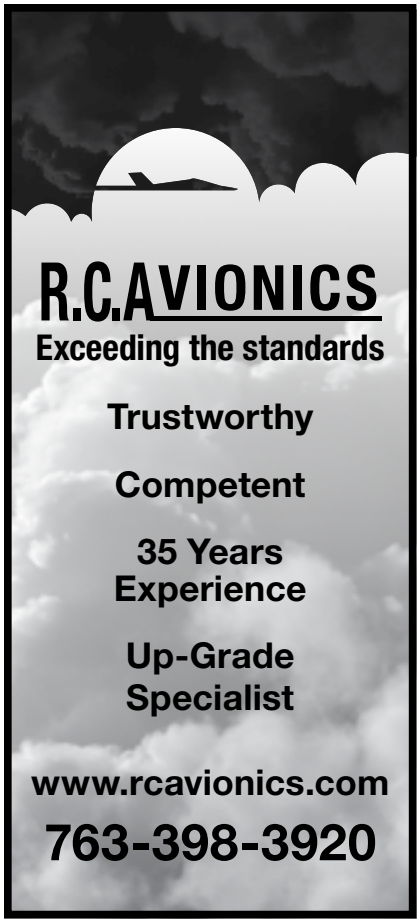


prevention seminars, and having a good time with your airplane.

Dr. Crabtree's King Air does not have high-floatation maingear or bleed-air heated brakes, neither of which are needed in their usual operation. On longer trips, Reynolds says he likes to get the airplane up to FL270 or 280, where it holds an 8,000-foot cabin altitude and zips along at 270 knots while burning less than 80 gallons per hour. Utilization averages around 200 hours per year, and the airframe had accumulated 10,500 hours at the time of our visit, a fact belied by its immaculate interior and paint job. Simcom Aviation Training is used to maintain pilot proficiency.

Off To Make Some Rounds

We met Jack Reynolds and copilot Jan Hoynacki at dawn to tag along on a day trip around some of their usual Ozark stops; Reynolds tugged the big King Air out of its private hangar at Springfield-Branson National airport and supervised its fueling. Today's mission carried five passengers plus two crew, for a takeoff weight of about 11,000 lbs. Dr. Crabtree, accompanied by two nurses and a physician's assistant, arrived on schedule with the usual pile of records and equipment, and we were soon off and running.

The PT6A-42's started reliably cool, the first engine peaking out at less than 800 degrees C., well under the 1,000-degree starting redline. With gen assist, the second engine responded even more eagerly, with a 640-degree start, and after governing, rudder bias and autofeather systems were checked we launched for Mountain Home, Arkansas' Baxter County airport (KBPK), a 150-nm hop that would be a considerable distance farther by road.

Cleared to 10,000 feet, the big King Air climbed out at 2,000 fpm before power was reduced to 1,900-lbs torque and 1,900 rpm, delivering a steady 1,500 fpm at 150 knots. With 850-shp per side, the underweight BE200 wasn't even breathing hard. Minutes later, in cruise, we were indicating 210 knots, truing 240 knots with the props pulled back to a quiet 1,700 rpm, on a fuel flow of 350 pph per side.

Very shortly, we were on the ILS approach to runway 5 at BPK, whose 5,000-foot runway is typical of the region's general aviation airport system. The King Air 200's landing gear is an excellent speed brake, deployable at 182 knots; approach flaps can be extended at 200 knots or less, and full flaps can be out at 144 knots or less. The big turboprop maneuvers nicely at just 125 knots and Reynolds crossed the threshold at 100 knots, requiring only a touch of reverse to exit at the three-quarters turnoff.

In the time-honored tradition of business flying, we loitered at the nicely-appointed FBO while the medical folks were occupied

with their clinical work. Big Air, an Avfuel service center at BPK, treated us like visiting royalty. The busy FBO's Customer Service rep, Brian Daugherty, says the field regularly hosts business jets up through Hawkers, and several jets and King Airs are based on BPK. As we were departing for the afternoon rounds, a local Citation was leaving for Las Vegas. On a typical day, Dr. Crabtree can visit three or four of the outlying destinations, impossible by any other means of transportation.

Heading For Home

The day's last stop was Little Rock's Adams Field (KLIT), a long-established business flying center, where we parked at the former Central Flying Service FBO, now TAC Air. After finishing the final business of the day, we boarded for the 240-nm hop back to Springfield. After a full day on the road, it was great to have a fine, dependable airplane to take us home in a hurry. With fuel burned down and one passenger deplaned, the Super King Air accelerated to 100 knots for Vr like it was knew it was heading for its hangar, and the initial climb rate zoomed to 2,500 fpm. Held down to 12,000 feet by ATC constraints, Reynolds pushed the power up to 2,000 lbs. torque for a few more knots of get-home speed, nudging the groundspeed up to 275 knots.

In less than an hour, we were on the approach to SGF's runway 2, where reverse thrust wasn't needed because our hangar was waiting at the departure end. By using the venerable Super King Air 200, the aircraft's owners can squeeze several days of productivity out of one day away from busy practices at their home bases. Like many business aircraft owners have learned, time is precious; the less of it you spend commuting between stops, the more you can grow your business.

The big King Air 200 may be approaching middle age, but it can still deliver a good day's work. T&T

HAIL? NO!

Avoiding Hail Hazards

by **Archie Trammell**

The way to not get hailed on is to avoid places where it's hailing. Talk about a ruined day! It happens a dozen or so times each year. Most of the time it's small hail, so no damage is done except chipped paint and an apology to your laundress. But, occasionally, hail is a big problem. For example, the following is from an NTSB report in reference to a hail encounter in a DC-9 during climb-out from Atlanta:

"They were examining the line of thunderstorms on their radar and requested a turn to 330 for weather, which was approved. On that heading they could see a 10 nm-wide gap between two cells. They could also see there was no weather on the other side of the line. Suddenly, as they entered the gap, an egg-sized hailstone smashed into the center windshield, shattering the outer pane. Turbulence began and lasted about 10 seconds. Large hail continued for about four seconds. It took out all outer panes of the windshield and the entire radome departed, going through the right engine. The pitot and static systems went with the radome, leaving the crew with no airspeed and unreliable altitude information. Of course, there was extensive damage to all leading edges and the right engine, which did continue to put out power.

They exited the weather on the north side of the line of thunderstorms and the crew successfully diverted into Chattanooga, using airspeed/altitude relays from ATC."

An experience like that tends to make you wonder if perhaps being shot out of a cannon at the circus wouldn't be a safer occupation.

How to avoid hail encounters is the question. An obvious answer is to stay out of thunderstorms. That's only a partial answer, however. Hail encounters have occurred 10, 15 even 20 miles entirely outside thunderstorms. In addition, hail damage has occurred in areas where there were only rain showers 15 minutes earlier. Sudden, explosive hail storms like that will only increase with global climate change, we are told.

What is the answer, then, to avoiding a hail strike incident? You must begin before flight by discovering where hail is *likely* to be encountered during the day. For the USA that's simple; NWS has made it easy for us to begin that investigation. It's where you should begin first thing each morning, whether you'll be flying that day or not.

Call up spc.noaa.gov. You'll be rewarded with a USA map. Select "Convective Outlook" on the right side and you'll get another USA map with colors indicating where thunderstorms are likely to occur within the next few hours. At top left, you'll find three tabs. Select "HAIL" and you'll get a revised USA map showing where hail is likely to occur this day.

What you get is not a simple forecast of hail; it's a "Probabilistic Forecast" of where hail is likely to be encountered. "Probabilistic" and "Forecast" are vastly different things. A forecast is based on current and expected atmospheric conditions at a location; a "probabilistic forecast" is based on what several meteorologists at SPC, after long experience, have observed typically happens in a certain location when a particular set of atmospheric conditions exist there. Big difference.

Note that the spc Outlook doesn't indicate hail *will* occur in the location, only that it typically does. Check it out day to day and your confidence in its accuracy will grow. That doesn't mean, however, hail is not possible elsewhere, given certain atmospheric conditions. What are they? Just five principal ones of interest to pilots; storm height above the freezing level, wind direction and velocity at higher levels, speed of storm movement, radar reflectivity and storm shapes.

Many NEXRAD uplink vendors provide storm height, movement and speed of movement. Otherwise, go to *www.aviationweather.gov/windtemp* and you'll be covered with tons of WX information. For a quickie, Flight Service should also be able to give you storm heights and speed of movement. There are numerous websites for aviation

weather in other nations. Or the world GOES images will give you an indication of how high storms may exist. If you don't know how to read temperatures in a GOES image, the formulars are listed below it.

For height information on your airborne radar, simply select +10° on tilt and apply the rule of 60 – at 1 nautical mile a degree is 100 feet in linear measure. Therefore, at 10 miles each degree is 1,000 feet. With +10° on tilt, an echo at 10 miles reaches to at least 10,000 feet *above your current altitude*; at 20 miles, 20,000 feet; at 30 miles 30,000 feet. Again, note, that's above your *current* altitude.

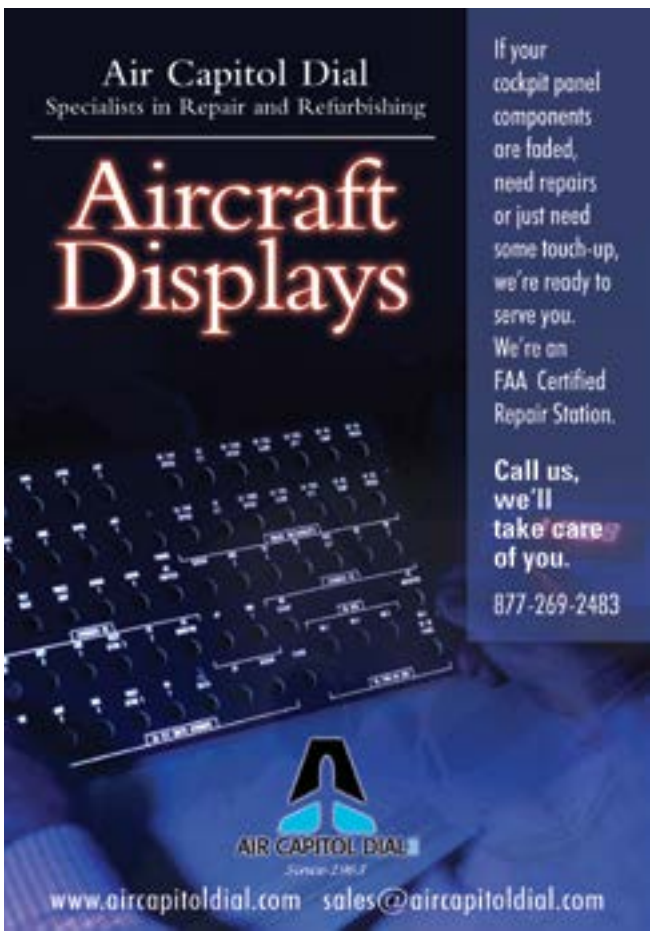
Obviously, if the storm's max height is below the freezing level, no hail will form. How much above the freezing level must one grow before it likely will? Many years ago thunderstorm research pilot, James M. Cook, the original "Project Rough Rider" pilot, after penetrating hundreds of them, found that almost every one with a height exceeding the freezing level by 10,000 feet or more had hail of some size in it. Hail damage on his aircraft made the point. Over the USA that means any storm reaching to or above about 30,000 feet may be spitting hail. In areas towards the Poles, the freezing levels tend to be much lower. In equatorial regions, much higher.

One must always consider the geographic area.

Once upon a time, radar intensity was available from any Controller or Flight Watch Briefer (the latter are no longer available). It was given to us as a VIP number. VIP 5 signified hail possible; VIP 6 hail certain. But several years ago NWS and FAA bureaucrats, in their anti-litigious minds evidently, decided pilots don't need that much detail. They dropped those precise VIP numbers and switched to meaningless abstractions. Now they tell us only that a weather echo is "Light, Moderate, Heavy or extreme", all of no help to a pilot wanting to avoid hail. For example, "Heavy" could mean a simple heavy rain shower or could mean a true thunderstorm with hail. "Extreme" can mean it *may* contain hail or it definitely *does* contain hail. Depends on whether it's low "Extreme" or high "Extreme". So for most pilots, NEXRAD – as gross as it is – has to do.

But, you must also consider that NEXRAD only tells you where it was hailing 5 or 10 minutes ago, not where it is hailing at this instant, or where it will be hailing 10 minutes from now when you get there. On NEXRAD, deepest red, magenta or deep blue at the top of the color scale all indicate hail or possible hail.

For radar-equipped pilots, on most airborne radars there's a method for sorting it out. When red weather is displayed, turn the CAL control down (misnamed "GAIN" on most systems) to the approximate mid position. If red is still displayed,



think hail in that echo. Many radars display magenta to indicate storm intensity; magenta signifies hail, little question. (Once more, several years ago the know-nothing bureaucrats decreed that magenta may no longer be used on airborne radars to signify a hail-containing echo; however it can on NEXRAD. Go figure. Today, only turbulence is indicated with magenta, on radars that have the TURB function.)

Next, shapes. Begin with round symmetrical echoes. They are most likely just showers or baby thunderstorms. Hail not likely. The more the shape varies from simple round, the greater the possibility of hail. Shapes are only grossly discernable on NEXRAD. The standouts are "pendant" shaped ones and "fingers" of echo. "Pendant Shaped" meaning it looks sort of like a lady's pendant with a notch in the large end. Sometimes they look like a snake with its mouth wide open. The mouth will be on the downwind end of the formation. (Yes, even for flights that never get above 12,000 or so, it's critical that pilots know both direction and velocity of winds in the flight levels.) With airborne radar, hail-indicating shapes can be seen clearly, even down inside the red part of the echo, by careful twiddling of that "CAL" control.

So, you suspect hail. How far away should you fly to avoid it? The usual advice is 20 nm. But that's just a partial answer. It'll help in making the avoidance decision to know that hail strikes rarely occurs in flight above 30,000 feet. Few occur during departures. Most are during arrivals. Reasons are obvious; on departures, it's usually possible to make wide deviations. Not so on arrivals. In making an avoidance decision, you must also consider turbulence potential.

If the storm is wicked enough to be generating hail it's also generating heavy to extreme turbulence far out from the echo on the downwind side. That's in reference to winds above 24,000, not low-level ones. To avoid all possible downwind turbulence from a potential hail producer, circumnavigate to a distance equal to the winds at 24,000 feet and above. That's even if you're at only 8,000 feet or thereabouts.

So, Hail? No! You just have to know the signs and be observant. Cunning also helps. T&T

Archie Trammell's credentials are 34 years as an instructor and lecturer on airborne weather radar and convective storms avoidance. His clients have included most major airlines, all five military services and numerous government agencies, including the FAA, NASA and NTSB.

His research has been exhaustive and has included more than 4,000 hours of inflight thunderstorm research, both in his own aircraft and from the jump seat for airline clients. He's a pilot and CFII, with much twin and turbine experience. His monthly web site, www.radar4 pilots.com, has been up monthly since May 2005.

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Owl Snot, Slippery As...

by **Kevin R. Dingman**

...as in, slipperier than. Before DuPont scientist Roy Plunket accidentally discovered Teflon in 1938, engineers at Fiction Friction, LLC were coaxing owls to excrete the substance, analyzing its molecular structure. What, you've never seen an owl sneeze into a beaker? The project was abandoned after a marketing test with homemakers was snot received well. Long before this, archeologists had discovered that O.S. was the secret in moving blocks to build the pyramids. It wasn't aliens, it was owls.

SaOS/Mμ

Mechanics and machinists reference the slippery compound when describing a lubricant that works really well; it's perfect. Machine parts using a lubricant with a coefficient of friction (Mμ – pronounced: mew) comparable to the owl's natural and biodegradable emollient would never, ever experience wear. Even though my suggestions to include a reference to the material in the AIM have been ignored, an excellent method to categorize extremely poor braking action is to use the SaOS / Mμ: Slippery-as-Owl Snot / coefficient of friction (© 2016). It's one notch slipperier than nil-braking and could be used for any reports of less than 0 on the ICAO Mμ scale.

What brings up such a disgusting description and fabricated history? And why the need to debate another reference for indescribable slipperiness? Well, my fellow aviators (which includes 216 species of owls, btw), to wit: for only the second time in 40 years of using aerodynamic and mechanical devices (wheel brakes, spoilers, speed brakes, thrust reversers, a tail hook, drag chute and once a cabin door) in order to stop my flying machine, I couldn't stop. This time it was a 140,000 pound airliner going down a sloped taxiway – with another airliner in front of me experiencing the same SaOS/Mμ. The first time was in a Cherokee 140 in Plainwell, Michigan (61D) in 1975.

This Fool Escaped

The runway in Plainwell is East/West and 2,650 feet long. Plenty of room for the mighty Cherokee piloted by a modest, but brilliant, teenager. Unless, that is, the runway is SaOS. The field is uncontrolled, no other aircraft were on CTAF, no one manned the FBO radio and it was night. No one was there to provide a field report. I was with a high school buddy and we landed to the East, close to the right spot but a bit long. A couple of seconds after touching down I applied the toe brakes. Nothing. Release and re-apply. Nothing. I quickly unlatched the cabin door and instructed my friend to hold it open against the wind. Using full-up stabilator and the open door, I was able to slow to about twenty knots before we ran out of runway. As the end of the runway neared, with a three foot berm of snow approaching the nose, I remember thinking that I didn't want the prop to hit the snow bank. Out of intuition, instinct or fear, I shoved the right rudder pedal to the floor. We slid 90 degrees sideways the last 100 feet, coming to rest with the left wing three feet over the berm. Thank you, Piper, for wing dihedral. No problem: taxi to the FBO, drop off my friend, and head back to AZO. It was one of a handful of times that fate was the hunter and this fool escaped.

Thick Rain

One final blast of cold, wet weather rolled through the Eastern U.S. recently. Winter's parting shot wreaked havoc on both surface and air transportation. It also caused the second event in 40 years when I couldn't stop my airplane due to SaOS surfaces. On the last day of a four-day trip, we were reassigned to work from RDU to DFW then deadhead (ride in the cabin) to ORD. We would take off two hours earlier (at 0550) than originally scheduled and get to ORD four hours later. During the ride to the airport, it started to rain– kind of. As I like to say, the rain hitting the windshield sounded a little "thick." By the time we exited the van at the RDU terminal, the ground was coated with a quarter-inch of ice and snow pellets. Our plane had been on the ramp overnight and was coated as well. The deicing location is on the opposite side of the field from our gates. Taxiway Charlie in that direction is uphill going east and of course, downhill coming back west. We were one of the first to taxi that morning so little was known of field conditions and none of the taxiways had yet been cleaned. Since we would be nearer 5R after deicing, ground suggested we use that runway. They were working on cleaning 5L (10,000) but 5R (7,500), was already clean. Cleaned by a unique machine with, apparently, a confusing name.

Mμ Value	Braking Action
40 or greater	Good
36 to 39	Med / Good
26 to 29	Med / Fair
30 to 40	Fair
20 to 25	Poor
20 to 0	Nil
Less than 0	SaOS

Bro's

With a two-person crew, you back each other up and catch each other's mistakes – like things on a checklist, spotting traffic and sharing tasks when things get busy. You also have someone to verify what was heard on the radio. Or not heard. Joe is my FO on this trip and he's a retired military pilot. Furloughed for over 13 years, he stayed sharp flying King Airs. Both of us came from the USAF fighter community; he flew F-15's and me F-16's.

The military is composed of a widely diverse group of professionals in which discrimination and racism has been virtually eliminated. It took a long time but it's true and it's a wonderful working environment. And we all participate in diversity training at our carrier. In a job like this, there is neither a time nor a place for racism, sexism, or any other derogatory 'ism'. Joe thought that he heard ground control tell a ground vehicle that his "bro's truck" was on the way to 5L. He was shocked. I had to take a second to regain my composure before telling him that the transmission he heard was the "broom" truck was on its way. The ice pellets were too thin to remove with plows, so the method of removal was by using multiple, giant, broom trucks. The rest of the day he was jokingly addressed as the racist old-white-man.

By the time we finished deicing an hour later, 5L was clean. Cleaned by the BROOM trucks. I asked for braking reports and the Mμ was 40 – equivalent to "good". It would be a simple matter of taxiing downhill to the other side of the field. Or perhaps not so simple.

This is where we, and the airliner ahead of us, encountered SaOS surfaces as we taxied downhill on Charlie. For some reason, the other plane and I were on different frequencies. Ground called to warn us the aircraft in front was sliding. Thinking back, this should have come as no surprise, since we heard that an airport vehicle had slid off some other taxiway. When I heard the jet in front of me was sliding, I tapped the brakes and braking was poor. Moving at about five mph, I tapped them again a couple of seconds later and had nothing. Not even the sound of the brake pucks squeezing the discs or any physical sensation of wheels touching the ground. I reported this to ground and suggested they close the taxiway. I prepared to use the thrust reversers if needed. Luckily, the jet in front of me was about three airplane lengths away and still moving– or sliding that is. Fortunately, the crown on the taxiway is slight so we both remained on the centerline. At the bottom of the hill was 5L, which had been swept by the BROOM trucks. Ground control instructed us to follow the jet ahead, back-taxi on 5L and turn off about 1,000 feet before the end of the runway. The taxiway from where we exited the runway to the approach end of 5L was just as bad as the hill, but taxiing at 2-3 mph made it manageable. As the sky began to glow on the eastern horizon, we rounded the corner onto 5L, shoved the throttles up and accelerated down the swept surface. The entire length was clean, with a ten-inch berm of ice pellets lining both sides.

The first of April is the day we remember what we are the other 364 days.

– Mark Twain

Braking reports are from other airplanes, a good source of information when available. Mμ readings are taken using ground vehicles and their friction-testing devices employ a trailing wheel. Various types of friction-testing equipment can provide different readings, so not all conditions are reported precisely the same. Also, the tests are accomplished using an automobile at speeds well below our normal approach and landing speeds. So, like the owl story, take the Mμ reports with a grain of salt. Owl snot was never researched by DuPont or Fiction Friction, of course, nor was it found in the pyramids– April fools. But that shouldn't stop us from promoting the SaOS/Mμ scale in aviation. It can get slippery out there flying airplanes, and not just on the ground. Watch your step, my friends, and have a tissue ready if you spot an owl. T&T

Kevin Dingman has been flying for over 40 years. He's an ATP typed in the B737 and DC9 with 21,000 hours. A retired Air Force Major, he flew the F-16 then performed as a USAF Civil Air Patrol Liaison Officer. He flies volunteer missions for the Christian organization Wings of Mercy, is employed by a major airline, and owns and operates a Beechcraft Duke. Contact Kevin at Dinger10d@gmail.com

Twin Proficiency:

by **Thomas P. Turner**

Push & Hold

The U.S. National Transportation Safety Board (NTSB) recently released its final Probable Cause report on the crash of a Beechcraft King Air B200 that occurred at Wichita, Kansas, October 30, 2014. A solo pilot, delivering the airplane to a refurbishment shop after it had just been sold, reported the loss of the big turboprop's left engine immediately after takeoff. The airplane turned left, toward the dead engine, through about 120° of heading change, before impacting in a fiery crash into a simulator training facility. The pilot, and three persons training in a simulator, died in the intense fireball caught on security cameras. Two additional people in the simulator bay suffered extensive burns; four others in the facility endured less-serious injuries.

The NTSB report states the King Air never got higher than 120 feet before descending, nearly wings level but in enough of a slip it was noticed by witnesses on the ground. The gear remained extended throughout the brief flight. Extensive fire damage prevented investigators from determining whether the propeller was feathered, or if the autofeather and rudder boost systems were turned on at the time of the crash. The NTSB's final determination of the cause of the crash is:

The pilot's failure to maintain lateral control of the airplane after a reduction in left engine power and his application of inappropriate rudder input. Contributing to the accident was the pilot's failure to follow the emergency procedures for an engine failure during takeoff. Also contributing to the accident was the left engine power reduction for reasons that could not be determined because a post-accident examination did not reveal any anomalies that would have precluded normal operation and thermal damage precluded a complete examination.

I was shocked with the horror of this thought: When he began his takeoff roll, as he moved the thrust levers forward for takeoff, the pilot and three others affected by his actions had only *two minutes to live*.

PUSH and HOLD

How could this be possible in a twin-engine turboprop? Because, however unlikely, it still *is* possible. Your required actions are pretty well-defined, and actually quite limited, when an engine quits immediately after takeoff. *The good news* is, that means you have only a few things to train for–you don't have to make it up as you go. If you're prepared, there is no immediate decision to make at the moment the failure occurs. Respond with the correct procedure; your time to make decisions comes (shortly) later.

If an engine fails just after takeoff you have only two things to do immediately:

PUSH FORWARD on the controls to maintain the proper, controllable airspeed; and

HOLD HEADING with rudder and wings level.

You PUSH FORWARD to attain the proper attitude for V_{YSE} ("blue line") speed with a windmilling propeller. In all the piston twins I've flown, this is very slightly above level flight…three degrees nose-up in a Beech Baron, for example. Ask your type-specific instructor for the windmilling-propeller pitch attitude for the airplane you fly. The proper attitude assures sufficient airspeed over the control surfaces to prevent a VMC roll and loss of control while approximating blue line speed. This gives you time to choose whether to pull both throttles and land or to maintain this attitude for aircraft control as you perform the memory steps of the Engine Failure in Flight checklist.

I emphasize the *PUSH* in PUSH FORWARD. Strict aerodynamicists say that if the airplane is properly trimmed when an engine quits it will tend to nose down

to remain in one-G flight. This helps maintain the angle of attack, preventing a stall. Unfortunately, there's a pilot holding on to the control wheel. You are subject to what's called "the startle effect." The March/April 2016 issue of *FAA Safety Briefing* contains an article on startle effect, defining it as:

…the result of a sudden shock that can disturb or agitate the recipient [and] can cause a person to have an involuntary physical reaction (e.g., jerking back on the yoke), can induce a significant emotional or cognitive response (e.g., fear, confusion or anger), or can simply cause a person to freeze in place.

At least two, and perhaps all three of those responses, would cause the pilot to involuntarily maintain or even increase angle of attack and reduce airspeed and/or increase induced drag in the seconds after engine failure occurs…supporting a common Loss of Control result.

Studies show the average reaction time to a "startle" event is 2.3 to three seconds. The time from the pilot's input until the aircraft responds is roughly another two seconds. During these five seconds the angle of attack will likely have increased quite a bit, and the airspeed decreased significantly, before the controls are moved. From this condition, you don't need to simply relax the controls; you need to PUSH to make the attitude go to the

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right place rapidly. Meanwhile, you need to aggressively HOLD HEADING with rudder and ailerons.

If you do just these two things, PUSH FORWARD and HOLD HEADING, you'll do more to assure your survival, along with the passengers and persons within the impact range of your airplane. If you do *not* do these two things, swiftly and correctly, you have lost command of the aircraft, and (as the Cirrus Pilot Proficiency Program states), loss of *command* is the first stage of loss of *control*.

Impairment

The NTSB reports one more important fact uncovered in the King Air crash: the pilot was being treated for multiple medical conditions, severe enough to prevent him from working as an Air Traffic Controller for an extended time. He was taking medications that are disqualifying for an FAA medical certificate; he failed to report this to his Aviation Medical Examiner and ground himself. One medication carries a warning that it "may impair mental and/or physical ability required for the performance of potentially hazardous tasks (e.g., driving, operating heavy machinery)."

It's tempting and easy to read that portion of the report and say "I'd never do *that*." The NTSB does not even cite pilot medications or conditions as factors in the Probable Cause. Yet, pilot impairment goes a long way to answer the question of why a pilot with multiple type ratings, recent training and FAA evaluation less than two months before the crash, missed basic things like airspeed control, directional control and gear retraction in the two minutes that defined the end of his life (and that of others).

Before you feel that this sort of thing only happens to others, ask yourself before every takeoff…

What's Your Impairment?

What factors exist right now that could prevent you from PUSHING FORWARD and HOLDING HEADING should an engine fail immediately after takeoff, and then hold these inputs while you perform the emergency checklists? What's the state of your:

Time in type. Have you flown this make and model of airplane a lot, but not so much that you're tempted to become complacent? Do you have a lot of experience in this specific airplane or one equipped identically to it? Do you fly lots of different airplane types, which might cloud the type-specific lightning response required to handle an emergency?

Recency of training. You may have a lot of point-to-point time in this airplane, but when was the last time you practiced emergency procedures? Could you pass the Practical Test for all the pilot certificates and ratings you hold, in this airplane today?

Health and medications. Is there anything going on right now that you hope the FAA doesn't hear about? Are you taking any over-the-counter medications that could affect your coordination, memory and decision-making? Do you feel "under the weather"?

Fatigue. When was the last time you got an uninterrupted, eight-hour sleep? How long since you got out of bed on this day? How long will it have been when you shut down the engines at the end of your flight? Do you feel well-rested and alert?

Personal stress. Are there external issues that might affect your performance and decision-making? Do you find yourself focusing on family issues or job deadlines, or the presentation or big deal you hope to make on the other end of your coming flight?

Environment. Are you taking off into low IMC, low visibility, or night conditions? Are there significant obstacles off the end of the runway or along your departure route? Is the departure ATC frequency likely to be crowded and fast-paced, making it difficult to make and receive calls? Is there a strong crosswind or low-level turbulence?

Mindset. Are you simply not thinking about the possibility anything could go wrong, any time you get ready to take off?

Any of these factors can impair your response to an emergency, just as readily as the medicines cited in the King Air Probable Cause report. Quickly evaluate them as part of your fitness-for-flight evaluation…and be willing to ground yourself until those factors are again under control.

You have two minutes to *live* every time you advance the power for takeoff; most airplanes take about two minutes from the beginning of the takeoff roll until the airplane is established in climb. Your actions and decisions in those two minutes, done right, will do everything humanly possible to ensure you, your passengers and everyone under your airplane, will live.

Realizing that my actions in the first two minutes of takeoff are to make me *live*, not die, and that I know to PUSH FORWARD and MAINTAIN HEADING at the first sign of trouble, makes it possible for me to confidently push the throttles forward and fly. T&T

Thomas P. Turner is an ATP CFII/MEI, holds a Masters Degree in Aviation Safety, and was the 2010 National FAA Safety Team Representative of the Year. Subscribe to Tom's free FLYING LESSONS Weekly e-newsletter at www.mastery-flight-training.com.

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Making Sense Of "Climb Via" And "Descend Via"

by **Shayne Daku**

Almost two years ago, Air Traffic Controllers began issuing a new clearance relating to Standard Instrument Departure (SID) procedures. You may have heard the following clearance or something similar; "N716RM, proceed direct GOPHER, climb via the KBREW SEVEN departure." If that sends a chill, you aren't alone. The "climb via" clearance (and its older cousin, "descend via") can be tricky to understand. And failure to comply with these clearances can result in a pilot deviation being filed by the FAA. Let's review the concepts, so you can accept these clearances with the confidence of an appropriately-seasoned airline pilot.

To quote the Pilot/Controller Glossary, the "climb via" clearance is:

"An abbreviated ATC clearance that requires compliance with the procedure's lateral path, associated speed restrictions, and altitude restrictions along the cleared route or procedure".

In short, ATC uses the "climb via" clearance to minimize radio calls. Rather than issuing numerous "climb and maintain" or "fly heading…" clearances, ATC will issue one clearance, with the assumption that the pilot will meet the lateral and vertical requirements depicted on the SID chart. ATC expects the pilot to meet all of the altitude crossing restrictions indicated on the chart. If your aircraft cannot meet the climb gradient requirements of a SID, notify ATC prior to accepting the clearance or by including NO SID in the remarks section of the IFR flight plan.

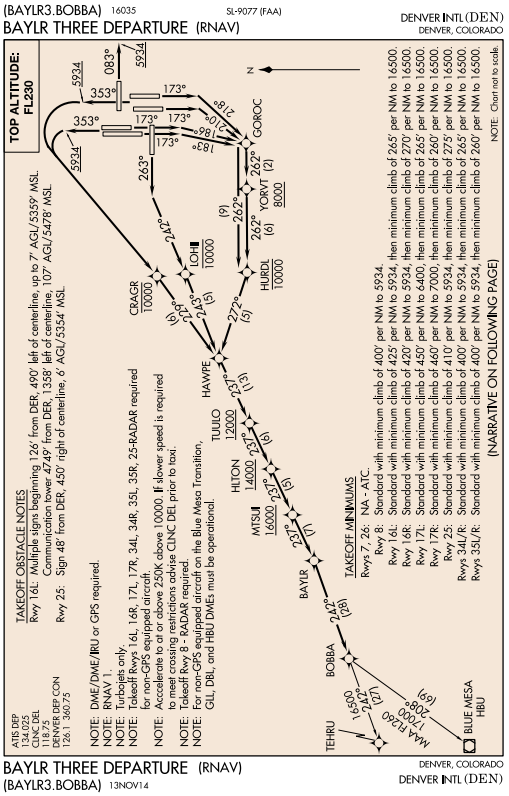
Typically, the "climb via" clearance will be part of your initial IFR clearance. It will sound something like this:

"Superjet 123, you are cleared to the San Diego airport, BAYLR THREE departure, TEHRU transition, climb via the SID, expect runway three five left for departure".

When you receive a climb via clearance, be sure to take some time to familiarize yourself with the procedure. If you need extra time to prepare, request your IFR clearance prior to starting engines. You can typically request the clearance up to 30 minutes prior to your scheduled departure time. This is also a good time to mention that ATC is expecting you to read the "climb via" clearance back verbatim, including your aircraft call sign. You cannot abbreviate the read-back of a climb via clearance.

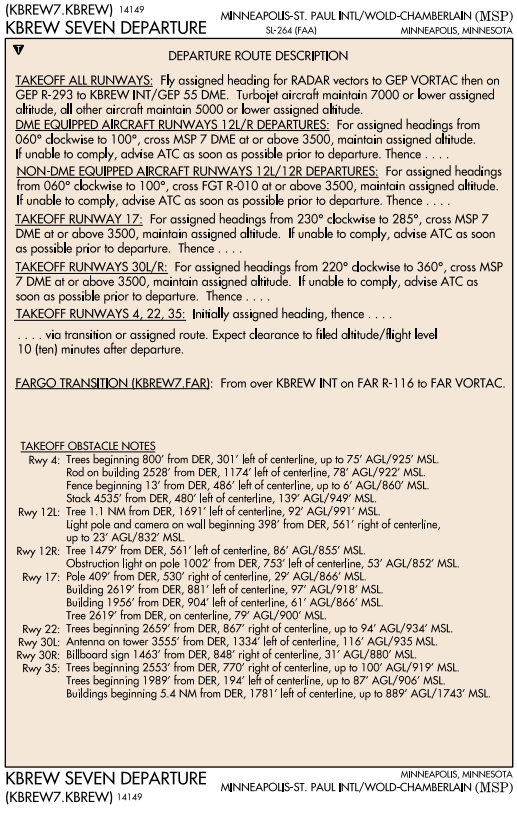
Let's take a look at the BAYLR THREE departure at Denver in more detail.

The first thing you should determine is the published *top altitude* for the procedure, depicted on the upper right-hand corner of the chart - FL230. This is the top of the climb via clearance. It's possible for ATC to amend this top altitude. I've underlined the top altitude in the example transcript for an amended clearance below.



"Superjet 123 you are cleared to the San Diego airport, BAYLR THREE departure, TEHRU transition, climb via the SID except maintain one <u>seven thousand</u>, expect runway three five left for departure".

In this example, ATC amended the top altitude to 17,000. We are still required to meet all of the remaining crossing restrictions but stop the climb at 17,000 until receiving further clearance. It's also possible that a departure procedure does not have a published top altitude, although top altitudes are being added to most departure procedures when they are updated. Have a look at the KBREW SEVEN departure procedure for the Minneapolis airport below. You won't find a published top altitude. For this reason, the ATC clearance


(KBREW7.KBREW) 14149 MINNEAPOLIS-ST. PAUL INTL/WOLD-CHAMBERLAIN (MSP)
KBREW SEVEN DEPARTURE SL-264 (FAA) MINNEAPOLIS, MINNESOTA

DEPARTURE ROUTE DESCRIPTION

TAKEOFF ALL RUNWAYS: Fly assigned heading for RADAR vectors to GEP VORTAC then on GEP R-293 to KBREW INT/GEP 55 DME. Turbojet aircraft maintain 7000 or lower assigned altitude, all other aircraft maintain 5000 or lower assigned altitude.
DME EQUIPPED AIRCRAFT RUNWAYS 12L/R DEPARTURES: For assigned headings from 060° clockwise to 100°, cross MSP 7 DME at or above 3500, maintain assigned altitude. If unable to comply, advise ATC as soon as possible prior to departure. Thence . . . .
NON-DME EQUIPPED AIRCRAFT RUNWAYS 12L/12R DEPARTURES: For assigned headings from 060° clockwise to 100°, cross FGT R-010 at or above 3500, maintain assigned altitude. If unable to comply, advise ATC as soon as possible prior to departure. Thence . . . .
TAKEOFF RUNWAY 17: For assigned headings from 230° clockwise to 285°, cross MSP 7 DME at or above 3500, maintain assigned altitude. If unable to comply, advise ATC as soon as possible prior to departure. Thence . . . .
TAKEOFF RUNWAYS 30L/R: For assigned headings from 220° clockwise to 360°, cross MSP 7 DME at or above 3500, maintain assigned altitude. If unable to comply, advise ATC as soon as possible prior to departure. Thence . . . .
TAKEOFF RUNWAYS 4, 22, 35: Initially assigned heading, thence . . . .
. . . . via transition or assigned route. Expect clearance to filed altitude/flight level 10 (ten) minutes after departure.
FARGO TRANSITION (KBREW7.FAR): From over KBREW INT on FAR R-116 to FAR VORTAC.

TAKEOFF OBSTACLE NOTES
Rwy 4: Trees beginning 800' from DER, 301' left of centerline, up to 75' AGL/925' MSL. Rod on building 2528' from DER, 1174' left of centerline, 78' AGL/922' MSL. Fence beginning 13' from DER, 486' left of centerline, up to 6' AGL/860' MSL. Stack 4535' from DER, 480' left of centerline, 139' AGL/949' MSL.
Rwy 12L: Tree 1.1 NM from DER, 1691' left of centerline, 92' AGL/991' MSL. Light pole and camera on wall beginning 398' from DER, 561' right of centerline, up to 23' AGL/832' MSL.
Rwy 12R: Tree 1479' from DER, 561' left of centerline, 86' AGL/855' MSL. Obstruction light on pole 1002' from DER, 753' left of centerline, 53' AGL/852' MSL.
Rwy 17: Pole 409' from DER, 530' right of centerline, 29' AGL/866' MSL. Building 2619' from DER, 881' left of centerline, 97' AGL/918' MSL. Building 1956' from DER, 904' left of centerline, 61' AGL/866' MSL. Tree 2619' from DER, on centerline, 79' AGL/900' MSL.
Rwy 22: Trees beginning 2659' from DER, 867' right of centerline, up to 94' AGL/934' MSL.
Rwy 30L: Antenna on tower 3555' from DER, 1334' left of centerline, 116' AGL/935 MSL.
Rwy 30R: Billboard sign 1463' from DER, 848' right of centerline, 31' AGL/880' MSL.
Rwy 35: Trees beginning 2553' from DER, 770' right of centerline, up to 100' AGL/919' MSL. Trees beginning 1989' from DER, 194' left of centerline, up to 87' AGL/906' MSL. Buildings beginning 5.4 NM from DER, 1781' left of centerline, up to 889' AGL/1743' MSL.

KBREW SEVEN DEPARTURE MINNEAPOLIS, MINNESOTA
(KBREW7.KBREW) 14149 MINNEAPOLIS-ST. PAUL INTL/WOLD-CHAMBERLAIN (MSP)

NC-1, 04 FEB 2016 to 03 MAR 2016

will include a top altitude in the initial clearance. I've underlined the top altitude in the transcript below.

"Superjet 123 you are cleared to the Fargo airport, KBREW SEVEN departure, Fargo transition, climb via the SID except maintain one six thousand".

After we've identified our top altitude, we should familiarize ourselves with all applicable climb gradient requirements. Returning to the BAYLR THREE example, we see that there is an initial climb requirement after departing runway 35L: climb at 400 feet per nautical mile (NM) to 5,934, then climb at 260 feet per NM to 16,500. If we are able to satisfy this climb gradient requirement, we can accept this departure procedure.

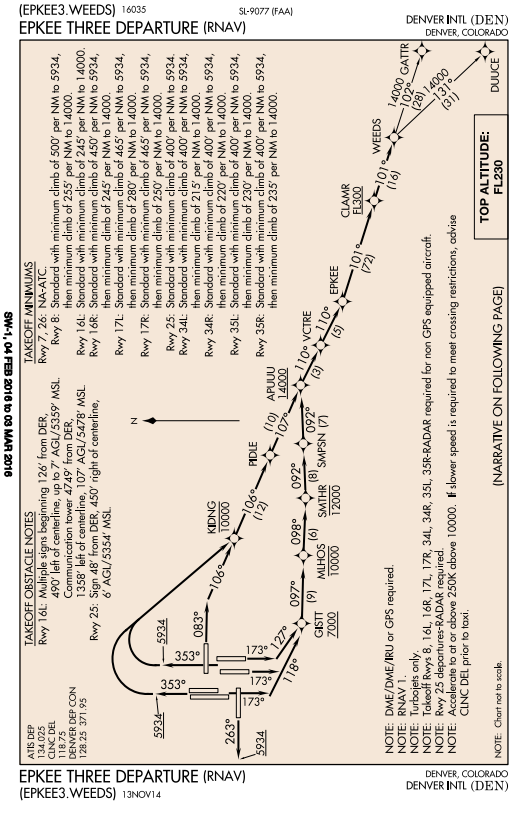
Finally, we should plan our departure and climb profile. In the BAYLR THREE example, we can reference the back side of the chart for a narrative of the takeoff requirements. Not all SIDs will include a detailed narrative, but if the chart has a narrative, you should read it carefully - it's likely a complex procedure that will require your attention. For our BAYLR THREE departure from 35L, we are required to climb on a runway heading until we reach 5,934, then turn left direct to CRAGR while continuing our climb. We have to be sure that we cross CRAGR at or below 10,000, then continue on to HAWPE intersection while we continue our climb to cross TUULO at or above 12,000. Next, we need to cross the HLTON intersection at or above 14,000, then MTSUI at or above 16,000. Finally, we continue our climb (at this point without any restrictions) up to our top altitude (FL230 unless amended by ATC) while navigating to BAYLR, then BOBBA, then on course. This departure procedure does not have any speed restrictions. If there are specific speed restrictions, you will be required to comply with these restrictions as well.

There are a couple of more things you should be aware of regarding the climb via clearances. It's possible that ATC will give you a temporary amendment to the climb via SID. If they are working you around traffic, they can vector you off of a SID or ask you to level at an intermediate altitude. That would sound something like this:

"Superjet 123, fly heading two two zero and maintain one four thousand. Expect to resume the SID".

In this case, you are required to comply with these new restrictions and temporarily disregard the charted restrictions of the SID. Once you are clear of the traffic, they will likely clear you back onto the SID ("proceed direct HAWPE, resume the BAYLR THREE") and you will again be required to meet the lateral and vertical restrictions while climbing to the top altitude, FL230.

I'll end the climb via discussion with one tricky example. Let's look at the EPKEE THREE departure at Denver.


(EPKEE3.WEEDS) 16035 SL-9077 (FAA) DENVER INTL (DEN)
EPKEE THREE DEPARTURE (RNAV) DENVER, COLORADO

TAKEOFF MINIMUMS
Rwy 7, 26: NA-ATC.
Rwy 8: Standard with minimum climb of 500' per NM to 5934, then minimum climb of 255' per NM to 14000.
Rwy 16L: Standard with minimum climb of 245' per NM to 14000.
Rwy 16R: Standard with minimum climb of 450' per NM to 5934, then minimum climb of 245' per NM to 14000.
Rwy 17L: Standard with minimum climb of 280' per NM to 5934, then minimum climb of 245' per NM to 14000.
Rwy 17R: Standard with minimum climb of 465' per NM to 5934, then minimum climb of 250' per NM to 14000.
Rwy 25: Standard with minimum climb of 400' per NM to 5934.
Rwy 34L: Standard with minimum climb of 400' per NM to 5934, then minimum climb of 215' per NM to 14000.
Rwy 34R: Standard with minimum climb of 400' per NM to 5934, then minimum climb of 220' per NM to 14000.
Rwy 35L: Standard with minimum climb of 230' per NM to 14000.
Rwy 35R: Standard with minimum climb of 400' per NM to 5934, then minimum climb of 235' per NM to 14000.

TAKEOFF OBSTACLE NOTES
Rwy 16L: Multiple signs beginning 126' from DER, 490' left of centerline, up to 7' AGL/5359' MSL.
Communication tower 4749' from DER, 1358' left of centerline, 107' AGL/5478' MSL.
Rwy 25: Sign 48' from DER, 450' right of centerline, 6' AGL/5354' MSL.

ATIS DEP 134.025
CLNC DEL 118.75
DENVER DEP CON 128.25 371.95

NOTE: DME/DME/IRU or GPS required.
NOTE: RNAV 1.
NOTE: Turbojet only.
NOTE: Turbojets Rwys 8, 16L, 16R, 17L, 17R, 34L, 34R, 35L, 35R-RADAR required for non GPS equipped aircraft.
NOTE: Rwy 25 departures-RADAR required.
NOTE: Accelerate to at or above 250K above 10000. If slower speed is required to meet crossing restrictions, advise CLNC DEL prior to taxi.
NOTE: Chart not to scale.

TOP ALTITUDE: FL230

(NARRATIVE ON FOLLOWING PAGE)

EPKEE THREE DEPARTURE (RNAV) DENVER, COLORADO
(EPKEE3.WEEDS) 13NOV14 DENVER INTL (DEN)

SW-1, 04 FEB 2016 to 03 MAR 2016

Step 1: Find the top altitude.

In this case, it's in the bottom right-hand corner of the chart.

TOP ALTITUDE: FL230

Step 2: Identify climb gradient requirements.

Assuming we depart from runway 35 left we need to climb at 400 feet per NM to 5,934, then 230 feet per NM to 14,000.

Rwy 35L: Standard with minimum climb of 400' per NM to 5934, then minimum climb of 230' per NM to 14000.

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Step 3: Plan out the departure and climb profile.

Again, assuming a departure from runway 35 left, we need to cross KIDNG at or below 10,000 and APUUU at or above 14,000. Have a look at the CLAMR intersection. It has a crossing restriction of FL300 (at or above FL300). This is above the published top altitude (FL230). You may not climb above FL230 until specifically cleared by ATC. Reading the narrative on the back of the departure procedure will help clarify this restriction. There are no speed restrictions for this departure procedure.

TAKEOFF RUNWAYS 34L/R, 35L/R: Climb heading 353° to 5934, then climbing left turn direct to cross CRAGR at/below 10000, then on track 229° to HAWPE, then on track 237° to cross TUULO at/above 12000, then on track 237° to cross HLTON at/above 14000, then on track 237° to cross MTSUI at/above 16000, then on track 237° to BAYLR, thence . . . .

. . . . as depicted to BOBBA, thence via (transition) maintain FL230 or filed lower altitude. Expect higher filed altitude ten minutes after departure.

So, right after takeoff from runway 35 left, we will climb on a runway heading (353°) until reaching 5,934, then initiate a climbing right-hand turn to the KIDNG intersection, then continue to the fixes depicted on the chart, being sure to stop at the top altitude of FL230.

Coming Back Down

Now, let's briefly visit an old concept that goes along with this topic, relating to Standard Terminal Arrival Routes (STARs), the "descend via" clearance. These clearances have been used for some time but I think it's good to review them.

It used to be that only a handful of airports utilized a STAR in which ATC would issue a "descend via" clearance, La Guardia's KORRY Arrival being the foremost in my memory. Now these STARs are quite common and it's becoming more likely that a pilot will hear a descend via clearance during his arrival into a moderately-busy airport. It's important for the pilot to know what this clearance means and what ATC expects of them.

First, to clarify what I'm talking about when I say a "descend via" clearance, I will use the CRAZI ONE

RNAV Arrival into the Billings Logan International Airport.

So what is a descend via clearance? The Pilot/Controller glossary in the back of the AIM offers the following definition:

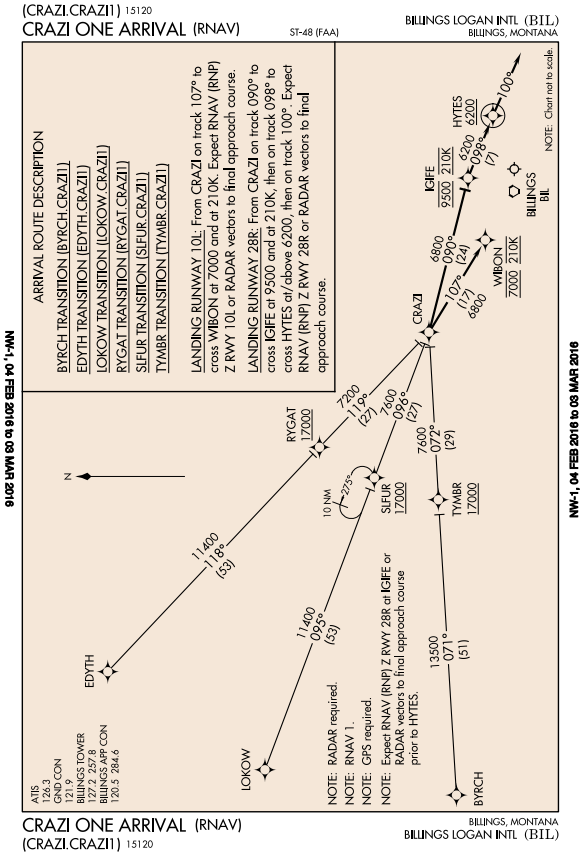
An abbreviated ATC clearance that requires compliance with a published procedure lateral path and associated speed restrictions and provides a pilot-discretion descent to comply with published altitude restrictions.

The typical descend via clearance will sound something like this:

Delta 1428, expect to land runway 28R, cross BYRCH at or above FL200, then descend via the CRAZI ONE Arrival, maintain 5,000, Billings altimeter 30.12.

That's it; really not a very complicated clearance. But what does it mean?

That's a little more complicated. Essentially, ATC wants you to follow the lateral and vertical depiction indicated in the STAR. It's a little like flying a non-precision approach that begins 100 NM from the airport. You will note that the STAR has numerous altitude "tags" that depict a minimum altitude (at or above 17,000), a maximum altitude (below 10,000), a hard altitude (at 7,000) or a range of altitudes (below 7,000 and at or above 4,000). When given a descend via clearance, the pilot must plan his descent to meet every one of these altitude restrictions without interaction from ATC; they will expect you to meet these crossing restrictions on your



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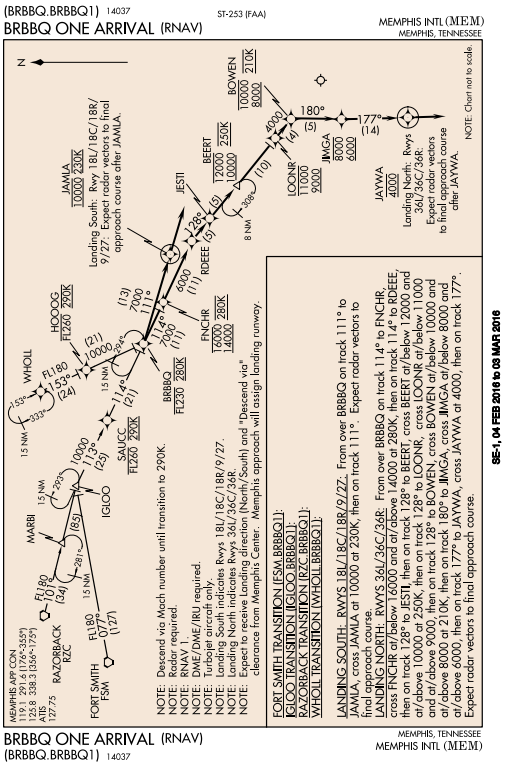
own. Some STARs also include speed restrictions (At 10,000 and 250 KTS). ATC expects you to meet these speed restrictions as well.

That's really all there is to it. Let's look at the Billings example again. Based on the clearance given, we would plan our descent to cross TYMBR at or above 17,000' MSL, IGIFE at 210 KTS and 9,500' and HYTES at or above 6,200' MSL while descending to 5,000' MSL. A descend via clearance doesn't preclude ATC from issuing amendments to what is published, either by issuing an amended clearance or by NOTAM. This is a really good reason to check those FDC NOTAMS very carefully. I remember when Reagan National Airport in Washington, DC was developing descent procedures for the WZZRD (now named the FRDMM) arrival. The altitudes indicated on the chart were amended pretty consistently by NOTAM. Read those NOTAMS carefully! It's also important to note, if you don't understand what ATC is wanting from you, ask!

It's far better to clear up any confusion prior to getting an altitude violation.

Let's close with another example. Memphis has a pretty complex RNAV Arrival procedure that's used with a "descend via" clearance quite often. It's the BRBBQ ONE Arrival. Look carefully at all of the altitude and speed restrictions on this arrival. Look closely at the BRBBQ intersection; at 280 KT and at or below FL230. Now look at FNCHR, only 11 NM down the road; between 16,000 and 14,000. If you crossed BRBBQ exactly at FL230 then tried



to meet the crossing restriction at FNCHR, that's an altitude loss of 7,000' over a distance of 11 NM! A 3-degree descent angle would require 21 NM; that's 10 NM more than you have. The lesson here is that you really need to be proactive in planning these descents early on. If we are going to make the restriction at FNCHR, we will have to be around FL200 by BRBBQ, assuming we follow a 3-degree descent angle.

Now, for some appropriately seasoned barbeque, visit the Germantown Commissary in downtown Memphis. It's a small place with excellent barbeque and great southern hospitality. If you come up with any specific questions, don't hesitate to ask: . *shayne@flyvift.com*. T&T

Shayne Daku is the President and Director for training for Valley In Flight Training. He also serves as an Assistant Professor for the University of North Dakota, Department of Aviation. He co-authored the Pilot's Manual: Multi-engine Flying and was a Captain in the CRJ 200 aircraft. He has a passion for aviation education, both on the ground and in the aircraft. Valley In Flight Training provides training and mentoring in owner-flown aircraft up to and including the King Air Series aircraft and will soon be expanding to include Cirrus, Bonanza, Baron, and Twin Cessna type-specific training. You may contact Shayne at shayne@flyvift.com.

Business Aviation Must Remain Vigilant Against ATC Privatization Threat

by Ed Bolen NBAA President and CEO

As readers of *Twin & Turbine* are aware, for the better part of a year, the nation's general aviation (GA) community has been locked in battle on Capitol Hill against proponents who favor replacing congressional oversight of our air traffic control (ATC) network with a private board, dominated by commercial airline stakeholders, and funded through new aviation user fees.

In February, such a proposal was introduced as part of H.R. 4441, an FAA reauthorization bill, representing a genuinely risky proposition, not only for our nation's business aviation community, but also for the citizens and communities of the United States.

Without Congress ensuring that the public's interest is at the forefront of any decision affecting access to our nation's airports and airspace, an airline-controlled private board would have ultimate authority to dictate where people would be able to fly, at what time, and – perhaps most disturbingly – at what cost. The airlines have long-sought such sweeping power over our air traffic system.

Any such authority favoring airline interests would directly impact areas of the country that currently depend upon the flexibility of business aviation for such critical tasks as opening new production facilities, developing new utilities infrastructure, and transporting doctors directly to small communities in need of medical assistance.

Fortunately, our industry has mobilized in the weeks since the Feb. 3 introduction of H.R. 4441 in a singular and powerful voice against this threat.

As you'll see in the accompanying article, numerous business aviation groups around the country have responded to NBAA's "Call to Action" on this issue, and have already contacted their elected representatives to encourage them to oppose the privatization of ATC.

These efforts have had a direct, meaningful impact on the debate over this legislation. But, despite the progress we've made, we can't afford to rest on our laurels. As I write this, the House is still working to find a path to the floor for consideration of H.R. 4441, and the Senate is expected to introduce its own FAA reauthorization measure soon.

At NBAA, we want the United States to continue to be the world leader in all aspects of aviation for decades to come. We believe the airlines' risky proposal is unlikely to make our system better, and would certainly leave smaller businesses, consumers and communities in a worse situation – not a better one.

I'm certain that you will agree that's a cause worth fighting for, and we cannot pause in this battle. I implore the *Twin & Turbine* readership to join with NBAA's more than 10,000 Members to make your voices heard, as well, against the fatally flawed concept of handing control of our nation's airspace to the airlines.

Groups Rally in Opposition to Airline-Supported ATC Power Grab

Numerous business aviation groups and other industry stakeholders from across the country have responded to the Feb. 8 "Call to Action" issued by NBAA President and CEO Ed Bolen, asking their members to contact lawmakers about opposing a plan to privatize ATC and fund it with user fees, which has been proposed as part of a U.S. House of Representatives FAA reauthorization bill, H.R. 4441.

As one example, the Louisiana Airport Managers and Associates (LAMA) approved a resolution opposing the replacement of congressional oversight of the nation's ATC network in favor of a privatized entity, as outlined in the House legislation. The resolution is particularly significant, as LAMA's constituency of more than 200 members includes representatives from the six air-carrier airports within the state.

"LAMA is of the firm belief that oversight and regulation of air traffic control will be best accomplished by reauthorizing the [FAA], and more specifically, by maintaining FAA and congressional oversight," the resolution stated, adding that the current system is much better than "transferring control to a private board or entity which might have authority over funding mechanisms and taxes, two areas best administered by the FAA, which is a governmental body whose direct oversight by Congress best insures its efficiency and responsiveness."

Other regional aviation groups have also publicly expressed their opposition to transferring control of the ATC system to a private entity outside of congressional oversight.

"We are sending this letter to request that you oppose any attempt by Congress to privatize our nation's air traffic control system and fund it with user fees levied against any segment of general aviation," noted a joint letter - indicative of several sent to congressional lawmakers - co-written by the Georgia Business Aviation Association and Georgia Airports Association on behalf of the groups' collective memberships.

In Florida too, multiple aviation groups joined forces to express their opposition to privatizing ATC services. "We are reaching out to you on behalf of over 400 of your constituents, who are members of the South Florida Business Aviation Association, Florida Aviation Business Association and the Tampa Bay Aviation Association, which includes entrepreneurs and companies of all sizes in Florida that rely upon the flexibility and access provided through business aviation," read the joint letter.

Other local and regional aviation groups also recommended their members act immediately. Among them were the Massachusetts Business Aviation Association, Oklahoma Business Aviation Association, Southern California Aviation Association, Nevada Business Aviation Association and the Colorado Business Aviation Association.

The New Mexico Municipal League and the Teterboro (NJ) Users Group are two more examples of organizations that urged their members to act upon NBAA's call to action. Joining them were other members of the general aviation community, such as the Eastern Region Helicopter Council.

In their email alerts, the groups often linked to NBAA podcasts and web pages on the subject of FAA reauthorization. Groups also suggested their members use NBAA's online Contact Congress tool to send personalized emails and tweets to their federal representatives.

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No Plane No Gain Advocacy Campaign Marks 7th Anniversary

In February 2009, NBAA joined with the General Aviation Manufacturers Association (GAMA) to launch the No Plane No Gain campaign, which highlights the important contributions of business aviation to cities, companies and communities across the United States.

In the years since, both associations have delivered on that commitment through seven critical, strategic initiatives:

Advertising: "For more than 50 years, using business airplanes is the single most productive thing I have done," noted golf legend, avid pilot and respected businessman Arnold Palmer in the first-ever series of No Plane No Gain video advertisements. "People who build business airplanes make things fly. People who use them make things happen." This message continues today, with recent campaign ads spotlighting a variety of CEOs, from companies of all sizes, who utilize business aviation to make their companies more flexible and competitive.

Studies: No Plane No Gain has published six studies – conducted in partnership with research firm NEXA Advisors – highlighting the many economic benefits that business aviation provides, not only to companies, but also to citizens and communities across the United States and around the globe, and even to government agencies.

Surveys: Conducted by Harris Poll in 2015, the survey "The Real World of Business Aviation" puts forward the true face of business aviation, demonstrating that business airplanes are utilized mainly by small and medium-size companies to maximize employee efficiency and productivity, while providing travel schedule flexibility. The survey, which updated findings from a 2009 poll, determined that 55 percent of companies using business aviation employ 500 or fewer workers, and 74 percent of these companies operate just one turbine-powered aircraft.

Web Resources: Last fall, NBAA and GAMA unveiled significant improvements to the popular No Plane No Gain advocacy website, including a responsive web design to make the site more compatible with smartphones and tablets. The new site also includes a "Share Your Story" area, enabling visitors to tell their own stories about the value of business aviation to their companies and communities.

Connecting People with Elected Officials: Each week, NBAA and GAMA are on Capitol Hill working to ensure that elected officials understand how business aviation works for America, giving the industry a powerful voice with Congress. Industry stakeholders may also spread this message through an easy-to-use advocacy tool that enables them to demonstrate to their congressmen and senators the industry's size and significance. Take action and tell Congress about the value of business aviation.

Social Media: No Plane No Gain quickly responded to the rise of social media, and today the campaign gets its advocacy message

out through Twitter and Facebook. Since No Plane No Gain established its presence on those channels, the number of Twitter followers for the campaign has grown to 18,500, while the number of Facebook "likes" has reached 18,200.

Advocacy Resources: No Plane No Gain offers regularly updated resources that people can use to make case for business aviation to national, regional and local elected officials, civic leaders and even workplace peers. For example, the Business Aviation Fact Book provides a clear picture of the scope and value of the business aviation industry. Also, the Business Leaders on Business Aviation booklet features 25 CEOs from some of the country's most dynamic and widely known companies, both large and small, who highlight the value of business aircraft to their organizations.

Learn more about these and other campaign initiatives, including ways that you may also help to spread the messages of No Plane No Gain, at *www.noplanenogain.org.*

Improved Weather-Forecast Products On The Way

The National Weather Service (NWS) Aviation Weather Center (AWC) is replacing the textual products from the old area forecast product with improved graphical forecast products intended to make the information easier to interpret, improving operator safety and efficiency. Through April 11, the AWC is soliciting input on this important weather forecasting tool from the business aviation community.

"At this time they are only working to replace the FA for the continental U.S, not for Alaska, Hawaii, the Caribbean or the Gulf of Mexico," noted John Kosak, weather project manager at NBAA's Air Traffic Services. "It is important that operators take the time to make useful comments regarding the appearance and content of information provided to allow the AWC to produce the best possible product for business and general aviation users."

The new tool (which may be found at *new.aviationweather.gov/areafcst*) includes the following weather products that are available to schedulers, dispatchers, crew members and any other interested parties: observations/warnings, thunderstorms, clouds, flight category (ceiling and visibility), precipitation, icing, turbulence and winds. Data reaches six-hours into the past, so users can see the trends, while the

hourly model data extends out to 15-hours in the future.

Reviews of the new product may be submitted at *www.nws.noaa.gov/survey/nws-survey.php?code=GRAFS.*

When reviewing the new product, users should indicate the type of platform they are using, (Apple iPad, Android tablet, smartphone, Microsoft Surface, etc.), as well as the operating system or browser (Chrome, Safari, Internet Explorer, etc.) they are using.

"This is one of many instances where the NWS asks for input from the business aviation community regarding changes to information and how it is provided," Kosak said. "If you're interested in more opportunities like this, you can participate on the NBAA Weather Subcommittee as either a core member or a member-at-large."

The current product will also remain available for the foreseeable future.

NBAA Offers Guide on Runway Excursion Prevention

Runway excursions are the most common type of accident involving business aircraft, according to the International Business Aviation Council's (IBAC's) 2013 Business Aviation Safety Brief. It has also been identified as one of the Top Safety Focus Areas by the NBAA Safety Committee, which recently also produced a new, 16-page guide to help flight departments reduce the risks of runway excursions.

The guide – Reducing Business Aviation Runway Excursions – explains how to identify potential causes of runway excursions and how to lessen those risks, beginning with an assessment of a department's risk exposure. It provides real-life examples of runway excursions, and offers suggestions for learning from them and outlining a set of protocols to enable operators to benchmark their runway excursion prevention efforts.

"Flight departments of all shapes and sizes have the potential to benefit from the contents of this guide," notes the document. "It is written primarily to facilitate thought and discussion surrounding runway excursions, and therefore is a useful tool for flight department leadership; however, anyone can gain a better understanding of the latest runway excursion prevention methods by reading this guide."

According to Ben Kohler, head of the NBAA Safety Committee's Technical Excellence Working Group, the new resource can help overcome misconceptions about runway excursions. For instance, some pilots may believe that using a stabilized approach while landing will always prevent an excursion, but that is not the case, as problems can surface after the approach is established, he explained. Also, some pilots may be unaware of all the hazards that can lead to an excursion.

"The NBAA guide is an easy-to-read document that provides all of the information in one place, so it gives pilots and flight departments a handy tool they can use to scrub their operations to improve safety," Kohler said.

The guide may be downloaded at *www.nbaa.org/ops/safety/in-flight-safety/runway/runway-excursions/Reducing-Runway-Excursions.pdf.*

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EN ROUTE

Twin Cessna Flyers Convention Set For Charleston, SC, April 27-30

The Twin Cessna Flyers will meet in their annual convention at the Charleston Marriott hotel in Charleston, South Carolina from April 27 through April 30, 2016. Following a highly-successful convention in Colorado Springs in 2015, TTCF is anticipating a record turnout of Twin Cessna owners, hosted by Atlantic Aviation at Charleston Executive Airport (KJZI).

Featured speakers include NTSB Board Member Robert L. Sumwalt, who addresses the Thursday morning opening session, and noted airborne weather radar

expert Erik Eliel. On Thursday evening, the Twin Cessna Flyers will dine aboard the historic U.S.S. Yorktown aircraft carrier, now a floating museum at the Charleston waterfront.

Friday morning's speaker will be Dr. David Strahle, discussing preflight weather planning, and Saturday will feature Dr. Robert Zubrin, an advocate of Mars exploration, whose topic will be "Mars Direct: Red Planet Visit Within A Decade." Educational seminars and a vendor exhibition hall will be available throughout the convention.

A pre-convention tour of the Charleston area will be featured on Wednesday, April 27 and a Companions tour of Boone Hall Plantation will be available on Saturday, April 30. Simcom Aviation Training will host the ground school companion Pinch Hitter Course on Thursday, April 28.

For a full schedule and registration information, visit *www.twincessna.org* T&T

EN ROUTE

Garmin® unveils the next generation of all-in-one ADS-B transponders

GTX 345/335 provide simple upgrade path for thousands of aircraft worldwide

Garmin International Inc. has announced GTX 345 and GTX 335 all-in-one ADS-B transponders that include Extended Squitter (ES) ADS-B Out, with options for built-in WAAS, as well as dual-link ADS-B In. The transponders will integrate with a wide variety of current and legacy Garmin displays, including select G1000® Integrated Flight Decks. The GTX 345 displays ADS-B traffic, subscription-free weather, GPS position data and back-up attitude information on the popular Garmin Pilot™ and ForeFlight Mobile apps via Bluetooth® and Connext™ wireless technology. The GTX 345/335's size makes it easy to replace the most popular transponders, like the Garmin GTX 327 and many others. Remote options are also available for compatibility with the GTN™ 650/750 series and G1000-equipped aircraft.

"For nearly 20 years, Garmin has led the development and initial deployment of various ADS-B projects, including Capstone, and today we have optimized that experience to unveil the industry's best ADS-B solutions, now including the GTX 345 and GTX 335 ADS-B transponders," said Carl Wolf, Garmin's vice president of aviation sales and marketing. "With more fielded ADS-B solutions than anyone else in the industry, Garmin remains committed to make the ADS-B transition simple, beneficial and cost-effective for everyone. Regardless of what type of aircraft you fly, where you fly or what you have in the panel – Garmin has your ADS-B solution."

The GTX 345 and GTX 335 incorporate the popular 1.65-inch tall transponder height and boast a bright, sunlight-readable digital display, including pressure altitude readout, dedicated buttons for numeric squawk-code entry and a built-in timer. An option for an integrated WAAS/GPS position source provides operators with an all-in-one solution that meets ADS-B Out requirements. The GTX 345 pairs with compatible displays to add subscription-free Flight Information Service-Broadcast (FIS-B) weather and ADS-B In traffic, incorporating exclusive features such as TargetTrend™ and TerminalTraffic™.

The GTX

345 includes a dual-link ADS-B receiver that provides pilots with a complete picture of ADS-B-equipped traffic. When paired with an active traffic system, the GTX 345 combines ADS-B traffic targets and active traffic targets to display a comprehensive traffic picture. Beyond the display, the GTX 345 may be integrated into the aircraft's audio panel to provide ATC-like audible alerts, such as "Traffic: ten o'clock, same altitude, two miles" to help pilots keep their eyes outside the cockpit

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when looking for traffic. Additionally, an optional altitude encoder is available and conveniently mounts on the tray of the transponder for easy installation and service, precluding the need for a static check.

For select G1000-equipped aircraft, either with or without WAAS, a remote-mounted version of the GTX 345 or GTX 335 takes the place of the aircraft's transponder and interfaces with either the aircraft's existing WAAS position source or the optional WAAS position source to meet ADS-B Out requirements. The G1000 display interfaces to the transponder to provide squawk code entry and control in the same manner as before. The dual-link GTX 345 provides the capability to display various ADS-B In benefits (software version dependent), on the primary flight display (PFD) and multi-function display (MFD). Pilots may view subscription-free weather, including NEXRAD, METARs and TAFs on the MFD, as well as ADS-B traffic targets on the MFD, and for aircraft equipped with Synthetic Vision Technology (SVT™) traffic targets also appear on the PFD. With built-in Connext technology, additional ADS-B In benefits can be wirelessly streamed to a Garmin GPS portable like the aera® 796/795 and the most popular apps in the industry, Garmin Pilot and ForeFlight Mobile. In addition to G1000, the GTX 345 integrates with thousands of installed displays to provide the benefits of ADS-B In, further extending existing avionics investments.

The GTX 345 transponder is available with and without WAAS for a list price of $5,795* and $4,995* respectively. The GTX 335 ADS-B Out transponder is available with WAAS for $3,795* and without WAAS for $2,995*. Remote-mount derivatives of the GTX 345/335 share pricing equivalent to the panel-mount transponders. For additional information visit: *www.garmin.com/ads-b.* T&T

*Manufacturer's Suggested Retail Price

EN ROUTE

Daher unveils new features of its Model Year 2016 TBM 900

Enhancements introduce "e-copilot" capabilities for reduced pilot workload and increased safety

The 2016 version of Daher's TBM 900 very fast turboprop aircraft incorporates improvements to further enhance flight envelope protection, improve warning identification and facilitate flight planning. These enhancements were introduced with Garmin's new software release for the G1000 V15 avionics suite – the TBM 900's all-glass cockpit configuration.

"With the Model Year 2016 TBM 900, we are offering our customers a concentration of innovation, technology and safety improvements that can be compared to bringing an 'e-copilot' into the cockpit to reduce the pilot's workload," explained Nicolas Chabbert, the Senior Vice President of Daher's Airplane Business Unit. "Those innovations reflect our policy of constant improvement, which offers TBM customers the latest technology available for the optimized use of their aircraft."

The enhancements include:

- Flight envelope monitoring through the Electronic Stability and Protection (ESP) and the Under-speed Protection (USP) systems, both of which have been added to the autopilot. These electronic monitoring and stability augmentation systems assist the pilot in maintaining the aircraft in a stable flight condition when flight parameters are exceeded.
- New aural alerts for stall, overspeed, landing gear extension and oxygen mask use. These alerts replace aural sounds for better warning identification.
- An AOA (Angle of Attack) sensor with visualization on the cockpit's Primary Flight Display electronic instruments.
- Two-way wireless link-up to the aircraft's Garmin G1000 all-glass cockpit avionics suite from a mobile device that runs the Garmin Pilot™ application. This Bluetooth® linkup is via Garmin's Flight Stream 210 wireless gateway, and enables the syncing of prepared flight plans and streaming of GPS, weather, traffic and other information to/from the avionics system.

In addition, Daher is including the L-3 Lightweight Data Recorder from L-3 Aviation Products as standard equipment on the TBM 900 for voice and flight data recording. This 5 lb.-category system has become an industry reference for general aviation and executive aircraft, as well as helicopters.

Offered by Daher as a TBM 900 option is the Garmin GRA™ 55 all-digital radar altimeter, which provides highly accurate altitude-above-ground and rate-of-change readouts.

To learn more about the TBM 900, visit *www.tbm.aero* T&T

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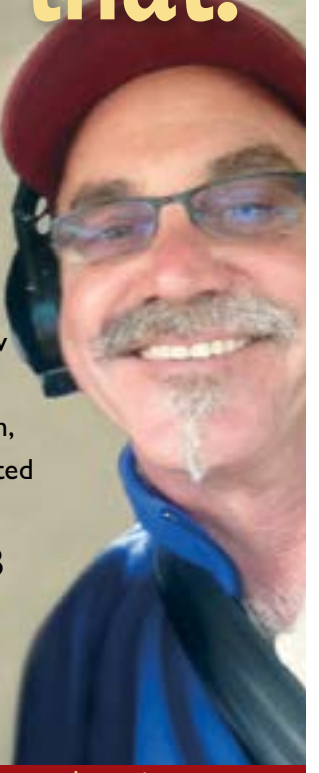

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EN ROUTE

JR Motorsports and Cessna Announce Partnership

On February 5, 2016, JR Motorsports (JRM) and Cessna Aircraft Company, a subsidiary of Textron Aviation Inc., announced a new relationship making Cessna the official business jet choice of Dale Earnhardt Jr. As part of the agreement, JRM's No. 88 Chevrolet race car will carry the Cessna brand as primary sponsor in six races during NASCAR Xfinity Series competition in 2016 with drivers Alex Bowman and Cole Custer. Cessna will also receive associate placement on the No. 88 during the two NXS events Earnhardt Jr. will compete in, at Texas Motor Speedway (April 8) and Richmond International Raceway (April 23).

"We are looking forward to representing Cessna on both the business and competition front," said Kelley Earnhardt Miller, general manager of JR Motorsports. "Cessna is a strong and leading brand and our business strategies complement one another. Together we have a unique partnership with tremendous potential for growth."

"Cessna Citation business jets are designed for speed and efficiency, two trademarks valued by Dale Earnhardt Jr. and his team at JR Motorsports. We're looking forward to the relationship with JRM that will demonstrate those qualities as Dale travels in the Citation this season to races and events across

the country," said Scott Ernest, president and CEO of Textron Aviation.

Bowman and Custer will drive the No. 88 Cessna Chevrolet Camaro in six races, with 22-year-old Bowman first up at Michigan International Speedway (June 11) and Iowa Speedway (June 19). The Tucson, AZ, native will also drive the Cessna entry at Richmond International Raceway (Sept. 9), Dover International Speedway (Oct. 1) and Phoenix International Raceway (Nov. 12).

Custer, who competes full time in the NASCAR Camping World Truck Series for JRM, will race the Cessna machine in one of his five NXS starts with the organization this season. He takes his turn at the wheel at Kentucky Speedway on July 8.

Cessna brings the latest technologies and innovations to its Citation series of business jets, offering customers industry-leading aircraft solutions to meet the most demanding and unique mission requirements.

Through its extensive global service network, Textron Aviation is renowned in the industry for its unrivaled, complete aircraft support across its Beechcraft, Cessna and Hawker platforms.

To learn more about the JRM organization, its drivers and its sponsorship opportunities, visit *www.jrmracing.com.* For more information about Textron Aviation, visit *txtav.com*. T&T

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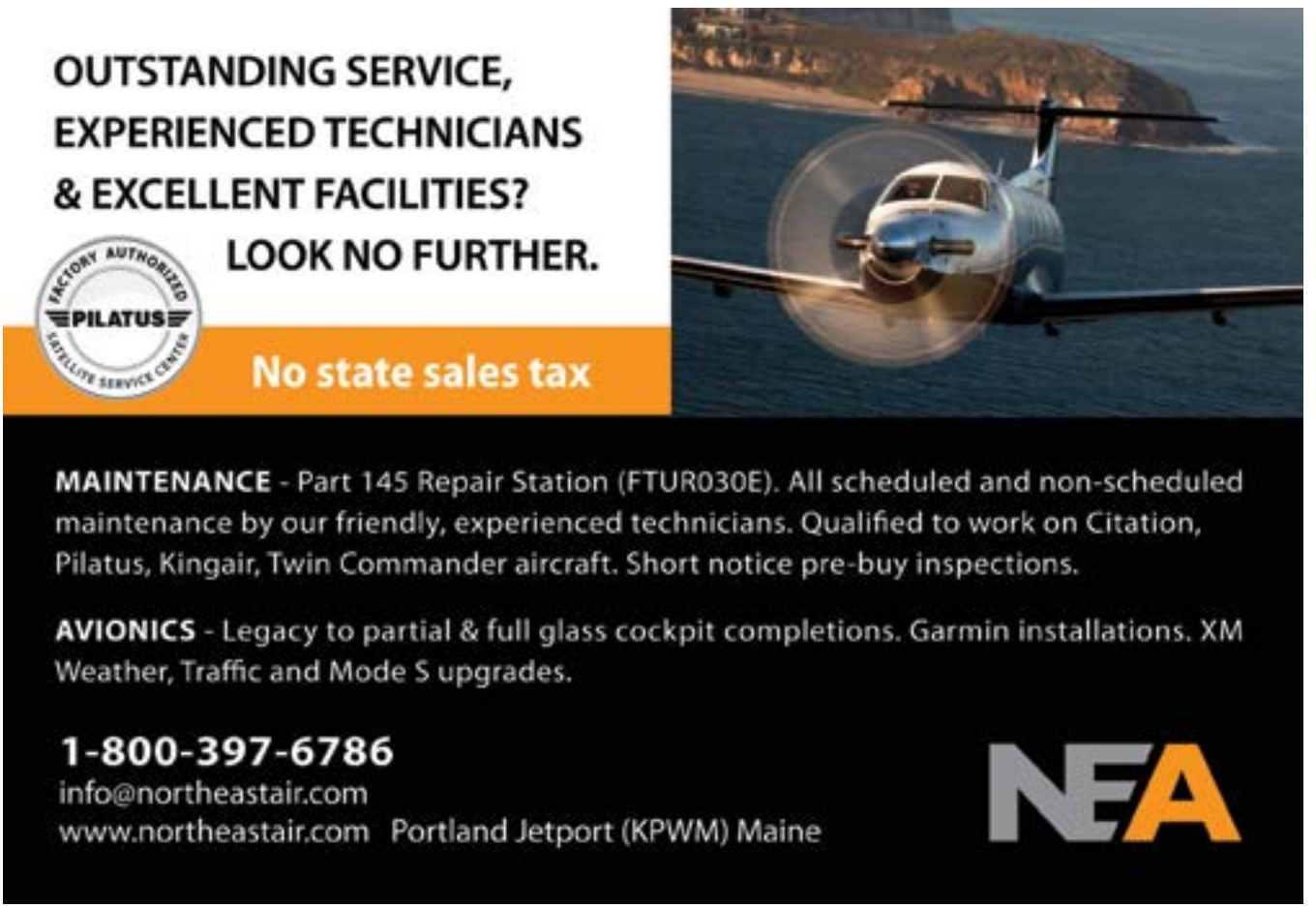

ON FINAL

by **David Miller**

Gee 3000

With 6,000-plus hours in his logbook, David Miller has been flying for business and pleasure for more than 40 years. Having owned and flown a variety of aircraft types, from turboprops to midsize jets, Miller, along with his wife Patty, now own and fly a Citation CJ1+. You can contact David at davidmiller1@sbcglobal.net.

I remember my first solo cross country in the late 60's in a Piper Cherokee 140. I had a single VOR receiver, a compass and some sort of black and white instrument that was supposed to tell me where my wings were. My parents sat by the land-line telephone, anxiously waiting news from my instructor after each of my landings. Back then, we knew we were going to get lost. We just didn't know HOW lost we were going to get. Many years later, along came a company called Garmin.

My, how times have changed.

Today, you can start flight instruction in all sorts of airplanes. But, most have Garmin avionics. Recently, I had the opportunity to spend five hours in my friend Larry King's brand new Citation M2 and expose myself to the G3000 system.

I was impressed.

Garmin has done with G3000 what Apple did with the iPad. They have changed our behavior. And the cool thing about the G3000 system is how it is integrated into the airframe. Looking for the switch for the rotating beacon? You won't find one on the panel. Instead, the G3000 powers up the beacon when you initiate the start sequence. Tired of reading confusing takeoff and landing charts? The system knows the airport elevation from the flight plan you entered. It knows the weather from the XM satellite broadcast. It knows your weight from airplane sensors. I think it probably knows if you left a bag in your car. At the touch of an icon on the GTC (Garmin Touch Controller), you can instantly have V-speeds posted on the PFD's, see the crosswind component, display the takeoff distance and receive a warning if the chosen runway is too short.

Gone are the thirty individual caution and warning lights on the glareshield in previous CJ's. They are replaced with a CAS message box on the PFD and are arranged in order of importance in case of multiple failures. Want to customize what I call the "pretty pictures" of the Garmin system? You can arrange charts, maps, weather, just about anything, in up to six panes on the screens. Want more info? Just display that on the two GTC's on the lower pedestal. Tired of having to turn off your avionics during a battery start? The M2 has a separate battery so you can keep everything running. Forget to release the parking brake before takeoff? The CAS message sends you a "No Takeoff" warning. Not sure what the best climb speed is during a missed approach? The G3000 knows and will peg it when the autopilot is coupled.

As for the M2 itself, Williams installed a "chip" in the engine, like we did to our cars in high school, to make it 20 knots faster than the CJ-1+. I saw almost 400 knots at cruise in ISA conditions. And while fuel use is slightly higher at the faster speeds, range remains the same. Fewer switches and more situational awareness leads to a safer flight.

Above all the weather at FL 410, Larry said, "You know, if I didn't have Garmin, I probably wouldn't be a pilot." That's a strong statement but one that made sense.

Fly safe.

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