

FLYING LESSONS for June 3, 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.

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This week's lessons:

You're flying smoothly, when suddenly the airplane is vibrating badly. What do you do? What might be causing the vibration?

There's no way to know immediately, but there's one action that may help in a number of different scenarios: reduce power, and reduce airspeed.

The vibration likely comes from one of these causes:

- A propeller imbalance or partial prop separation
- Control surface harmonic vibration or flutter
- Partial engine failure, including cylinder head separation or fuel delivery to one but not all cylinders
- Propeller overspeed

In some cases reducing power and airspeed will stop the vibration. Control surface flutter or harmonic vibration is very sensitive to airflow, and should stop almost immediately with a change in airspeed. Propeller overspeeds can usually be brought under control with a power reduction. A propeller imbalance resulting from asymmetric ice shedding might be fixed with a propeller rpm change, which changes the angle of attack of the prop blades and tends to break off ice that has formed.

A partial propeller separation is extremely serious because the shaking may be enough to tear the engine off its mounts. If the engine actually departs the airframe, the resulting center of gravity shift may make the airplane uncontrollable.

Control surface vibration or flutter is the result of control imbalance or exceeding design airspeeds. Flutter, especially, is extremely hazardous because it can tear a control surface from the airframe in just about the time it takes the pilot to recognize the event's taking place. Vibration or flutter can severely bend or crack nearby airframe structure; in many cases it's enough to render the airplane forever unflyable.

Vibration from partial engine failure will not go completely away with a reduction in power, but it might become much less obvious.

Propeller overspeed (rpms well beyond the tachometer redline) may cause vibration along with a tremendous increase in noise. Left unchecked a prop overspeed can lead to hub or blade failure and a subsequent severe vibration from the imbalance. Pull the throttle and slow the plane down, and you can usually regain propeller speed control, at least temporarily.

Most single-engine airplanes with controllable props will go to overspeed when oil pressure is lost in the prop dome. In fact, prop overspeed may be your first indication of a catastrophic engine oil loss. Note the overspeed, reduce power to reduce rpm, and check the oil pressure and temperature gauges.

Most multiengine airplane propellers will automatically go to feather with oil loss. This makes prop overspeed in twins much less likely. However, some older propellers (including some common Hartzell designs) have an air-charged chamber in the propeller dome opposite the oil-charged side. If the air (usually nitrogen to resist corrosion) leaks out this may make a propeller overspeed in these designs possible.

If a power/airspeed change stops the vibration, land at the very earliest opportunity to check for damage except in the case of asymmetric ice shedding, if you can positively determine propeller the ice was the cause. Don't assume just because you've stopped the vibration that the problem has gone away. You may find severe airframe wrinkling or propeller cracking when you have a chance to look at inflight vibration's aftermath.

Remember, instructors, that regardless of the experience of the pilot-receiving-instruction [PRI], you are ultimately responsible for the safe outcome of your flight.

Remain vigilant; watch your student closely, but watch the "big picture" with even greater intent to avoid terminating a lesson, a student-instructor relationship, a reputation, quite possibly the life of an airframe, and, in the case of a professional pilot, perhaps a career, all in one awful, screeching moment.

Comments? Questions? Tell us what you think at mastery.flight.training@cox.net.

Debrief: Readers write about recent *FLYING LESSONS*

Reader Bruce Landsberg writes about last week's mention of the changes at the AOPA Foundation:

Thank you for putting out information on the merger of ASF into the AOPA Foundation. One minor correction but important. As a charity we cannot and do not work on the advocacy or legislative side of AOPA. IRS rule prohibit that.

The erroneous statement was mine, and I apologize for any misunderstanding. The charitable AOPA Foundation is and will even more so be involved in pilot education and safety programs. The "home office" of AOPA handles advocacy and government affairs. Keep your eye on the nascent AOPA Air Safety Institute for more on the good works of the AOPA Foundation. Thanks for the clarification, Bruce.

FAA Safety Stand-down

The April 2010 nationwide FAA Safety Stand-Down is now available online. Check it out:

First, review the handout material found [here](#). (See the file at: https://www.faa.gov/files/notices/2010/May/FAA_Safety_Stand_Down_Brochure.pdf)

Then watch the videos at the links below:

Opening message: http://videoontheweb.faa.gov/Aviation_safety/SSD_2010.asx

Owner-Performed Maintenance: http://videoontheweb.faa.gov/aviation_safety/ssd2010_maintenance.asx

Approach and Landing: http://videoontheweb.faa.gov/aviation_safety/ssd2010_takeofflanding.asx Surface

Deviations: http://videoontheweb.faa.gov/aviation_safety/ssd2010_surfacesafety.asx

Risk Management: http://videoontheweb.faa.gov/aviation_safety/ssd2010_RiskMgt.asx

Closing message: http://videoontheweb.faa.gov/aviation_safety/ssd2010_close.asx

Question of the Week

This week's question:

Have you ever have a “near mishap” while receiving flight instruction? What happened? Tell us your story at mftsurvey@cox.net.

No one responded to last week's question, so we'll leave it open should you decide to cite your experience:

When's the last time you rejected a landing? What happened?

Going into the back issues, one reader responded to a past Question of the Week that asked if there was anything a reader learned after earning a pilot certificate or rating that they wish they knew before the checkride.

I wish I had better known how to back up a precision approach with GPS. Set the active GPS waypoint to the FAF and select OBS mode. Dial the final approach course into the GPS course display, which overlays the GPS course onto the ILS course. This helps you to avoid overshooting your localizer intercept turn if (when) ATC forgets you and helps back up your position on the approach. Great for situational awareness. Never trust one box with your life.

Good points, reader. Thank you.

Fly safe, and have fun!

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



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