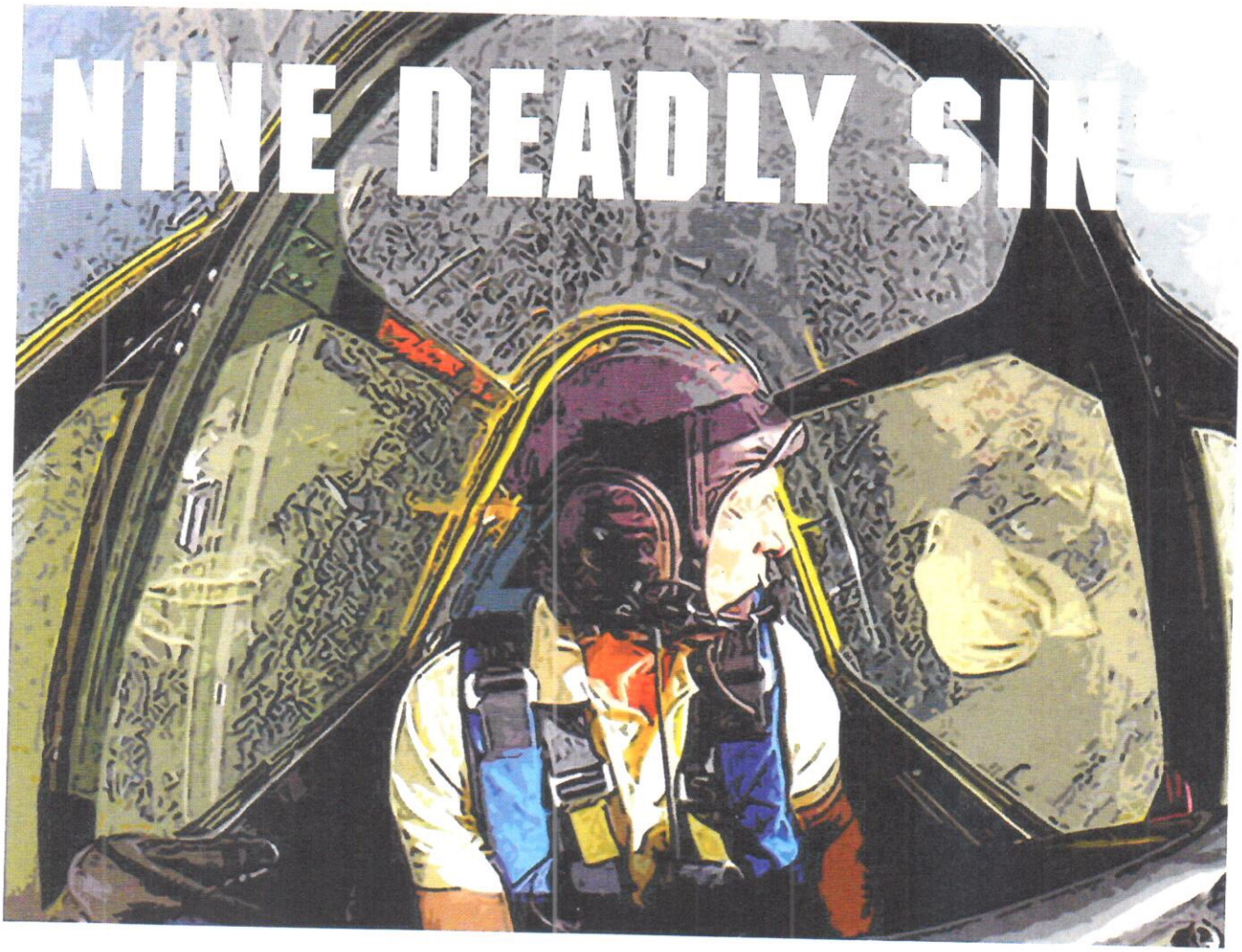
NINE DEADLY SIN



by Rick Volker

Each year, our air show community loses some of its most talented and beloved warbird pilots to accidents. Pore over the NTSB data and videos, and you will see that we cannot seem to learn from each other's mistakes. We accept warbird culture as the way it was, the way it is, and the way it will always be. Yet, we complain about the consequences. If you spend enough time in the air show industry, you will personally witness and be affected by several potentially fatal factors, which cannot be legislated out of existence. They can, however, be reduced by a cultural shift within the warbird community. It is up to all of us to identify, demonize, and eliminate the deadliest factors that presently exist endangering warbird pilots. The following are nine of the most deadly causes, in no particular order.

PILOT SKILLS: THE PILOT LACKS FORMAL AEROBATIC HISTORY

A fail-safe method to build a complete skill set in preparation for displaying a warbird is to pass through the gauntlet of modern aerobatic competition. The lack of a formal aerobatic experience prevents a pilot from acquiring aerobatic box savvy and from developing the competent use of the entire aircraft performance envelope. Formal aerobatic training, followed by formal aerobatic competition, provides a safe way to explore the complete flight envelope of an aircraft, and gives pilots a better chance to handle or avoid emergencies. The demands of aerobatic competition produce a better awareness of gyroscopic forces, 3-D spatial problem-solving, and energy management. This experience is quantified by independent judges and refined by mentors. The aerobatic pilot develops easily transferrable skills that provide great insight in understanding the character of a

OF AIR SHOW WARBIRD FLYING

warbird, and the improved ability to respect boundaries imposed by aircraft age and/or type. Modern advanced competition aircraft such as the Pitts and EXTRA have traits that allow them to better meet the demands of warbirds than the original trainers, with similar power-to-weight ratio, power-off glide ratio, gyroscopic forces, and speed of maneuvers.

Examine the history of the most respected warbird pilots. It is likely they have paid their dues in a Pitts or similar aircraft. There is a ground swell among aerobatic competency evaluators to insist that new air show pilots have significant time in competition aerobatics. The cost of this training is nominal compared to the operating costs of the average warbird. Aerobatic aircraft such as the Pitts and EXTRA are available for rent in many areas of the country, and small-share partnerships are common. Demonstrated aerobatic competency is what it will take to prevent pilots from doing a failed roll into the ground. How long will it be before every warbird collection has a Pitts tucked away in the hangar?

DEMONSTRATED AEROBATIC COMPETENCY IS WHAT IT WILL TAKE TO PREVENT PILOTS FROM DOING A FAILED ROLL INTO THE GROUND.

AIRCRAFT ENVELOPE: THE AIRCRAFT IS NOT ALLOWED TO BE FLOWN AS DESIGNED

In the 1940s, conferring safety to budding pilots was achieved by building familiarity and mastery of the complete performance envelope through the use of a series of trainers using constant coaching and critique. The modern warbird culture is sadly lacking in comparison, and in some cases, the thorough training of the past has been replaced with a minimum number of acceptable landings and a predetermined number of generic flight hours. Today's accepted requirement of 200 hours of flight time in a T-6 does not begin to compare with historical requirements and could actually result in one hour of mistakes being repeated 200 times! Learning the 1 percent of the flight envelope that made up 99 percent of the teaching in 1942 is denied, discouraged, or forbidden. Today, there are few places to gain insights into the behavior of these aircraft at the extremes of their capability, and even fewer opportunities to practice them with enough frequency to make learned behaviors unconscious and automatic. Museums that provide training for new pilots often have liability clauses preventing anything more than ride programs. Aerobatics and spins are now almost universally prohibited. A pilot unable to master these forbidden maneuvers in the type will never attain an acceptable level of competence.

PILOT CURRENCY IN TYPE

Do you feel as sharp on the first flight of your season as on your last? As amazing as it sounds, there are cases where World War II fighters arriving at a show were flown by pilots with only four hours in the type. They're then expected to take part in formation flyovers. Museums and private owners often expect pilot currency to be built en route to an air show in straight and level flight. This is not acceptable. Museums should use pilots with current time in the type instead of in-house converts with single-digit hours.

After accumulating hundreds of hours in one warbird it becomes a matter of course to develop a memorized checklist. This can adversely affect all of

your emergency responses in other warbirds. Are you reflexively using the T-6 emergency checklist you once memorized instead of the Mustang checklist on your lap? Memorization is a double-edged sword. Find a way to stay current in the specific aircraft type — if you're not meeting your personal minimums, then don't fly!

FLIGHT PLANNING

We often deviate from accepted general aviation practices when flight planning with a warbird. When planning a GA flight, it is acknowledged that the presence of obstructions at an airport can make the risk unacceptable. Even the best pilots will occasionally have less than perfect takeoffs and landings. Runway excursions will happen, yet rarely is there a discussion of the limitations caused by airports with trees or buildings lining the runway edge. Safe run-off areas should be factored into airfields where warbirds are expected to perform. If the site obstructions are not acceptable, change the site!

Similarly, when planning a cross-country route, it is rare that the shortest path is the most desirable. Obstructions, water, populated areas, and fuel stops are all factored in when determining the best course. Operators of warbirds, perhaps to minimize time on the airframe, often suggest flying the most direct route to a venue. This may be over water, out of gliding range of land, over populated areas, and/or at altitudes too low to bail out. In WWII, the majority of water ditchings in liquid-cooled aircraft were fatal. A pilot experiencing an engine-out over a densely populated area or at low altitude requires an emergency landing area within gliding distance. It is an unspoken law that you must value the life of the innocent on the ground first, yourself second, and the aircraft last. Pilots must be mentally prepared to make this tough decision every time they strap on their parachute — or change their acceptance of show sites. The respect between the owner, the pilot, and the producer should ensure that a full and frank discussion of risk occurs prior to accepting the mission.

AUTHENTICITY: ORIGINAL AND NONORIGINAL EQUIPMENT

Owners rightfully take pride in historical accuracy. Unfortunately, this has led to tragic consequences. Consider the authentic gun sight, which took the lives of pilots in WWII and will continue to do so because gun sights are not compatible with stretching seat belts and healthy facial structures. Get them out!

The following are examples of modifications that were made for convenient maintenance. Operating and safety issues were never considered.

A fuel injection lubrication port on one German fighter had a small lever, partially hidden. If a pilot with no experience with this feature forgets to close this, the engine will quit in 40 minutes.

The location of air bottle shutoffs on some Spitfires and Hurricanes are placed where they cannot be reached in flight. Forget this and you'll have enough air to taxi and take off, but none to operate flaps or brakes to land.

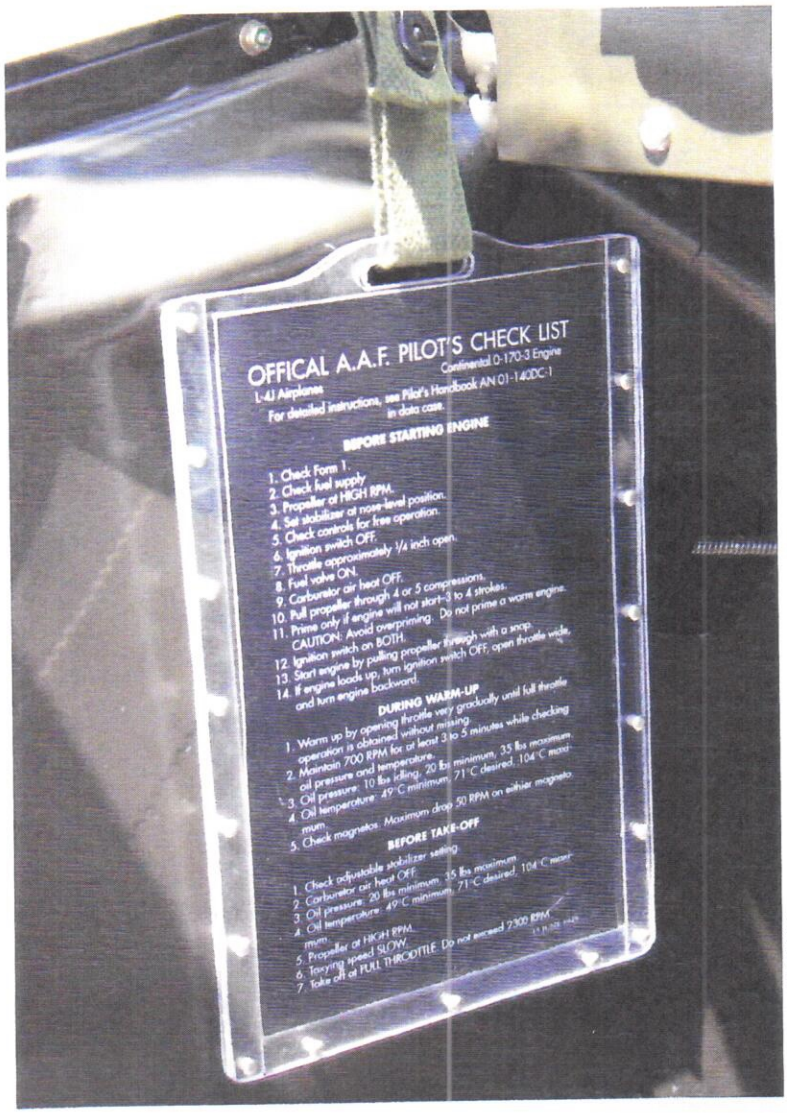
Bizarre auxiliary fuel tank setups with mysterious operating procedures are found on too many aircraft to mention. Safety modifications must be prioritized over authenticity.

AIRCRAFT MAINTENANCE

Warbirds are expensive to maintain and owners rightfully want to preserve their investment, but one must recognize that limitations on flight hours to control costs can create unforeseen maintenance nightmares. A preflight review of the logs shows whether a plane is in annual and that an uneventful post maintenance test flight was performed. A closer look may reveal that this was the only flight in the last 12 months. If this were a C-172 that was covered in dust at the back of the hangar, would the eagerness to strap in be as great as if this were a P-51? A pilot may be current in the type and walk into this situation. Seals, magnetos, and corrosion don't pay attention to our laws. Aircraft don't fare well with inactivity. Just because it started, does not mean it will continue to fly.

The time of operation immediately after a restoration or repair has a very high risk of mechanical problems. Many GA pilots consider the first 100 hours after an engine overhaul to be too risky to fly over the Rockies or the Atlantic Ocean for this reason, yet warbird owners commonly operate their aircraft in a state of raised "infant mortality" for the aircraft's entire operating life.

The following are examples from personal experience: A Messerschmitt Bf 109E with only 59 hours had to be overhauled due to corrosion and disuse. A Spitfire with less than 100 hours developed a crack in the head creating a massive induction backfire that blew off the top of a piston and the diaphragms in the carburetor, and ruptured the intercooler. Less than 10 hours after a Hurricane's hydraulic system was rebuilt the



JIM BUSHA

system burst, soaking the pilot and burning his eyes.

All aircraft need to fly a minimum amount of time per year to be dependable enough to lower their risks to acceptable levels. There should be a consensus among owners, mechanics, and pilots as to what the minimum standard will be for each aircraft. If these minimums are not met, and alternative measures cannot be taken to meet the predetermined mark, then not flying their prized asset must be the only decision.

LOW *G*-TOLERANCE

Military fighter pilots and aerobatic competition pilots are very familiar with managing *g*-tolerance. They know that *g*-tolerance requires good health, regular practice, and the wisdom to sequence maneuvers correctly. *G*-tolerance is decreased with a lack of currency, fatigue, high body temperature, dehydration, and caffeine. A week of flying aerobatics is not enough to build tolerance and

safeguard against g-induced loss of consciousness (G-LOC). Maintenance of this type of flight fitness will likely require more than a once-a-week aerobatic practice. If you cannot afford to maintain tolerance in the warbird, add aerobatic practice in other, less expensive aircraft.

EGO

WWII aircraft have been successfully displayed for more than 70 years, during which time pilots have established the limits of performance of every warbird. If a loop on takeoff has not become a standard maneuver over 70 years of demonstrations, do you really think you are that much better than the rest to do it safely? Sure, it can be done a few times with tiny margins, but at whose cost? The crowd does not care if you do that roll at 50 feet. They are excited to see all angles of the aircraft and will get a better view if the maneuver is done at 200 feet. Larger, not smaller.

LARGER, NOT SMALLER, MARGINS OF SAFETY MUST BE BUILT INTO DISPLAYS TO HELP THIS INDUSTRY SURVIVE.

margins of safety must be built into displays to help this industry survive.

CHECKLIST SYNDROME: "IF I DON'T SAY YES, I'LL NEVER GET THE CHANCE TO LIVE THE DREAM"

How many of us have longed for the chance to fly [insert the name of your favorite warbird here] since we were 10 years old and are now in the fortunate position to have this dream come true? An owner asks you to fly his warbird at an air show. It is just coming out of annual. After a quick checkout, you agree to take the aircraft 300 miles to a show. It is only a flyover, so you are not permitted to do aerobatics in preparation. The show site is a remote show over water, and you must descend to 1,000 feet over a city as you approach the base airport.

If you do not say yes immediately to this once-in-a-lifetime opportunity, you will be knocked down by the hordes of pilots who

WARBIRD TOONS

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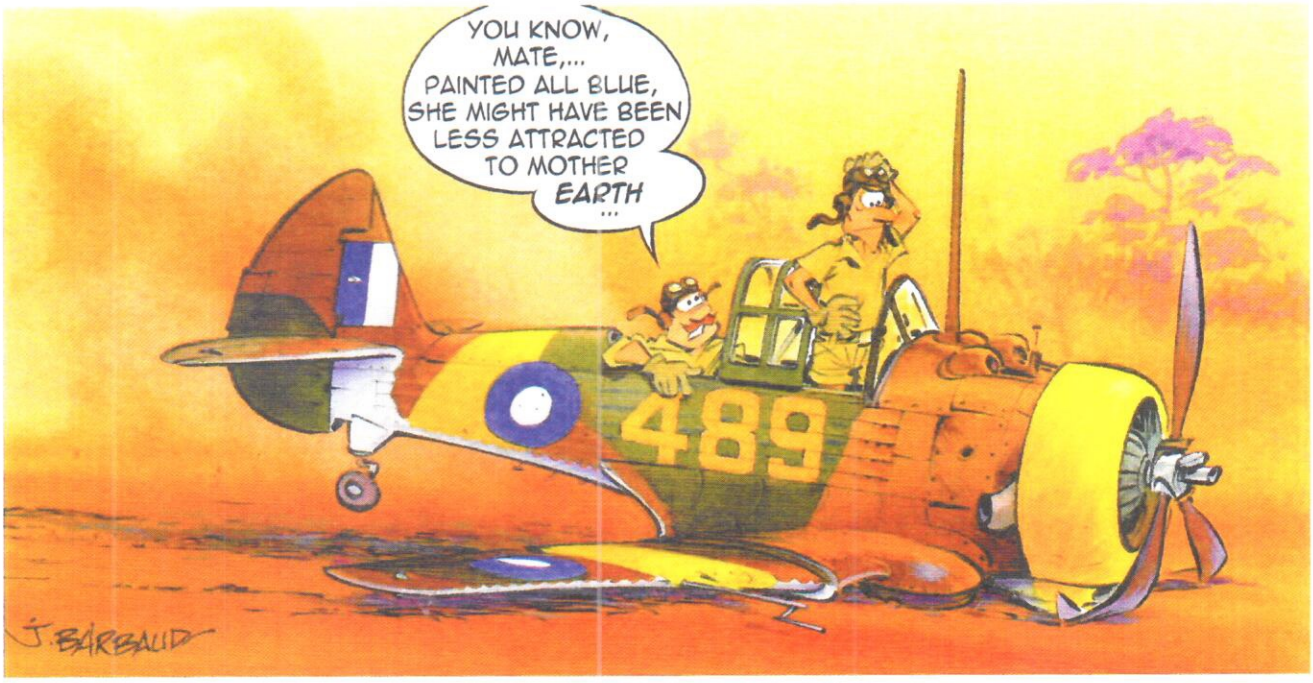

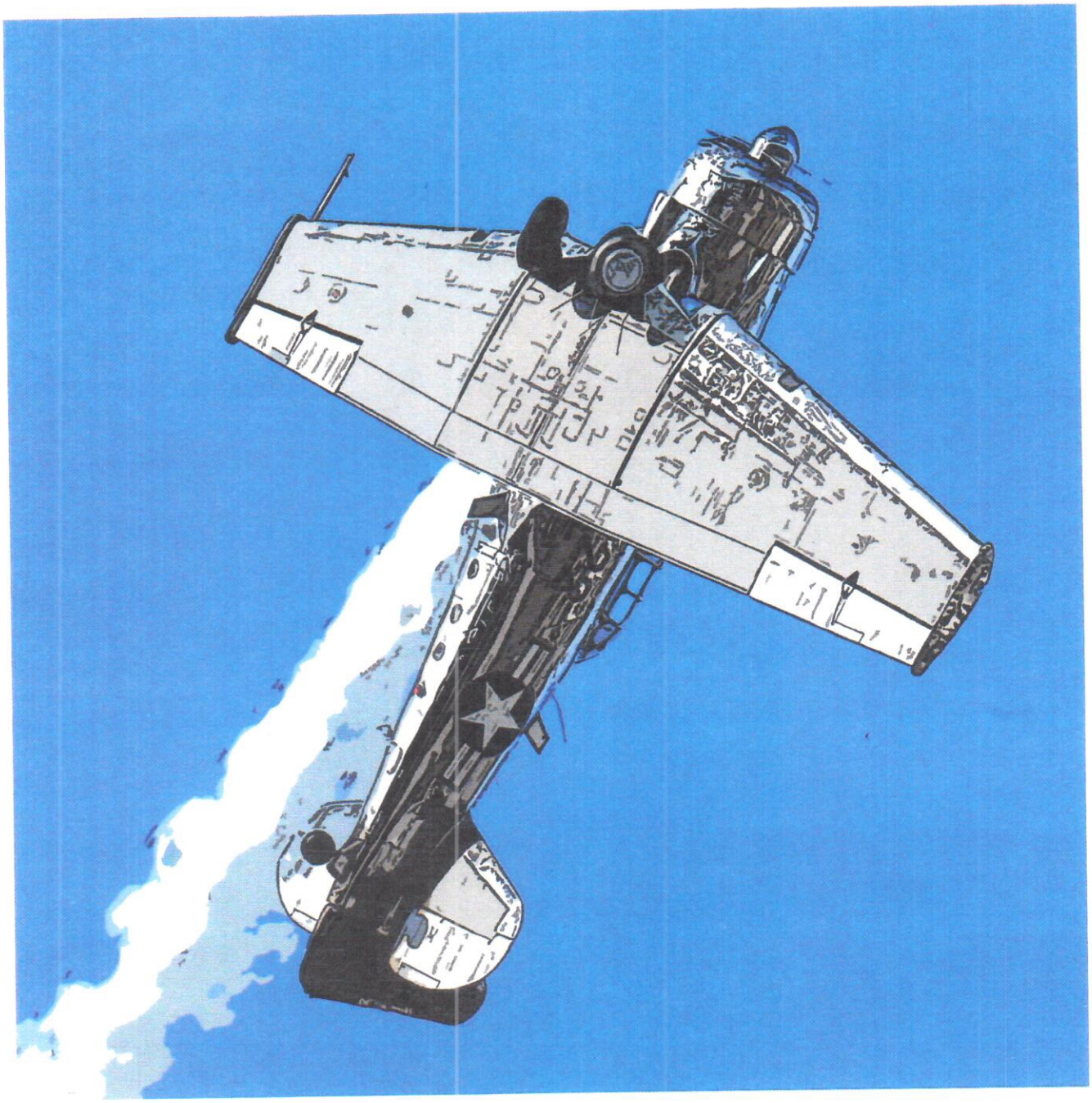

will ignore the risks discussed above, so that they can live their dream. These risks can and should be mitigated.

CONCLUDING THOUGHTS

The tolerance of risk has grown with the novelty of operating warbirds. We must ensure that the collective wisdom built over 100 years of general aviation does not disappear when we get the chance to "live the dream."

THE TOLERANCE OF RISK HAS GROWN WITH THE NOVELTY OF OPERATING WARBIRDS.

We have the ability and responsibility to increase the safety of warbird operations, or else this right will be legislated out of existence. It will take a change in attitude, habits, and money to alter the status quo. Role models such as Stallion 51 in Kissimmee, Florida, exist who have set the stage and appropriately addressed these concerns. Champion these leaders. Be a part of the change.