FLYING LESSONS for October 5, 2017

FLYING LESSONS uses recent 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 airplane have little direct bearing on the possible causes of aircraft accidents—but knowing how your airplane's systems respond can make the difference as a scenario unfolds. So apply these *FLYING LESSONS* to the specific airplane you fly. Verify all technical information before applying it to your aircraft or operation, with manufacturers' data and recommendations taking precedence. **You are pilot in command, and are ultimately responsible for the decisions you make.**

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 response 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 indicated airspeed. Propeller overspeeds can usually be brought under control with a power reduction—those airplane types with a Propeller Overspeed checklist usual recommend:

1. Throttle – IDLE
2. Airspeed – DECREASE

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 is 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 propellers 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.

Whether a power/airspeed change stops the vibration or not, ***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 airframe wrinkling, propeller cracking or even major airframe cracking when you have a chance to look at inflight vibration's aftermath.

Comments? Questions? Let us learn from you, at mastery.flight.training@cox.net

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What's Going On?

Fatal accidents worldwide involving business jets and turboprops increased 42.8 percent year over-year in the first nine months, to 20, while **fatalities climbed by 43.5 percent**, to 66 people, according to data compiled by ***AIN***. Business jets accounted for much of this increase, logging five fatal accidents that killed 19 in the first three quarters, up from two fatal accidents and four deaths in the same time last year. Fatal turboprop accidents rose by three, to 15, and 47 fatalities, up from five last year.

Year-to-date, three people died in two accidents of U.S.-registered business jets, compared with two fatalities in one accident in the year-ago span. All were being flown under Part 91. Fatal accidents of non-U.S. registered business jets also surged, with 16 killed in three crashes, compared with two people who perished in just one accident in the same period last year.

Fatal accidents of U.S.-registered turboprops doubled from four in the first nine months of last year to eight so far this year, though the number of deaths diminished from 17 to 15, respectively. This year, two of the fatal accidents occurred under Part 135 versus one Part 135 fatal crash last year. Part 91 accounted for the remainder. Meanwhile, fatal crashes of non-U.S.-registered business turboprops decreased year-over-year by one, to seven, but fatalities jumped by three, to 30.

See http://www.ainonline.com

I expect we'll see a lot about these statistics as their impact is felt in the overall general aviation record. Although the industry has lamented the flat (albeit low) overall general aviation (GA) accident rate over the past 10 to 15 years, the rate among personally flown business and recreational aircraft has been going ***up***. It's only the fact that the vast majority of GA flight hours are flown in turbine, corporate-type airplanes, and that these types of operations have been exceedingly safe in recent years, that keeps the *overall* GA accident rate low.

I do not downplay this increase in fatal crashes—it *may* indicate a longer-term trend, although that remains to be seen. Stay tuned for some reactionary responses…and realize that although the percentages of increase look huge, the actual numbers involved are quite small.

NTSB General Aviation Blogs

Check out these informative blogs recently posted by the U.S. National Transportation Safety Board. Scroll down to find recent blog entries in this order:

- Do We See and Avoid, or Avoid Seeing?
- Addressing Medical Issues
- Inside the NTSB's Accident Investigative Process
- Don't Press the Limits

See https://safetycompass.wordpress.com/category/general-aviation/

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Pursue *Mastery of Flight.*

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