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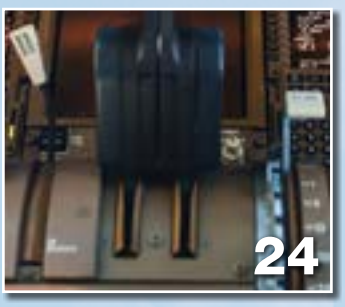

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Do We Need A Third-Class Medical?

For the past several years, an on-going debate has been raging about "When are they going to do away with the medical exam for Private Pilots?" Whenever pilots gather, there's always a couple or three who strike up a conversation about what they are going to be able to do when the FAA no longer requires a third-class medical certificate. A lot of them are inactive pilots, folks who want to return to flying but currently doubt their ability to pass the medical exam, or find it too daunting a task.

Most *Twin & Turbine* readers hold a medical certificate, because they are out there flying their airplanes every day. We know the actual examination is simple and painless, hardly capable of diagnosing anything other than partial blindness or a heart attack in progress. What the FAA wants is information about your recent medical history, so it can determine if you're likely to remain functional for another 6, 12 or 24 months. Even so, if your medical condition changes one day after the exam, you are to consider the medical certificate invalid and cease your aerial endeavors until the matter is resolved.

Most often, it is the revelations of the exam's attention to history, medications or screening that leads to rejection. As the pilot population ages, more and more of us require supporting tests and documentation to keep our medical in force. To its credit, the FAA's medical division tries to keep relatively-healthy pilots in the air; it allows medication to control blood pressure, cholesterol, thyroid deficiency and other shortcomings, and even permits pilots who've had strokes and open-heart surgery to get back in the cockpit with supporting evidence of recovery. But, it takes some determination and expense to jump through the requisite hoops.

Which brings us to the questions behind the interest in changing the rules; Is The Physical Worth It? Does the Third-Class medical really do any good, particularly for purely-recreational flying? After all, if you take the physical before your 40th birthday, it's valid for five years, unless your condition changes. Or, would allowing medically-uncertificated pilots of unknown status to ply the skies create a hazard to the more-serious practitioners of aviation? What restrictions would be appropriate for flying without a medical?

Non-medical piloting has been expanded from gliders and balloons to the Sport Pilot license, and there doesn't seem to have been a noticeable rise in accidents from pilot incapacitation following the advent of sport piloting, which includes not just certificated Sport Pilots but other-rated pilots operating light-sport eligible aircraft sans medical. Which is to say, about as many medical factors are found with accidents involving sport pilots as with medically-certificated pilots. This provides fodder for the rush to abandon the medical for non-commercial piloting.

In my opinion, the Third-class medical exam may as well be given by a family doctor, using a simple form supplied by the FAA; upon submission, the form can go in the FAA's file until the specified interval is up. AME services could be retained for Second and First-class exams. All pilots would see a doctor, but not at the same level of scrutiny. When I took my first pilot medical exam, nigh onto six decades back, certification scrutiny was simpler, and pilots were probably a less-healthy group than they are today.

All of us will, hopefully, become older, and we'll become less sure of our ability to satisfy the FAA as time goes on. If Congress and the FAA decide, based on the evidence from accident analysis, that the non-commercial pilot doesn't need a medical certificate, it might make our pleasure flying in our retirement years a little more pleasurable.

LeRoy Cook.
Editor

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The Cessna A Versatile

by **LeRoy Cook**

By the mid-1960s, Cessna Aircraft Company was on a growth spurt, bringing out new aircraft models to fill every possible marketing opportunity. Recognizing that business aircraft was the key to the company's future, it was obvious that expanding the twin-engine line was vital. The Model 310 was over ten years old and had seen its share of upgrades, but Beech Aircraft had introduced the cabin-class Queen Air in 1960. To compete, Cessna needed a bigger plane.

What the engineers came up with was something called the "Cessna 411". Originally, it was one of Cessna's few design mistakes, but it did serve as the foundation for a successful family of rear-door twins, extending for the next 20 years. The 411 utilized the 310/320 wing, complete with wingtip fuel tanks, split flaps and electrically-operated landing gear, but with an entirely-new "wide oval" fuselage. Unlike Beech's taller, but narrower, "bread loaf" cross-section, the new Cessna twin sacrificed headroom in favor of a wider cabin, since most of the trip is spent in a seated position. A split entrance door

402 Cabin-Class Twin

behind the wing offered folding entrance steps in its lower portion and a windowed upper portion. Nominally set up for four club-facing seats in the rear plus two cockpit chairs, two additional passengers could be accommodated if desired.

Certificated in August 1964, the 411 made use of turbocharged 520 cubic-inch Continentals, similar those of the late model 320 Skyknight, but with a 3:4 gear ratio behind the propeller to generate 340 horsepower, turning the engine at 3,200 rpm and props at 2,400. The vertical fin and rudder turned out to be undersized for the task of opposing engine-out predicaments; Vmc was published as 90 knots. The 411 was produced for four years and 300 units; with oval windows and turbocharger bleed air available, it was obviously designed for pressurization, and thus the 421, with a larger tail and 375-hp GTSIO-520 engines turning propellers at a 2:3 ratio, was certified on May 1, 1967.

Meanwhile, Back at the Drawing Board...

Shortly after the 411's introduction, it was obvious that the fuselage had utilitarian possibilities, and on September 20, 1966, Cessna gained certification for Models 401 and 402, using direct-drive TSIO-520 engines of 300-hp. The airplanes were basically identical, with the 401 supposedly a more-opulent executive configuration and the 402 slated for utility service, much like the two versions of the 206 single that had been offered a year earlier. Most importantly, the 401/402 had a bigger tail than the 411, dropping Vmc to 83 knots with the smaller engines.

The 402 proved to be the clear winner, and the 401 version was dropped after six years. Although both grossed at 6,300 pounds, the 402 had 1.6 inches more aft c.g. allowance and could carry an additional passenger, for a total of nine occupants.

For the 1969 model year, a 401A and 402A were offered; the 401A was certificated in October 1968 and the 402A in January 1969. With the 402A designation, up to 10 seats could be installed. The major change occurred with the 401B and 402B, approved November 12, 1969. The – B model had an extended nose with a second forward baggage door, allowing as much as 600 pounds to be carried in the snozzola. However, the maximum takeoff weight of 6,300 pounds remained.

Cessna continued development of the 400-series twins in the 1970s, introducing a less-expensive pressurized 414 for the 1970 model year, powered by direct-drive 310-hp engines, and in 1976 the 421 got its makeover with a bonded, wet-wing fuel system and hydraulic landing gear, abandoning the tip-tanks that required auxiliary cells larger than the tips. No one missed the labyrinthine fuel lash-up. Accordingly, the clean-wing 414A came along in 1978 and in 1979 it was the 402's turn for the new wing.

The restyled 402C was built until 1985, and it remains a popular load-hauler for charter and business use. More than just a removal of the tip tanks and change to hydro gear, the engines' output was boosted to 325 hp each and max gross weight went to 6,850 pounds, creating a much more useful airplane. Even with the weight increase, single-engine performance went up and the stall speed went down a couple of knots. The 402C remained in production through the decline in general aviation manufacturing in the 1980s, finally succumbing to the triple threats of product liability costs, a bad economy and an oversupply of slow-selling aircraft. Cessna wisely abandoned propeller twins to concentrate on jets.

The Three Cessna 402s

There are three variations of the Cessna 402; the original short-nose 401/402, the long-nose 402B, and the wet-wing 402C. The latter is the most sought-after, with its greater payload and simpler fuel system, but the older tip-tanked airplanes offer a lot of capability and value.

The walkaround inspection reveals an imposing aircraft, with a huge vertical tail and an equally-significant proboscis. So extensive is the forward baggage area that it requires four swing-up doors to access it, and 600 pounds can be carried, less any installed avionics. A 45,000-BTU combustion heater is in the nose. Not that other baggage space is lacking; wing lockers, aft of the nacelles, can take 200 pounds each, although air conditioning normally installed behind the right engine cuts 80 pounds off that side's allowance. And a swing-open cargo door behind the air-stair entrance allows loading of bulky items, with baggage adjacent to the aft seats. Loading should be accomplished in front-to-back order.

The 402C's landing gear is hydraulically actuated, powered by pumps on both engines, rather than electrically-driven like the earlier airplanes. The maingear, carrying 6.50 x 10 tires, stows into open wells, instead of behind the sequencing doors used previously; the nosegear has a 6.00 x 6 tire. A standby blow-down bottle in the nose backs up the hydraulic system.

In a most-welcome departure from the tip-tanked 402, the wet-wing fuel system is a simple on/off/crossfeed system, normally requiring no management, holding 206 usable gallons, but seldom filled unless extreme range is required. About 900 pounds of payload can be carried with full fuel. There is a 6,515-pound zero-fuel weight to be observed, so there's no reason to depart with less than 30 gallons per side. Maximum landing weight is the same as max takeoff weight.

The electrically-driven flaps are split-type panels, retained from the earlier twin Cessnas.

The TSIO-520-VB engines are cowled in slim nacelles with screwdriver accessible drop-down doors and removable panels. Cowl flaps are installed. The engines can put out 325 hp for takeoff and single-engine operation; normal rated power is 310 hp. The three-blade McCauley props are housed in polished spinners.

The big tail stretches 12 feet into the air, with a single trim tab on the right elevator, along with trim tabs on the rudder and left aileron. A clever optional rudder gust-lock lever on the left side of the tailcone pins the rudder in neutral. If overlooked during preflight, it will disengage with application of up-elevator.

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The State of Missouri's Department of Conservation operates a 1985 Cessna 402C as a versatile utility load-hauler, carrying such diverse cargo as otters, pallid sturgeons, wild turkeys, fish fry, equipment and personnel around the state and elsewhere. Purchased in 1993, the airplane has given them very little trouble, according to Mike Beul, lead aircraft mechanic for the Department. The Department had previously operated a 402B, so it was well acquainted with Cessna utility twins.

Service-wise, the exhaust system requires continual attention, as with all turbocharged Cessnas. Because of the aircraft's capability, loading has to be monitored to maintain the proper C.G. The only complaint from the users is the output of the old R12-charged air-conditioning system in the right engine nacelle. MDC's 402C flies about 300 hours per year and as we went to press it had about 8,600 hours total time. In Beul's words, "It's been a great all-around mission airplane, with good cabin size."

For personnel transport, the MDC airplane is outfitted with five passenger seats in the cabin. Cargo is easily loaded through the swing-out auxiliary door aft of the airstair. The airplane is outfitted with the forward crew door, which permits the cabin to be cubed-out with cargo while the pilot enters over the wing.

Eventually, a replacement for Conservation's 402C will have to be found, but it will be very difficult to find an airplane that will do as much, with as much efficiency.

The early 401 designation for passenger accommodation and 402 for utility hauling was replaced in the 1973 402B by simply offering "Businessliner" and "Utililiner" packages, the latter having extra seating and plainer furnishings. These offerings were carried over into the 402C. If used for cargo hauling, a forward crew door and wingwalk were offered.

For business flying, the cabin would normally have club seating plus two crew and two aft seats, with foldaway work tables and cabinetry. After entering via the airstair, the lower door is raised by its support cables and secured in place, followed by pulling down the upper portion and latching it. The wide aisle gives enough room to wiggle forward in a low crouch, and the cockpit is spacious, once seated. Because most electrical controls are on the sidewalls, there's little overhead but some lights and

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The new Cessna twin sacrificed headroom in favor of a wider cabin.

rheostats. Fuel selectors are on the floor, and everything else is handy at waist level.

The pedestal has the power stalks and cowl flap handles, along with trim and autopilot controls. Power gauges are at eye-level under the glareshield and there's plenty of room for avionics plus right-side gauges. Starting and electrical switches are on the left sidewall, with a priming toggle between the starter buttons to actuate the high boost pump. One quickly learns to catch a faltering engine with primer, starting with mixture rich and pumps off. Once running, the boost pumps go "on", which is a low-speed vapor-purge setting unless the engine-driven pump fails, causing the boost pump to automatically go to "high".

Taxiing is a pleasure, with light pedal pressures and prompt steering. Visibility isn't bad, despite the long nose; the maingear span is almost 18 feet, so it pays to watch taxiway radius and centerlines. There's a heavy elevator down-weight and a slight aileron/rudder bungee interconnect, neither of which are objectionable. Runup is conducted at a sedate 1,700 rpm, trims and controls are checked, boost pumps are verified on, cowl flaps are open and air conditioner turned off for departure. The prop synchrophaser can be left on.

Line-up and go involves the usual spool-up for the turbochargers, and regard for the single-engine operation numbers. Vmc is 80 knots, but Vyse is 104 knots. A compromise of 95 knots gives Vxse, so rotation is scheduled for about 90 knots, at which point liftoff and gear retraction would put one in safe territory. Flaps are not used, since they are primarily a drag device.

Acceleration is quick, given that the power-loading is around 10 pounds per horsepower, and 2,000

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feet of runway is sufficient to reach Vxse, climbing away at 1,500 fpm. Normal cruise-climb power is 29.5 inches and 2,450 rpm, which yields around 1,000 fpm at 125 knots. Boost pumps off and props synched, there's little to do but watch the airplane climb; the 402C is stable and solid, even flown manually.

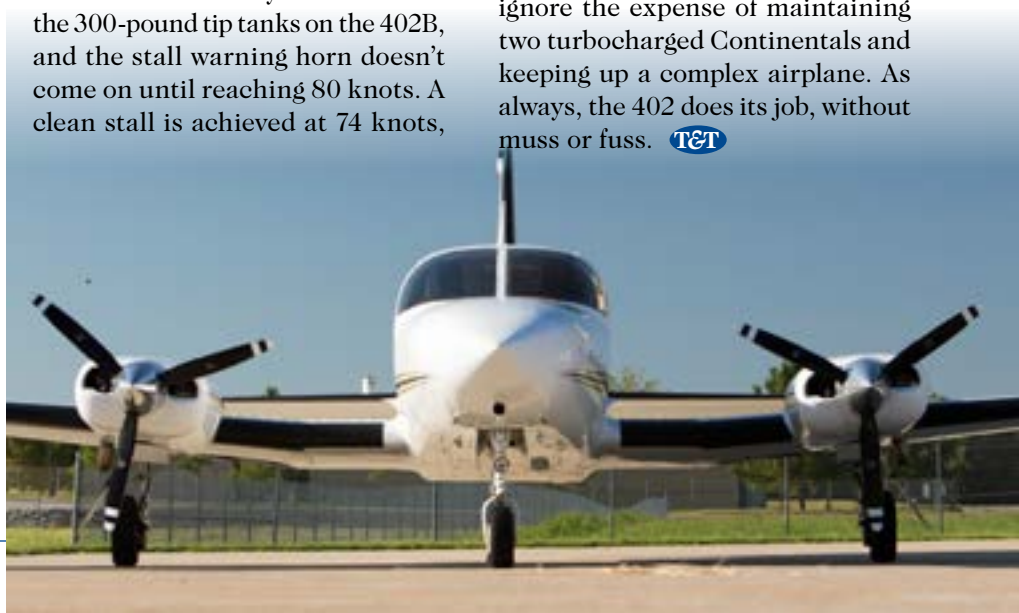
Leveled out and leaving the power at 29.5 and 2,450, about 70%, the TAS at 9,000 to 10,000 feet works out to 200 knots, burning about 18 gph per side. Coming back to 28 inches and 2,300 rpm, roughly 65% power, TAS drops by six or seven knots and fuel is down to 17 gph each, and at a fuel-saving 56% power of 26/2,200 the TAS is 183 knots on 14 gph per engine. At cruise, the big 402C rides like a bus, trimmed up with yaw damper on.

Slowing down, both first-flaps and landing gear can be extended below 180 knots, which is basically anytime, with additional flaps allowed below 149 knots. Motoring along at the 104-knot Vyse blueline, there's none of the flywheel effect of the 300-pound tip tanks on the 402B, and the stall warning horn doesn't come on until reaching 80 knots. A clean stall is achieved at 74 knots, and in full-dirty configuration the stall break comes at 10 knots slower.

Single-engine performance is not the hallmark of a loaded 402C, but it's possible to manage 300 fpm with an engine zero-thrusted, pulling full 325 hp out of the good engine. As with any piston-powered light twin, loading, technique and atmospherics influence performance greatly, and density altitude must be respected if any single-engine capability is to be expected.

In the pattern, 17 to 18 inches m.p. works well for maneuvering power, riding down the glideslope at 100 knots or so. With experience, one can fly a 90-knot approach and cross the threshold at 85 to get down and turned off in 1,500 feet of runway. For a three-ton people hauler, it's a pretty good short-field airplane.

The old 402 developed into a dependable, capable utility twin during its 20 years of production, and it's still a very useful tool for business and personal travel. Early examples can be obtained cheaply, but do not ignore the expense of maintaining two turbocharged Continentals and keeping up a complex airplane. As always, the 402 does its job, without muss or fuss. T&T



Twin Proficiency:

Confident "Go"

Don't Drive on the Greens

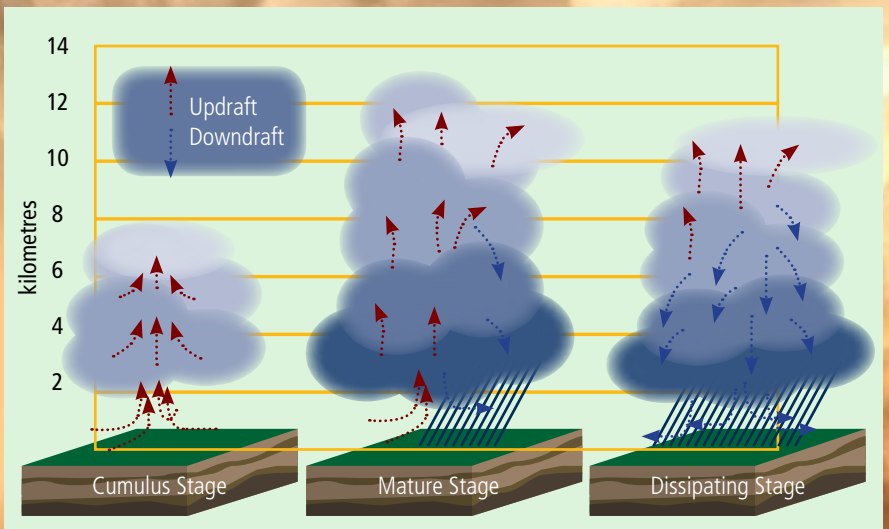


Figure 1: *Life cycle of a thunderstorm cell. In the Cumulus, or Updraft stage, vertical speeds of 2,000 feet per minute can occur. The mature stage, defined as when precipitation begins to fall (and therefore the first echoes appear on radar), has rising and falling air currents on the order of 5,000 to 6,000 fpm. In the Dissipating (Downdraft) stage, air descends at 6,000 fpm or more. It's encountering the wind shear between still air and rising and falling columns of air that is the major hazard of thunderstorms. An individual cell can complete the entire life cycle in about 30 minutes, from beginning to end.*

I spoke with a pilot at Oshkosh who had very recently survived a harrowing encounter with thunderstorm turbulence as he was flying IFR between cells. The pilot was working with Center to find a path between the growing cells. ATC suggested a deviation based on its real-time weather radar display; the pilot's onboard NEXRAD upload agreed with the controller's description of the cells' locations. So, the pilot confidently accepted the new course.

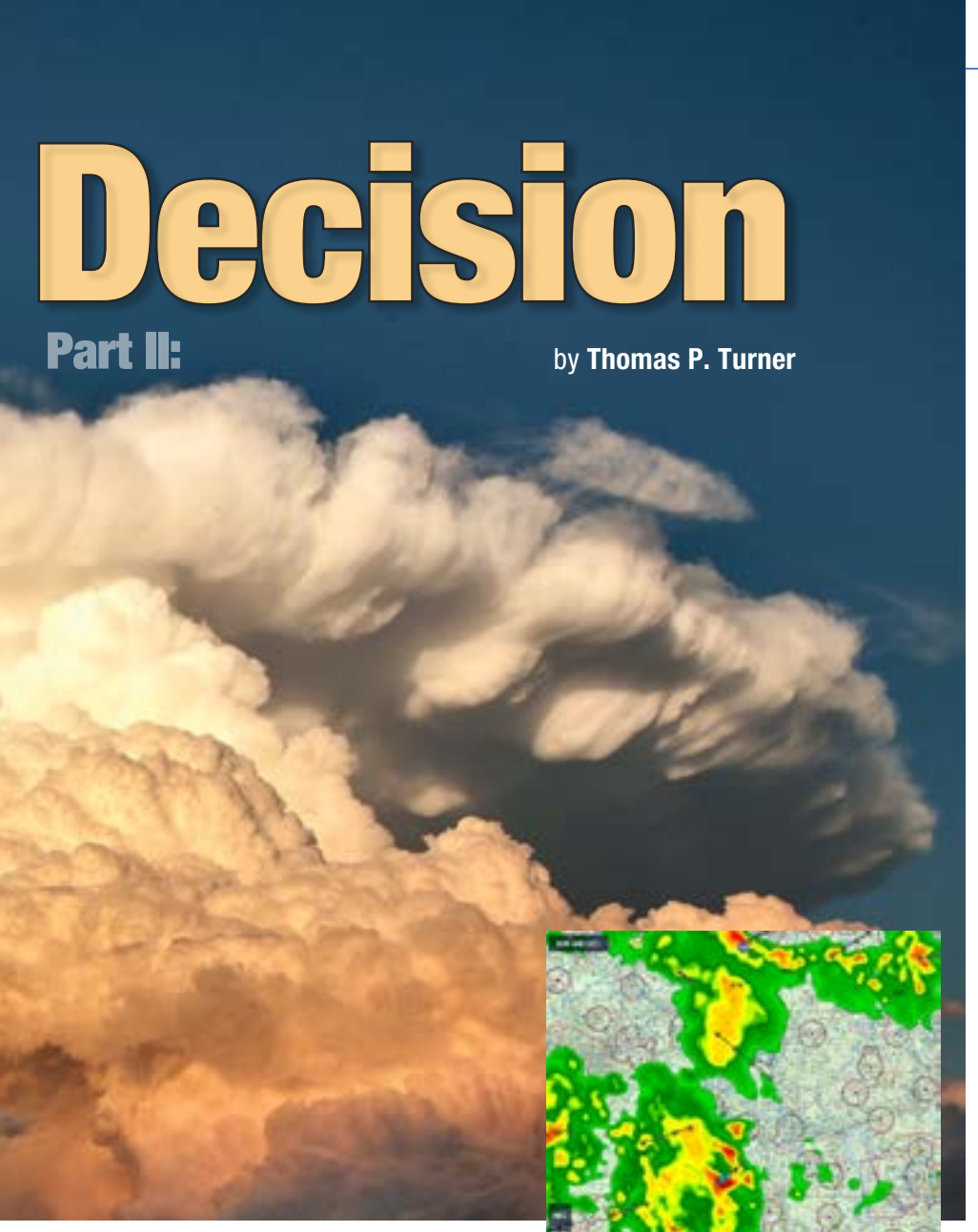
With no warning, in the clouds but outside the areas of heavy precipitation on both ATC radar and the NEXRAD uplink, the airplane suddenly hit strong turbulence. It was thrown into a steep bank that disengaged the autopilot and caused the airplane to enter a sprial. The pilot recovered after entering visual conditions beneath the cloud deck, at roughly 1,300 feet above the ground. He thinks he may have momentarily blacked out from the G-load of pulling out of the dive.

ATC granted the pilot's request to land at the nearest airport reporting VMC, which was uneventful. Shaken up, his brief visual inspection of the airplane revealed no apparent damage. Later, the pilot and his mechanic inspected the airplane more closely. The pilot had not looked under the fuselage, but the mechanic noticed the fuselage skin below the wing's carry-through spars was wrinkled. Removing the cabin interior, he found wrinkling in the carry-through itself. Further, the wing attach fittings appeared to be bent. The pilot and his wife were

Decision

Part II:

by **Thomas P. Turner**



extremely lucky to have survived. The airplane was totaled.

Radar and the life cycle of a thunderstorm

One of the challenges of making an informed, confident "go" decision when thunderstorms are developing is precisely how to plan your route to avoid the threat. It's easy to look at the greens and yellows and reds on a radar screen or uplink display and think: "As long as I stay out of the yellows and reds I'm okay." After all, green often indicates very light precipitation. Certainly a piston twin or light turbine can handle that.

The pilot who lost control and miraculously recovered asked me how he encountered such significant turbulence while flying outside the yellow and red areas of his iPad's NEXRAD map, and those Center told him were painted on their screen. I told him this is because radar doesn't indicate the earliest, but still dangerous, phase of a thunderstorm's development: the Updraft Stage. I took the experienced pilot back to his knowledge test preparation and asked him to name the three stages of a thunderstorm's development. He recalled them as the Cumulus or Updraft stage; the Mature phase; and the Downdraft or Dissipating stage. I then asked him–and this is a key point–what defines the beginning of the mature stage. The answer: it's *when precipitation begins to fall from the cloud.*

Figure 2: *Flying in an area that looks like this? Avoid* all *the radar returns…even the green.*

Then I queried: What's the greatest hazard of flying into a thunderstorm? He correctly said "turbulence." I have recently been asked "How much rain can an airplane fly through?" The answer is "it depends"–some engines may have air filters or inlets that don't stand up to rain. Some canard surfaces are known to have adverse aerodynamic reactions to rainflow, and high-efficiency laminar airfoils may lose some of their lift-generation capability in the rain. But, for most of us, the beating of rain against the airplane makes noise but does not alone create a hazard. What *is* dangerous is the wind shear effect of a boiling, fluid atmosphere.

The critical concept: Radar doesn't detect turbulence, it displays the precipitation that sometimes (but not always) coincides with areas of strong turbulence. It's turbulence, not precipitation, that is the hazard of flying near a thunderstorm. And, by definition, the Updraft stage of thunderstorm development is invisible to radar, despite the potentially damaging wind shear it contains–as soon as the storm appears on radar it is no longer in the Updraft stage.

Further, Center air traffic control radars are optimized for aircraft detection, not weather returns. Often, they cannot detect areas of light precipitation that may be the first indication of a mature-stage thunderstorm. The ability to paint weather on ATC scopes varies widely from one ATC facility to another. *And*, the rate at which individual thunderstorms can build is so great that what appears to be a clear path can close in before an airplane can traverse the space between the cells. That may include your escape path, too.

Twenty miles from where?

The old advice about avoiding thunderstorm activity–to remain 20 miles from the edges of any storm cell's radar return, and to stay in visual conditions if at all possible while doing so–is just as valid now as it was in the days before weather data uplinks and moving map displays. The true purpose of these technoloiges is not to help us penetrate areas of precipitation returns; it's to make it easier for us to stay 20 miles or more away.

There are additional factors of Base Reflectivity vs. Composite radars (the former reads only what is happening at the base of the clouds, while the latter depicts precipitation in the cloud in cross-section, providing advance warning of heavy precipitation), and the time between radar observation and transmission through NEXRAD uplinks (the latency period, which isn't as bad in areas of active radar returns as has been reported). Even the colors used to identify specific levels of precipitation activity are very different from one weather radar data provider to another.

Dr. David Strahle developed an operating logic in the 1960s that pioneered digital transmission of weather radar information, eventually into the cockpit in flight. Dave is known as "the father of datalink radar." A very active IFR pilot, he is an expert on weather radar interpretation and regularly consults with Government and private authorities and air crash investigators. His profession is as a radiologist…who better to analyze radar cross-section returns with a fresh, new outlook than someone whose industry-leading career is interpreting cross-section imagery of cancer patients?

Dr. Strahle is the extremely-rare authority who not only knows his stuff, but is also makes it extremely easy to understand the very advanced topics as a speaker and lecturer. I've heard him speak on inflight radar uplinks four times, and would do so again in a minute. I highly encourage you to watch for him on the speaking circuit and attend his presentations. In his Oshkosh 2015 talk, he emphasized: It's generally safe to fly through areas of light precipitation ("green" returns on most radar plots), if there is no moderate or greater precipitation associated with those clouds. However, Dr. Strahle tells us, if there is any moderate precipitation in the radar plot (generally yellow), you need to remain at least 10 miles away from even the light (green) returns that surround the heavier precipitation. If there is heavy (often, but not always, orange or red) or extreme (darker red, white or other) precipitation, remain at least 20 miles away from even the light (green) returns.

Why is this? Research shows that individual thunderstorm cells

will "share" or "exchange" energy, creating massive areas of instability and turbulence between them that may be invisible to radar… and even to the eye. If there is any precipitaiton at all in an area of storms with moderate or greater precipitation returns, anywhere in the cluster, researchers tell us there is the chance of extreme turbulence hazard. Dr. Strahle warns that if thunderstorm complex has enough energy to create yellow or red radar returns, it has enough potential to create turbulence anywhere within or near the cloud.

So, what exactly should you stay 20 miles away *from*? If there's moderate, heavy or extreme precipiation in the cell at all (yellows, reds or worse), it's not safe to be *anywhere* in the precipitation footprint of that cell. Remaining 20 miles clear of that thunderstorm means staying 20 miles or more away from the outside edges of even the lightest, green radar returns.

Knowing what you know now, it's a lot easier to make an informed go/no-go decision for flying when storms threaten. You know you're not pushing your luck if you plan your flight to remain well away from *anything* that shows up on radar, to avoid the Updraft stage of individual storm cells and the potential of encountering significant turbulence as cells share and exchange energy between them. If you're enroute and can't stay well away from *all* the radar returns surrounding heavy precipitation, deviate right away. If you can avoid driving on the greens, as it were, you can make a confident "go" decision. 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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The Gray

Are You Current, or Both?

By **Todd Hotes**

Is it possible for a baby bird to survive without its mother? Sure, at least for a while. Ultimately, however, the odds will change and the outcome will yield unfortunate, if not tragic, results. The same analogy can apply to pilots, except manipulation of the odds can be made in favor of survival. I am referring to the regulatory compliance of pilot certificate currency and recent flight experience, versus proactive pilot proficiency (Reference FAR part 61.56 & 57). Those are three very different definitions, two with inherent pitfalls for the unassuming pilot, although they're all trying to attain one goal: Safety. Note: The latter of the three, proactive pilot proficiency, is usually a standard upheld by the individual pilot, not a regulation.

At the airlines, training occurs twice a year for captains (ground school followed by two proficiency checks) and once a year for FO's (ground school, followed by a PC). The ground school consists of system operations, airline SOP's, reviewing ASAP reports (Aviation Safety Action Program) and other valuable trend data. Occasionally, line flying stories are traded, the usual banter of the airline is debated, and tribal knowledge is passed down between the ranks, such as "if this happens, try doing this first" (before the official procedure). The airlines do not like tribal knowledge, as it encourages a lack of standard operating practice.

Simulator sessions encompass IAP's, emergency ops, LOFT training (Line Oriented Flight Training), and some extracurricular situations that are only possible (hopefully) in the simulator. The simulator is very comprehensive, as it knocks the rust off tools normally underutilized. Yes, you may be thinking to yourself, "I train once, if not twice, a year." Although that may be true, the difference is that airline pilots fly almost daily. Proficiency, therefore, is maintained by flying regularly. I hesitate, however, to write this in today's environment, as we've also seen a degradation in proficiency on the Part 121 side of the spectrum. Simply put, if you can't fly on a regular basis, you may not be as "proficient" as you think you are, or as the regulations lead you to believe.

That being said, as Part 91 pilots, it's up to us to uphold the same standards set forth by those companies flying paying passengers and/or cargo. After all, anything less than an accident/incident-free year is cause for improvement. Therefore, what does this mean for those of us who want to be as sharp as we can? Well, we all know about the existing programs to keep us up-to-date on trends, techniques, and procedures; I won't list them here. However, on the flying side of the equation, why not set up a training schedule based on the amount you fly per month, as well as the quality of flying normally conducted? Perhaps for every 15 hours of flying or 15 days (whichever comes first), you train for two hours. Whatever the course of action you deem to be appropriate, follow through and stick to it. Think of it as a requirement.

Moving back to the airlines, their crews train in night and poor-weather conditions during the simulator sessions. This enables the pilots to hone their basic instrument flying skills, situational awareness, SOP's, etc. Although the training is aimed at facilitating proficiency, what really keeps the crews sharp is the constant exposure to flight, on an almost-daily basis. For those of us on the Part 91 side, flying for hours every day is not possible, so we need to be proactive in order to maintain proficiency. I don't suggest taking off into hard-IMC conditions alone at night, unless you feel qualified. Instead, take an instructor or qualified safety pilot (I'm

Area: Proficient,

sure both are eager to ride in a Twin & Turbine aircraft) and practice some actual or simulated approaches, published holds, and non-published holds. On another occasion, should the same flight not be conducive, find a nice day or night to practice your air maneuvers; engine out procedures, aborted takeoffs, stall recognition and recovery, memory items and limitations, cross-wind landings and takeoffs, and even aborted starts. Either way, set up a system of flying regularly, and train well beyond what's required by insurance companies and regulations. It's like compound interest: The more you put in, the more you'll receive in return–the more you train, the more proficient, comfortable, and confident (albeit, hopefully, not over-confident) you'll be.

Of course, this is easier said than done and we all fall victim to a lack of time in our lives. Flying around in a complex, cabin-class machine is a responsibility. So, too, is holding the certificate to act as PIC. If the regulations alone are not stringent enough to force the issue of true proficiency, then make sure you do it yourself. Ask yourself: Are you really ready to fly today, if the last approach you flew was five months and 29 days ago? Are you ready to land at night, if your last nighttime landing was over two months ago? And, should the unthinkable occur, are you ready to handle an emergency situation? If the answer is yes, then good for you. If not, make sure you get out there and practice. After all, isn't it just another reason to jump into a beautiful machine and have some fun?

This may appear to be a lot of effort, perhaps even overkill, but the time and cost is well-allocated and will absolutely yield a strong return on investment. Remember, we're flying complex airplanes in complex airspace and with that comes the responsibility to ourselves, our passengers, and even those we fly over (or near) to maintain proficiency rather than just currency and recent flight experience. Can a fish live without water? For a little while… T&T

Todd Hotes
Former Check Airman
Chief Pilot, Polymer Resources, LTD.

Airspeed, Alpha

By **LeRoy Cook**

Precision control of an aircraft in flight requires both piloting skills and the tools to evaluate and perfect them. As pilots, we need to be capable of hand-flying the airplane, not just monitoring it. We can take satisfaction in knowing we can keep our aircraft under control, using our eyes, hands and feet. But, how do we know we're being successful? We have to use instrumentation and visual cues to do this job, each of them providing some, but not all, of the feedback necessary.

There are some basics underpinning the art of airmanship that I believe are vital. One of them is "attitude, plus power, equals performance", a formula behind every maneuver we perform with an aircraft. Apply the right pitch and roll attitudes, establish the correct power setting, and the airplane will settle into the performance state you desire. Get either input wrong, and you'll be chasing the needles to adjust the results.

Another fundamental precept is understanding how to assess the aircraft's energy state. Primarily, we are interested in the total energy held, and capable of being generated, by the moving airplane. This includes kinetic energy represented by the aircraft's motion, potential energy available from the stored altitude that we can tap, and further energy potential in the fuel that can be called upon to produce thrust. Excess energy can be useful, or wasted, depending on how well we apply it. If, on the other hand, we allow our aircraft to become deficient in energy, we'll have to rebuild its energy status by pushing up the power or sacrificing some altitude.

And so, much argument is made over how to control an airplane; do we manipulate speed by varying pitch attitude, or changing the power setting? For my part, the reply should be "Both, at the right times." On the takeoff roll, for example, we are obviously attaining the desired speed by applying full takeoff thrust, with the aircraft in a level attitude. When it comes time to lift off, we change over to attitude control, rotating the nose up to a target pitch index, at which point the angle of attack ("alpha", in the popular lexicon) produces the requisite lift and the wheels leave the ground.

Did the attitude provide climbout performance? Not by itself. Did the firewalled throttles cause the airplane to lift off? Not alone. The desired performance was achieved by combining the two fundamental elements of flying–Power, plus Attitude, equaled Performance. During the roll, the aircraft's energy state was building toward a speed that would generate lift sufficient to support the loaded airplane's weight against the pull of gravity, and a bit more to ascend the climb gradient.

How do we determine the proper climb attitude? Traditionally, we refer to the airspeed indicator to see if it's showing the desired number; V2, Vy or a cruise-climb speed or Mach. But, we don't fly the airspeed indicator–we fly the airplane's pitch attitude, either matching flight-director commands or using other familiar pitch targets that generate the right speed. If sufficiently over-powered, we may slip the throttles back to a climb-power setting, prolonging engine life and reducing noise and fuel burn. Again, our need is to fly pitch attitude, not the ASI; if visual, it's probably easier to reference the glareshield against the natural horizon. And it's safer, since the other airplanes representing a collision threat are coming from somewhere outside, rather than out of the instrument panel.

Is an angle of attack indicator useful for this

& Attitude

effort? Certainly, although its precise guidance may not be required in ordinary operations. The instantaneous results of changing pitch and G-loading can be seen on the multicolored fast-slow Alpha indexer's scale, showing how our available reserve of lift is doing. Again, we are only using the angle of attack reference to show the results of our efforts. If we adjust pitch and power to keep the A of A reference exactly on the merging of the green and yellow bands, we're getting the most, and safest, performance from the aircraft. If the absolute maximum lift is needed, we can keep the indexer on the yellow band's juncture with the red, but only for critical operations.

Whether referencing ASI or AOA, pitch control is primary, with appropriate power a necessary ingredient. One cannot ignore pitch attitude, so it's important to fly by a working attitude reference. In the dark or in cloud, only the instrumentation showing the airplane's attitude state will keep us upright and level. If the referenced attitude disagrees with the airspeed or VSI, or with the heading and turn indications, a back-up attitude reference must be sought. Chasing the performance instrument readings themselves will lead to disaster. It usually takes less than a minute for spatial disorientation to lead us into the "graveyard spiral."

Automation

Is there a case to be made for automation? Certainly, a good autopilot relieves us of the tedium of constant corrections, and it allows for workforce reduction on the flight deck, so we can divert our attention to programing changes into the FMS while "George" minds the airplane. Never, however, should we allow the autopilot to boldly take us where we aren't capable of flying ourselves. Yes, I know I can't meet RVSM tolerances at altitude without the autopilot's help–but I should be able to steer, climb and descend on my own, albeit with less precision.

I've always found it helpful to watch an automated flight control system work, particularly with autothrottles engaged. The autopilot will nudge the airplane, almost imperceptibly, back to a courseline while I might be waiting for more deviation before taking action. The coupled thrust levers will work aggressively in turbulence, before the aircraft's energy state is depleted or we get too high on the approach. My takeaway is to emulate the autopilot's smooth results, by making timely pitch and power corrections.

Most autopilots, however, fly a bit crudely, particularly when challenged by the environment, so we, as artistic aviators, will probably accept a bit of inconsequential error in favor of a smooth ride for our passengers. When the ground gets close, or ATC demands immediate movement, we may have to give up some of our chosen soft-ride maneuvering. Underlying it all, however, is the fundamental requirement to fly pitch and power to produce performance.

Which Way Is Up?

The other day, I was testing a trainee's ability to recover from a sudden insertion into an unusual aircraft attitude, solely by reference to instruments. We began with him ducking his head down and closing his eyes while I positioned the

aircraft in a nose-high pull-up or a rolling dive. Upon command, he looked up, interpreted the situation and recovered to stabilized level flight. His success prompted a greater challenge. "This time," I instructed, "keep your eyes closed and try flying the airplane only by what you're feeling. If you feel a turn, roll out until it feels right; if you think you're diving, pull up to stop the dive."

After about 45 seconds, he had allowed a 45-degree bank to develop and the nose was slightly down, the airspeed already accelerating well above what it would be in level flight. I told him to look up, whereupon he uttered an expletive and yanked the controls to recover into a straight-and-level attitude, all while his senses told him otherwise. My point was made; we can't fly without attitude references, visual or artificial.

If our fancy instrumentation fails us, we have to rely on the most basic references we have. A turning heading indication almost certainly means we have a wing down; stop the turn with opposite control. If airspeed is decreasing, yet power is normal for the phase of flight, you're probably nose-up and need to reduce pitch. However, check the VSI and altimeter for correlation, and seek an attitude that will correct to a stable airspeed. If a standby attitude indicator is available, use it. Never chase an airspeed indication alone; fly attitude to achieve results.

An angle of attack indicator is simply a graphic presentation of what an airspeed indication is already telling us; fly too slow and bad things will happen. It is superior to the ASI in that it represents an energy state, without interpretation, even under G-load, so it's a quick confirmation of what we need to know. And yet, attitude and power are still key to producing performance. Fly with the basic tools, and you'll survive any loss of supporting instrumentation. T&T

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From the Flight Deck

Old-School

by **Kevin R. Dingman**

I was talking with a flight attendant the other day about changes in the airline business; water cooler talk–or, in Part 121 parlance, "sit-time" talk. We have about an hour between flights to "sit" – if we don't have to change planes and move thirty or forty gates away, that is. When we keep the same plane, we have time to engage in conversation. The talk is normally about life at home, politics, or complaints from both directions about hotels, pay, or expensive food while traveling. Sometimes it's about management: "If I were running this airline…." or "that was a bad decision they made about…." Or, the most common: "did you hear they re-interpreted the contract again?" It can get very heated. Other times, it's about the good-old-days at the airline.

The flight attendant and I reminisced about how our areas of expertise, and the world, has changed. From her perspective, it was the service we used to provide: un-rushed boarding, cloth napkins and silverware, and reasonably tasty food throughout the cabin. Magazines, pillows and blankets, and a rested, knowledgeable and polite staff were the standard. And, from my perspective, it was the way Captains used to be Captains in addition to being the PIC: demonstrating leadership of the crew and command of the vessel, greeting and saying goodbye to the folks, keeping them informed of delays, turbulence, and the geography along the route of flight. By the time the passengers get on the plane these days, they have been beaten down by a long drive to the airport, additional fees at the ticket counter, a strip-search by TSA and a less-than-cheerful gate agent. The flight crew has their work cut out for them before the passengers cross the threshold into the jet.

What brought up the subject of changes in the business was the P.A.'s that I make to the passengers on every leg. The flight attendants hear them, and sometimes they actually h-e-a-r them and make comments. There's a few things about seat belts, and not hanging around the cockpit door that are mandatory, but except for those, time enroute, and changes in geography, my P.A.'s are pretty much the same words; I could do them in my sleep. I'm told, however, that this type of in-flight oratory is uncommon; that most captains have changed and say very little or nothing at all to the people. Granted, because of communication and navigation satellites, the internet or video screens throughout the cabin of "modern" airliners, most flight information is provided in real-time. Now-a-days, the passengers know as quickly as the pilots about routes, weather and gate changes; so, like this intentionally rambling sentence, the need for a rambling P.A. has disappeared – even become annoying to some; God forbid we interrupt a game on their electronic devices. Annoying unless, that is, you enjoy human interaction or the reassuring, calming voice of the grey-haired Captain.

People Skills

Most people are annoyed by a rambling sentence or a rambling P.A. So, over the years, I've refined my P.A. (and sentence structure) based on input from editors, flight attendants and customer comments. I now talk to the passengers at the top of climb, once every hour and once thirty minutes before landing. I invite kids to the cockpit before and after flight and sometimes hand out Disney "Airplane" coloring books and a five-pack of washable crayons or a junior-pilot logbook. Usually, ten or so of the 140 customers will say something to me on the way out the door after every flight. They mention the P.A.'s or say "nice landing". They want to shake my hand or take a picture with us – kids give us drawings. I've even run into a handful of *T&T* readers. It's nice. After 21,000 hours, apparently I've developed an acceptable level of people skills and have discovered how to put down a smooth landing. Of course, the company wants its employees to exhibit good public relations skills, so this is all good for business. It helps to offset the times when things don't go as smoothly as we would all hope.

One frequent-flyer told me that the way I fly was "old-school." It reminded him of better days; like the ones the flight attendant and I remembered. He missed the way airline flying used to be – without all the electronic gadgetry. When you looked out the windows, had good food, read magazines and talked to your fellow travelers. Passengers used to network with each other before networking was a word, and some even met their spouses-to-be in this way. It was like getting gas at a full-service gas station, fruits and vegetables from the farmer's

market, listening to music with words and a melody, or saying The Pledge of Allegiance in school; flying used to feel more social and "American". These systemic changes on both sides of the cockpit door have occurred due to a shift in our culture, and for safety, efficiency and economic reasons.

Crank Handle

Changes in the flying world are not restricted to Part 121. In the name of modernization, efficiency and security, all of GA is bracing for changes related to NextGen, including ADS-B compliance. Old-school is being replaced once again. The Duke, like a growing percentage of aircraft, is now compliant. Gone are its old Collins Nav/Coms, a first generation King IFR GPS, the ADF, DME, RMI and a handful of even more "antique" components – including a Collins RNAV and two marine radio signal-strength meters. Flying without the RNAV and those marine meters will be challenging, I'm sure. Fellow airport bums had been dispensing grief about the avionics– a bit beyond old-school, they said. "Oh, my God, an RNAV. I haven't seen one-a-those since the seventies. Where is the loop antenna crank-handle for that ADF? Is that a Narco VOR? It has a crank too, right?" they would chuckle. The explanation was the same one I use as the reason I fly the MD-80 instead of one of the next-gen aircraft available at my carrier: like the old avionics, I'm old-school too. I've grown comfortable in the MD-80 and with its avionics. Truthfully, I'd do just about anything to avoid six weeks of training in a new jet at the flight academy in DFW. Teaching old dogs new tricks and all, you know.

Itch Scratching

The Duke's Century IV autopilot is also old-school, but it's coupled to everything, which anyone flying single-pilot in the soup, at night, or over long distances will tell you is very nice – so it gets used a lot. But, I still enjoy staying in touch with the flight control system, the engines and manual navigation, when appropriate, as well. The F-16 is a fly-by-wire airplane, complete with all kinds of classified magic and I have a type in the 737, so it's not as though I've never been

exposed to modern technology. I suppose you can compare it to those that fly both a Citation and a Cub: each satisfies a different itch. The workload is considered to be higher in older airplanes or those with legacy avionics, but that's the itch I've enjoyed scratching–the one that made me feel more engaged, more useful – even more needed. Eventually, though, the finicky old avionics began affecting flight planning and aircraft reliability.

The Collins radios needed a mod to prevent frequency bleed-over; a mod that was not available anywhere on the planet. Both transponders (yes, someone installed two, way back when) were intermittent and sometimes transmitted a different code than what was selected. The GPS was non-WAAS and the humor of having Smoky and the Bandit-style radio signal-strength meters was gone. These reasons, and the initial sale price offered by L-3 for its ADS-B line, triggered the upgrade.

Newly installed is a Garmin 430W, a King digital flip-flop Nav/Com and a Lynx NGT-9000 ADS-B transponder. The transponder has a polite lady's voice announcing traffic and its touch-screen is very "iPad" like. The Garmin GPS is four or five generations newer than the old KLN 90B, so the utility and functionality is a pleasing leap forward. I really appreciate coupling an LPV approach and the value of the lower MDA. Almost 20 pounds more useful load was generated from the conversion and a sizable blank spot is now available on the panel.

Timing of the ADS-B conversion for the Duke was due to a growing list of malfunctioning components and not so much the concerns about avionics shop-time availability or the looming deadline. It did take a month to get on the schedule, however, and they say the wait time will become increasingly longer as the deadline nears. It's becoming more and more difficult to remain old-school – without buying a separate, old-school, itch-scratching flying machine. At the pace that technology changes, it shouldn't be too long, though, before the current iteration of new-school avionics becomes old-school itself; then, me and the Duke will be back to our old selves. 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

EN ROUTE

Pacific Coast Avionics Upgrades Piper Meridian to Garmin Glass and Touchscreens

New-generation custom panel upgrade includes dual Garmin G500 EFIS units, GTN 750 touchscreen GPS/COM/NAV and GDL 88 ADS-B UAT

Dewey Conroy, Pacific Coast Avionics' Vice President and COO, announced August 3rd that the company has completed a next-generation Garmin panel upgrade on a Piper PA-46-500TP Meridian turboprop.

Conroy said that the Meridian is owned by Darren Pleasance, head of customer acquisition for Google. Mr. Pleasance uses his aircraft for business and pleasure trips throughout the U.S. from his home base in San Jose, California.

"Darren came to us with the goal of creating an avionics solution that would enable him to fully utilize his Meridian's capabilities now and well into the future," Conroy said. "The completed panel speaks for itself. Darren now has an airplane and an avionics suite that will permit him to operate in any airspace or weather with greater capabilities, situational awareness and safety."

"From the first time I saw it, I knew it was everything I had hoped for in my panel upgrade," Pleasance said. "Whether flying for business or pleasure, my Meridian has always been an excellent airplane, but now, I'd have to say, from an next-generation capabilities standpoint, its avionics are equal to its performance."

Conroy explained that the Meridian's all-new panel features:

- Dual Garmin G500 EFIS with Synthetic Vision Technology (SVT)
- Garmin GTN 750 touchscreen GPS/NAV/COM
- Garmin GTX 33/ES Mode S/ADS-B Transponder
- Garmin GDL 88 ADS-B Datalink Universal Access Transceiver (UAT)
- Garmin FlightStream 210 Bluetooth data streaming device
- Mid-Continent Instrument MD-302 SAM 3-in-1 Standby Attitude Module.

"From start to finish, the total project took six weeks," Conroy said. "Along with a custom metal panel, we fabricated new wiring harnesses that integrated all the new avionics and displays with the aircraft's original Meggitt digital engine displays, as well as other legacy equipment and sensors.

"It's not our first Piper Meridian panel, but it is the first time we've done one with dual Garmin 500 displays," he said. "Everyone involved with Darren's Meridian upgrade is extremely proud of the way the panel turned out. It's a really something special."

For more information, visit: *www.PCA.aero*. T&T

EN ROUTE

Flightsafety is building a King Air 350 simulator equipped with Rockwell Collins Pro Line Fusion Avionics

FlightSafety International has announced that it is building a full-flight simulator for the King Air 350 aircraft. The new FlightSafety FS1000 simulator will be equipped with the Rockwell Collins Pro Line Fusion integrated avionics system.

"FlightSafety is pleased to increase the support we provide owners and operators of King Air aircraft," said Steve Gross, Vice President, Sales. "Building a King Air 350 simulator equipped with the Pro Line Fusion avionics system demonstrates FlightSafety's commitment to respond to the changing needs of our Customers."

The Level D simulator is expected to enter service early in 2016 at FlightSafety's Learning Center in Atlanta, Georgia. Owners and operators of the King Air 350 also benefit from FlightSafety's new Operational DayFlow training methodology. This innovative, highly customized training system, transforms ground school by presenting critical procedures and tasks according to phase of flight.

The FlightSafety FS1000 simulator being built for the King Air 350 will feature tightly integrated computer hardware and software across subsystems, which allows for more accurate and higher fidelity simulation. It will be equipped with a new multi-function Instructor Operating Station designed to enhance the effectiveness of training by providing an intuitive interface, scalable graphics, and large multi-touch displays. The simulator will also be equipped with FlightSafety's VITAL 1100 visual system and electric motion control and cueing.

For further information, visit *www.flightsafety.com* T&T

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EN ROUTE

Quest Aircraft Planning Factory Expansion

Quest Aircraft Company has developed plans to expand its Sandpoint, Idaho factory. The company is adding approximately 75,000 square feet to its KODIAK production facility. Construction is slated to begin in August, with a targeted completion by the end of the year.

"We are very pleased that the increased worldwide demand for the KODIAK necessitates the need to increase our production capacity," said Sam Hill, Quest CEO. "We have been ramping up production of the KODIAK, and to efficiently meet continued demand for the aircraft, we need to grow our Sandpoint facility."

The company last increased the size of its facility in 2005, when it expanded to its current 84,000 square feet. Since receiving FAA Type Certification in 2007, Quest has seen continued growth in the global marketplace and has KODIAKs in operation in over 20 countries.

The KODIAK's rugged aluminum construction combines superior STOL performance and high useful load. With powerful turbine performance, the aircraft has the ability to land and take off from unimproved surfaces and is capable of working off floats without structural upgrades. The KODIAK can take off in under 1,000 feet at full gross takeoff weight of 7,255 pounds and climb at over 1,300 feet per minute.

For more information, please visit *www.questaircraft.com*. T&T

QUEST AIRCRAFT

EN ROUTE

Gulf Coast Avionics Completes Garmin G1000 Panel Upgrade On A Colombian Army King Air B200

The first-of-its-kind project was done in collaboration with Corporación de la Industria Aeronáutica Colombiana in Bogotá, Colombia.

Rick Garcia, President and CEO, Gulf Coast Avionics Corporation recently completed its first Garmin G1000 panel upgrade on a Colombian Air Army King Air B200.

"This project had many unique aspects to it," Garcia said. "It was our (GCA's) first Garmin G1000 installation in a King Air B200 and it was the first time we ever did an installation in cooperation with the Corporación de la Industria Aeronáutica Colombiana (CIAC) in Bogotá, Colombia."

"Its ultimate success is a true testament to not only the technical knowledge and experience of our team here in Lakeland, but also the cooperative efforts by them and the installers at CIAC," he said. "It was a marvelous team effort."

Andy Smith, GCA's Installation Sales Manager, explained that all of the B200's panel design, engineering and wiring harness fabrication was done at the company's facility in Lakeland, then shipped to CIAC's aircraft maintenance center in Bogotá.

"We went down to CIAC's facility early on then worked remotely with their technicians on-site," Smith said. "They handled all of the hands-on part of the installation and did a great job. I returned when it was completed for the final configuration."

"As any shop can attest, installing a G1000 avionics suite is not an easy task – especially the first time," he said. "After seeing the finished panel, my hat went off to the guys at CIAC. They did a tremendous job with the project."

For a copy of their catalog or for more information, visit: *www.GCA.aero* T&T

EN ROUTE

Garmin® Introduces New, All-Digital Bluetooth® GMA™ 350c Audio Panel

Garmin International Inc. has announced its all-digital series of Bluetooth-enabled audio panels, the GMA 350c, GMA 35c and GMA 350Hc. The GMA 350c series incorporates Bluetooth technology for wireless access to music, phone, Garmin Pilot™ alerts and more. This adds to an impressive list of features, including industry-first Telligence Voice Command technology and 3D Audio processing, as well as enhanced auto-squelch capability and more. These features decrease heads-down time and increase overall situational awareness in the cockpit.

"Garmin continues to focus on simplifying the flying experience with the GMA 350c audio panel, so pilots can focus more readily on the task at hand – flying the aircraft," said Carl Wolf, Garmin's vice president of aviation sales and marketing. "With the GMA 350c, it's easier to complete important tasks such as opening a flight plan on the ground before departing an uncontrolled field. This, coupled with Telligence Voice Command and 3D audio, combine to make it the most-capable audio panel on the market."

The GMA 350c incorporates patented features and superior voice control to provide pilots with exclusive features unmatched by any other audio panel on the market. Bluetooth technology provides more functionality, allowing pilots to wirelessly connect a smartphone or tablet to the GMA 350c to make phone calls or stream audio entertainment. Additionally, the GMA 350c series can be paired with the Garmin Pilot app to transmit terrain, obstacle or traffic alerts in-flight. Pilot-controlled audio distribution ensures the appropriate communications are dispersed to passengers and crew accordingly.

Also, Bluetooth Audio connectivity offered by the GMA 350c allows pilots to connect wirelessly to a VIRB XE camera in place of a headset audio cable, to conveniently overlay intercom audio and air traffic control communications while capturing rich, high definition video.

Telligence Voice Command allows pilots to activate selected audio panel functions by spoken commands; with TVC, pilots can switch from approach to tower frequency by simply stating "COMM one." Using stereo headsets, three-dimensional sound is simulated with 3D Audio, which mimics how pilots hear and process multiple audio sources. This technology differentiates the audio sources and their unique locations or seat position, so they are easier to distinguish. For example,

sound from COMM 1 will come from the left, whereas sound from COMM 2 will seem as though it's coming from the right.

Advanced auto squelch automatically adapts to the volume level within the cockpit; an internal microphone senses ambient noise and adjusts cockpit speaker volume level throughout all phases of flight, and ensures alerts are quieter on the ground and louder in-flight. The GMA 350c series includes pilot, copilot and up to five passenger stereo intercom. It also supports three stereo music inputs, as well as dual COMM, NAV and AUX audio inputs. A built-in digital clearance recorder can record up to 2.5 minutes of selected COMM radio transmissions, so pilots can optionally play back clearances or unclear radio transmissions.

For easy and convenient upgrades, the GMA 350c is pin-compatible with the GMA 340 and GMA 350, designed as a direct replacement for existing GMA audio panel installations and as a slide-in replacement for the GMA 350. In addition to enhanced Bluetooth capabilities, the GTN 750 series has tightly integrated audio compatibility with the GMA 35c remote audio processor. For use in helicopters, the GMA 350Hc has the same core features as the GMA 350c, adding three COMM support, night vision compatibility and more.

The GMA 350c, GMA 35c and GMA 350Hc are expected to be available Q3 2015, starting at $2,295 MSRP. For additional information, visit *www.garmin.com/aviation* or contact a local Garmin authorized dealer. T&T

Ad Index

by **David Miller**

One In and One Out

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.

As I studied the radar picture while parked at the Million Air KADS (Addison, Texas) ramp, I knew another plan was in order. My typical route to Gunnison, Colorado would take me through a developing area of precipitation near Amarillo.

"Ground, November 1865 Charlie, should I file another flight plan for weather or just negotiate a deviation with center?" I asked. "Either one is fine with us. We can just delete the old flight plan if you have two," came the response. A few button pushes on the iPhone and I had a new route filed around the Sigmet area.

After departure, Ft. Worth Center, just trying to help, cleared me "direct destination". Right through the weather! "1865 Charlie would like to continue flight plan route, due to weather," I said. We were struggling to climb in the ISA + 17 temps, after a near gross weight takeoff, and it became clear that, even at FL400, further deviations south would be necessary. A new center controller said he was painting an area of moderate to extreme precipitation over Amarillo and that all the air carriers were deviating north or south. "How about wrong way 410 for 65 Charlie?" I asked. And, sure enough, the tops were poking above FL450 north of our route. Further south we went, and we finally cleared the stuff enough to go direct to destination.

A quick turn to drop off passengers and then it was off to Santa Fe, New Mexico (KSAF). Departing KGUC in calm winds, pilots were using both ends of runway 6/24. A Pilatus went missed when he got uncomfortable with a Baron approaching from the opposite direction. It's always a challenge, picking up a clearance at non-towered airports, and at Gunnison I constantly monitor both Unicom and Center for any surprises.

A few minutes after leveling at FL290 came this from Albuquerque center: "November 1865 Charlie, cleared direct to POAKE intersection to hold north as published on the RNAV GPS 20 approach, expect further clearance at 1630." Wow, that was 40 minutes from now! As I reduced power from max cruise speed, I was glad I added a little extra fuel in Gunnison.

Santa Fe is a very popular spot. Popular enough to justify radar coverage all the way to the ground. But not this year or any of the 30+ years I have been landing there. It's "one in and one out", as the local controller later told me.

So, I was about to get some real IFR holding practice. And I had a lot of company. Six airplanes, to be exact. All six of us flew racetracks around and around, a thousand feet apart. The MFD depicting traffic looked like JFK on a busy weekend. Departures were backed up too, including the American flight. "One in and one out." Finally, my turn came and I was cleared for the approach through the murk, breaking out about 1,900 feet above the ground in very light rain, surrounded by mountainous terrain.

The ramp at Landmark was bustling with airplanes, and passengers wondering why they flew in so many circles today. I told my passengers it was "one in and one out."

They had no idea what I was talking about.

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JETS

CHIEF PILOTS & OWNERS

Aircraft Count	
4	AIRBUS ACJ319
32	ASTRA 1125
31	ASTRA 1125SP
63	ASTRA 1125SPX
51	BEECHJET 400
275	BEECHJET 400A
58	BOEING BBJ
391	CHALLENGER 300
65	CHALLENGER 600
58	CHALLENGER 601-1A
133	CHALLENGER 601-3A
56	CHALLENGER 601-3R
279	CHALLENGER 604
5	CHALLENGER 800
169	CITATION 500
319	CITATION 525
284	CITATION BRAVO
151	CITATION CJ1
69	CITATION CJ1+
202	CITATION CJ2
160	CITATION CJ2+
390	CITATION CJ3
180	CITATION ENCORE
306	CITATION EXCEL
5	CITATION I
288	CITATION I/SP
478	CITATION II
50	CITATION II/SP
173	CITATION III
329	CITATION MUSTANG
138	CITATION S/II
257	CITATION SOVEREIGN
284	CITATION ULTRA
287	CITATION V
20	CITATION VI
104	CITATION VII
257	CITATION X
199	CITATION XLS
1	DIAMOND I
53	DIAMOND IA
3	DORNIER ENVOY 3
282	ECLIPSE EA500
47	EMBRAER LEGACY 600
8	EMBRAER LEGACY 650
158	EMBRAER PHENOM 100
82	EMBRAER PHENOM 300
123	FALCON 10
28	FALCON 100
25	FALCON 200
176	FALCON 2000
21	FALCON 2000EX
81	FALCON 20C
17	FALCON 20C-5
26	FALCON 20D
3	FALCON 20D-5
7	FALCON 20E
8	FALCON 20E-5
59	FALCON 20F
82	FALCON 20F-5
229	FALCON 50
8	FALCON 50-40
113	FALCON 50EX
135	FALCON 900
21	FALCON 900C
116	FALCON 900EX
98	GLOBAL 5000
112	GLOBAL EXPRESS
25	GULFSTREAM G-100
161	GULFSTREAM G-200
8	GULFSTREAM G-300
27	GULFSTREAM G-400
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188	GULFSTREAM G-IV
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182	GULFSTREAM G-V
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2	HAWKER 125-1AS
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2	HAWKER 125-400A
29	HAWKER 125-400AS
1	HAWKER 125-400B
4	HAWKER 125-600A
11	HAWKER 125-600AS
113	HAWKER 125-700A
50	HAWKER 4000
187	HAWKER 400XP
21	HAWKER 750
223	HAWKER 800A
2	HAWKER 800B
335	HAWKER 800XP
14	HAWKER 800XPI
67	HAWKER 850XP
131	HAWKER 900XP
4	JET COMMANDER 1121
6	JET COMMANDER 1121B
12	JETSTAR 731
11	JETSTAR II
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15	JETSTREAM 41
15	LEARJET 23
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5	LEARJET 24A
19	LEARJET 24B
53	LEARJET 24D
14	LEARJET 24E
9	LEARJET 24F
33	LEARJET 25
57	LEARJET 25B
7	LEARJET 25C
94	LEARJET 25D
6	LEARJET 28
28	LEARJET 31
172	LEARJET 31A
43	LEARJET 35
426	LEARJET 35A
21	LEARJET 36
34	LEARJET 36A
24	LEARJET 40
219	LEARJET 45
193	LEARJET 45XR
115	LEARJET 55
5	LEARJET 55B
12	LEARJET 55C
293	LEARJET 60
130	PREMIER I
16	SABRELINER 40
13	SABRELINER 40A
7	SABRELINER 40EL
3	SABRELINER 40R
24	SABRELINER 60
1	SABRELINER 60A
2	SABRELINER 60AELXM
12	SABRELINER 60ELXM
3	SABRELINER 60EX
1	SABRELINER 60SCEX
85	SABRELINER 65
1	SABRELINER 75
17	SABRELINER 80
3	SABRELINER 80SC
101	WESTWIND 1
4	WESTWIND 1123
45	WESTWIND 1124
76	WESTWIND 2

TURBO PROPS

CHIEF PILOTS & OWNERS

Aircraft Count	
275	CARAVAN 208
1087	CARAVAN 208B
3	CARAVAN II
34	CHEYENNE 400
221	CHEYENNE I
14	CHEYENNE IA
303	CHEYENNE II
59	CHEYENNE III
21	CHEYENNE IIIA
59	CHEYENNE IIXL
22	CHEYENNE IV
303	CONQUEST I

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502	KING AIR 200
12	KING AIR 200C
12	KING AIR 200T
203	KING AIR 300
3	KING AIR 300LW
588	KING AIR 350
34	KING AIR 350C
17	KING AIR 90
7	KING AIR A/B90
120	KING AIR A100
203	KING AIR A200
58	KING AIR A90
221	KING AIR A90-1
135	KING AIR B100
902	KING AIR B200
78	KING AIR B200C
63	KING AIR B200GT
2	KING AIR B200SE
3	KING AIR B200T
66	KING AIR B90
295	KING AIR C90
32	KING AIR C90-1
160	KING AIR C90A
316	KING AIR C90B
7	KING AIR C90SE
278	KING AIR E90
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29	MERLIN IIB
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20	MERLIN IIIA
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5	MERLIN IV
13	MERLIN IV-A
13	MERLIN IV-C
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29	MITSUBISHI MU-2F
1	MITSUBISHI MU-2G
22	MITSUBISHI MU-2J
32	MITSUBISHI MU-2K
15	MITSUBISHI MU-2L
23	MITSUBISHI MU-2M
30	MITSUBISHI MU-2N
38	MITSUBISHI MU-2P
55	MITSUBISHI SOLITAIRE
673	PILATUS P-12
341	PILATUS PC-12 NG
549	PILATUS PC-12/45
154	PILATUS PC-12/47
18	PIPER 700P AEROSTAR
492	PIPER MERIDIAN
10	ROCKWELL 680T TURBO
6	ROCKWELL 680V TURBO II
7	ROCKWELL 680W TURBO II
9	ROCKWELL 681 HAWK
89	SOCATA TBM-700A
91	SOCATA TBM-700B
4	SOCATA TBM-700C1
115	SOCATA TBM-700C2
318	SOCATA TBM-850
22	SOCATA TBM-900
6	STARSHIP 2000A
51	TURBO COMMANDER 1000
27	TURBO COMMANDER 690
129	TURBO COMMANDER 690A
113	TURBO COMMANDER 690B
58	TURBO COMMANDER 840
16	TURBO COMMANDER 900
23	TURBO COMMANDER 980

TWIN PISTON

OWNERS

Aircraft Count

9	ADAM A500
1550	BARON 58
479	BARON 58P
137	BARON 58TC
5	BARON A56TC
142	BARON G58
43	BEECH BARON 56 TC
2	BEECH BARON 58 PA
217	BEECH DUKE B60
193	CESSNA 340
556	CESSNA 340A
120	CESSNA 402B BUSINESS LINER
64	CESSNA 402C
38	CESSNA 404 TITAN
288	CESSNA 414
374	CESSNA 414A CHANCELLOR
72	CESSNA 421
61	CESSNA 421A
454	CESSNA 421B
757	CESSNA 421C
66	CESSNA T303
124	PIPER 601P AEROSTAR
29	PIPER 602P AEROSTAR
465	PIPER CHIEFTAIN
28	PIPER MOJAVE
870	PIPER NAVAJO
24	ROCKWELL 500 SHRIKE
33	ROCKWELL 500A SHRIKE
69	ROCKWELL 500B SHRIKE
46	ROCKWELL 500S SHRIKE
8	ROCKWELL 500U SHRIKE
28	ROCKWELL 520 COMMANDER
15	ROCKWELL 560 COMMANDER
21	ROCKWELL 560A COMMANDER
17	ROCKWELL 560E COMMANDER
11	ROCKWELL 560F COMMANDER
36	ROCKWELL 680 SUPER
17	ROCKWELL 680E
19	ROCKWELL 680F COMMANDER
22	ROCKWELL 680FL GRAND COMMANDER
14	ROCKWELL 680FLP GRAND LINER

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OWNERS

Aircraft Count

250	BEECH BONANZA
493	CESSNA 182
71	CESSNA 206
448	CESSNA P210N
26	CESSNA P210R
58	CESSNA T182
1	CESSNA T206
2714	CIRRUS SR22
240	PIPER MALIBU
387	PIPER MALIBU MIRAGE

37,744 TOTAL AIRCRAFT

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