



BY J. MAC McCLELLAN

The Psychology of Safety

THE GENERAL AVIATION safety record has changed very little in decades despite continuous efforts by regulators and the industry. On the other hand, the major airlines and corporate flight departments have made great progress in reducing the number of accidents. There are many reasons for the divergence in results for the two types of flying, but it's clear that what we have been doing to improve general aviation safety isn't working.

The insurance company Avemco has a very specific interest in reducing the number of general aviation accidents because those are the only airplanes it insures. The company covers only piston airplanes and, with this focus plus a solid financial position and a reputation for excellent claims service, has been able to earn a big share of that market segment.

Avemco is also the only direct underwriter in the general aviation insurance business, so it deals directly with its insured pilots. With very detailed information on its pilots and, of course, exact information on every claim, Avemco is in a unique position to try to understand the general aviation safety situation better than the National Transportation Safety Board, the FAA or other organizations that promote safety do.

Over the past few years, Avemco has established a formal study program to examine why general aviation airplanes crash and how to prevent accidents and, in its own self-interest, to at least identify pilots who are at higher risk. It's clear that the FAA's training and testing standards are not doing the job because the record is not improving, so Avemco is looking at its own data for answers.

What Avemco has learned is that advanced pilot ratings make no noticeable difference in its risk

when insuring general aviation pilots. A person with a commercial or ATP certificate shows up in its loss column at essentially the same rate as private pilots do.

Total pilot experience, after you have several hundred hours, doesn't seem to matter that much in predicting risk for Avemco. Recent experience is important, and time in type also matters, but the company has found that many thousands of hours in the logbook just don't help it understand the risk of the next flight hour that it is insuring.

Some insurance companies won't cover pilots of high-performance pistons unless the pilot has an instrument rating, but Avemco doesn't have that rule. It has found that a pilot can safely fly a Bonanza, for example, VFR and there doesn't seem to be any higher loss rate than for instrument rated pilots in the same airplane. In fact, flying IFR reduces some risks but also adds new issues that the VFR pilot should not encounter. Thirty years ago most of us in the industry thought that the IFR

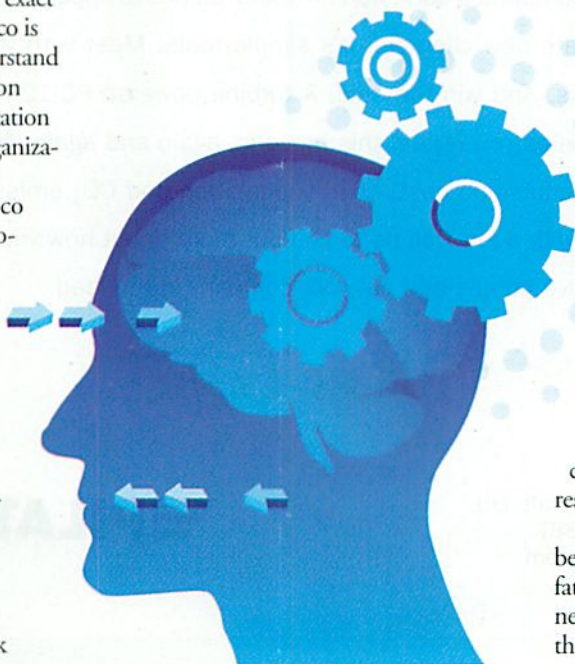
rating was a silver bullet that would eliminate, or at least greatly reduce, the weather-related accident, but it just hasn't worked out that way.

With all of the industry's standard measurements of what makes a good pilot — total hours, ratings and so on — not really being a reliable predictor of who will have an accident, Avemco has focused on the pilots as humans, hoping to find a way to identify those who have the "right stuff" in terms of attitude and personality to fly safely. In other words, who is the pilot that will add on too much risk, and how do you identify that person?

Bill Rhodes, a retired professor from the Air Force Academy, is conducting much of the research for Avemco. Bill's specialty is human behavior, but his passion is flying. His work is far from complete, but already he has identified some basic patterns in the pilot population.

It appears in Bill's research that pilot training, experience and skill level are important in preventing the minor accident. The most common insurance claim comes from a fender-bender type of accident on or near the runway. Pilots run off the end or the side or land short of the runway with alarming regularity. The damage from the big majority of this type of accident does not meet NTSB reporting standards, so it is not included in the overall safety statistics. But the insurance companies know about them, and care about them, because each one results in a claim.

The good news is that a fender-bender almost never causes injuries or fatalities. And the other part of the good news is that pilots get better at avoiding this type of wreck with experience. A



gusty crosswind, for example, that may send the 100-hour pilot off the runway will be manageable by the 1,000-hour pilot. The more experienced pilot will be better at managing airspeed so is less likely to land long or short. Good basic flying skills and experience appear to be a cure for the minor wreck.

The picture is not clear, however, when you examine the major accidents. In those accidents, experienced pilots do no better and may even be more likely to crash than a low-time pilot would be. And it is the major injury and fatal accident that cost insurance companies so much, and drive pilots' premiums so high. The fact that general aviation kills 500 or more people in a typical year is crazy, and even more so because nothing in that sorry record has changed over the years.

One of the ways Bill is trying to understand why some pilots crash while

and controllers that Bill interjects, and they are able to prioritize tasks during stressful situations.

During and after the session, Bill measures stress indicators such as heart rate, breathing, speech pattern changes, posture, facial expressions and so on. The pilots who do well all show some signs of stress but are able to handle it. For example, they will often turn off the intercom so they can't hear the intruding passenger, tell controllers to stand by and make very deliberate movements.

The nonexpert group shows essentially opposite behavior. These pilots press on in deteriorating weather, stretch fuel reserves, make very quick decisions and actions and usually try to do several things at once. For example, when under stress, many of the pilots in this group will find it hard to tune the radio because they are spinning the knob so fast, or they will repeatedly

solo than with passengers. It looks like the presence of a passenger may make pilots change their behavior. And certainly the presence of somebody to impress on the ground leads some pilots to buzzing accidents. No pilot would buzz a house if there were nobody around to admire his flying skills.

In many respects, this is not new information. I'm sure all of us know pilots who we think take too many chances for their own capabilities and those of their airplanes. But how does an insurance company or the FAA identify these risk takers? It's clearly not the number of hours or ratings the person holds that tells the tale. Maybe Avemco's study can find common traits that warn of a pilot who is too rash without examining each and every one in a simulator session, but that's not likely.

The best hope seems to be to modify the training standards to change pilot behavior. The military is very good at this. With just 150 hours or so, military pilots are flying demanding missions in very high-performance airplanes with a safety record about 15 times better than general aviation pilots have. It's true that military pilots fly within a system all of the time, but it's also true that the military is constantly analyzing the risks and then training to mitigate those risks. (Our own Robert Goyer wrote exactly about this topic in the May 2010 article *Safety Against the Odds*.)

It is clear that the biggest risk in general aviation is the psychology of pilots. If each of us could make decisions that manage risk on every flight, the record would improve. I think Avemco is making an important first step with its study to find out just how pilots make their decisions and why. That information could form the foundation for a new training and testing standard that would, for the first time, make real progress in safety.

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>>> It appears that pilots who are less able to handle stressful situations are the ones more likely to take on added risks rather than minimize them by making conservative decisions to divert, or to not even take off in the first place.

others don't is to put pilots through stressful simulator sessions. The flight is what we call LOFT (line oriented flight training) in the jet world, where the challenges the pilot faces are comprehensive and include decisions on preflight planning, weather conditions, diversions and so on instead of simply airplane system failures. Bill is trying to analyze flying skill, but more importantly the psychology of pilots.

Already two groups have emerged from the study. One group that Bill calls the "experts" or the "pros" demonstrates different cockpit behavior and almost never crashes the sim. No matter what their total experience, these pilots respond well to the stress, act methodically and make conservative decisions. Many will divert the simulator to an alternate airport when the weather changes; they are able to ignore the distractions of passengers

push the wrong mode buttons on the autopilot. They also are unable to tune out passengers and controllers and become easily distracted.

It appears that pilots who are less able to handle stressful situations are the ones more likely to take on added risks rather than minimize them by making conservative decisions to divert, or to not even take off in the first place. There are no conclusions yet, but it looks like some pilots are out to prove something to themselves, or maybe to others.

While deadheading jet crews have made some boneheaded decisions that they probably would not have made with passengers on board, it looks like general aviation pilots who have serious or fatal accidents are the opposite. The number of people killed in a fatal accident averages around 1.6, but it is believed that more GA hours are flown