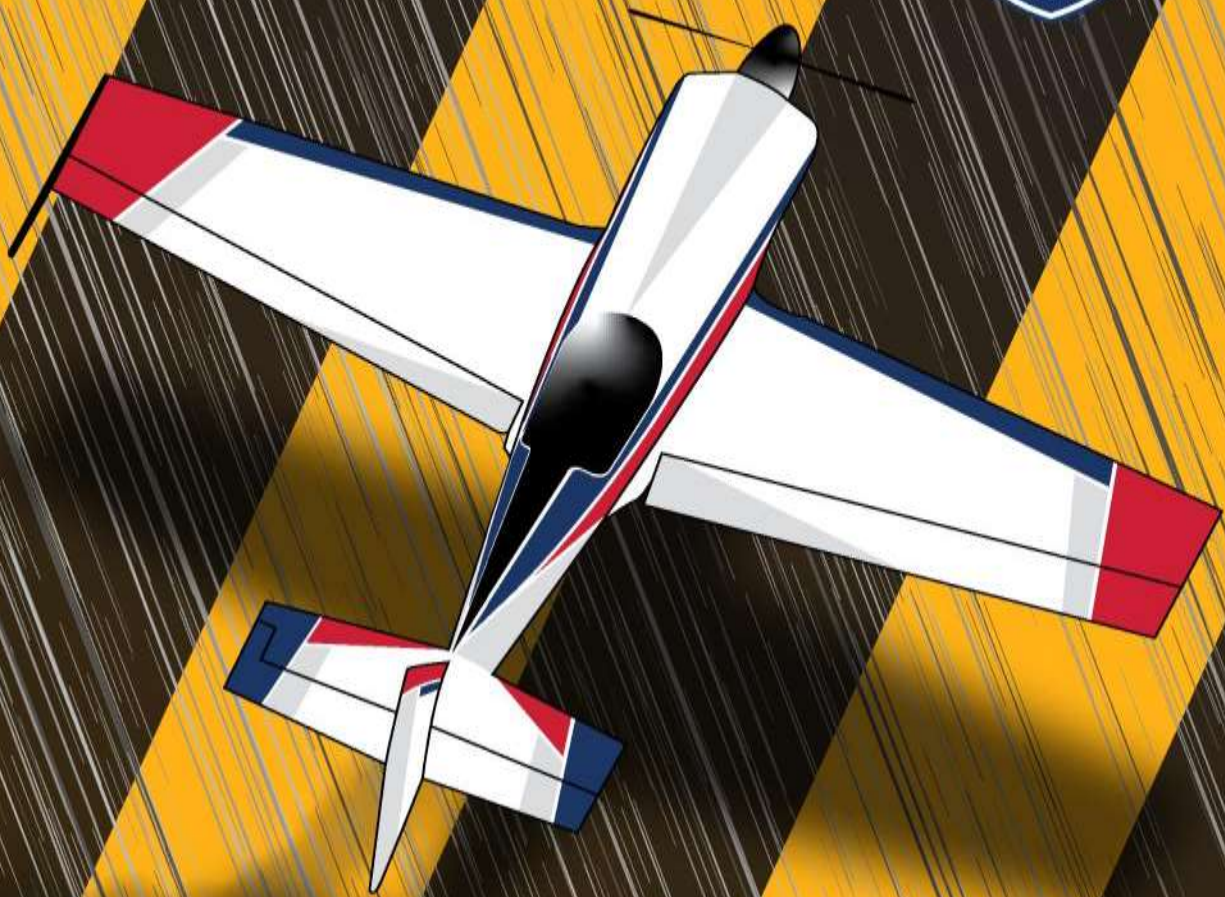


SPORT

MARCH 2019

Aerobatics

OFFICIAL MAGAZINE of the INTERNATIONAL AEROBATIC CLUB





ROLL WITH US!

JOIN TODAY www.IAC.org

UNIQUE CHALLENGES OF AEROBATIC AIRCRAFT MAINTENANCE

BY MICHAEL FLAGELLA, IAC 431429



EVER SINCE I STARTED FLYING, I've been obsessed with aircraft safety. As an A&P mechanic with inspection authorization who is focused on aerobatic planes, I find that maintaining them brings additional challenges beyond your standard GA aircraft. I've seen what a botched aerobatic maneuver can do to an aircraft structure. Therefore, it is our duty to understand what could go wrong and why, and then try to find these issues before they become a problem.

Understanding how these aircraft are flown helps guide our maintenance and routine inspections in addition to the standard checklists. Aerobatic flights are generally short-duration, high-intensity affairs that routinely use the aircraft's entire flight envelope — and sometimes go outside of it. Aerobatic maneuvers can place demanding loads on various structures and components, and include rapid changes from high-*g* to low-*g* loading (rolling circles), torsional stresses (snap rolls), and even reversed airflow over control surfaces (tailslides). Thinking about these loads and affected structures suggest areas that you and your mechanic should be carefully inspecting in order to identify problematic items early, and attempt to mitigate the risk of a major failure in the future. Using the examples above, careful attention would be given to the wing and cabane/strut attachment fittings, steel engine mounts and their associated hardware, and the hinge attach points of control surfaces.

Interestingly, reviewing the older IAC literature suggests that more chronic issues are likely to be problems for a pilot. During the tech inspection at the 1977 IAC Fond du Lac contest, a number of problems were reported that year, but those that we can learn the most from are those that were repeatedly



found (*Technical Tips Manual, IAC, 1981*). The following were noted to be found many and very many times that day: chafed brake lines, corroded propellers, loose aileron hinge fittings, deteriorated engine mount bushings, loose tail brace wires, worn tail wheel interconnect springs and clips, worn rudder horn cable attach points, looseness between elevator halves, oil-soaked belly fabric, and, finally, foreign objects in the tail cone.

With the exception of the “foreign objects in the tail cone,” an astute observer will recognize that everything else on the list are items that might be attributed to wear and tear, or problems that can get worse, almost imperceptibly, over time. An owner looking at their aircraft every day might not actually realize or recognize how bad something has become until someone else points it out. Therefore, it's a good idea to get another set of eyes on your airplane, especially if you are the one signing it off for the annual/condition inspection. Perhaps even invite a fellow pilot to pair up during a practice session and swap tech inspections with them.

Regarding the findings of foreign objects in the tail cone, it's never a bad time to review foreign object debris (FOD). In AC 150/5210-24, the FAA defines



FOD as “any object that is located in an inappropriate location in the airport environment that has the capacity to injure airport or air carrier personnel and damage aircraft. ... FOD has the potential to damage aircraft during critical phases of flight, which can lead to catastrophic loss of life and aircraft.” The types of FOD are varied and include aircraft hardware (nuts, bolts, safety wire), mechanics tools, flightline items (water bottles, soda cans, pencils), airport ramp items (plastic bags, wheel chocks), and natural materials (rocks, dirt, wasp nests). The sources of FOD in the context of the typical airport environment within which our aircraft operate are personnel, such as pilots, passengers, and mechanics; the equipment operating on the field, such as fuel trucks and other aircraft; and the environment, such as wildlife or weathered pavement. FOD can get lodged in flight controls,

short out electrical circuits, and get sucked into intake systems. None of these is particularly compatible with concluding a flight safely.

FOD hazards can be reduced by bringing awareness of its dangers and implementing practices intended to prevent, detect, and remove it from the environment. How many of you were taught, prior to an aerobatic flight, to empty your pockets? How many passengers are told to do this during a preflight briefing prior to that Sunday joyride? If you rent your aerobatic aircraft, you need to be extra vigilant because a previous renter may have lost something in the cockpit. Aerobatic maneuvers and all the associated forces can throw FOD around inside a cockpit and tail cone, and you just can’t predict where it will come to rest. One good preflight practice is to tap the bottom of the belly (if fabric) and

listen for things bouncing inside. Another is to remove an inspection cover from the tail cone and give the insides a good visual look-over. You’d rather find something back there while on the ground than in the air after it’s too late.

The tech inspection used at contests is based on a history of malfunctions, defect reports, and maintenance inspections that were gathered by the IAC over the years, and it is this knowledge that has led to the excellent safety record at contests. While not exhaustive, this article is intended to remind pilots and mechanics that safety is an ongoing endeavor, to be aware of what we’re putting our aircraft through, and to be extra mindful of this during inspections, including pre- and post-flight. If we pay attention and iteratively improve our practices, we can achieve the goal of flying with an increased level of safety for ourselves and those we look after.

 **BUTLER**
Butler Parachute Systems, Inc. **HIGH SPEED - CUSTOM FIT**

888-235-3280
sales@butlerparachutes.com
www.butlerparachutes.com