NTSB: GLASS PANELS UNSAFE?

Last March the NTSB published a disturbing report on glass-panel airplanes. They're less safe than we hoped; training appears to be the culprit.

by Fred Simonds

On April 8, 2007 a Cirrus SR22 descended to earth north of Luna, NM under its ballistic parachute. The uninjured pilot later said he was climbing in IMC from 15,000 to 16,000 feet to avoid building thunderstorms and snow showers when the airspeed began to decrease.

This was followed by the PFD airspeed and altimeter failing and presenting the dreaded red Xs. The pilot disconnected the autopilot, began a descent and turned the pitot heat on. Shortly thereafter the PFD airspeed indication returned, but not the altimeter readout.

Sensing rather than seeing that the airplane was in a descent because the attitude indicator "went haywire", the pilot tried to pitch up. About that time the Terrain Awareness and Warning System (TAWS) activated and he pulled the parachute.

He said that he did not initially look at the backup airspeed indicator, but when he did, it read zero. Significantly, he never looked at either the backup altimeter or attitude indicator.

Air Data Input Defective?

It later developed that when internal validity checks within the PFD flagged the pitot input invalid, the system logic went a step further and declared *all* the air data parameters defective.

This led the pilot to reasonably believe that the airplane suffered not just a pitot failure, but an Air Data Computer (ADC) failure – ironically, a self-induced failure created by the ADC itself.

The latest and greatest in general aviation avionics, the glass cockpit provides massive amounts of information. So, why isn't the accident rate better?

This incident has training problems written all over it, starting with the pilot's failure to engage the pitot heat before entering IMC. Had he done so, he would have averted the subsequent avalanche of failures that led to his joining the caterpillar club.

He neglected backup instruments right in front of him, to which he should have reverted instantly. It is unlikely that he knew about the internal ADC bug, but it points out a potential deficiency if the avionics manufacturer did not document the ADC's behavior in such conditions so that pilots could be forewarned.

NTSB's Glass Cockpit Study

Lack of, or inadequate, training is the single largest factor that can make a glass cockpit unsafe, according to a March 2010 NTSB Safety Study title titled Introduction of Glass Cockpit Avionics into Light Aircraft [NTSB/SS-10/01].

When the study was published, it caused a stir in the GA community because the five-year research project refuted a longstanding belief that glass cockpits make aviation safer.

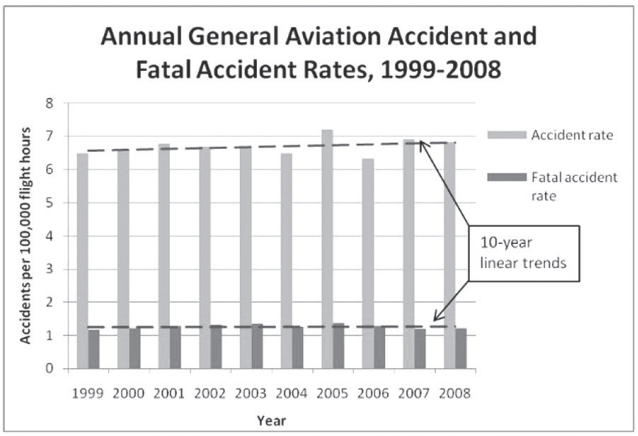
Instead, it found that while glass-equipped light single-engine aircraft experienced lower total accident rates than the same aircraft equipped with round dials, the fatal accident rate was higher in glass machines.

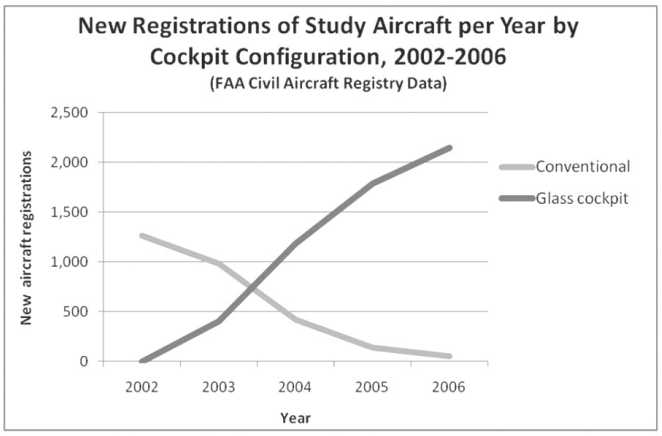
The study sought to explain why this new technology is not living up to its safety potential and what can be done about it.

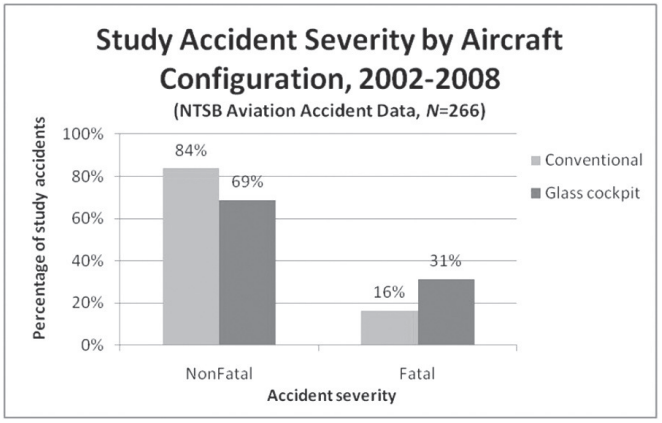
Training

The problem, in a word, is training: five of the six recommendations the NTSB made to FAA involved training.

The NTSB said that the training deficit begins even before a pilot applicant gains a certificate because current airman knowledge written tests don't evaluate what applicants know about glass cockpit displays even though the use of glass is addressed in







NTSB data shows the fatal accident rate has been nearly constant while the overall accident rate has crept up (top left). Interestingly, sales of new glass cockpit airplanes tromped round dial sales by the end of 2006 (top right), yet, safety did not increase; a glass cockpit airplane crash was more likely to be fatal than in a round dial airplane (above).

the Instrument and Instrument Flight Instructor Practical Test Standards (PTS).

Nor does FAA have any equipment-specific training requirements for pilots operating glass cockpit light aircraft. This absence of specific direction creates a training vacuum in which wide variations in the quality and quantity of initial and recurrent training result.

Except for training provided by airframe manufacturers with the purchase of a new aircraft, pilots seeking to fly glass must either train themselves and/or arrange for equipment-specific glass cockpit training on their own.

Poor Training — Bad Habits

A sad axiom of aviation is that poorly trained pilots exhibit bad habits. With new technology this means they make using glass harder for themselves than necessary and generally fail to get the most from the information available with glass gear, especially weather data.

Further, the dearth of training provided to pilots about glass cockpit systems may lead them, when the heat is on, to misunderstand, misinterpret and inadequately respond to system failures, as with the hapless Cirrus pilot.

The NTSB recommended development of new training procedures and tools to ensure that pilots are prepared to safely operate glass-equipped aircraft.

The FAA responded to this with a recitation on FITS, or FAA Industry Training Standards, introduced in 2003.

FITS is centered on scenario-based training in an effort to make training more relevant to the real world.

Initially FITS was conceived as being aircraft and equipment-specific, to the point where FAA could have required type-specific training and a logbook endorsement for same under 14 CFR 61.31(h).

This never happened and the failure of glass-cockpit technology to provide increased available safety is one result.

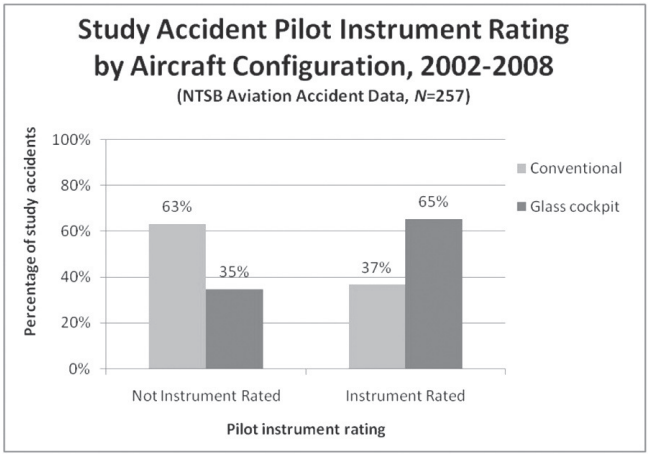
Since then FAA has gotten away from type-specific training and has adopted a largely passive approach focused on updating training manuals and promoting FITS instructional techniques such as scenarios, task-oriented training and student-led performance reviews.

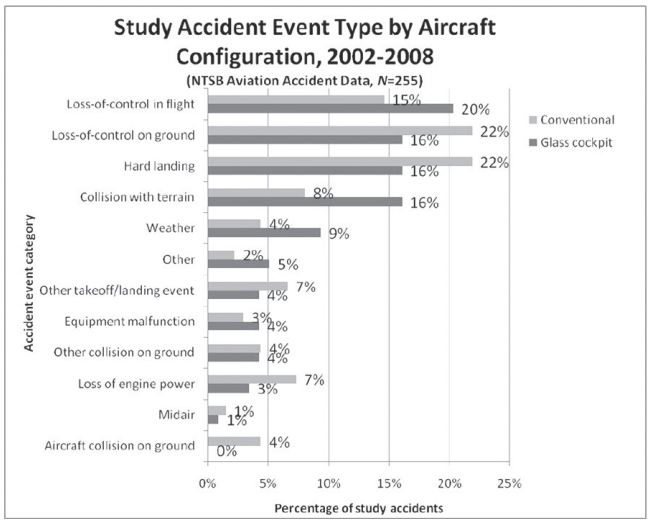
Frankly, good instructors taught by scenario long before FITS existed, and I have yet to see data showing that self-grading is significant in terms of training value.

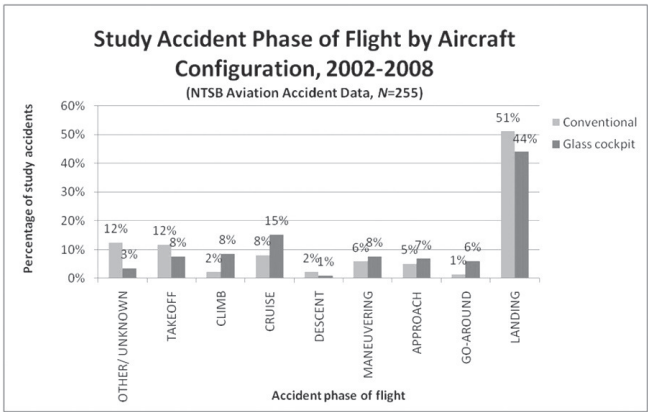
Manufacturer Training Programs

I have been through both the Cirrus and Cessna, FITS-based, transition training courses and have high praise for them. I found the training organized and thorough.

The NTSB noted that manufacturer training is a checkout rather than a proficiency check. For example, Cessna instructors were prohibited by company policy from endorsing logbooks for Flight Reviews or Instrument Proficiency Checks. It caused me to







Instrument-rated pilots were more likely to have an accident in a glass cockpit airplane (top left). Accidents in glass cockpit airplanes seemed to be more prevalent in cross country flying than round dial airplanes (top right and above).

wonder how proficient I really was when it was over.

Typically, these checkouts come free of charge when a new airplane is purchased, which means they implicitly exclude the general flying public.

Without exception I found factory instructors well-trained, helpful and good teachers. In my experience, I think any user of a glass-equipped airplane would benefit from a manufacturer's training course.

Avionics Manufacturers

The incredible little PC Trainer offered by Garmin for a modest $25 is the best bargain in glass-cockpit, equipment-specific training. The NTSB seems to agree, noting that "Pilots who do not have ready access to approved flight simulators or training devices could benefit from equipment-specific training using software applications or procedural trainers that replicate glass cockpit displays", and recommended that FAA publish guidance on using them.

Garmin also offers a guide to its cockpit avionics for CFIs and examiners plus basic failure modes and operational scenarios matching the requirements of the Instrument-Airplane PTS. Instructors can prepare students for the check ride using Garmin's G1000 pilot training guide complete with knowledge test and resource materials.

Insurance Requirements

As matters stand, the steely-eyed underwriters at aviation insurance companies carry more clout in terms of equipment-specific training than FAA. Insurers can require pilots to receive training to gain and maintain coverage. While exact requirements are tailored to individual pilots, formal factory-approved training, especially FITS-based, is a common prerequisite. Premiums can be reduced if a pilot voluntarily takes such training. However, if you trade your round-dial Skyhawk for a glass version, some insurers will want a one-time checkout and others not, so there is little consistency.

Those who retrofit older airframes with glass would not come to the attention of an insurer unless an owner contacts them requesting increased hull value coverage, and such knowledge would not likely trigger a training requirement.

On final analysis, the glass safety record is ours to make or break. So far the data shows we haven't been making it, and it's because of a lack of organized training. Though not a pilot, Norman Mailer could have been speaking to us when he wrote, "One must grow or else pay more for remaining the same."

Our penalty for remaining the same is a too-high fatal accident rate in sophisticated airplanes that should be improving aviation safety.

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