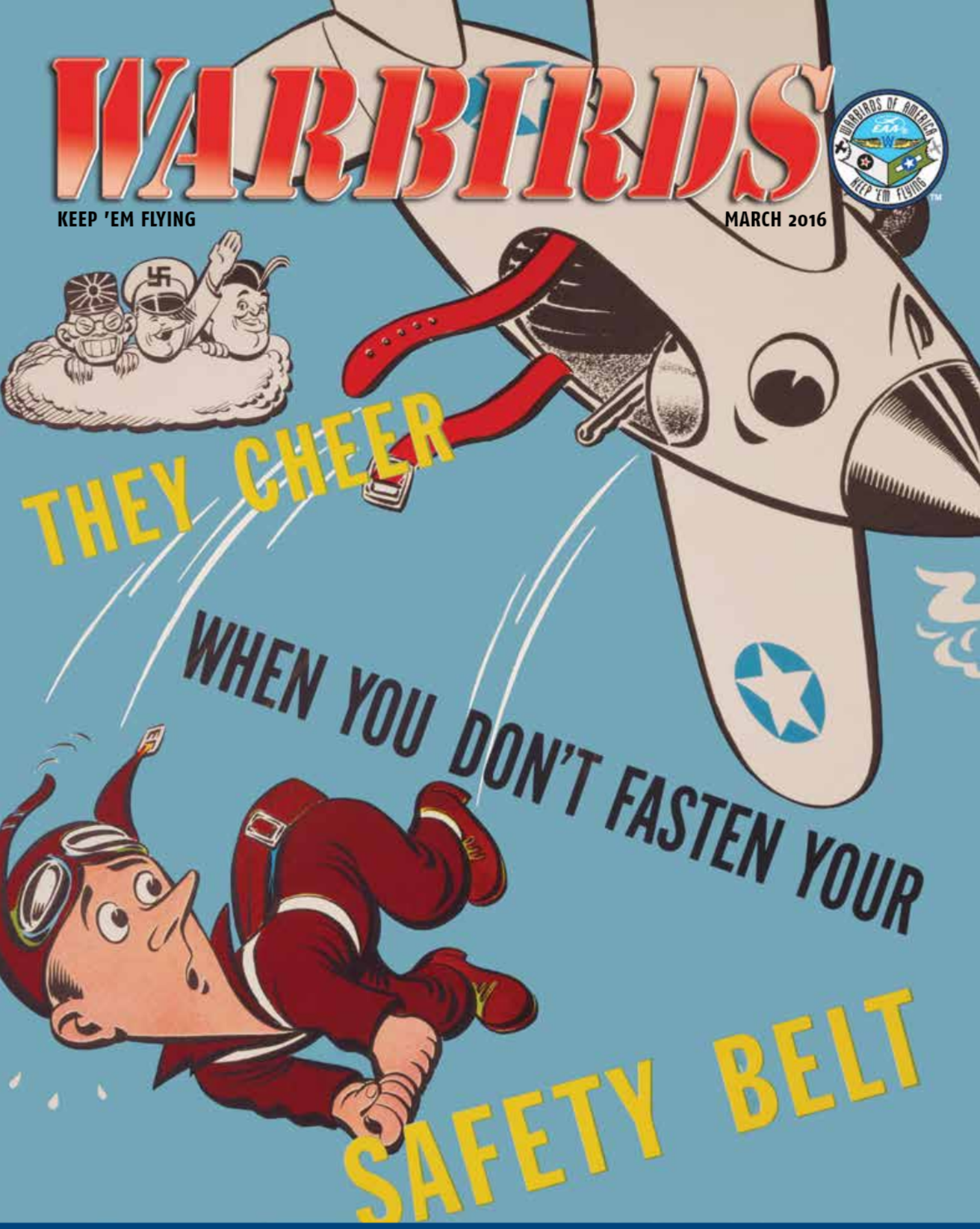
WARBIRDS

KEEP 'EM FLYING

MARCH 2016



ANNUAL SAFETY ISSUE

Human Factors in Display Flight Safety

Dealing with diversity, decision, and euphoria: Which pilot are *you*?

BY DUDLEY HENRIQUES

As I look back over my career as a pilot and instructor spanning 50-odd years in aviation, I become acutely aware of how diverse and complicated the issue of display safety has become. With the influx into the display arena of new hardware made available to the industry through the genius of people and 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 10s both ways are now commonplace in the industry, and roll rates up to 400 degrees per second coupled with gyroscopic capabilities you have to see performed to believe possible are now the norm.

These fantastic aircraft are just one factor in the safety equation. 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.

All of us, ranging from the pilots all the way through to show organizers and producers, are interested in flight safety. This industry lives or dies on the quality of its flight safety. All of you reading this are not only interested in these issues, but have attended seminar after seminar, meeting after meeting, and briefing after briefing on the subject.

The formal presentation of flight safety related data as presented in seminars is necessary, and all of us have our share of volumes and notes filled with it. My personal approach to display related flight safety starts with the formal seminar, then beyond that recognizes

a need for the industry as a whole to additionally reduce this formal approach on down to some basic useful common sense that pilots 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 all fields of expertise, in a manner that includes everyday common sense language that everybody from the pilots to the people who park the cars can easily understand.

What I'd like to do is present a little bit of basic flight safety common sense from my own kit bag of experi-

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ence and lay it out for you. Perhaps there's something, even a few small things presented in this nontechnical way, that might help us all toward a safer display environment.

One of my favorite openers when I begin discussing human factors aspects involved with display flying involves how we view ourselves as pilots and how we view the pilots who surround us daily as we travel through our careers.

Let's talk for a minute or two about 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 with it at the end of the pass. It turns out we're not only interested in the pilot who did it but 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, for example, causes an experienced airline pilot to take his big, beautiful, but nonaerobatic airliner down low in the marbles for a low fast pass, then attempt a barrel roll with it?

I'm convinced, and have been convinced for years, that at least part of the answer to this question lies in a strange dichotomy involving what we as pilots generally perceive as superior performance versus what in actuality should correctly be perceived as bad judgment.

Let's take this airliner being rolled as an example, shall we?

Is there a pilot, flight instructor, airline pilot, military pilot, or just plain everyday private pilot who, upon watching an ATR 42-500 come in low and fast on the deck, pull up, 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*?" Problem here, folks...*big problem*!

Pilots shouldn't think this way... but they do. *Trust me*, they *do*!

These pilots watching are reacting to what I believe is a preconceived 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.

I have found what I have described here so pervasive among the pilot community that in many cases for those watching such a display of bad judgment, the bad judgment being witnessed, although evident, is apparently carried forward by a great many pilots who might view such acts as good performance.

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 an awe and respect factor 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 new display pilots coming on board and into the program.

Through my research over time, I've identified what I believe at least is a partial reason why some pilots are "impressed" with acts involving bad judgment.

I found that partial reason in the early flight-training phase of student pilots, where 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. I've seen proof of it time and time again. 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.

This missing piece that forms the ability to define sound flying judgment I have discovered in both the pilot type who would roll an ATR 42-500 and in pilots who would tend to watch such an event and not associate it with bad judgment.

On the other hand, I found I can spot a pilot *not* fitting this category either as a participant or as

a "wowed" spectator, be they a 20,000-hour ATP or a 100-hour private pilot. 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 flight instructors. So the sword has dual edges and can cut both ways, and the designer of the sword, and the most prevalent link in the determination that decides which way the finished sword cuts is, in all too many cases, the primary flight instructor.

A magic bullet solution that improves display flight safety? Perhaps not, but something to think about as we as pilots evaluate ourselves. *A good, unbiased self-evaluation* of ourselves as pilots just might readjust a few attitudes, and *that* is a positive step toward improved flight safety.

Let me switch my focus here for a minute and talk about special relationships in tail chases using World War II fighter planes. I'm a warbird guy myself, and this corner of the arena was one of my favorite areas in which to operate. 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 the trailers when lead is maneuvering, and I'd like to address one of those dangers here.

Let's set up the scenario. We'll assume a two-ship tail chase for simplicity, as this issue concerns the No. 2 directly and only peripherally the lead. What we'll be taking a look at here for our No. 2 could affect others behind as well because, for this example, we'll just use the section 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 No. 2 in trail some distance behind lead 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.

There is an insidious danger in this for the trailer, as it is extremely easy for the trailer to make a fatal mistake here if he's not careful.

As the No. 2 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 No. 2

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 the wingman isn't right on top of his game and makes an unconscious reflex positive pitch input that slacks off his rolling aileron to try to 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 WWII prop fighter, might not be recoverable.

The correct response, of course, 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 for repositioning on lead's tail. Just a gentle reminder: Don't roll and turn at the same time while a wingman is in a tail chase.

Just as a side note, even if this scenario sounds familiar, I'm not discussing a specific accident here, just general warbird tail chase safety information.

Moving right along, from my own experience, a few words on preflight inspection for display pilots.

I had a P-51D on a show site back in '62 doing a mixed flight display and static display for a local chamber of commerce in Pennsylvania. I have always had a strict policy, one of several I never broke, that at any time, for any reason whatsoever, 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 redo the preflight.

There are just too many things that can happen to an airplane out of sight of its intended pilot while sitting on a large ramp when air show 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 fine. The Mustang was in "go" condition with everything in order. I had even stowed the new red pitot tube cover with the yellow lightning bolt sewn onto it with the words "HIGH VOLTAGE" sewn onto the lightning bolt. The cover was my idea and had been made up and donated by a gal on our crew. In case you're wondering why we had HIGH VOLTAGE sewn on a pitot tube cover, you perhaps might not as yet have had the absolute pleasure of standing on the wing of your Mustang explaining to a lady in the static display line looking into your cockpit that there wasn't room for a bathroom in a P-51 while watching a kid grab your pitot tube and try to make a swing out of it. Anyway, the HIGH VOLTAGE bit solved *that* problem. We never had another kid touch our pitot tube.

Anyway, right after the inspection, I was called over to the comm 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.

Closely associated with this incident, I would also suggest that heavy emphasis be placed to 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.

Finally, I'd like to address some general remarks about the diversity we have in the display community as that diversity relates to aircraft, some general comments on decision-making, and last but not least, the subject of something I call aerobatic euphoria.

When we talk flight safety in reference to 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, much of what is said is essentially correct.

But there is another world that exists under all this generality in the display community, and that world involves safety issues specific to category and type.

For example, when Extra, Edge, CAP, Sukhoi, and a few others entered the display arena, they opened up an entire new world of performance. Pilots began to realize that life was worth living on the vertical line, and that what could be accomplished in the way of maneuver from that line would be something that before these airplanes came on board had been virtually impossible. Pilots had been given thrust-to-weight ratios, roll rates, and available *g* that made it possible to write a whole new book on aerobatics. Just watching a world-class aerobatic pilot per-

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form in one of these new airplanes is breathtaking, even for old guys like me. You can imagine what it looks like to the fans.

With these airplanes came a new danger for display pilots, that being euphoria. I'm not talking about the euphoria you got the day you won the lottery, went out, and bought your new Edge or Extra. I'm talking about the euphoria that becomes 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 difference and improvement in performance carries over into a sense of invulnerability. Trust me, it happens! 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 *this* is the problem.

When you fly these new-generation 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!

On diversity safetywise in type, consider you can enter a loop unrestricted in a Mustang at 300 mph, pull over your intended +3 to +4g's, and easily miss your high energy gate by being way too low and into that low gate way too fast. In the 51, you better escape out of that situation, reposition, and re-enter 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 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 due to its extreme roll rate before passing the 90 degree downline. You have just killed yourself in the Mustang. Something to think about.

I'd like to leave you with a thought if I may. 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."

Thank you, good luck, and I wish all of you the very best.

WARBIRD TOONS

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http://jeanbarbaud.blogspot.com