HOW LOW SHOULD YOU GO?

BY

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The lowest flight I ever made was about 200 feet below sea level. A guy named Craig and I were partners in a Piper Warrior, and we had taken our plane on a boogie out west to see the country. We departed Las Vegas early one morning and descended into Death Valley, noticing that there were two primitive roads running along the sides of the valley, a good place land in the event of engine malfunction. I guess that would have been as good a place as any to die of thirst or heat prostration, but I'm glad we didn't have to test our mettle gliding ever farther below sea level. It was a truly beautiful flight, and we did it early enough to beat the heat of that day.

For the most part, however, it's a good idea to stay above sea level when you're flying in an airplane. How low you should go is a question that has to be answered using a variety of considerations of law and safety.

Pilots flying on instrument clearances have prescribed altitudes that keep them out of trouble most of the time. But folks flying VFR sometimes have to create their own safe altitudes. Right after hurricane Katrina I was going out on a night cross-country flight with a private student. During the briefing we heard a lot about "unlit towers." I realized that having a bunch of invisible structures sticking up into our path of flight might be a problem if we spent much time below 2000 feet in the dark.

The way we solved the problem was to check the charts and approach plates to see where the IFR guys would be going. By adhering to the minimum altitudes prescribed for IFR, I figured that we could protect ourselves from unintended encounters with towers and their associated guy wires. We flew on airways, adhering to the MEAs, or the minimum enroute altitudes marked on the Low Altitude Enroute charts for the meter readers. Staying at or above the MEA on an airway guarantees that you will be at least 1000 feet above the highest obstacle within 5 miles of your position. It also guarantees useable reception of a VOR signal to keep you on track, a custom they used to practice before satellite navigation became popular.

As I recall, we flew up to McComb, Mississippi, adhering to all of the minimum altitudes on the approach plates when we got in the vicinity of the airport. It must have worked, since we didn't hit anything. It was one of the darkest flights I've ever made at night, since there were few lights in operation that soon after Katrina.

I guess I'd better mention the law about minimum altitudes, in case it's been a while since you attended private ground school. The law (Part 91) says that we must not fly any closer than 500 feet above or to the side of any person, vessel, vehicle, or structure when we're in sparsely populated areas, and a thousand feet above the closest object within two thousand horizontal feet, when we are over a densely populated area of a city, town, or settlement. This rule excludes takeoffs and landings, but it also says that we have to fly high enough to make a successful forced landing in the event of a failure of the powerplant. Think about that when your instructor lets you

make one of those long, Boeing 767 patterns, way out of gliding distance of the runway.

I'm a high flier when enroute. In my estimation, the higher the safer. When my nephew was in the Air Force, he was contemplating going to A-10 school. That's the airplane that dodges around tree tops looking for tanks and ack ack guns to kill. That seems to me like very hazardous duty. I encouraged him to go into something involving a bit more space between him and the enemy, like maybe the space program. I don't see many people getting killed coasting around the earth at 17500 miles per hour. He ended up flying tankers, which I thought was a whole lot better than A-10 Warthogs, although he complained that tanker duty was boring.

I customarily cruise between seven and ten thousand feet. That's where our Cessna 182 seems to get the most speed for the least amount of power output. At full throttle, at those altitudes, we're pulling manifold pressures in the high teens and low twenties and going a little better than 130 knots on something like 12 gallons per hour. At lower altitudes, where the air is hotter and thicker, I often have to leave the cowl flaps open to keep the cylinders cool, and that costs about two or three knots. I also find that I have to run the mixture a bit richer, increasing fuel consumption. With the price of fuel these days, I don't know which is more expensive, burning the extra gas to keep my cylinders cool or replacing a jug once in a while.

At the higher altitudes, the air coming into the vents during the summertime feels like air conditioning, and we can often get above the tops of the convective currents, giving us a nice smooth ride. And in the unlikely event that we develop a

problem with the rubber band, it increases our radius of operation, looking for an airport at which to park the thing. I am also more likely to stay in radar contact at the taller heights. All in all, I usually select the highest altitude that's practical, even if it means more headwind or less tailwind. As my wife says, "Where would you rather be, up here or down there?"

That's my answer to selecting a cruising altitude during normal flying conditions. What about scud running? That's kind of a sensitive subject for some people. Personally, I prefer to file IFR when the clouds are low and the weeds are tall. But sometimes we don't have the luxury of flying on instruments. Is there any way I can persuade you to put off your flight until conditions improve? Obviously that's the most prudent choice on days when cloud bases are low and visibilities are limited. This line of thought leads me back to the popularity of microwave towers in today's modern America. I remember a day when my wife and I were coming home from Sun 'N Fun in our 172. We were cruising westward, approaching the Florida panhandle at 1500 feet. It was one of those beautiful mornings with a high overcast, plenty of visibility, and not a ripple in the air.

I was enjoying a relaxing interval of flight, watching the trees go by, when the controller called and asked me if I was familiar with the antenna farm at 12 o'clock, 10 miles. I peered out the front and, sure enough, saw a strobe light up ahead, somewhat above our altitude. I decided to climb and give up our low-level sojourn. Higher is safer.

We flatlanders don't think much about climb gradients, but a recent trip to the Smokies made me think with horror of the

term, “ridge obscurement.” When you’re climbing out from a place like Asheville, the hills aren’t very high, but it is kind of important to keep your altitude higher. Encounters with cumulogranite clouds are, I am told, not encouraged by people in that part of the country. The FAA provides us with climb gradient schedules for places in the mountains where we might be in danger as we climb up through the clag. For instance, coming out of Aiken, SC, the “takeoff minimums” section says, *“**Rwy 1, 200-1 ¼ or std. climb of 220 feet per nautical mile to 800, or, alternatively, with std. takeoff min. and a normal 200 foot per NM climb gradient, takeoff must occur no later than 1400 ft. prior to DER. DEPARTURE PROCEDURE: **Rwy 19,** climb heading 186° to 1100 before turning west.*

Wow! We flatlanders aren’t in the habit of worrying about stuff like that. I shudder to think what would happen if your heading indicator processed a little bit and you climbed out on a heading of 185°!

Is that the kind of stuff VFR pilots pay attention to? Most times they should be able to see the *terra firma* and maneuver so as to avoid going splat. Coming down has well defined altitude requirements, and ATC also has their own criteria for keeping us at a safe altitude. When you’re being vectored, the controller will be constrained by a *minimum vectoring altitude* that keeps you comfortably above the terrain as well as high enough for him to pick you up on his radar.

So now we come to the nitty gritty – the bottom line – where the rubber meets the road, to mix some hackneyed metaphors together. When you’re in the clag and making your final descent for landing, that’s when the hair really gets short.

Obviously you can't stay 1000 feet above the highest obstacle within 5 miles of your position when you're approaching the runway. You have to get underneath the clouds so that you can see to land, and that's where things really can get tricky.

There is a minimum altitude below which you must not go, at the end of an instrument approach, until two criteria are met: You must be able to see the landing environment and to keep it continuously in sight, and you must continuously be in a position from which a normal descent for landing can be made. I understand that seeing approach lights is sufficient for descending below this minimum altitude when you're lined up on final approach, although losing sight of those lights should be cause for an immediate missed approach. And what would be a position from which a normal descent and landing might be feasible might be very different in a 172 than it is in a Lear Jet. Except for that, you are required to descend no lower than the minimum descent altitude (associated with approaches without glide slopes) or decision altitude (associated with approaches with glide slopes). The main difference in this case is that arriving at a particular altitude, called the decision altitude or decision height, means that you are automatically at your missed approach point, the place where you must decide immediately whether to continue on down and land or to go around; whereas the minimum descent altitude designates how low you can go until you either satisfy the two criteria listed above or determine by other means (DME or time) that you are at your missed approach point and should proceed no farther.

Landing out of circling approaches, particularly in low-visibility conditions (Think about foggy, misty nights.) can be very scary. Remember that you must maneuver at your MDA

(minimum descent altitude) until you are in a position where you would usually descend from that altitude for a landing. There you are, barely able to see, trying to stay half-on-instruments while you are gaping out the window hoping those little runway lights don't disappear… If they do, your best option is to make a turn toward the middle of the airport and climb like your pants were on fire. The theory is that there is little chance of somebody erecting a microwave tower right in the middle of an airport. Anybody who wants to bet his life on that proposition should probably stay away from Thibodaux, Louisiana.

So. There are quite a few factors that go into deciding what altitude is a safe one. Adopting the Malone Method of flying safety is one possible way of keeping your undercarriage out of the treetops. Just don't go unless you have plenty of margin for error.