FLYING LESSONS for December 1, 2011

suggested by this week's aircraft mishap reports

FLYING LESSONS uses the past week's mishap reports to consider what *might* have contributed to accidents, so you can make better decisions if you face similar circumstances. In almost all cases design characteristics of a specific make and model airplane have little direct bearing on the possible causes of aircraft accidents, so apply these *FLYING LESSONS* to any airplane you fly. Verify all technical information before applying it to your aircraft or operation, with manufacturers' data and recommendations taking precedence. You are pilot in command, and are ultimately responsible for the decisions you make.

If you wish to receive the free, expanded *FLYING LESSONS* report each week, email "subscribe" to mastery.flight.training@cox.net.

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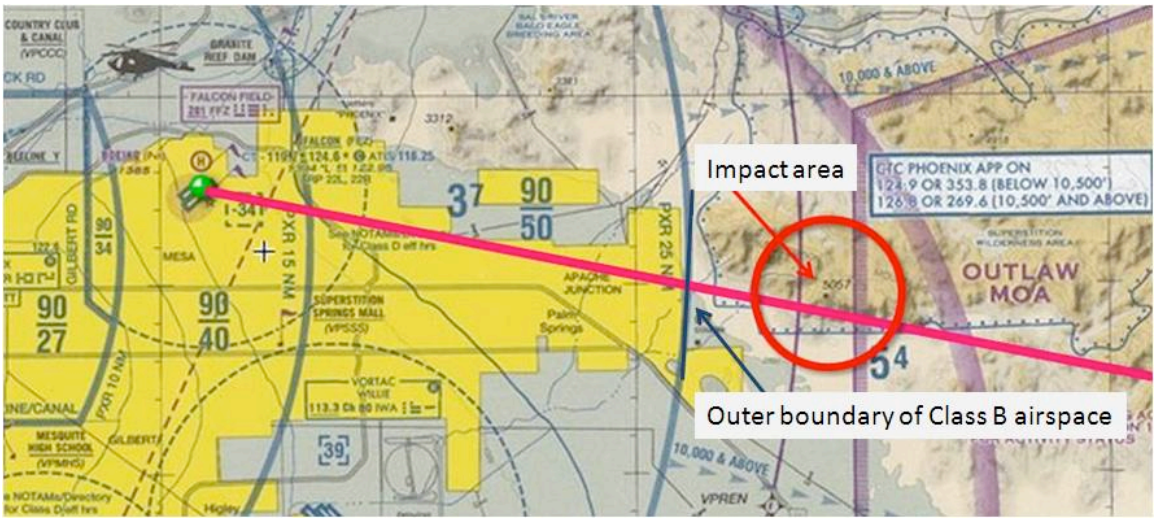
This week's lessons:

This week an especially tragic Controlled Flight into Terrain (CFIT) event received widespread press coverage. A turboprop Twin Commander flew straight and level into a sheer mountain "only several hundred feet" below the summit on the way to a family holiday celebration. Two pilots, a mechanic and three small children perished.

See www.huffingtonpost.com/2011/11/23/phoenix-plane-crash_n_1111332.html

Initial speculation was that the pilot, flying under Visual Flight Rules in "severe clear," night conditions while attempting to remain under the base of Class B airspace, flew into the dark mountain in an otherwise brilliantly illuminated urban area.



A direct route from Mesa, AZ's Falcon Field to destination Safford, AZ, goes almost precisely over the highest point of Superstition Mountain and the impact site at Flat Iron, the southwestern edge of the ridge. The pilot had reportedly remained below the base of the Phoenix Class B airspace and had not climbed sufficiently to avoid terrain after passing the Class B's outer boundary. Terrain in the area would have been very dark compared to the brilliant lights of Phoenix and Mesa.

AVweb quotes an NTSB investigator as saying recent changes to the PHX Class B airspace are a "potential consideration in his investigation" and that the Twin Commander flew "in a straight line at 4500 feet, 500 feet below the Class B floor in that area, directly into a cliff…." There is no indication the airplane was in distress of any kind prior to impact. A news report cites witnesses as saying "they heard a plane trying to rev its engines to climb higher before apparently hitting the mountains."

Flying at a slower speed would have given the pilot more time to climb. A very minor diversion to the south would have completely eliminated the risk of hitting the Superstitions.

See:
www.avweb.com/eletter/archives/bizav/2067-full.html#205811
www.huffingtonpost.com/2011/11/23/phoenix-plane-crash_n_1111332.html

Readers may rightly raise political issues about the design of Class B airspace in areas of rising terrain, and the willingness of Air Traffic Controllers working such airspace to accept VFR flights. Although those issues may affect how a pilot might be able to fly in the area some day in the future, however, it's the airspace, the terrain and ATC's right to refuse VFR traffic that exists *today* that affects how you must plan your flights.

Although this tragedy is currently in the public conscience, it is far from an isolated incident. Similar accidents have occurred elsewhere. Two that received a similar level of press coverage in their day were a Cessna Turbo Skylane that crashed into mountains at Las Vegas, Nevada in 2007, and a Hawker HS 125 jet that flew into terrain near San Diego, California in the spring of 1991.

The Las Vegas Skylane was a similar night, VFR flight beginning under the base of Class B airspace. The NTSB report includes this ATC transcript and analysis:

> A Cessna T182T…was destroyed after impacting mountainous terrain during climb to cruise…about 13 nautical miles southwest of Las Vegas, Nevada. The left-seat first pilot [with over 25,000 hours' experience] and right-seat second pilot, both of whom possessed airline transport pilot certificates, were killed. Visual meteorological dark night conditions prevailed…and a visual flight rules (VFR) flight plan had been filed and activated at the time of the accident.
>
> The flight departed the North Las Vegas Airport (VGT), Las Vegas, Nevada, about 1905 [local time], and was destined for the Rosamond Skypark (L00), Rosamond, California. The pilot [had] filed a VFR flight plan…and stated that he did not need a weather briefing. Air Traffic Control recorded the flight as CAP [Civil Air Patrol] Flight 2793. After departing VGT on Runway 30L, the airplane turned to a southwesterly heading. At 1905:29, the pilot made the following transmission: "Las Vegas departure, Cap Flight 2793 is with you. We're leaving, ah, twenty-seven hundred for ten point five."
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> The controller responded, "Cap Flight twenty-seven ninety-three, Las Vegas departure. Ident, and ah, remain outside of class Bravo airspace." The pilot acknowledged the controller's instructions.
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> At 1905:49, the controller transmitted, "Cap Flight twenty-seven ninety-three, radar contact two miles south of North Las Vegas Airport. Verify climbing two-thousand seven-hundred." The pilot responded, "That's affirmative."
>
> At 1906:05, the controller asked the pilot to verify his destination. The pilot replied, "We're going, ah, to Rosamond, California." The controller replied, "Cap Flight twenty-seven ninety-three, roger." At this time the airplane's altitude was 2,800 feet MSL. At 1906:34, the controller advised the pilot, "Cap Flight twenty-seven ninety-three, traffic eleven o'clock, four miles west

bound is a metro helicopter climbing three-thousand five-hundred." The pilot replied, "Twenty-seven ninety-three, we have him." The airplane's altitude was now 3,100 feet MSL.

At 1907:42, the pilot radioed to the controller, "And Cap Flight twenty-seven ninety-three, we would like to leave frequency for a minute to open a flight plan." The controller granted the pilot's request and asked him to confirm that he still had the helicopter in sight. The pilot replied, "That's affirmative." The controller replied, "Cap Flight, ah, twenty-seven ninety-three, roger. Maintain visual separation, and, ah, approved as requested." The pilot replied, "Alright." The airplane's altitude was 3,500 feet MSL.

At 1908:25 and 1908:40 the pilot attempted to contact Reno Radio to open his flight plan; the flight service station (FSS) specialist reported that both transmissions were unintelligible. At this time the airplane's altitude was about 3,600 feet MSL.

At 1909:48 the pilot transmitted to Reno Radio, "Flight two seven niner three departed North Las Vegas five minutes past the hour. Open my flight plan please." The FSS specialist replied, "Cap Flight two seven niner three, roger. VFR flight plan activated." The airplane was now at 4,100 feet MSL. At 1910:30, the pilot asked the controller, "Can, ah, Cap Flight twenty-seven ninety-three get higher?" The airplane's altitude was now 4,200 feet MSL. At 1910:33, the controller responded, "Cap Flight, ah, twenty-seven ninety-three contact approach one two, or correction, climb to VFR requested altitude outside of class Bravo airspace. Contact approach one two five point niner." The pilot replied, "Twenty-five nine, changing." The airplane's altitude was 4,200 feet MSL.

At 1910:50, the pilot transmitted to the controller, "Approach, Cap Flight twenty-seven ninety-three is with you. We're leaving forty-four hundred for ten point five." The controller replied, "And Cap Flight twenty-seven ninety-three, Las Vegas departure. Roger." The airplane's altitude was 4,400 feet MSL. At 1911:55, the controller asked the pilot, "Cap Flight twenty-seven ninety-three, what's your requested on course heading, and how high you want to go?" The pilot responded, "We would like, ah, ten point five, and we are at two one zero." The airplane's altitude was 4,800 feet MSL. At 1912:06, the controller responded, "Roger. Proceed on course. VFR climb to ten point five approved." The pilot replied, "Cap Flight twenty-seven ninety-three, thank you." The airplane's altitude was 4,900 feet MSL.

At 19:17:29 radar contact was lost. There was no further radio communication received from the flight. The last recorded altitude was 7,000 feet MSL. A local law enforcement officer/pilot…reported…he observed a large fireball/explosion in the vicinity of Mount Potosi, elevation 8,514 feet MSL. The officer stated that his partner also observed and confirmed that it was an explosion. The officer reported that while en route to the area of the fire he observed additional fireballs, and upon arriving at the accident site his partner confirmed that the fire was the result of an airplane crash. One officer described the area as void of any lighting which would aid in the illumination of terrain.

See www.ntsb.gov/aviationquery/brief2.aspx?ev_id=20071121X01832&ntsbno=SEA08FA023&akey=1

The Hawker jet was a night, VFR takeoff with the intention of picking up an IFR clearance in the air. This was the 1991 crash that killed 10 including most of entertainer Reba McEntire's band. From the NTSB Probable Cause report:

After flying [the musicians] to Lindbergh Field [at San Diego], the aircraft was positioned to nearby Brown Field, since…departure was planned after [a] noise curfew was in effect at Lindbergh. The pilot talked with [a Flight Service Station] specialist three times before takeoff. He reported he did not have [the] instrument departure procedure from [Brown Field]. The specialist read [the pilot] the departure procedure on the phone. On the last call [the] pilot said he planned to depart VFR toward the northeast and obtain [his] clearance after [he was] airborne (this was toward mountains). During the call the pilot expressed concern about remaining clear of [the] TCA [Terminal Control Area, similar to today's Class B airspace] and inquired about staying below 3000 feet [to remain clear]. The specialist agreed with the pilot's concerns, but after [the] accident [the] specialist said he thought the pilot was referring to 3000 AGL, rather than 3000 MSL.

[The] pilot had filed to take off at midnight, but didn't get airborne until 0141 [local time]. Since [the] flight was over 1.5 hours late, [the] IFR flight plan had "clocked out." As Center [controller] was reentering the flight plan into [the] computer, [the] aircraft hit rising terrain near the top of [a] mountain about eight miles northeast of [Brown Field] at an elevation of about 3300 [MSL].

See www.ntsb.gov/aviationquery/brief.aspx?ev_id=20001212X16614&key=1

What do these three tragic events have in common? All were attempts at flying beneath the base of Class B (or TCA) airspace at night. All were well-equipped airplanes flown by qualified, high-time pilots. All reveal insufficient preflight planning and/or imprecise position

awareness, and in the case of the HS125 and especially the T182, a mistaken belief that Air Traffic Control would protect them from collision with terrain either through preflight consultation (the Brown Field Hawker jet) or VFR Flight Following services (the North Las Vegas Cessna). All could have been prevented had the pilot changed the conditions of the test, that is to say, altered the outcome by identifying potential hazards and choosing a mitigation strategy before ever getting into the airplane.

What if instead of Class B airspace, the "obstruction" was a visible and highly defined thunderstorm cell, one whose boundaries of turbulent air you could see directly out the window or detect with great precision on some panel-mounted screen? The mountains below don't move; you would either see a clear path between the storm and the ground and plot a route and altitude to transit the area, or you would route yourself around the threatening storm. Especially at night when you cannot see the mountains, you'd want a wide berth, or else you would plan a different route away from the mountains or around the "airspace storm."

Similarly, any night flight threading the needle between airspace and terrain must be planned and flown with the same level of precision you should plan an IFR flight—pre-select a route, including a programmed GPS track, headings and/or visual checkpoints sufficient to ensure you remain at known positions at all times, and preplanned mandatory altitudes (remember MAs?) that keep you safely between terrain and the base of the airspace.

See www.faa.gov/air_traffic/publications/atpubs/PCG/pcg.pdf under "M"

In fact, the Mastery Flight Training-suggested Categorical Outlook Flying™ matrix recommends a "no-go" decision when faced with night VFR in mountainous terrain, perhaps reconsidered only if you have a GPS-precise ground track or a route defined by a highly visible, lighted ground feature like a major highway, coupled with preplanned minimum safe altitudes…with both ground track and minimum altitude considered mandatory, and a clear "out" (probably an early decision to make a 180° turn, or in a worst-case scenario pulling up into the Class B, then calling ATC and confessing, declaring an emergency if appropriate) if for any reason you cannot verify or maintain *both* ground track and altitude.

See www.thomaspturner.net/Categorical%20outlook%20matrix.htm

Would a Synthetic Vision Technology system have made any difference? Possibly, but it's not certain. The Twin Commander pilot would very likely have angled to the south and we would never have heard about him, his friends or family. The T182T pilot, equipped with a G1000 that would today be compatible with SVT, would probably have diverted away from terrain as well. The Hawker crew, if SVT had existed in its cockpit, would likely have survived only if the captain had the courage and discipline to climb and violate the Class B airspace when approaching the ridge. Unfortunately, only a very few airplanes have this technology even today…and even SVT is not a panacea for Controlled Flight into Terrain.

Below-the-base mitigation strategies include:

- Take time to study the charts, including IFR departure procedures, before any night departure. Develop a plan, including routes and minimum altitudes for each segment of your transit. Commit your plan to writing (on your chart or kneeboard), then follow your plan.
- Re-route your flight away from the hazardous area. It will likely take you only minutes out of your way to dramatically reduce risk.
- Reduce speed in areas of reduced visibility, to give yourself more time to see and avoid obstacles. Don't fly full-tilt into darkness in areas of rising terrain.
- Delay the flight until daylight, to be able to see and avoid the terrain.
- Call Approach Control on the phone (preferably during a slow time, even if you need to get up very early in the morning) and ask controllers how they'd suggest you fit into their strategy…then "fly it their way" on a Class B clearance.

- File and fly IFR, even for short trips, near Class B airspace.
- Don't attempt to pick up your clearance once airborne at night in areas of rising terrain. Get your clearance before takeoff—even if that means a Clearance Void Time at a nontowered airport.
- Don't expect Air Traffic Control to keep you clear of terrain while flying VFR.
- In all cases, enforce a "sterile cockpit" during your transit. Use the intercom's pilot isolation switch if necessary.
- Remember you are Pilot-in-Command. *You* set the conditions of your transit around or through controlled airspace by your actions before as well as during your flight.

Questions? Comments? Additional mitigation ideas? Let us know, at mastery.flight.training@cox.net

FLYING LESSONS is coming to Denton, Texas **this Saturday**, with *FLYING LESSONS: The Deciding Factor*. This day-long event has sold out every year, with **only 10 seats now remaining**. See this announcement for more information and to pre-register for *FLYING LESSONS* at Denton, Texas (KDTO).

See www.mastery-flight-training.com/masteryflight_groundschoolt.pdf

The second most common cause of death in general aviation airplanes is **Loss of Control During Initial Climb**. Several readers have contributed thoughts about the sample case histories linked from prior editions of *FLYING LESSONS*. To summarized, we can reduce the risk of succumbing to this, the second most common cause of fatal general aviation events, by:

- Verifying engine power on takeoff in time to abort the takeoff if maximum potential power is not attained;
- Knowing the pitch attitude necessary to establish initial climbout, and positively attaining and verifying that attitude upon rotation or liftoff;
- Having an airspeed target for initial climbout, and crosschecking airspeed to your attitude and power targets, adjusting attitude and/or power if needed to assure the proper airspeed.
- Avoiding abrupt or rapid changes in pitch attitude to smoothly transition between angles of attack on initial climb;
- Resisting any temptation to "show off" by climbing out more steeply than necessary for initial climb, and/or abruptly changing heading or otherwise aggressively controlling the airplane close to the ground.

And the number one cause of death by general aviation aircraft: **Loss of Control in Maneuvering Flight**. Next week we'll begin discussion of this rather broad category of causation, with the hope of deriving some general rules for avoidance that will make 2012 a safer year for us all.

Still have something to say about Top 10 Cause #2? Have some initial comments on the most common cause of fatal accidents? You know the drill…at mastery.flight.training@cox.net.

Share safer skies. Forward *FLYING LESSONS* to a friend.

Flying has risks. Choose wisely.

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