SOME CURIOUS THINGS TO POINT OUT TO PASSENGERS NR 8/99 rev 4/05

AT DAWN OR SUNSET

Night doesn't fall: it creeps up from below! Towns down below in the river valleys and hollows will be dark and have their streetlights on, while you are still floating along in the sunset. Sometimes, when the sky is completely clear of clouds, it's possible to see the Earth's shadow rising in the east at sunset. Look for a large, faintly liver-colored patch of sky opposite the sun. Its boundary gradually rises during twilight.

Also note the crepuscular rays (beams of sunlight formed by distant clouds at sunset) that sometimes go clear across the sky and converge to a point opposite the sun. (The convergence is an effect of perspective.)

When flying along a beach or other flat place, note the curious, extremely elongated shadows of buildings at sunset (or sunrise). Note also how unbelievably red and LED-like the sun's disk can appear when viewed through the longer-than-usual air path length available at altitude. The pure red color is due to the complete scattering or absorption of shorter wavelengths of light by air molecules and particles suspended in the air.

IN CLOUD

Flying through cloud toward the sun, sometimes you can see a corona ahead and a "glory" behind -- a neat way to fly! With the sun behind, and misty clouds up ahead, sometimes you will see a Brockenspecter (a shadow of unexpected size, due to a wall of cloud being closer than you might have realized). With rain falling ahead and the sun behind, keep an eye out for rainbows. Seen from the air, especially against a background of black clouds, the colors can be amazingly intense.

> Once, in central Mass, with the sun behind me, there was a cumulonimbus up ahead in which heavy rain was falling. As I watched, the cloud split in two, revealing an interior blacker than Zip's behind. Then, when the angle to the sun behind me became just right, two short, intense arcs of rainbow appeared, segments of both the primary and secondary bows, spanning the Stygian gap. These were no ordinary, washed-out, pastel-colored affairs: both arcs had intense, fully-saturated bands of every last color of the spectrum, bright as neon signs against the coal-black background!

Note the halo rings around the airplane's shadow on cloud decks. Supposedly, the sizes, colors, etc. of the rings have never been satisfactorily explained.

At night in precip, the development of St. Elmo's fire on the canopy (or even better, a ring of it around the prop) will definitely impress the passengers. The radios will squeal

with static, and you may be about to take a lightning hit, but the brush discharge itself is fairly harmless. Electrification often accompanies ice: if the temperature is near freezing, you might start to pick up some. Best get out of there!

OPTICAL EFFECTS AND ILLUSIONS

In post cold-front weather, the colors of the landscape can appear to be especially sharp and saturated from the air. At other times, when it's hazy, and especially near sunset, the light will be almost monochromatic. In haze, notice the strong "Chinese painting" aerial perspective effect on a series of receding hills.

Note the bowl-of-milk illusion in heavy haze. If VFR, you can amuse yourself and your passengers by navigating by the shapes of lakes – about the one visual reference that may still be usable. As for yourself, realize that even if you can occasionally see objects on the ground or on the ocean's surface, seat-of-the-pants flying, especially at night,could lead to trouble: you won't be able to judge your altitude (or sometimes, your attitude) by eye. You can easily lose your own internal vertical reference and get into a spiral dive (probably what got Kennedy). Also, when flying toward the sun in haze, be aware that you will have no idea whether you're able to see three miles or three feet ahead. Blank-field myopia may cause you to miss visual traffic even if you do have adequate forward visibility. There are ways to counter these illusions, but it's better to be on instruments.

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Note the "connect-the-dots" tricks the eye plays with blinking building-outline lights at Xmas-time. (The illusion may explain the erroneous "canals on Mars" observations made by astronomers a century ago.)

> Many years ago, at night over the Alleghenies, I saw, maybe 40 miles ahead, what looked like writhing, colored-neon worms or spaghetti – a really weird sight to come upon in the midst of the mountains at night! When I finally got closer, I could see it was a whole subdivision of new houses somewhere east of Pittsburgh, their roof-lines all decked out with strings of flashing Xmas lights. The writhing illusion was due to the humps in the straight lines introduced by the house gables: as first one house flashed, then another, the "humps" in the "worms" changed position. Enough of houses were lit at one time (and the sight-angle was such) that from a distance, they gave the impression of a whole bundle of agitated luminous worms!

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> In the old days, when the steel mills were active, Pittsburgh at night was an amazing sight from the air, particularly if there were broken layers of cloud! Add airliners arriving and departing through the clouds with their landing lights on, and you had a fantastic scene.

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Tall glass buildings, which look blue on the ground, look brick, stone, or tree-colored from the air. This only stands to reason, but it's a surprise when you first see it.

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Flying a few thousand feet over layers of cloud, or over snow covered ground, notice how the surface below can form a concave "bowl" illusion like the "dome" of the sky above. Sometimes, between layers, it's like being inside a hollow lens formed by two watch-glasses, one above, and one below. The turned-up zone around the rim of the "bowl" at the horizon seems more pronounced on very cold days, possibly due to refraction of light rays by gradients in the cold, dense air near the ground. (Compare the mirages seen over very cold water or ice). Sometimes, coming back from the West in clear, cold weather, you can see Boston, tilted up slightly on the horizon, from as far away as Albany. Going the other way, you can sometimes see NY farms in the far distance climbing the apparently-rising horizon.

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Note the "Heiligenschein," a bright spot that appears on the ground (instead of a shadow) when you're about 3000' AGL. There seems to be more to this bright spot than simple diffraction: it may be something subtle about the grazing reflection of sunlight on the shiny paint of the airplane. (A question for the physicists: how is the sun-shadow of a shiny sphere different from that of a sharp-edged disk?)

> [The question reminds me of the ancient engineers' joke about the physicist who, when asked to design an automatic chicken-plucking nachine, stepped to the blackboard, drew a circle, and said, "First, assume a spherical chicken . . ."]

Note the extra brightness of the bright spot on pine trees (the "Sylvanschein"). It's due to tiny resin beads on the surface of the pine-needles that act like the glass beads on road-signs. Retroreflective road signs themselves, far down below you on the interstates and normally lost in the distant haze, light up amazingly when the sun is directly behind the airplane. (Retroreflectivity is where you find it: the astronomers tell us that the Moon grows definitely brighter within a few hours of full, as the glass beads on its surface kick the Sun's light directly back toward viewers here on Earth.)

THINGS TO NOTICE ON THE GROUND

Some impressive ground sights look pretty puny from the air: Mt. Rushmore, e.g., or municipal fireworks displays on July 4 or Labor Day. On the other hand, there are many impressive air sights that often can't be seen at all from the ground. The coastal islands of Maine are one; the cornfields of Iowa another.

In New England, note the stone fences everywhere. The place used to be <u>much</u> more densely settled! (As Wolfgang Langeweische pointed out, those fences are pretty stern stuff. The children were set to work to pick up rocks in the fields and build them.)

When the leaves first turn in the Fall, note the orange rectangles laid out like a plaid blanket on the re-grown forest on the hills and mountains. These are due to deciduous trees that remain along the old field boundaries. (The abandoned fields themselves have grown back in evergreens.) Amazing, the slopes they were trying to farm back then!

In the Fall, before a wind scrambles everything, note the curious reflecting-pond look on the ground, where trees have dropped their colored leaves straight down in still air. Also note the exceptional roundness (and brilliant color in the Fall) of the cranberry ponds in southeastern Mass. (Their circularity is the result of a shore-curvature-minimizing wind and wavelet action on glacier-deposited gravel and soil).

Pay attention to our various modern and historical civil engineering works, which are impressive, and have a certain wit to them. Langeweische points out that from 1000 feet over a big construction, you're looking down at it from the same "policy-making altitude" that its planners once did, looking down at its drawings laid out on a desk.

In western Mass, note the curious old hill towns, exceptions to the general clustering of towns in the river bottoms. Also the cloth-shaded tobacco fields in the Connecticut River valley. In PA, OH, WV mining country, note the mess made by strip mining. Around Buffalo: all the spilled iron ore blown off the barges and rail lines. In the Midwest: all the really big, brightly painted stuff they make out there, visible in factory yards, or on the railroads. Also section lines, envelope plowing, contour plowing. Further west, badlands, desert, and, of course, the mountains.

Note all the "starter castles" recently built in Nerdistan (Sudbury), also all the other evidence spread out everywhere of people's idea of the good life. Westchester County, NY is impressive, especially on summer nights when all the swimming pools are lit up.

Note the Jones Effect (the clustering of swimming pools, Winnebagos, or other conspicuous baubles in working-class neighborhoods.)

The weather is good for some really amazing sights.

> Once, on instruments in eastern New York, just west of the Berkshires, I encountered enormous, perfectly-formed snowflakes the size of pancakes, falling in dead-calm air from an apple-green sky through which the sun was feebly shining. The huge flakes, dead flat, and like dead leaves falling off a tree, oscillating from side to side as they fell, caught and reflected the light like pieces of mica.

The Berkshires after an ice storm are an impressive sight. The Berkshire Ice Machine, famously hazardous to pilots, is capable of cladding everything in a quarter inch of clear ice – creating, in the words of the famous New Yorker cartoon, "Another goddamned fairyland!"

Of course, at any time, NYC as seen from the Hudson River corridor is one of *the* great air sights in the world.

> Once I was vectored over the city late at night as a dense sea-fog crept off the water. It filled the street-canyons below with a thick, internally-lit layer of fog colored red-orange by all the neon signs and vehicle lights down at street level, through which the dark, crystalline shapes of the skyscrapers rose into the clear air above. It looked like an upwelling of red-hot molten metal that had somehow flooded the bases of the skyscrapers. Or maybe Pat Robertson's fondest dream had been realized: maybe what I saw was the earth beneath the city somehow cracked open, making it possible for an observer like me to see past the burned-off lower floors of the skyscrapers right straight down into the fires of Hell!
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> Then there are those strange sights with no explanation at all, such as finding a beach in Maine lit one night by literally hundreds of red highway flares, or on another occasion, seeing six red position lights circling rapidly down below me in a remote mountainous area of Vermont. This last sight was really strange: maybe it was just an auto racetrack on the ground, or, if the whole thing was airborne, maybe it was somebody in a UFO waving to his grandmother, but since I didn't ask for a deviation to check it out, I'll never know.

"STUPID AIRPLANE TRICKS"

As you fly at modest altitude over the outskirts of towns or suburbs during the evening commuting hours, have your passenger spot a car down below, and have him keep an eye on it for the 45 seconds or so it will remain in view. Like as not, it will promptly turn into a driveway and stop! Have him pick another one. It will do the same thing! (The more outlying the suburb, the better this works). (Let him look: you fly the airplane!)

Show how you can pull the sun back up after sunset (by climbing). (Let the passengers look; you fly the plane and watch for traffic!)

In slow flight on a windy day, you can "park" the airplane's shadow on the ground, or cause it to move right along with a vehicle -- (this last is inadvisable if the driver could become upset and distracted in traffic, or if you don't watch for air traffic at your altitude!). In a big wind at altitude, you can even fly backwards – disconcerting to anyone not fully clued in to what's happening.

> Once, after being turned to an intercept heading for the ILS into Providence, my approach clearance was rescinded due to the faster-than-expected arrival of an airliner making straight-in for the airport, and I was told to expect further vectoring before being cleard for the approach. Just then, I broke out into good VMC and had the both field and the inbound traffic in sight, so I advised approach that I could very well reduce speed and then make a visual approach behind the airliner. This was approved, so I removed some power, lowered the

flaps, and waited for the traffic to pass in front of me. Presently there came a panicked call from the ground. The controller was all excited because the speed readout on his scope said zero -- as well it might, considering that his last vector had faced me around directly into a huge post-frontal wind at my altitude, and I was in our 172. I told him I was perfectly fine, had the field in sight, and would just hang right there at my altitude and wait the traffic out. (The idea that a 172 could hover like that was obviously news to him!)

A harmless stunt is to park the Heiligenschein right on someone hanging out the wash or just standing around. (Be sure to watch all around for traffic!) The victim's surroundings flicker weirdly and light up a few f/stops brighter, as if the Sun were going to explode, but he won't see you, geostationary above him at 3000 feet and lost in the solar glare!

And if all this gets boring, notice that at high altitudes (>10,000 ft.), when you "cluck" your tongue, it does not stick as tightly to the roof of your mouth as it does at sea level.

[This one came from the late Dr. Bernard Vonnegut, a brilliant, witty scientist, and brother of the novelist. He was a (posthumous, alas) winner of a recent IgNobel Prize for his Amer. Meteorological Soc. paper on "Chicken Plucking by Winds of Tornadic Velocity".

His stories of wonderful things to be seen from airplanes would fill many pages -- but most aren't suitable for entertaining passengers. Try ball lightning rolling down the aisle in a DC-3; or on another occasion, the accidental dropping of a 2-ton ice-cube, produced when a load of shaved ice to be used for a cloud seeding experiment got stuck together and left the airplane all at once! (They flew back expecting to hear that someone had been killed by the world's largest hailstone, but nothing came of the incident.) Once he saw foot-diameter boulders, ejected from the Surtsey volcano near Iceland, "floating" outside the airplane windows at the peaks of their trajectories, on a flight made at 5000' MSL to measure lightning in the ash-cloud. Scenic as hell, no doubt, but that was definitely flying tough!]

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Then, after you land (particularly if you have flown through a smog-filled inversion layer), point out to the passengers the thin brown line of pollution products deposited along the stagnation line at the leading edge of the wing. Tell them it would really be terrible to have to live down below on the ground and actually breathe all that stuff!

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Passengers usually want to know what it costs to fly the airplane. One answer is that every time you put a penny in the slot, the propeller goes around 10 times.

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At night, under sodium- or mercury-vapor lighting, you can usually see strobing of the prop at rpm-multiples of the 60 Hz (120 pps) line frequency. The effect is less pronounced where light is integrated from groups of street-lights being fed with 3-phase power (since their respective 'on' periods will overlap), but it's still remarkable to think of all those lights going on and off in precise step with each other.

> [The engineer who got me started flying played a big part in developing metal-vapor streetlights. He had once been a cabin boy on Henry Ford's airline between Detroit and Toledo, and later had worked for Henry Ford himself, before taking up lamp engineering at Sylvania! He's long gone, but now, when I see our huge metro areas all lit up at night, I think of him and of Sir Christopher Wren's epitaph at St. Paul's Cathedral, "Si monumentis requaeris, circumspice!" ("If you seek his monument, look about you!")]

SOME ADDITIONAL TRICKS

To illustrate how the airplane always flies in perfect balance, get it all trimmed out. Take your hands and feet entirely off, let it fly on for a bit, then tell your passenger that you can fly the plane by mental telepathy. Say, "Airplane! Go down!" and point your finger down, while at the same time you imperceptibly shift your weight or reach an arm forward in order to point. Sure enough, after a few seconds, the plane will start down. Reverse the process, and it will climb. Incline your head or surreptitiously stick an arm out across the seat backs (while you point with a finger on your other hand), and it will turn.

Once he's caught wise to what you're doing, have your passenger stick out his arms in front of him, or lean forward in his seat, and wait. Or pull his arms in or lean back and wait. Or roll his head to the side. Or hang the weight of the hand-mike on the yoke, and watch. After a few seconds, the airplane will slowly begin the commanded maneuver.

(You can also pull this stunt on an unsuspecting pilot, especially if you and your confederate are in the rear seat. Slowly and imperceptibly lean forward, wait till he trims, wait a bit more, then slowly and imperceptibly lean back. When he trims again, wait, and then lean forward. Keep this up until he says, "Damn! This thing won't fly in trim!")

People are fascinated and surprised to see how delicately the plane is balanced. In perfectly-trimmed flight, even the tiniest inputs have a detectable effect, (just as they do with a refined musical instrument). It also makes the point very clearly to white-knuckle types that the airplane can do a perfectly fine job of flying, all by itself; that superhuman powers are not required to keep the wings from rolling up and the prop from falling off.

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It is rumored that DME can scatter birds. Probably belongs in the same folder with the work of one "Cyclone" Jones, who back in the 30's claimed he could locate storms with an ADF. There are lots of things in the folklore that may or may not be so.

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If you find yourself explaining to the passengers how the airplane flies, do not perpetrate that hoary canard of high-school general-science texts having to do with pressure, Bernoulli, and the different distances traveled by parcels of air passing above and below the wing. (How then to explain inverted flight?) No: airplanes fly because the wing washes a mass of air down, and lift is produced from the equal and opposite reaction force resulting, as Sir Isaac would have been quick to point out. It helps to have a cleverly-shaped airfoil to wash the air down efficiently, but with enough power, the shape isn't so critical, and an ordinary wing will work upside down. . On an ordinary airplane, about 1/4 of the lift comes from simple kite-like deflection downward of air hitting the underside of the wing; about 3/4 from air pulled down by the conditions of flow over the upper surface. Some aerobatic airfoils have nearly symmetrical cross sections.

You can see the effects of downwash clearly when airplanes are landing and taking off on dusty gravel strips, or on grass, water, or fallen leaves -- also in the way jet contrails get washed down, or the way helicopters raise the dust when they take off or hover. You can also see it with birds. (My pet crow used to blast all the papers off my desk when landing or taking off, or even when just flying overhead. It takes quite a wind directed downward to keep a couple of pounds of crow in the air!)

True, the curved wing surface helps the downwash process, and brother Bernoulli can be invoked to help explain how that happens, and circulation theory can be invoked to calculate the pressures resulting, but the generation of lift is really just a simple action-reaction thing

MORE STUNTS

An amusing (anti-) coordination exercise is to do a series of alternating right- and left-hand, constant-heading slips. Use about 15 degrees of bank, and keep the heading fixed. The result is a perfectly horrible sensation – one that forever fixes in your mind the great desirability of keeping turns coordinated and the ball in its cage.

(Don't ever do this with susceptible first-time passengers aboard, or you will surely make them sick. The ball, after all, represents the contents of their stomachs!)

As a sensation, it is considerably less dangerous than the other one that can result from a botched turn (particularly a botched turn made too close to the ground). That's where the airplane, goaded to the limit, suddenly falls off on one wing or the other, and enters a snap-roll or a spin. I saw it happen right in front of me, one day at Marlboro, to a guy in a Tri-Pacer. A horrible thing to watch, but it was perfectly obvious just from observing his turns in the pattern that he was about to prang it this way!

> Marlboro was also the place where you could watch Mel Dorr fly his famous 90°-banked-turn pattern. Contrary to the conventional wisdom of the time, nothing bad happened to him. Nor should it have: steeply banked turns are aerodynamically legit if done properly and you don't try to maintain altitude by increasing angle of attack in the turn. To be sure, there are some definite secondary reasons not to bank the aircraft to such an extreme extent, but if there's a choice to be made among greater or lesser bank angles for turns in the pattern, I say it's better to go ahead and "toorn th' aero-plane!" once you've cleared the turn and started it, rather than spend a lot of time in a slow, shallow turn with your view of traffic in the pattern blocked, or worse, trying to sneak around the turn using rudder alone because someone told you never to bank steeply near the ground. (Steep turns should be avoided near the ground whenever there's apt to be wind-shear or a large near-ground wind-gradient that could conceivably dump you over if you presented your underside to it, but the rest of the time the airplane doesn't care. Avoid steep turns on instruments, though, and don't ever do them with pax aboard.)

Some people call such alternate-direction, constant-heading slips "Dutch rolls" but that's not strictly correct. In a Dutch roll, the heading hunts back and forth as the plane rolls from side to side in a nasty, anti-coordinated, somewhat spontaneous fashion. One characteristic sign of Dutch roll is that the wingtips tend to execute a constant circular motion vs. the distant horizon. It's a fault of the airplane, not the pilot. Mercifully, our Cessnas are pretty much free of it.

Where a tendency to Dutch roll exists, any bump of turbulence or similar disturbance can set it off, after which the plane's inherent roll-yaw coupling then sustains the oscillation or causes it to build. Such a tendency, when encountered, is very obnoxious, and it will definitely upset the passengers' stomachs. To stop it requires judicious application of first ailerons and then rudder during the respective times of maximum roll and yaw *velocities*. (That is, the opposing control inputs must be made 90° out of phase with the respective maximum *excursions*, in order to suck the energy out of the oscillating system and damp out the excursions.)

The opposite condition (too much inherent roll damping) can leave the airplane overly susceptible to graveyard spirals. Spiral tendency is probably less of an evil than Dutch roll tendency, but you can get an argument. (One or the other is necessary if the aircraft is to turn properly, so the aircraft designers have to choose their poison.) Spiral turns whose

speed stays within the green arc (or yellow arc in smooth air) aren't particularly dangerous in themselves, but the speed, of course, must not be allowed to get out of hand. If you do enter a spiral, deliberately or not, you need to know for sure how to recover without taking the plane apart.

I bring up graveyard spirals because passengers always want to know "What got Kennedy?" Once you understand graveyard spirals, you can show them one of the probable scenarios if you're in VMC – or not show them, depending on your estimate of what they might be able to understand and tolerate. (Don't mess with showing them the other possibility (a spin) -- at least not in our equipment!)

> Note that discussions of spiral recovery in most of the books are wrong or incomplete. True, they describe how very, very wrong it is to keep pulling back on the yoke, and they talk about removing power, stopping the turn, and leveling out during recovery, but they often fail to explain what can go wrong during the procedure.
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> It's true that stopping the buildup of speed in the spiral turn is indeed the first thing to do, and it's true that this must be done by stopping the turn with ailerons and rudder, i.e. *not* by trying to slow the plane with the elevator! – but there is also a secondary problem that if not handled correctly, can lead to stall/spin. The books say to remove power -- and you should -- but realize that a few more seconds of engine power, or a few less, won't make that much difference in the amount of kinetic energy you have to deal with during a spiral recovery! The real problem is the kinetic energy *already* stored in the airframe!
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> The big thing is that once the turn has been stopped, the wings will be level -- and this means that the lift-force vector that has been pulling the airplane around the spiral turn will now be aimed vertically. If the airplane has built up any speed to speak of, this lift force will be a lot more than that needed to overcome the weight of the airplane -- a difference that will now show up as a tendency to climb.
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> Or, said another way, with the turn stopped and the wings level, any excess kinetic energy will suddenly and automatically be converted into an altitude gain -- unless angle of attack is drastically reduced at the same time to change the energy back to airspeed. If you just sit there doing nothing about a growing and now-excessive angle of attack, you could inadvertently zoom up quite steeply or even go over on your back, leading to stall/spin or further disorientation – a good way to lose it! (Compare the need to keep the nose down when transitioning from a steep left 360° turn to a steep right 360° turn -- and think what doing this would be like if done at fairly high speed!)
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> The tendency to zoom during recovery is easy enough to counter if you have outside visual references, but if you're in simulated or real IMC (or if you're out there in darkest night) and your gyro has tumbled (as it might have), you will have nothing except your airspeed and altitude indications to help you judge when to level off during recovery.
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> To finish a spiral dive recovery, start pushing the nose down just as soon as the altimeter needle starts to move upward, and you will generally wind up in level flight at a

reasonable airspeed. But don't delay: if you see the airspeed dropping rapidly, get the nose down. (Forget about using the VSI – it's way too slow.)

Maybe this sounds pretty dramatic, but properly done, nothing about the maneuver needs to be overly exciting!

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When ATC (despite your hints) has failed to provide a timely let-down, you can bet they are eventually going to ask you to make an approach in which you might have to come down "like a sack full of hammers" or "a Bonanza full of doctors" as the sayings go. Once or twice (upon bringing me practically up to the airport boundary while still at 3000 ft. AGL), they have asked me "Do you think you can make it down from there?"

For the sake of your passengers (and for the sake of safety in a sky full of mixed traffic), it's best to refuse any clearance or request that calls for a heroic rate of descent. Instead, request or accept vectors, 360's or a descent in a holding pattern as appropriate. You should never go screaming down toward the numbers, especially at places where unsuspecting VFR people are apt to be in the pattern. Also, you don't want to stove in your passengers' eardrums with too-rapid a descent, or frighten the bejeezus out of them with an overly-dramatic approach and landing. You also don't want to wind up coming in way too hot over the threshold, and then float off the other end of the runway!

On the other hand, someday you might want to *get down, now!* (There are several emergency situations, notably fire, where you might need to do that. Or, even if it's not quite that desperate, you might still want to make a steep approach, or if asked to do so, make close approach. You should know how to do these things.

Now, we all know about best angle and best rate of climb, but have you ever wondered what the fastest or steepest way to <u>lose</u> altitude is (that is, get down fast without taking the airplane apart)?

Once during my primary training, my instructor and I, in a VFR-only trainer, raced a snow-squall back to Hanscom. Tower had cleared us to land but unfortunately, just as we entered the pattern, the world went white. (I suspect they had been stretching things a little to hold the field VFR for us.) Suddenly, straight down, directly beneath me, I spotted the runway intersection, whereupon my instructor took the controls, headed into the wind, and slipped us straight down, right into the teeth of the oncoming snowstorm. We touched down on the intersection with almost no rollout at all. (The wind was that strong!) One can argue about the wisdom of such a wild-ass descent, but our other options weren't so wonderful either. Never mind: this one worked just fine, so we taxied in.

Basically there are four different things you could do to get down fast. Some of these should be tried in somebody else's airplane, not ours, but one of them might work for you some day in a real bind. Obviously, as will be apparent, none of them should be used

with inexperienced passengers aboard, and none should be used unless you know you can maintain proper coordination and airspeed control!

1. One is to slow down (using initial flaps and gear down if applicable) and then, when the white arc is reached, stick out the rest of the flaps, put the nose down, and dive for a spot well short of the runway. With full flaps, our Cessnas will generally stay within the white arc, even at unbelievably nose-down attitudes. (Such a descent is legit, even though there are some rules about max allowable pitch angle with passengers aboard. In an emergency, you should do whatever is necessary.)

Salvaging a descent to a spot short of the runway is easier than salvaging one that won't let you land within the first third of the runway. As you near the end of the full-flaps descent, be sure you still have enough kinetic energy to maintain flying speed and ability to flare. You may want to retract the flaps a bit if necessary to glide to the beginning of the runway.

If, in a steep descent, you come in too hot or too high, go around!

2. Another possible way to steepen the descent is to hold an approach speed on the back side of the power curve -- but if you do that, the aim point and progress of the descent will be hard to judge because the nose will be so high. And, at the end of the slow ride down, you might find yourself still in mushing flight and close to stall. Unless you do something to regain a little speed, you might not have enough energy to flare properly. For these reasons, descent on the back side of the power curve is generally not recommended.

3. Another method that's legit is to slow down to maneuvering speed, and then put the bird into a humongous forward slip. Then just hang on, keeping it in the slip. It will sink like a stone, but as long as you can hold it in the slip, it won't stall. But you've got to hold it, and then manage the transition out of the slip correctly. Don't let it mush down on the nose or work its way into a stall/spin. Note also any restrictions about prolonged uncoordinated flight with low fuel – you may need the engine at some point!

In some airplanes, it's best to avoid slips with flaps extended. (Older 182's used to be placarded against it. With flaps down, the 206 can get wild, too, as you will discover if you try slipping to a landing while carrying significant flaps in a stiff crosswind!)

4. Finally, as a desperation move, with most single engine Cessnas, you can slow all the way down and stall the airplane out completely. (Don't try this with airplanes reputed to be touchy or hard to recover, e.g. Cirrus.) Slow the airplane down first, and *don't* let it tail-slide!). Then, once it's stalled, don't let it get away! *Hold it in the stall, keeping the wings level by prompt footwork on the rudder,* and ride it on down, perhaps helping it to stay level with the ailerons, but basically using the rudder.

(Yes, if you let stall/spin develop, you could make a big airplane-shaped hole in the ground! Obviously you don't want to let it spin in (especially when too close to the ground for spin recovery) and obviously, you don't want to run out of room to recover gliding speed at the end of the ride down to low altitude. Nor do you want to put excessive loads on the airframe or the control surfaces, or risk an upset in turbulence --

but it is possible to dump altitude and get down low in a big hurry this way! If you can stay ahead of the airplane with the rudder, nothing bad will happen.)

I don't have any information as to which technique gives best descent rate or angle, but I have seen all of them used in emergency situations. (All seem good for max descent rates of the order of 2000 ft/min.) Of these somewhat hairy techniques, the forward slip is seems most acceptable, and would work if the electrical system has failed. At any rate, it's what our aeronautical ancestors used routinely, before they had flaps. We should all know how to do slips correctly! Get some instruction!

Again, it's inadvisable to use any of these extreme methods to salvage an approach that should be flown in a more conventional way, at the correct speed. None of them have any place in normal flight on instruments. Above all, don't unnecessarily frighten your passengers by using them where a more temperate and professional means of descent would do!

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Frank Comerford used to amuse us by telling how he would belt himself in the middle of a 150, with one cheek planted on the pilot's seat; the other on the co-pilot's seat; left foot on pilot's right rudder pedal and right foot on co-pilot's left rudder pedal; hands on the corresponding inboard horns of the left and right yokes -- and then he would fly the full set of commercial maneuvers!

(Like some of the previously described stunts, this one is for hypothetical amusement only! Don't try this at home!)

Same goes for some of the other non-standard cockpit activities in the folklore. Every now and then one sees accident reports from the hinterlands where the authorities had to scrape up and bury the participants in some hare-brained escapade. These days, especially here in the Northeast, strict attention must be paid to avoiding traffic and flying professionally and safely, without horseplay or other distractions.)

Passengers are almost invariably pleased to be able to see their house, their town, or their camp-site from the air, but in line with the foregoing, it's essential not to attempt low-altitude sightseeing flight or photography unless you know what you're doing, are truly proficient at ground-reference maneuvers, have due regard for neighborhood noise sensitivities, and stay well above the legal ground clearance minimums.

Never try to sightsee when it's rough, never fly toward the sun or into obscuration with possible obstacles in the vicinity, stay out of the mountains if the wind is up. Know the local drill for flights near scenic wonders, watch for traffic, and don't screw up. Let the passengers gawk and take the pictures: even if they start to throw up or all hell breaks loose in some other fashion, don't get distracted! You fly the airplane!

STILL MORE TRICKS

The best trick of all was our old instructor Harold's, which won't be divulged here because the outcome was so astonishing. Those of us he successfully sprung it on will never, ever forget it, or the lessons learned! Unfortunately, the particular circumstances he so cleverly wove together to make it a complete gasper have evaporated, but even so, some approximation might be found in the future. All I can say is, "Just wait 'til it gets sprung on you!"

There is no reason, however, not to mention the lessons learned. There were several, which this trick delivered unmistakably, all at once!

+ Have the wit and imagination to spot the Murphy's Law possibilities in whatever you are about to undertake, and take all the necessary precautions to short-circuit or de-fuse them.

+ Where your fellow man is in a position to do you some real harm, you should never accept his friendly assurances, defer to his rank or seniority, or be intimidated by an overbearing attitude, or assume he actually did what he said he did! This time, he may have goofed, or his normal good judgment may have deserted him, or he may be answering unthinkingly out of habit, (or, as here, he may be trying to teach you a lesson!).

+ More specifically: even if you, your co-pilot, and ATC think everything is going fine, you still need crosscheck and confirm everything for yourself, and make sure that your next moves will indeed be the right ones.

+ And finally, when error is discovered (and confirmed), do what you have to do to snatch your cookies out of harm's way! Let go of whatever disastrous illusion has been filling your head. Don't automatically continue with something that truly isn't going to work out for you! You have got to "Fly the airplane!" and "Fly what you see!" even if it's not at all what you had assumed would happen, or what you or ATC had been expecting you to do. Size up the situation; don't blunder on, meanwhile getting deeper and deeper into trouble; get back to a safe altitude! (Harold had some horrendous stories to tell about people who were so functionally-fixed that they couldn't or wouldn't do this last!)

MORE NOTES ON CARE OF PASSENGERS

Please see the notes elsewhere on VFR touring with passengers aboard. Not covered in those notes are certain passenger weirdnesses I have encountered over the years. Anticipating and short-circuiting the sometimes very strange misprisions of inexperienced light-plane passengers is especially important in this age of anti-GA sentiment!

In this country, much of our flying does not (yet) have to be done under positive control. It's important to realize that not everyone is thrilled to discover this! One of my former

bosses (a rather prejudiced and stubborn turkey) was aghast. "Little airplanes, always running into airliners!" was all he could think of when he saw how we can come and go at will from the less-congested places.

And now we have 9/11, and just recently, the Washington DC ADIZ incidents. Amongst ourselves, we might joke about it, and get a laugh out of the bumper sticker that says, "I FLY A CESSNA 152 – FEAR ME!" but seriously, it has hit the fan! The public does fear us! How we present ourselves to our passengers, and to the non-GA-flying public in general is critical.

It doesn't do much good to protest about our historical rights: all we can really do is point out calmly and patiently to the aeronautically-naïve how the system really works, and be restrained and highly professional in our own flying. It's not a bad idea to always file instruments if you're going to be carrying nervous passengers. They need to feel that *something* is under control. (Much of the fear of flying is perceived lack of control – by them, by ATC, by somebody!)

If you're careful and lucky, you can gradually convert most of the doubters who set foot in your airplane into friends of GA, but there will always be people who greatly resent our privileges, or who remain inordinately fearful, or who look for help from the Government to further their own GA-unfriendly concerns. So watch it: don't give folks like Senator Schumer (D, NY) any (more) ammunition!

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A trap for the unwary: inexperienced passengers have no idea of what to expect. They're not used to looking out the front of the plane. Many have no idea of what they're looking at, either on the panel or on the ground, and no idea of how the flight is going. As a result, they can often become unhinged by something quite trivial. Often, even though terrified, they may not say much. Until you're sure they understand what's happening, keep an eye on them, and brief them occasionally during the flight. Ask if you suspect something has spooked them, and explain (but at the same time, don't talk their ears off!).

> For example, some passengers are unnerved by the pre-flight inspection or the run-up: ("What's the matter? Is the airplane broken?"). Or they might get the willie-jillies from seeing you use a check list: ("Doesn't he know how to fly this thing?"). Simply point out in a matter-of-fact way, "This is the way it's always done: we always check and confirm everything!" Same for the briefing about doors, seatbelts, prop, etc. (Our shoulder harnesses sometimes make people gulp. Make sure they know how to release them.) Don't make jokes, don't dwell on all the downside possibilities: just treat everything as SOP and under control.
>
> You will find that some people respond well to being able to make rudimentary sense of the gauges. Briefly point out the automotive similarities (but unless there's some specific interest in the equipment, don't get into a long discussion about the gauges or the other toys on the panel). Big holes in the panel (with dangling wires, perhaps) are a

big no-no. If anything is apt to blink, beep, or light up alarmingly (marker beacon indicators, e.g.) try to head it off, or let the passenger know ahead of time it's nothing to worry about.

It helps a lot to provide passengers with creature comforts of a familiar sort. Have passengers wait in a comfortable place until you are ready to board. Don't let them soak, roast, freeze, starve, or succumb to their fears and internal sensations. Many people are astonished to find spiffy FBO facilities – it doesn't hurt to meet your passengers there.

Others are astonished to find there's a cabin heater and a set of air-vents on our airplanes (but even so, you may want to bring lap robes in cold weather, or cold water and washrags or alcohol wipes in hot).

If appropriate, provide some non- messy food, water, soft-drinks, and paper napkins (and discreetly, some airsickness bands, sick-bags, and pee-packs). Try to stave off boredom. Keep the trip legs short, and at the end of each leg, shut down promptly and let the passengers out some place where they can stretch and piddle. Newspapers, magazines, and snacks can be a welcome surprise (but don't let naïve passengers try to read or eat when it's rough).

It's a good idea to pre-arrange things at your destination if you can so that you get the red carpet treatment and prompt ground transportation. The greater the contrast to present day airline cattle-car conditions you can manage (within the limits of reason), the better the impression, and the more the passengers will like it!

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Realize, though, that you can't anticipate everything! Once, going into Portland International in Maine to put a friend onto an airline flight, we had some excitement. On final, as we followed the glideslope down past the city's waterfront, she sensed we were getting low, but somehow, she didn't grasp the idea that the vast open area up ahead was the airport! She became even more agitated when I pointed out the runway and said that's where we were going to land! Now, Portland's 7200- x 150-foot ILS Runway 29 might be able to handle most of the world's big airliners, and it might be the city's pride and joy, but to her, it didn't look as if we could possibly fit the 182 into the little trapezoid of pavement she could see up ahead. (No such trepidation had accompanied our up-country takeoff from a much smaller place, but then, spatial visualization wasn't her thing.) I had her watch the VASI lights, which she found quite fascinating, and eventually, all was well.

On another occasion, I landed at Minute Man with still another first-time passenger. I was all finished landing the plane within the first few seconds after touchdown, but then, as is normal there, I allowed it to trundle on down to the turnoff at the far end of the runway. As we eventually swung off the active, she gasped, "Ooh! We *just* made it!" She had been sitting there for some tens of seconds after we were down, terrified to see the end of the runway coming up, with no sign that she could discern that we were about to turn off or stop! So now, I try to say what I'm doing.

Finally, here's the classic story of this general nature:

Once, down South, there was an attractive young lady who took a clerical job with an FBO. She became curious: from the runway numbers thrown around in conversation, it seemed to her that there ought to be a lot more runways than just the two she could see from the office window. That is, if there's a Runway 12, what happened to runways 1 – 11?

Sensing an opportunity to get better acquainted, one of the instructors offered to take her up and explain things, which he did. They flew around a while and everything was fine — until on downwind, as he was preparing to land, he started to close the throttle. She said, "Oh no you don't!" and shoved it back open again! Dumbfounded, he finally blurted out, "Whatever happened to you in a Volkswagen?"

So, watch your passengers closely, both before and during a flight. To head off any wild misconceptions, get them to voice what they're thinking. To spare the upholstery and keep them friendly toward GA, don't push! Land right away if you see them growing too quiet or starting to turn green! And, even if they do barf or commit some kind of aviation gaffe, be helpful and sympathetic: we need all the friends we can get!