



WORLD

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AIR SHOW NEWS

*Changing Lives While
Helping Kids Soar:*

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Airshow Flying Safety



As I look back over my career as a pilot and instructor spanning fifty-odd years in aviation, I become acutely aware of how diverse and complicated the issue of display safety has become. With the influx of new aircraft through the genius of manufacturers like Extra, Zivko, Sukhoi, and CAP Aviation, just to name a few, performance has been upgraded to almost unbelievable parameters. G-loads ranging in the 10's both ways

are now commonplace in the industry, and roll rates up to 400 degrees per second are coupled with gyroscopic capabilities you have to see performed to believe.

In the warbird community, we have an aging population of still proud and airworthy aircraft being flown and maintained, in most cases expertly, but aging nonetheless. These fine aircraft present all the safety issues that are unique to this division of the industry factored into that aging.

The entire airshow industry lives or dies on the quality of its flight safety. My personal approach to display-related flight safety starts with formal seminars, but recognizes a need for the industry to reduce this formal approach down to some basic useful common sense that a pilot can take with them as they push a throttle forward to begin a display routine. What the industry needs most of all is to be able to communicate with each other in a manner that includes everyday common sense language that everybody from the pilots to the people who park the cars can easily understand.

AN ATTITUDE ADJUSTMENT

One of my favorite topics in the human factors involved with display flying is how we view ourselves as pilots, and how we view the pilots that surround us daily as we travel through our careers.

Let's consider a pilot who takes an 18,000-pound airliner down low on the deck, makes a high speed grass cutter pass with it, then performs what looks like a fairly decent barrel roll at the end of the pass. I'm not only interested in the pilot who did it, but also the pilots who witnessed it.

As someone who has spent most of my life one way or another involved in flight training, flight safety, and specifically aerobatics and aerobatic safety, I've naturally been aware of, and given a great deal of thought to the issues surrounding overconfidence and aerobatic malpractice.

What causes an experienced airline pilot to take his big, beautiful, but non-aerobatic airliner down low in the marbles for a low fast pass, then attempt a barrel roll with it?

I have been convinced for years that at least part of the answer to this question lies in a strange dichotomy between what we as pilots generally perceive as superior performance vs. what in

actuality should be perceived as bad judgment.

Is there any pilot, flight instructor, airline pilot, military pilot, or just plain everyday Sunday private pilot, who upon watching an ATR42-500 come in low and fast and execute a beautiful and *successful* barrel roll, wouldn't stand up, grab the shoulder of the pilot standing next to them and shout at the top of their lungs, "Good God Almighty man...WOW! Did you see that?"

The big problem here is that pilots shouldn't think this way... but they do. They are reacting to what I believe is a pre-conceived perception of what constitutes superior pilot performance, when in reality, they *should* be reacting to what they have just seen as a glaring example of poor pilot judgment.

A pilot community that thinks this way can easily become polluted, suffering badly in the overall value system of its members. Carry this attitude on into the display environment with a new pilot entering the venue, and the result can easily be a display pilot with a tendency to be impressed by a dangerous value system.

It seems that no matter how we cut the potential for the development of bad judgment, there remains a degree of twisted fascination among all too many pilots that allows for the entrance of awe and respect for pilots who work their aircraft close to the ground regardless of the overall safety factors involved with that close ground proximity. Add an aerobatic element to the equation, and the specter of increased status within the peer community for pilots doing this low level aerobatic work can dangle like a sword of Damocles over the heads of

WITH THESE NEW AIRPLANES CAME A NEW DANGER FOR DISPLAY PILOTS – I CALL IT "AEROBATIC EUPHORIA."

new display pilots.

Through my research, I've identified what I believe at least is a partial reason why some pilots are impressed with acts involving bad judgment. In the early flight training phase of student pilots, instructors have the opportunity to instill in a new student the mental outlook and attitudes toward flying these students will carry with them all through their tenure in aviation. But in all too many cases, these critical attitudes that form the basis of a professional approach to flying and define good flying judgment, are simply not being implanted in new student pilots by their instructors.

Both the pilot who would roll an ATR42-500, and the pilot who would find such an action to be entertaining, do not perceive the act as a display of bad judgment.

On the other hand, I can also spot a pilot *not* fitting into this category. This pilot has an unashamed respect for the airplanes they fly and the environment in which they fly.

In almost every case where I find a pilot with these positive traits, I can trace their professional approach right on back to their initial primary flight instructors. It's something to think about as we evaluate ourselves, and a good unbiased self-evaluation might re-adjust a few attitudes. That is a positive step toward improved flight safety.

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TAIL CHASE SAFETY

Let me switch my focus for a minute and talk about tail chases using World War II fighter planes. I'm a warbird guy myself, and like many of you, I loved flying the old fighters. And like some of you, I thoroughly enjoyed a good tail chase.

Normally a good tail chase can proceed without incident and pose no special problems for the pilots following lead. But a trail formation can hold hidden dangers for a trailer when lead is maneuvering.

We'll assume a two-ship tail chase for simplicity, as this issue concerns the number two directly and only peripherally the lead. This issue could also affect others behind, but we'll just use the two-ship for simplicity.

Assume all safety briefings have been completed and all is in order as the chase progresses. We find lead at 1,500 feet AGL crossing the field on the show line tending away from the crowd with his number two in trail some distance behind, but following lead's maneuver plane of symmetry. Lead initiates a roll to the left, and completes it over the top to a nose low position at about 270 degrees into his roll, knifing out to the right nose low. The wingman in trail follows lead's roll to the left, but it is extremely easy for the trailer to make a fatal mistake here if he's not careful.

As number two rolls and reaches inverted, his visual cues pick up lead in lead's nose low turn going away from the trailer's roll axis. In other words, the wingman sees through his inverted windshield his lead leaving him behind as the lead is turning. Remember, the wingman isn't turning, he's rolling. Seeing this visual cue inverted, the natural reaction for the number two is to follow lead's turn for positioning as not to be left behind with a negative closure rate.

It's here the trailer can get into real trouble. If he isn't right on top of his game and makes an unconscious reflex positive pitch input that slacks off his rolling aileron to try and maintain his nose-to-tail separation on the turning lead, and he does this between his inverted and his second knife edge, the trailer can easily pull his nose down early, scooping out the roll. The result would be a wide descending nose down arc, that from 1,500 feet in a World War II prop fighter might not be recoverable.

The correct response would be to accept lead's turn in the inverted windshield, finish the roll on axis, then use power, arcing, or a low yo-yo to reposition on lead's tail. Don't roll and turn at the same time as a wingman in a tail chase.

PREFLIGHT INSPECTIONS FOR DISPLAY PILOTS

I had a P-51D on a show site back in 1962 doing a mixed flight display and static display for a local Chamber of Commerce in Pennsylvania. I have always had a strict policy that at any time while on a show site, if after I had preflighted my aircraft prior to doing a display, the airplane was, for any reason at all, out of my sight for even a moment, I would re-do the preflight. There are just too many things that can happen to an airplane out of sight while sitting on a large ramp when airshow fans are involved.

On this particular Sunday afternoon, I had just made my inspection of the aircraft with about 10 minutes to go until my time to fly was due. Everything was in order.

Right after the inspection, I was called over to the com trailer for a last minute change by the announcer. The Mustang was out of my line of sight for perhaps a minute or two. I walked back to the airplane and conformed to my own set-in-concrete rule. I did a fresh walk around.

Sure enough, there it was. Some nice fan had stuffed a Teddy Bear into the carb air intake tunnel under the spinner. Cute bear too. I still have it as a constant reminder that had I not redone the inspection that afternoon, I just might have had a problem

getting air into the carb at what very well might have been an inopportune time.

I would also encourage all who might not already be doing it, to establish and respect a specific time period – I suggest at least 30 minutes directly prior to a display being flown – where display pilots can be totally alone and undisturbed to mentally prepare for their display. The use of intermediaries to buffer pilots from any outside and/or unnecessary disturbance is something I highly recommend.

AEROBATIC EUPHORIA

When we talk flight safety in display flying, I'm always amazed at how general the conversation is usually directed. We should do this. We shouldn't be doing that. This is what happens if you do this. This is bad. This is good. All general terms, and in a lot of cases, essentially correct.

But there is another world that exists under all of this generality, and that world involves safety issues specific to category and type. For example, when Extra, Edge, CAP, and Sukhoi entered the display arena, they opened up an entire new world of performance. Pilots began to realize that they had been given thrust to weight ratios, roll rates, and available G that literally made it possible to write a whole new book on aerobatics.

With these new airplanes came a new danger for display pilots – I call it "aerobatic euphoria." I'm not talking about the euphoria you got the day you won the lottery and went out and bought your new Edge or Extra. I'm talking about the euphoria that is possible as you move into one of these new generation aircraft from an older generation aerobatic mount and see for the first time what these airplanes can actually do. The danger lies when the vast improvement in performance carries over into a sense of invulnerability.

With these airplanes you point it where you want it to go and it takes you there...NOW! You think roll, and it's done. Most insidious of all is the feeling that a blown maneuver can be flown out of with raw power. It's important to note that much of this is true, and that is the problem.

When you fly these new aircraft, it's just as important that you give yourself a safety edge as it was in the older, less agile and powerful aircraft, but that safety edge will differ somewhat. It's ever so easy with this new performance at your fingertips to give in to a sense of aerobatic euphoria that dictates you can push the airplane deeper into its envelope than anything you've flown before. You can only do this to a point. A Mustang needs a lot more room than an Extra to recover from an error, but the Extra still needs room!

Consider that you can enter a loop unrestricted in a Mustang at 300mph, and pull over your intended +3 to +4 G's and easily miss your high energy gate by being way too low and into that low gate way too fast. In the P-51, you better escape out of that situation, reposition, and reenter the display. In the Extra, you blow a high energy gate too low and too fast and you should also exit, reposition, and re-enter the display. The difference between the P-51 and the Extra is that if you make the bad decision to pull on through and correct on the back side, you just might survive the mistake in the Extra, but you have just killed yourself in the Mustang.

I'd like to leave you with a thought. It's an old axiom I stole from years ago. You will find it in *Zero Error Margin* by Des Barker as one of my contributions to his extensive and, in my opinion, indispensable work on display flying safety.

"There are old pilots and there are bold pilots. The trick in becoming an old pilot is in knowing exactly when to be, and not to be, bold."