

# **FLYING LESSONS** for January 21, 2010

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.

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

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## ***This week's lessons:***

**Three flights, lost in the fog** remind us of the hazard of reduced visibility. A high-performance single [hits rising terrain](#) in rain-obscured skies. Two perish when a fixed-gear single [disappears into freezing fog](#). A record attempt is cut tragically short when [fog cuts off all escape](#).

See:

[www.nts.gov/ntsb/brief.asp?ev\\_id=20100111X22511&key=1](http://www.nts.gov/ntsb/brief.asp?ev_id=20100111X22511&key=1)

[www.faa.gov/data\\_research/accident\\_incident/preliminary\\_data/media/F\\_0119\\_N.txt](http://www.faa.gov/data_research/accident_incident/preliminary_data/media/F_0119_N.txt)

[www.aero-news.net/news/sport.cfm?ContentBlockID=c1c2d359-ec81-446b-9886-fe9273f4b5c6&Dynamic=1](http://www.aero-news.net/news/sport.cfm?ContentBlockID=c1c2d359-ec81-446b-9886-fe9273f4b5c6&Dynamic=1)

**Fog comes in many varieties**, but all have one thing in common—visibility obscures terrain, preventing even most instrument arrivals, and it hides the horizon to disorient pilots without "blind flying" instruments or the training to use them. Yet the conditions conducive to fog formation are predictable, making these fatal crashes (and many more like them every year) doubly tragic.

**Fog forms** when the temperature cools to the dew point, or additional moisture is blown into a parcel of air to the point the air can hold no more water vapor.

**Air can hold water vapor in varying amounts** depending on the air's temperature. The warmer the air the more vapor it can hold. Air at 70°F (~20°C) can hold almost four times as much water in vaporous suspension as can air at the freezing point.

**Dew point is the** air temperature where the amount of water *already* present is all that can be held—any more will have to condense out into water droplets, called fog if it's near the ground. Or if the air cools even further—even one degree—condensation will begin as well. Putting it in "TV weather" terms, the dew point is the temperature where relative humidity equals 100%.

**When will the temperature and dew point meet?** On cool, clear nights, when air near the surface cools rapidly in the dark, temperatures often cool to the dew point. When moist air blows uphill, cooling as it rises up mountains, or across slowly climbing, flat terrain, condensation can occur. Large blocks of wet air blowing off large lakes or inland from a shore add to local moisture, potentially saturating the air. Sunny skies in days after heavy rain or when snow-pack covers the ground can become vapor-soaked when water evaporates or snow sublimates. The normal rise and fall of temperatures over a 24-hour period—the [diurnal variation](#)—makes fog most likely after dark and at the lowest temperatures of the day, at or just after dawn. But fog can form at any time.

See [www.encyclopedia.com/doc/1O16-diurnalvariation.html](http://www.encyclopedia.com/doc/1O16-diurnalvariation.html).

**All these conditions**, if not precisely predictable, are at least “anticipate-able” when the pilot looks at the larger weather picture. Ask yourself these simple questions:

- What is the dew point? Is it rising or falling? Is the temperature trend toward or away from the dew point?
- Where’s the wind blowing from? Is it coming off a large body of water, or blowing from lower toward higher field elevations?

Look beyond the METARs and the TAFs—study the Area Forecasts, the spiral of air around region-wide pressure systems, even the flow of the jet stream. Are colder temperatures and/or more moisture inbound? Then fog is more likely.

**[FAA Advisory Circular 00-6A](#)**, *Aviation Weather*, defines types of fog and the conditions in which they form:

*Radiation fog*: Clear sky, little wind, narrow temperature/dew point spread. Sometimes called “ground fog”. A common hazard at night when terrestrial radiation cools air to dewpoint. Fog forms in a thin layer but significantly reduces visibility near the ground.

*Upslope fog*: Moist air cools as it rises in elevation. This upslope fog can form under an overcast cloud layer.

*Advection fog*: Moist air moves over cooler surface. Most common in coastal areas advection fog but can move well inland. Wind speeds below about 15 knots forms advection fog; higher winds lift the fog into a low stratus layer.

*Precipitation-induced fog*: Precipitation, especially light rain, falls into already saturated air.

*Ice fog*: In subfreezing temperatures moisture in the air sublimates directly into ice crystals. Most common during light winds with temperatures below about -25°F (~-30°C).

See [http://rgl.faa.gov/Regulatory\\_and\\_Guidance\\_Library/rgAdvisoryCircular.nsf/list/AC%2000-6A/\\$FILE/Chap%2010-12.pdf](http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/list/AC%2000-6A/$FILE/Chap%2010-12.pdf).

**Experience has taught me to add** another form: *Evaporative* or *Snowmelt fog*: (my term). Cool temperatures in clear skies after heavy rain, or under sunny skies when snow covers the ground, creates thick, days-long fog when copious moisture sublimates or evaporates into the air, saturating it.

**Sometimes you need to wait it out.** Or divert to drier or warmer air. If you’re flying when moisture, wind and temperature hint of fog, don’t fly visually at night because you can’t see fog ahead. In daylight be ready to change plans at any time. If IFR, carry *lots* of reserve fuel; you may have to fly a significant distance to divert to a fog-free alternate. Best of all, whether VFR or IFR wait until the temperature trend is *away* from the dew point, to avoid being yet another flight lost in the fog.

Questions? Comments? Email me at [mastery.flight.training@cox.net](mailto:mastery.flight.training@cox.net)

## **DEBRIEF:** Readers comment on past *FLYING LESSONS*

Regarding last week’s *FLYING LESSONS* on magneto operation and propeller pull-throughs before engine start, reader and aviation safety researcher Karl Fischer adds:

Regardless of this or any ‘MAG CHECK’, never pull a propeller through thinking it is ‘COLD’. Additionally, never pull a propeller through in the direction that the engine normally rotates. If you pull it counter-rotating ... backwards ... the MAGS will not fire ... will not click! But it is still a ‘HOT PROP’!

Keep up the good work!

Note some engines' vacuum pump or other components may be damaged if you pull the propeller through against the normal direction of rotation. Comply with any engine manufacturer recommendations.

I remember my early U.S. Air Force training, in a T-41A (Cessna 172), it was a training "bust" to walk through the propeller arc any time! *Always* assume the engine is ready to fire with even a slight movement of the propeller. Thanks, Karl.

## Automation fixation

A recent *FLYING LESSON* concerned loss of basic flying skills as a result of training emphasis on avionics at the expense of stick-and-rudder skills, and over-reliance on autopilot operation to the detriment of hand-flying skills. The journal of the Regional Air Cargo Carriers Association ([RACCA](#)) this week tells us this is a growing concern even among leaders of professional pilots groups all the way to the FAA Administrator:

### Pilot, or Passenger?

Concerned that automation may have adverse affects on the skills of pilots, controllers and mechanics, FAA Administrator Randy Babbitt plans to convene a group of human factors experts to discuss the issue. The industry is beginning to question whether a cockpit that enables the flight crew to engage the autopilot from cruise to approach has a negative impact on piloting skills.

Of course, autopilot use has some obvious benefits over hand-flying the aircraft too. Specifically, utilizing Reduced Vertical Separation Minimums requires engaging the autopilot to provide the necessary margin of safety. The industry's larger concern seems to be whether automation has degraded the skills of pilots to the point where it contributes to some of the more visible accidents in the past year. Similar discussions have been heard among RACCA members regarding the difficulty of hiring young pilots [now commonly trained in glass cockpits] with the skills necessary to fly aircraft with "steam gauges."

Are your skills *enhanced* or *degraded* by the use of cockpit automation? Are you honestly able to take over manually and complete the flight, including approach set-up in a dark, turbulent cockpit if needed, without turning on the autopilot? Yes, automation makes us safer, less fatigued, and more precise when distracted by other duties. But do you fly to lower minimums, when more fatigued or in worse weather than you would if the automation was not available? Experience shows, from the air carrier level down to recreational pilots, that the time may come when automation fails at the most critical time, and the pilot who is unprepared to take over immediately by hand and see the flight to a safe landing is only fooling himself when he says automation makes him a safer pilot. Include hand-flying and basic airmanship in regular training and your day-to-day flying to benefit, not suffer, from the effects of cockpit automation. Be a pilot, not a passenger.

## The common sense of safety

Dr. Tony Kern, corporate aviation safety guru, [Convergent Performance](#) founder and *FLYING LESSONS* reader, hosts a blog that recently posted this entry:

On November 4th, FAA Administrator Randy Babbitt said "there is an extreme need to refocus on professionalism" citing the "sad example" of the crew who "lost total situational awareness" and overflew their intended destination with an airliner full of passengers. "I can't regulate professionalism," he lamented. "With everything we know about human factors, there are still those who just ignore the common-sense rules of safety." There has been a lot of discussion in aviation circles in recent weeks about a need "to get back to basics." That won't work.

Read *why* back-to-basics is a flawed concept by [reading](#) the entire essay.

See [www.convergentperformance.com/gwoe/blog/](http://www.convergentperformance.com/gwoe/blog/)

Automation fixation. Flawed basics. What do **you** think? Let us know at [www.mastery.flight.training@cox.net](mailto:www.mastery.flight.training@cox.net).

## QUESTION OF THE WEEK

### January's Question of the Week #3:

**What's one thing you learned about flying in the last year that seems like "common sense" now that you know it?**

**Win the instructional DVD *Those Who Won't: Avoiding Gear Up and Gear Collapse Mishaps*. Answer this Question of the Week to be included in the random drawing for December. Copy and paste the question with your response to [MFTsurvey@cox.net](mailto:MFTsurvey@cox.net)...then come back to read the rest of *FLYING LESSONS*.**

Win your choice of a Mastery Flight Training hat or the instructional DVD *Those Who Won't: Avoiding Gear Up and Gear Collapse Mishaps*. Answer this Question of the Week to be included in the random drawing for January. Copy and paste the question with your response to [MFTsurvey@cox.net](mailto:MFTsurvey@cox.net)...then come back to read the rest of *FLYING LESSONS*.

January question of the week #2 was: ***Is there a specific flight operation or accident scenario you'd like to see as the subject of a special FLYING LESSONS report?*** No one responded to last week's Question. Either I'm doing everything right...or you were all out flying. Any ideas? Let me know at [MFTsurvey@cox.net](mailto:MFTsurvey@cox.net).

One reader follows up on January question #1, whether it's advisable to land a retractable-gear airplane gear *up* or gear *down* in an off-airport landing:

When in an off-airport landing, is lowest possible safe speed really more important than gliding to impact with minimum rate of descent? What about the landing gear? Having the gear down on a rough surface might cause one main gear to [hang up] and the airplane will go for extremely short ground roll or even worse - flip over? Any known statistic about that?

As far as I know (and I spend a lot of time immersed in accident data), there's very little hard evidence out there to support one side or the other. It is true that airplanes that land with the gear down nose over more often than those that land gear-up; it's also true that some of them land essentially damage-free, tough to accomplish with the gear up. In addition to other confounding factors, such as the type of terrain, time of day, need to maximize gliding distance, etc., the decision seems to be based on the pilot's personality as much as anything else. Also, of course, a completely successful off-airport landing -- one that results in no damage or injuries -- isn't reported as an accident, and there may be no good way to get a fix on the number or circumstances of those.

Thanks, reader. I still hope to get some data-based answers from *FLYING LESSONS* readers who are accident investigators or ASIs (Air Safety Investigators).

***Fly safe, and have fun!***

Thomas P. Turner, M.S. Aviation Safety, MCFI  
2008 FAA Central Region CFI of the Year  
2010 FAA Central Region FAAS Team Representative of the Year



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