

I have avoided this thread for all the obvious reasons. However, I don't think anyone with experience as a pilot has chimed in (sorry if I have overlooked any such posts), and since I was in an earlier period of my life just as active as an amateur pilot as I have ever been as an amateur astronomer, I thought that perhaps some observations from the viewpoint of an aviator might be useful.

My flight experience might be summarized in non-technical terms as:

I have a Commercial Pilot Certificate with ratings for single-engine and multi-engine land planes, and with an instrument rating. (Those ratings are all just for lightplanes; stuff much larger requires separate ratings for each type of aircraft. I don't have any ratings for big planes.)

I have been a Certificated Flight Instructor (for airplanes).

My total flight time as a pilot is about 1,100 hours, mostly in single-engine lightplanes.

It has been more than 25 years since I have piloted an airplane. I quit cold-turkey in 1978 (which, not coincidentally, was when I ramped up my amateur astronomy activities).

Comments worth making perhaps include the following:

- 1) There is a common perception that airplanes up in the sky are a long way away, so that the beam of light from a laser will have diverged to the point of being inconsequential by the time it gets there. That's not always true. Aircraft descending for landing often fly a descent profile of about 300 feet per mile, so that ten miles from an airport it is not unusual for landing traffic to be down to 3000 feet above airport level, which might put them at lower altitude over terrain if there are hills near the airport. That is true for both airliners and small lightplanes. Furthermore, small aircraft making short flights occasionally cruise at altitudes as low as two or three thousand feet above ground level. So lots of those planes can come as close as half a mile slant range to folks on the ground.

I think that many people who have lasers have occasionally pointed them at things on the ground that are on the order

of half a mile off; it is my impression that many lasers produce an obvious bright spot at that range. I myself haven't been in one of those spots so I can't say how bright it appears to the viewer.

- 2) Many aircraft do indeed have good visibility downward -- in the case of high-winged lightplanes, almost straight down. Pilots do indeed look as close to straight down as they can from time to time -- landmarks on the ground are generally most easily identified when they are directly below you, both because the high-angle perspective makes them easier to see and because they are closest to you when they are right below. Furthermore, operations of light aircraft near an airport often involve navigation by reference to landmarks on the ground, which are often particularly hard to see at night, so one perhaps spends more time looking down at night than by day. (A control tower might say something like "Cessna 736, straight-in approach approved, report crossing the \_\_\_\_\_ shopping center.") (And if the pilot of Cessna 736 didn't know where the \_\_\_\_\_ shopping center was, the tower would likely advise the aircraft to make a different and more standard kind of approach to the airport.)
- 3) Use of vision at night in an aircraft is a vexing proposition. A cynic might characterize aircraft cockpit and instrument lighting as too dim to see anything in the cockpit and too bright to see anything outside. (That is a substantial exaggeration, but should give you a sense of the issue.) The problem is made more difficult because many airports are located near towns and cities, which are generally brightly lit, whereas the airport grounds and runway areas are generally much darker. With one's night vision not at its best because of cockpit lighting and the lights of a city or town, the last mile or so of approach to landing at a typical airport often resembles flying into a vast black hole, within which the edge lights of the runway are miraculously suspended. Even though one does not strictly require excellent night vision to land an aircraft at night at an airport that has runway lights, one nevertheless wants one's night vision to be working as well as possible, to minimize the chance of (disastrous!) loss of spatial orientation while flying into that big black hole.
- 4) So as a pilot at night, I was and still would be worried about anything that might diminish my night vision. I wouldn't have to be totally blinded, or even nearly so, for that to

happen. Any bright light flash that created a temporary afterimage in part of my visual field, or that temporarily reduced my entire eye's sensitivity to low light level, would be a matter of concern. I am not sure how bright a laser beam it takes to do that. As amateur astronomers, many of us have had that kind of experience when we have been unexpectedly flashed with automobile headlights, or just from a view of the moon through an eyepiece. Remember, as a pilot, I can't just shut my eyes for a few minutes and wait for my vision to return to normal; I have to keep flying the plane. If I am approaching for landing, I must either chug on into that black hole with diminished night vision, or, in the interest of safety, break off my approach and fly around at altitude for a few minutes more. The latter maneuver will perhaps require coordination with a control tower: "Cessna 736, what's the problem?" "I just got flashed by a laser, I have to let my vision recover." At that point, folks on the ground can probably look forward to the sounds of sirens and rotor blades, and I can look forward to filling out a lot of paperwork, in quadruplicate, explaining just what happened and certifying that no, I do not have permanent eye damage requiring loss of my pilot license ...

- 5) Furthermore, as a pilot, if I see a laser beam directed at or near my aircraft, I have to consider whether it is (a) (high probability) some stupid inconsiderate geek having fun, or (b) (low probability) a terrorist using the low-power beam to track the target -- me -- and about to push the right buttons on some infernal laser device, to deliver a light pulse truly intense enough to blind me. (It might also be a target-illumination device for some other kind of weapon.)

Granted that the probability of (b) is probably very small, yet it would be sad to be sitting in the pilot seat, unable to see anything, listening to the rising scream of the slipstream, knowing that the ground was coming up, and wishing that I had taken that dratted laser beam more seriously. Thus as a properly paranoid pilot -- and nobody lives to be a thousand-hour pilot without being a card-carrying paranoid -- I might well think it reasonable to take the sighting of even a low-power laser beam seriously, at the level of duck head, bring up hand to protect eyes, or even maneuver the aircraft so the beam could not reach the cockpit.

There's been enough said on this matter already that I am not going to add my own two cents worth on philosophy, suggested solutions, and blah blah blah, but I hope the preceding comments about the view from the other side of the cockpit windows will have been both novel and useful.

-- Jay Freeman, Deep-Sky Weasel