Editor’s Notes

Winter is usually marked by a slow down in flying activity, except for those members who live in temperate climates. We have only one clinic to report on in this issue, so we thought we would take the opportunity to address some of the topics that all of us could find useful as we get spun up for the 2013 flying season.

If you have something to contribute for the good of the cause, whether it be safety, training, or just good-to-know information—put it together so we can share and all benefit from the experience.

Mike

Red Alert is your magazine and would not exist without your input—your stories and experiences are what bring the magazine alive.

2013 ISSUE DEADLINES

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Greetings, Comrades, and welcome to your Red Alert for 2013.

I can feel the excitement in the air as we begin a new warbird flying season. I have a lot to discuss, so let’s get to it.

For many of us, the end of winter weather means we are finally getting back into the air. So, let’s talk about proficiency and currency. As subscribers to the RPA Culture of Excellence, we all should have ended 2012 as very proficient aviators. We were regularly and professionally flying traffic patterns, stalls and falls, aerobatics, and formation. We were very familiar with our checklists and emergency procedures. Many of us did our BFRs, were critiqued by judges, flight leads, colleagues, significant others, and, most importantly, ourselves. Moreover, if we routinely cycled through skill sharpening exercises, we were also current. Together, proficiency and currency made us inherently safe. These are the ultimate goals of RPA professionalism—proficiency, currency, and safety.

The cold and snow of winter may have robbed us of our currency. It may have also eroded some of our proficiency. As RPA professionals, we know how to get tuned back up. First, make sure you are healthy and fit—holiday cookies and winter-induced, reduced exercise may have softened up your stamina and reduced your G tolerance. Then, begin with some study time. Review your POH, operating limits, checklists, and emergency procedures. Spend some time in the cockpit polishing your normal and emergency procedures muscle memory by looking at and touching instruments and switches. Crawl through your aircraft. Re-familiarize yourself with its systems. Make sure it is airworthy and no winter guests have left any surprises. When you get back into the air, start with the basics like traffic patterns, stalls and falls, and engine out landings. If desired, get help from an IP. When you get to aerobatics and formation, start high and start simple. As your skill sets, fitness, and G tolerance return, ramp up your intensity and complexity, as needed. This building block approach, systematically repeated during this blooming flying season, will restore proficiency and currency, resulting in more inherent safety.

In February, I attended the National Warbird Operators Conference (NWOC) in Seattle, Washington. The highlights for me were the FAST BOD Meeting, the Round Engine Shop seminar, the informal Oshkosh planning meeting, and the museum, aircraft restoration, and engine shops we toured. The five museum, aircraft restoration, and engine shops we toured were amazing! Many volunteers are doing extraordinary work to preserve aviation heritage and history, most of it for Oshkosh 2013, the RPA will host the FAST Check Pilot meeting. We will also host an RPA safety seminar. There will be a new pedestrian and vehicle traffic pattern leading into and through the warbird area. It will funnel more pedestrians past the Alternate Display Area, enhancing the exposure of the displayed aircraft. The RPA has been asked to display two aircraft for a day. More on this later. For the second time ever, the RPA has a slot in the Warbirds in Review venue. In addition to a Yak, CJ, and Jet, I would like to find a WWII Russian fighter to display and talk about. Additionally, if I could get a real “Red Star” fighter pilot/author to do a book signing and presentation, it would move us forward on the schedule. In an effort to get more aircraft in mass formations for the warbird air shows, the air bosses are working with all of us to improve the value of participating in these shows. I asked for time in the strafe pattern with pyrotechnics and more low level passes in front of the crowd. I don’t know if we will get more exposure, but standby for an enhanced profile.

Finally, I want to ask for your help. You’ve heard me say often that the RPA is about our pilots, our planes, and our activities. We are an international association, spread across the globe with hundreds of colorful pilots, aircraft, and stories to share. I want to share these stories with our current and future membership so we all get to know each other better. I want you in your RPA Alert! We started our “picture and a paragraph” (P&P) initiative last year with great success. We want to keep it going. Our editors need just the facts. We can write the story, if you can’t.

If you are a new (Green Bean) or an old (Brown Bean) member, send a P&P. If you have a cool cockpit, paint job, or cool modification, send a P&P. ANY cool flying activity, fly in, cross country, event, or clinic in which you participate, send a P&P. In doing so, you help preserve RPA history and heritage.

That, my friends, is a very cool thing.

Terry “Mags” Slawinski
Whether you fly a CJ or a Yak, you’re operating in a high noise cockpit. There are things we can do that are easily added to your helmet or headset that can improve clarity of communications, reduce noise fatigue, and eliminate the added stress that comes with unclear communications—no more asking lead or ATC to, “Say again.”

In my early days flying the CJ, I noticed that hearing communications from outside the aircraft, and even with my GIB, was difficult. I did some research and added an active noise reduction (ANR) system to my David Clark headset. While this helped significantly, it left me with a few remaining sources of frustration: first, the battery life with ANR is not very long and, once your battery gets weak, the noise level gets pretty bad. In fact, the ANR is noted to be noisier when not functioning than an original headset without ANR! Second, I was still not satisfied with the sound quality so the “say again,” returned from time to time. Finally, ANR works well when the ear-seals are fitted snugly against your head. Even sunglasses can disrupt this seal and affect the sound attenuation of ANR.

When I switched over to a HGU-55 helmet, I found the passive noise attenuation in the helmet quite dissatisfactory. That led to an immediate upgrade and additional expense of a Hush Kit from Oregon Aero. While the Hush Kit helped, it was still not enough. I spoke at length to the wonderful people at Oregon Aero who admitted that high noise cockpits are a challenge for them—they suggested adding ANR or a CEP kit to the helmet.

In 1995, the US Army Aeromedical Research Laboratory (USAARL) at Fort Rucker, Alabama, completed a study comparing active noise reduction (ANR) to an early version of Communication and Ear Protection (CEP) for Army aircrews, primarily operating in Blackhawk helicopters. They concluded that CEP was a better choice for the following reasons: “CEP provides better hearing protection, speech discrimination, lower weight and cost, and less need to modify existing aircraft systems compared to ANR.” While it is still unclear whether ANR, which cancels out noise electronically, actually prevents hearing damage, the CEP system does in fact physically prevent noise from getting to your ear. According to the USAARL, aircrews that were given CEP sets while participating in the study did not want to return them claiming, “remarkable improvement in speech intelligibility.”

CEP consists of miniature earphones inside foam earplugs. The earphones are connected via wires to a connector that attaches to a receptacle on the outside of your helmet or headset. Inside the helmet or headset, the wiring is easily connected in parallel to one of the internal speakers. Since the CEP provides sound in addition to the sound coming from the helmet or headset speak-
Each year, the first week in March is a pleasant reminder of why snowbirds flock to Arizona. Dead calm mornings, clear blue skies with the “thermostat” set to perfect only heightens the anticipation of anything to do with flying. Such was the weekend of the fifth annual Falcon Field (KFFZ) Informal Formation Clinic in Mesa where CAVU was the order of the day.

Beginning in 2008, only 12 participants took part in the clinic. This year, 32 aircraft registered, with CJs, T-34s, Yaks, T-6s, a Pilatus P-3, two Mooneys, and a Beechcraft on the ramp. As in previous years, Alan House hosted us in his massive hanger, large enough to accommodate the entire group for briefings and the Saturday night banquet.

Thursday dawned with out of town arrivals straggling in and a handful of dust-off formation flights. Things got more serious on Friday morning with the CAF interrupting the 0800 brief with the reverberating sound of its B-17 and B-25 as they left for the day. The morning skies hosted several training flights, with the afternoon set aside for more training, and what would be the first of two of the weekend’s mass formations. Mike Pflueger briefed and led a 16-plane formation over Williams Gateway airport where the CAF’s B-17 was parked next to the world’s only flying B-29, Fifi.

On Saturday morning, training flights formed, briefed and disappeared over the horizon to one of the four designated practice areas. The highlight of the day was a 20-ship mass formation flight over the Annual Cactus Fly-In, 35 miles to the southwest. This event was also organized, briefed and led by Mike Pfluger in his T-6. The evening’s banquet was supposed to be a pig roast, but because of some confusion with the caterer, the pig was given a pardon, leaving the organizers to scramble to feed the hungry group. On exceptionally short notice, an abundance of tasty food was there to greet the participants that evening. The night ended with a raucous call sign review with two new call signs assigned: Robin Hou—Ebay, and Betsy Brittenham—Bobbit.

The flying continued on Sunday morning as several participants left for their home bases. Most would agree that one of the best parts of this, and past informal formation clinics, was having T-6s, and T-34s flying together with Yaks, and CJs. The inclusion of Mooneys, a Pilatus, and a Beechcraft was refreshing, and a challenge as well. Seeing dissimilar aircraft, and vastly different personalities, all working so well together bodes well for the future of the RPA and formation flying in the desert Southwest.
In the Fall 2012 issue of Red Alert Mike Carter excellently refreshed us on the dynamics of the accelerated stall in his article Unload for Control. If you have not read that, do it. It could save your life. I want to add emphasis to his discourse by considering some human factors that go hand-in-hand with Mike’s aerodynamics discussion.

The recent Yak-52 crash (September, 2012) and death of my friend, George Myers—to which I was a witness—has induced some deep soul-searching and analysis into just what perceptions he might have experienced, in his final seconds, and how those perceptions may have hindered his normally good judgment and sound aeronautical skills. What follows is all conjecture—my thoughts only. I could not find any discussion of these concepts on-line or in literature.

We all know—I hope—that aerobatic maneuvering at low altitude is a skill best left to the airshow performers. For the rest of us, no matter what our experience level, it’s a high stakes game of roulette where the consequences of error are incredibly higher than any personal satisfaction we might derive from it.

This should not be construed as a charge that George was performing low altitude aerobatics. In fact, as to FAA altitude minimums (1,500 AGL), he was perfectly legal. Despite starting his barrel roll above FAA minimums, he found himself nose low and roaring toward the terrain. What he then did, and what others before him did—speculative though it is—is what I want to talk about.

I think there are two main factors involved in many low altitude loss-of-control accidents: I’ll call them terrain rush and backstick bias.

My first experience with terrain rush was planned and briefed by the instructor in my rear cockpit when, as a fledging fighter pilot, I was first introduced to a 30-degree dive delivery. That first vision of the earth rushing up at me, expanding like an explosion in my windscreen was a feeling I’ll never forget. Yet it didn’t scare me because the IP had tipped me off about its effects, and besides, he had the jet and I trusted him completely. Later I became so comfortable with rapidly upward rushing terrain that I once pressed so close I kicked up dust in my wake turbulence—so a wingman tersely informed me. It’s proof that familiarity can breed death, not just contempt.

When George dished out of his barrel roll and found his inverted nose buried in terra firma he made, in my opinion, his second mistake (the dish-out was the first): he decided to pull through. A split-S is never an appropriate recovery for a botched aerobatic maneuver. Only perform a split-S when you properly plan it. By then he was at, or below, the FAA minimum aerobatic altitude. The terrain was rapidly rushing up at him. His survival instinct kicked-in and he pulled. He pulled too rapidly and too hard. The aircraft instantly entered an accelerated stall and snapped. George recovered from the snap and got his wings level again, but the plane was still gyrating about all its axis when his altitude ran out.

The take-away is that George could have recovered (again, in my opinion) with the altitude under him if he had fought off the urge to jerk the stick back and used his available altitude. Look at the illustration. If he had smoothly metered-in the back-pressure at a rate appropriate to his rate of descent, he possibly would have recovered, although he may have had to intentionally take it down to the treetops.

Therefore my recommendation, controversial though it may be, is this: If you get into a situation where your nose is low with the ground rushing up to smite you, don’t succumb to the fright of terrain rush and jerk the stick—use all the altitude God gave you to recover. However, you’d better know the terrain characteristics and obstacles in your play area and you’d better judge the pull-out correctly. There won’t be a second chance.

The second issue associated with low altitude upsets that factors in to many accidents is backstick bias. Since the US Air B-737 accident in Pitts-
burgh in 1994, which was a (relatively) low altitude upset, airline and corporate pilots have trained in simulators on upset recovery. When they first introduced me to a 130-degree roll upset, I wanted to complete the roll rather than turn back the long way around. They don’t want that. They say you will inadvertently apply back-pressure during the inverted phase and the altitude loss will be disastrous. I acknowledge they’re right on that account. Most pilots would do just that.

That tendency to pull back carries over into all realms of aviation. We see terrain coming up at us—we want to pull back. Even the most experienced and skillful of us will have a hard time fighting off the tendency to get the nose back into the blue when ground impact seems possible if not imminent.

Case in point: In 2008, a Yak-52 crashed in Washington, killing the pilot and his son. The retired airline pilot made a low pass over his private runway and performed a roll. A witness said that at the completion of the roll, the airplane appeared to be in a level attitude when a slight movement was observed, “as if it hit turbulence” and descended wings level into the terrain. The NTSB’s assessment: (Case number SEA08LA120) The pilot’s failure to maintain an airspeed sufficient to avoid a stall during a low altitude aerobatic maneuver. Contributing to the accident was the low altitude at which the pilot initiated the maneuver.

That statement “as if it hit turbulence” is exactly what I saw at George’s accident, and is a clear indication, in my opinion, of an accelerated stall. Might that pilot have been inadvertently applying back-pressure during his roll and on the completion of it, been spooked by terrain rush? Might he then have jerked the stick back so abruptly he entered an accelerated stall?

So, terrain rush and backstick bias go hand-in-hand. They are a deadly combination. We can avoid both by maintaining an awareness of their consequences, planning maneuvers properly and avoiding low altitude roulette.

There may be other factors that ought to enter into this discussion, and there might be criticism about my suggestions. I invite others to sound off.

Many years ago, Boeing adopted a “dark panel concept” when their engineers designed the systems display panels on modern jetliners. Prior to this change, display panels would have a number of lights illuminated to indicate to the pilots which systems were active. The dark panel concept takes the opposite tack—if a system is operating normally, there is no indication—the panel for that system is completely dark. The overhead panel on the B-767 is festooned with systems panels—hydraulics, electrical, pressurization, environmental, fuel, navigation, auxiliary power unit, engine anti-ice, wing anti-icing, and others. There are more than 100 lights associated with all these systems. With the dark panel concept, only an anomaly or system malfunction will trigger the illumination of an indicator light. Thus, when I line up on the runway and stand the throttles up for takeoff, a quick glance of the overhead panel tells me instantly if all is as it should be before we take to the air.

This concept of not providing information unless it is needed also applies to our formation radio communication protocols. We are all familiar with the idea of brevity when we transmit on the radio. We want to be clear, concise, and keep the chatter to a minimum. Here’s an example of how you can apply this dark panel concept to something you do every time you fly formation—your ops check. The fuel check and the ops check go hand-in-hand. When Lead makes the call “Redstar 1, fuel check 90 minutes,” his expectation should be that, in addition to checking fuel state, the wingmen are also checking all aircraft systems. As a wingman, when you respond, the only information you need to transmit to Lead is your fuel state—unless you have discovered a system problem that Lead needs to know about. Your response, baring any abnormal condition, should be: “Redstar 2, 60 minutes.” This simple call tells Lead all he needs to know—you have 60 minutes of fuel on board and your aircraft systems are all normal. It surely must be a human foible to feel compelled to continue talking long after any useful information is given. Let’s see if we can keep it simple.
I am sitting in my office, gazing at the gently falling puffs of white snow and wishing it was flying weather. No matter how hard my mind drifts to those fun “laughter silvered” skies, I just cannot consider going to the airport in this beautiful, frozen winter pastoral. Tis the season of no flying.

But wait! Instead of languishing in my warm and lazy chair, I could be a very productive aviator. Just as my 14 year old is doing, I too could be cracking the school books. I could be making my own set of homework assignments. I too could be making a set of quizzes and tests, of all sorts. I could even lecture myself…….. that might scare my teenager. The point is that this is a great time of year to take the opportunity to brush up on my aircraft, on those FARs, on the formation flying procedures and all the other books, documents, safety articles and notes I’ve collected over the past year and several flying seasons. This really is a perfect time to be my own armchair quarterback. After all, my team did not make the playoffs, so what do I have to lose?

Now that I’ve thrown down the gauntlet to self-educate myself (I know Carl, oxymoron here), how do I get started to be most productive? Really, the easiest curriculum is based on my summer’s past experiences. In other words, were there some flight scenarios that caused me to pause? Was there a flight that had me question myself, my aircraft or others in the formation? I could do an honest reflection of what I, or my “squadron mates,” could have done safer, better or as well—gasp, legal. This is the best place to start—to challenge myself on researching some of these real-life flying scenarios.

It is time to think back to each of my flight missions in detail, whether alone, or in a formation. Check my log book and also see if I left a trail of evidence in the notes section. Was there a flight that made me say: “But for the grace of……..” Was this event a landing issue? Was this some problem I saw during a rejoin? Could I have made better use of the performance charts of my trusty flying steed? What was that mechanical item that I fixed at the airshow site? What was the legal aspect of that flying I did in low weather? These questions, and others, are somber to remember when I think of my friends that have gone west. Is there something that they did that I shouldn’t do? I could really learn something here. I could be a safer pilot. I really could.

Now with the study plan in mind, with some specific items to research, review, and analyze, I can gather up all my resources that I’ve pulled off those dusty shelves. Get them organized for those scenarios that frightened me, that frightened my flight, or worse—frightened a family member. It has been a long time since I cracked the books in school (flight school, the air carrier or Air Force undergraduate pilot training, as the case may be). It is just a good time to organize my thoughts and studies to get the very most from all those resources.

Whatever way we get it done, the winter down time is a great place to make ourselves safer and much more proficient. It really is a gift to have time to go into study seclusion for a few hours each winter day. I know, as an instructor, I very much respect those students that come well prepared, having done all their book work before a flight session. Let’s give ourselves that same benefit. Let’s study up now, for a more proficient and safer flying season. ★

Check Six, Vlado
Whirlwind Propellers

By John Warwick  john.warwick1@gmail.com

Many of our members are flying behind Whirlwind Propeller Corporation’s propellers. RPA member John Warwick recently sat down with Jim Rust, of Whirlwind Propellers, for a short Q&A about the business.

JW: Jim, I heard you got your company started straight out of college. Can you give a quick bio of yourself and tell us about the early days of Whirlwind?

JR: I graduated from San Diego State in 1992 and started Whirlwind Propeller Corporation (WWPC) in 1995. I wanted a MT prop for my beater Pitts, but did not have the money for one. So I thought: “I’ll just make one.” It was WAY more work than expected, but I had several other people calling for a propeller, even before the prototype was finished. The early propellers were woodcore construction. Full composite propellers started in 2000. That’s really the start of WWPC.

JW: You have performed airshow aerobatics, right? Can you tell me a bit about your flying career?

JR: My father was in the GA business and I, literally, grew up on the airport. I soloed on my 16th birthday, got my private pilot’s license on my 17th birthday, Commercial at 18 and then on to an ATP and Citation type rating. Yes, I did fly airshows for 14 years, the last one in 1998. I have flown a Cessna Aerobat, Long-Ez, Christen Eagle, Zlin 526, Pitts S2S/S2B and formation two-ship. I flew Part 135 charters, hauling bank checks in the middle of the night, and other stuff along the way. After several years of flying all the time, I realized I would rather stay at home and design and build cool airplane parts.

JW: I remember seeing your Pitts in your hangar back in 1996, and another experimental under construction. Since then, you have built a Tailwind and there are some other planes in the stable. Can you tell me about them?

JR: Airplanes I have built are: a Long-ez, a Lazer 200, a Tailwind, and several rebuilds from wrecks with Robbie Grove of Grove Landing Gear Systems, whose business is, pretty much, next door. I’m working on a second Tailwind right now.

JW: The WhirlWind Aviation (WWA) arm of the business, in Ohio, now markets WhirlWind propellers for aircraft like the RV, and you retain marketing for the ground-adjustable, airboat and M-14P related products, plus all manufacturing here, in El Cajon, CA—is that correct?

JR: Yes, WWA in Ohio does sales and manufacturing for all constant speed propellers. Here in El Cajon, WWPC makes the W530 blades and spinners, plus ground-adjustable, airboat and wind-tunnel propellers. WWPC also manufactures all the blades and hubs for WWA in Ohio.

JW: When you looked at producing a propeller for the RV series, what technical opportunities did you identify over existing propellers that Whirlwind could improve upon?

JR: My goals were increased performance and to make a prop that was light weight and durable. I knew these goals were possible with modern composite materials and processes, coupled with a true Theodorsen propeller design. It proved out that way, the result has been an efficient, quiet and light-weight propeller.

JW: Specifically, for M-14P owners, you provide new composite blades, refurbishment to Vperod V530 blades and composite Spinners. The WhirlWind Propeller website explains all this in detail, but is removal and refitting of blades something owners have performed themselves without difficulty?

JR: The W530 composite blades are a direct replacement for the old wooded Vperod paddle blades, and are very easy to install. We even supply a blade pitch tool that takes all the guess work out of setting blade angles. These 98 inch, W530, scimitar-shaped blades (Vperod blades are 96 inch diameter) climb noticeably better and are slightly faster. Another interesting observation that is the W530 blades are very quiet compared to the original paddle blades. Blade structure is thermo-cured, epoxy prepreg carbon fiber, a patented ferrule retention system and a one-piece nickel leading edge that is perfectly faired into the blade contour.

JW: Your website has several glowing customer testimonials about your composite blades. Apart from quieter operation, it can stop the Yak’s pitot tube from doing aerial gymnastics! So how does blade life compare to the Vperod?

JR: The W530 blades should have unlimited life and less maintenance than the Vperod. They really are quieter and provide an improvement in performance. Because the W530’s composite matrix is molded into hard tooling, the blade contour is very consistent which results in smoother operation.
JW: So, if you are sporting a nickel (NI) leading edge on your Vperod V530, there is only one place you could have gotten it refurbished and that is at Whirlwind, correct? No more postage stamps on the leading edge. You must have seen some pretty nasty stuff coming from the field. Any war stories?

JR: WWPC is the only one using the one-piece, NI leading edge on the Vperod blades. Other rehab shops around the world have contacted us to sell them with our leading edge but the answer is a polite ‘no.’ As you can imagine, the NI leading edge manufacturing process is very special, tooling/equipment intensive—plus the bonding process is a trade secret, which took us years to perfect. As far as refurbishing Vperod blades from the field, I have found all sorts of surprises over the years once the segmented leading edge and fabric are removed—dry rot in the wood and some really scary repairs.

JW: You explained to me once that the manufacturers of metal propellers provide holes internal to the blade where weights can be added for static balance. The Vperod doesn’t have that luxury. How is static balance achieved when you refurbish blades?

JR: Balance for the Vperod blade can be challenging. These blades are not a model of precision. At WhirlWind, the blades are balanced with the finishing system (primer and paint) as a matched set. This is a good horizontal balance but vertical balance can only be accomplished by adding weights to the hub.

JW: Because the original Vperod has a wood core, won’t refurbished blades eventually experience moisture loss and gain anyway?

JR: Not like the original blades do. The original blades have several places for water intrusion, notably around the leading edges and rivets. I have seen many examples of dry rot in these areas—even though the blades looked fine on the exterior. The WWPC reconditioned blades are sealed much better using a fiberglass skin and a bonded NI leading edge. This makes the blades much more moisture stable than the originals—but bear in mind, these are still wood blades.

JW: Is the blade tip on an M-14P transonic at take-off? And did your wife Patti’s graduate research at SDSU play a part in the eventual Whisper Tip blade design?

JR: There are conditions when the tip can be operating in transonic speeds, and it’s under these conditions that the Whisper Tip (scimitar shape) blade shows the biggest performance increase and noise reduction. Patti’s senior project was testing different wing tip designs in the SDSU wind tunnel—this was the origin of the Whisper Tip blade designs you see today.

JW: Sam Sax, from the Southeast region of the RedStar Pilots Association, made his own appreciation You Tube video about your 400C-M14 Series Propeller—Whirlwind’s top of the line 3-blade. He has good things to say about it. Can you expand on any of the points he makes in his video?

JR: This project was a lot of fun. The design was in the works for a few years and always seemed to get put on the back burner. In the end it worked out better that way. This prop incorporates all the latest design tools and we were able to keep a very classic blade design shape. It really looks like a Hamilton standard from a DC-3. The 400C-14 performs as expected, with impressive acceleration, climb and braking.

JW: Your El Cajon CNC manufacturing shop is growing fast. That splined prop flange adaptor for the 400C is an elegant piece of machining. Are you completely vertically integrated or are there plans to bring more machining capability in-house?

JR: We have expanded quite a lot the last year by doubling manufacturing space and bringing new processes in-house. You’re correct in saying that we have become vertically integrated. For most of our propeller products, we do manufacture everything in-house. Over the last four years we jumped head first into the digital manufacturing world, not only with CNC milling centers but with CNC composite cutting and processing. All the design is done using Solid Works CAD/CAM. There is always a balance to strike between expanding capability and focusing on the core competence and I feel we have gotten it right. One example is the latest blade design—we were able to go from blade design, solid modeling the necessary tooling, CNC machining the molds, then
manufacturing and assembling parts to flight testing the new propeller in just four weeks. This would have been unthinkable a year ago, or so. Yes, I really enjoy the streamlining and constant refinement process.

JW: Anything in the works at WhirlWind, of interest to RedStar pilots, that you can tell us about?

JR: We are always looking to improve our products. This really has been a rewarding journey working with M-14 powered airplanes. I look forward to many more years of working with this community.

References:
WWPC’s YouTube channel at: https://www.youtube.com/user/WhirlWindPropellers
Kitplanes factory tour at: https://www.youtube.com/watch?v=8cycr356pq
Sam Sax’s three-blade appreciation at: https://www.youtube.com/watch?v=2sFFD_XNpa4
Yak-18 startup with reconditioned blades at: https://www.youtube.com/watch?v=aNmc2J1SH88

Newbies

Chuck Crinnian pilot@frontierneurology.com
I started flying at age 15, soloed on my 16th birthday and got the private rating on my 17th birthday. My goal was to be a professional pilot. My first flying job was that of one of the founding instructors at Embry-Riddle, Prescott, Arizona campus (ERAU). I branched out to a charter operation and then back to ERAU. The airline industry was floundering (again), so I decided to make a major change and went to medical school. Now my day job is that of a Neurorohospitalist, but my passion is flying.

My interest in formation flying started with flying my Mooney 231 in mass arrivals to Oshkosh. But the formation bug stung me hard so I decided to enroll in an RPA formation clinic. It was the best time flying in my life. So now I’ve got “RPA-itis” and hope to progress through the FAST program, as well as obtain a CJ, or at least part of one.

At this point, I hold an ATP and maintain my CFI-AIM with approximately 3300 hours. I look forward to my association with RPA and the remarkable folks who participate in the events.

Robin Hou rmhou@yahoo.com
I have been flying GA “spam cans” since 1991. The $100 hamburger flights got old pretty soon and then I discovered formation flying. I participated in formation clinics with Norcal BeechBoys flying a Bonanza, and West Coast Hepcats flying with the Grumman Tigers, until my Nanchang pilot friends urged me to get a “real formation plane.” A short search led me to purchase N22161 in September 2012. I have about 60 hours in “161” with most of these hours in formation flights. There are three other Nanchangs at my home base, so I have the opportunity to fly formation almost weekly. On the first weekend of March 2013, I attended my first RPA event—the Southwest Informal Formation Flying Clinic. Thanks to my flight lead Ron Lee, check pilot Scott Andrews and other RPA members, I received my FAST wing card on the second day. I also participated in a 20-ship mass formation that same weekend—what a thrill that was. My friends are right that a Nanchang is a wonderful formation platform, and the greatest part of my ownership experience is the wonderful new friends I met through RPA.

Hank Canterbury flyf33@aol.com
Hank lives in Litchfield Park, Arizona. During a 30 year career in the US Air Force he flew tactical fighters including the F-100, F-105, F-4, A-10, F-15, and the F-16, retiring as a Major General. While serving he flew as the slot pilot on the USAF Thunderbirds for two years and completed two combat tours in Southeast Asia. Continuing his lifetime love for flying, he has owned a Bonanza F33A for 32 years, and is a co-founder and director of the Bonanza/Baron Pilot Training (BPT) program, which annually provides refresher and safety training to over 400 owners. Hank owned a Pitts S2C for 10 years, instructed and competed in it, winning the Arizona state Intermediate Championship in 2003. He holds an ATP certificate, is an active CFII in both single and multi engine aircraft, and has 17,800 hours of flying time.
At one point or another, we’ve all been sitting in the local airport café—the weather is beautiful, CAVU, and as you’re sitting there, you see a couple heading out to their airplane. He’s dressed in his Hawaiian shirt, Bermuda shorts, and his flip flops. She’s wearing her tank top, shorts, and sandals.

This young couple’s off to see some friends in Las Vegas for lunch, leaving from Torrance Airport, in California. It won’t take long—it’s 9:30 in the morning and the flight’s just a little over 90 minutes. An hour for lunch, and they’ll be home in plenty of time for dinner. The weather’s great, the plane’s fueled and ready to go—a quick preflight and they’re off. It’s so nice, and the couple wants to be able to chat on their way, so the pilot won’t even use flight following.

Lunch time comes and goes—the friends waiting in Las Vegas now start to worry, and there was no call to say they were, or were not, leaving. No one knows the route the pilot had chosen for this particular flight.

Well, you guessed it, the worst has happened, they’re down somewhere between Torrance and Las Vegas. If you pull out your sectional, you’ll notice that between these two points there are some pretty high mountains and long stretches of desert. Both passenger and pilot are not hurt, but the radios don’t work because of an electrical fire—there are no cell towers handy so they can’t pull out their phones and call for a pizza and taxi. No one knows where they are, they have no water, no warm clothes, no survival equipment, except for a pack of breath mints. Oops!

Will they survive this? Maybe.

It is believed that we can survive three days without water. That’s not a lot of time, but there are other factors to add in—what kind of shape you’re in, did you hydrate before leaving on the flight, what is your mental condition? Those are just some of the personal items, and then you have to deal with the environment—heat, cold, and all the other elements.

Now it’s game time. How long will their luncheon friends wait before, if they do at all, calling the authorities and getting the ball rolling.

So, now it’s four o’clock in the afternoon and the Las Vegas friends decide to call the police to have them go check to see if they are home. The police don’t come up with anything, other than they’re not there. Someone calls the USAF rescue ser-
vices, which, in turn, activates the Civil Air Patrol (CAP)—you know, the guys that you’ve seen people make fun of. The men and women who donate their time and money to help people in need. They now need to call in their people to get needed info and send people to the aircraft home base to see if the plane did, indeed, ever take off. This is all precious time, and it probably means that, at least for the first day and night, the lost couple is camping.

Okay, so you get the idea where I’m going with this. I’ve seen many of my friends getting ready to make the trip to Oshkosh, packing their baggage area with clothes, cameras and the like, yet not one piece of survival equipment. Now, obviously, if you’re flying to a nearby airport to have lunch, and you’re passing all kinds of airports and populated areas, you don’t need much equipment with you, except maybe a personal locator beacon (PLB). Even if you’re traveling as a flight of two, four, or whatever, if you go down, you need to have the necessary items to keep you alive until help can get there.

When I was traveling from my home base of Camarillo, CA, to our other home in Scottsdale, AZ, I would always wear a survival vest—and the parachute goes without saying. If you have to go over the side, the only items you’ll have are those that went with you.

There are long stretches of desert between Palm Springs and Phoenix. The T-28 is a wonderful airplane and has a very large storage area in the fuselage—big enough for a queen size bed and enough stores to go on an African safari for six weeks. The problem is, if you have to put the plane down in the dirt, there’s no way to get to your supplies because the entry to the baggage area is on the bottom of the fuselage.

So I encourage you, when you’re flying long distances, over rugged or barren areas, to get a survival vest, put it on, take

water in your flight suit leg pockets and, if you can, invest in a PLB. If your plane has a baggage compartment that, in the event of an off-field landing, you could access, store some extra supplies there.

Remember, some of the important items that will increase your chances of survival are: water, the ability to start a fire, shelter, and a good attitude.

This is one of times where the saying, “It’s better to have it and NOT need it, than need it and NOT have it,” come to mind.

Remember, flying starts long before you ever open the hangar doors. When you’re going on a flight over a long distance, tell a friend and leave a copy of your flight plan. Let someone know an approximate time when you should be arriving and tell them that, once you’re on the ground, you’ll call and let them know you have arrived. These are all simple steps to help ensure you have a safe and enjoyable flight. ★

RPA President Terry Slawinski says the following about survival gear:

I bailed out of a burning F-16 last century. My Air Force flying gear and survival kit greatly minimized my injuries, facilitated a comfortable wait in the desert and expedited a helicopter rescue. Any airplane I fly has the potential to make life miserable. Having good flying and survival gear mitigates post-mishap survival risks.

In my survival vest I carry:
1. Spot satellite personal tracker
2. PLB
3. Hand held 720 VHF comm radio
4. Signal mirror
5. Leatherman Tool
6. Small first aid kit
7. Survival knife (K-bar)
8. Battery powered GPS with aviation and ground-based databases
9. Whistle

In my flight suit I carry:
1. Cell phone
2. Flying wallet and credentials
3. Water flask
4. Snacks, as required, for duration of flight and day,
When I fly our C-150 or Janus C glider, I also wear my vest and carry the same gear.

In addition to a survival vest, this young A-10 pilot is also wearing a G-suit. The survival vest looks as if it’s fully stocked including an automatic pistol.
Duke “MADDAWG” Molter’s Yak52
Duke "MADDAWG" Molter's Yak52

**Manufacturer:** Yakovlev  
**Year:** 1983  
**Model:** YAK 52  
**Engine:** M14P  
**Horsepower:** 360  
**Propeller:** MTV-3-B-C

**Misc Upgrades:**  
- Dynon EFIS -D6  
- Becker Transponder  
- Falcon magnetic compass  
- Garmin 250XL nav/com.
As many of you know, I own International Jets in Gadsden, Alabama. Our specialty is the L-39 but we’ve worked on everything from CJ-6s to C-130s, Alpha Jets to TBMs. We do Warbird and military maintenance, parts and training on four continents. I’ve personally ferried six single engine jets from the US to Europe over the last three years. To say I am greatly interested in the mechanical condition of the airplanes I fly is a huge understatement.

I know these are tough economic times. It seems that when times are tough, people stop flying their airplanes, or stop doing proper maintenance. It is painful to put money into a Warbird that might have lost 20-50% of its value. Your proficiency is also GREATLY decreased when you only pull it out of the hangar a handful of times per year, but that is another story. I want to focus on what we are seeing as aircraft age and owners stop spending money on maintenance.

A friend brought a CJ-6 to IJ last year for an engine change. When we did the annual we found that the flow restrictors in the landing gear lines had been removed. The results were gear that banged up and down so hard that the metal structure in the nose well was seriously deformed. We had to remove and fabricate new support structure. There were also many other serious systems problems.

Two friends brought their older Mooney for an annual. I’m sorry to say they got much more than bargained for but thank God they finally used a competent shop. The landing gear was so corroded it’s amazing it didn’t fail. The exhaust was leaking badly up against the floor of the cockpit. Worst of all, every single rivet of the lower wing skin where it attaches to the rear spar had failed. The skin was literally flapping in the breeze. This was a fatal accident waiting to happen.

The L-39 fleet in the US (over 260 aircraft) is aging and we are seeing the results. Recently we started a series of engine borescopes for IJ’s customers. Some engines were starting to run outside of parameter in terms of RPM or EGT. In a number of cases, the engines ran perfectly with not a single parameter even close to being out of limits. However, what we found was sometimes horrifying—severe cracks, heat eroded coatings, slag-cooked fuel nozzles, and missing or damaged hot section structure are just some of the problems we found.

In Yaks and CJs we’ve recently seen failed master rods, sheared splined accessory shafts, cracked engine blocks, air line corrosion and leaks, and deteriorated actuators to name just a few squawks. Our civilian clients seem to have depended on some local mechanic for many years. Either they pushed for cheap maintenance, or the mechanic just didn’t do his job correctly, or both. The result is usually an aircraft that is one failure away from killing the occupants.

Sure there are older airplanes or home built aircraft that make it possible for the “average Joe” to enjoy aircraft ownership. However, most Warbirds, high performance singles and twins, and certainly turboprops and business jets require a high dollar commitment for maintenance and operation. When you stop doing required maintenance, or put so much pressure on your chosen shop that they stop doing proper work, you no longer can afford your aircraft. It is time to sell it.
The above statement may seem really harsh but look at the alternative. Better yet, ask yourself the question, “What is your life worth?” Most jet Warbird accidents are not maintenance related, but rather weather or low altitude maneuvering related. Honestly, it calls into question the decision making process of the PIC. Prop Warbird accidents are a combination of both with most also related to weather and low altitude maneuvering. As I said in the beginning of this article, that is a subject for another article. The point here is to ask, “What are the consequences for flying an aircraft that is not airworthy?”

Engine failure is a rare but terrifying experience. Ask Doug Sapp what went through his mind when his CJ-6 engine failed, or what it was like to crash a two seat tail dragger in the mountains when his engine failed right after takeoff. Ask me what happened to my heart rate when I lowered the gear on an L-39 and the gear didn’t move, or how I handled counter weights that dropped onto the elevator cables of my CJ-6 and froze the control stick!

I’m not Chicken Little, and the sky is not falling. However, the FAA has taken a serious interest in the high accident rate of jet Warbirds as an example, and has imposed restrictive programs focused on maintenance schedules and procedures. The truth is our fleets are NOT getting any younger and we do NOT usually maintain our Warbirds according to strict manufacturer or military required inspection and time life requirements. As aircraft and engines age, we see them deteriorate in ways that would never happen if they went through strict calendar time PDM or overhaul schedules.

At IJ we started including inspections of items that were not on the normal 100 hour inspection checklist. These include brake anti-skid release valves, weight-on-wheel switches, fuel system pressure tests, and a much more thorough inspection and testing of the engine and all of its “aggregates.” It is these kinds of adjustments that help us find the hidden problems that will bite you in the tail pipe.

Every aircraft owner should be thinking of what needs extra attention during the year and at the annual. What are the things that can hurt you? Do you fly at night, IFR, or over rough and desolate terrain? Every aircraft has its “gotchas,” and has critical components. Talk to your mechanic, other owners, and use the forums. There is a wealth of knowledge just waiting to be tapped. But most of all do NOT skip or scrimp on maintenance!

I have seen so many accidents throughout my 37 years of military and Warbird flying. I have cried over many a lost friend, but mostly I feel for those left behind. Imagine your children having to learn about life without you. Imagine a spouse who is left embittered for losing her true love, her partner, her most important support. Imagine the hurt felt by the family who’s loved one was killed in your back seat. Imagine the financial risk imposed on YOUR loved ones because of a mistake on your part.

I know, I’m preaching now, and if you’re reading this then you are likely not the problem. So, my next point is do not be afraid to reach out to the person who does not belong to a group, who does not follow safe practices, who seems to want to do it “My Way” as Frank Sinatra sang. I’d rather say something and be wrong, then keep quiet and be right.

This community of Warbird owners is my greatest joy after my faith and my family. You are my extended family and I mourn the loss of each friend, especially when it happens because of an avoidable accident. We CAN make our community safer without giving up the passionate joy of flying our Warbirds. It just takes a real and full time commitment. I hope this article gives each of you pause, and causes you to re-evaluate your own commitment to safe flying. It starts with a safe and airworthy airplane. It ends with a professional and proficient pilot. We’ll save that subject for next time.

Fly safe, and always Check Six!

Rich
Embrodered patches are, and have always been, an important identification tool for military personnel, denoting a unit, organization, or rank. The roots of the modern-day patch can be traced thousands of years ago to ancient cultures of the Mediterranean, Mideast, China, India and South America, where the art of decorating fabric with thread stitching originated. elaborate hand-stitched designs and patterns were used to decorate the robes worn by royalty and for religious artifacts.

The oldest of all official U.S. military patches is the Big Red One of the 1st Infantry Division, first issued on Oct. 31, 1918. Embroidered patches became more common during World War II with distinctive patches for individual units of the Army, Navy, Marines, Air Force and Coast Guard. This has become an honored tradition.

Military patches have always been designed using metaphors, including the colors used and the types of images portrayed. White or silver denotes peace and sincerity, yellow or gold signifies generosity, blue stands for loyalty, red for fortitude and green for loyalty. Animals depicted on military patches also have significance. A lion represents deathless courage, a tiger signifies fierceness and valor in combat, a bear denotes protection of kindred and the wolf shows it’s dangerous to assault. The five-pointed star has strong associations with the military, power and war and, in regard to the RPA, its relationship with eastern bloc aircraft.

The patches on this page and the RPA FAST patches on the page to the right are available to members from the RedStar store. To be able to purchase a FAST patch, the buyer must hold the qualification for that particular FAST rating. The patches on this page are $5.50 each and the RPA FAST patches are $7.70 for each patch.
Wing Pilot Qualifications:
Private pilot certificate*
350 hours total time (250 hours with a commercial certificate)
10 hours formation time within the previous two years (military or civilian)
Complete a formal ground school conducted by an FAA* recognized formation organization
Current member of an FAA* recognized formation organization
Practical test recommendation by a current lead pilot
Successfully complete practical test * or non-US, country equivalent

Lead Pilot Qualifications
Private pilot certificate*
500 hours total time (350 hours for current or former CFI*, military or airline IP)
30 hours logged formation time as a credentialed FAST wing pilot
Demonstrated proficiency in each position of a 4-ship
Complete formal FAST lead upgrade training program
Current member of an FAA* recognized formation organization
Practical test recommendation by a current FAST lead pilot
Successfully complete practical test * or non-US, country equivalent

Instructor Qualifications
The “patched” flight instructor is designated by the RPA. He is an onboard IP who is capable of demonstrating and teaching all the formation tasks, from takeoff to landing.
In addition, this instructor must possess the wisdom and experience to recognize when it is necessary to take the aircraft from the student in order to prevent an incident or accident.

Check Pilot Qualifications
Commercial pilot plus one of the following:
FAA examiner or designee*
Current or former military flight IP
Current or former airline check airman
Current or former CFI*
2000 hours minimum flight time (military or civilian)
200 hours minimum formation time (military or civilian)
100 hours minimum logged as a credentialed lead pilot
Member of at least one FAST signatory organization
Recommendation of a FAST signatory organization
Recommendation of two other FAST check pilots
Commitment to volunteer and serve the formation flying community
Agree to abide by all FAST policies, and procedures
* or non-US country equivalent

A formation qualified T-28 pilot is awarded the patch on the left. A qualified Lead adds the “Leader” rocker to the top of the patch.
NATA’s FAST patch is augmented with a rocker for a Lead and an additional rocker for a check pilot.
A T-34 pilot’s formation skill level is displayed with one of two of the above patches that clearly identify flight qualifications.
Flight Physiology & Fatigue Management

Last month I talked briefly about risk management and some steps to help mitigate those risks on your next flight. As we awake from our winter slumber and begin the preparations for this year’s flying, I thought it appropriate to talk about some physical aspects of flying that can keep us safe. Much has been written about the need to be aware of the demanding physiology of formation and high-G flying. The goal here is a review, not an all-encompassing lesson in the human factors of flight.

The environment in which we fly lends itself to a high level of exposure for some potentially deadly physiologic issues. One issue that we do not readily prepare for after a long winter of one G is the onset of higher G forces when we begin our Spring flying. As we know, G-forces are those forces that wreak havoc in the blood flow to the brain. Under high positive Gs the brain can be deprived of vital blood flow, causing loss of visual acuity, motor control and other sensory damping. In high, negative-G situations, the skull cavity can be under an enormous amount of pressure, leading to pain and discomfort and, when the two swap ends, it can lead to a quick black out. The best way to regain our G tolerance is to take it one step at a time and not get ourselves into a high-G situation on the first flight.

The body will adapt to higher Gs over a period of time, so make an effort to spend a few minutes of your first couple of flights at more or less than one G. This might be a good time to practice steep turns, stalls and log a few minutes of astronaut training. As the body begins to recognize the need to protect itself from a loss of blood flow the veins begin to anticipate this by constricting. We can train the veins to be ready by slowly working up to our max anticipated G levels, then take a few minutes each flight to keep our G tolerance in balance.

G tolerance is not only a function of training, it is a function of physical fitness. Now to be fair, those of you that know me realize I’m not in the best of shape but I do work to maintain my ability to control blood flow. The military teaches techniques to help us maintain blood in our brain during high-G maneuvering. The method I use is the “hook method.” This is a simple technique where by, as you begin to pull on the stick you say the word “Hook” and catch your breath on the letter K. You will naturally contract your gut. Hold this pose and continue to say hook in a steady pattern until you relax the stick. You can also tense up your thighs to help keep the blood in the upper region of the body near the heart.

Here are a few additional tips to improve your G tolerance. Be well hydrated, well fed, and make sure you have gotten adequate rest. Medication, alcohol and lower O₂ levels (high altitude) can significantly reduce your max G level and lead to the dreaded G induced loss of consciousness (G-LOC).

When I mention tips to improve G tolerance, some of these tips come from the topic of fatigue management. Fatigue management has gotten a lot of attention in recent months especially in the airline community. FAR 117 will go into effect in the near future and outlines duty restrictions for pilots. These guidelines were the culmination of years of research and effort put forth by the NTSB, NASA, the Air Line Pilots Association and many other agencies who recognized that a fatigued pilot was an unsafe pilot and one who should not be tasked with flying the public.

Fatigue is much different than being tired, although being tired is not a condition we want to find ourselves in when we are about to go flying, flying formation, or performing aerobatics. Fatigue is a physical state that reduces our ability to make good judgments, act reasonably or perform complex physical tasks. Without getting too technical, I want to increase your awareness of fatigue and discuss some ways to mitigate it and thereby reduce our exposure to its effects.

Fatigue is not something that comes on in one day. However, research has shown that fatigue can have cumulative effects in as little as three days. If you are someone who needs eight hours of sleep in any given 24 hour period and you find yourself in a situation such as a FAST clinic or air show, where you are now only getting five to six hours, you are in danger of being dangerously fatigued by the end of the weekend. Combine that with the alcohol and the lack of water during the day and you could find yourself in a very dangerous situation going home.

Aside from the obvious solutions to the above situation we must get our needed rest in order to recover from a buildup of fatigue in our body. Find time in the day to go to a comfortable place and close your eyes. Research shows that napping can help mitigate the risks of fatigue. Although a nap is good, it is not the solution. The only way to completely shake the full effects of fatigue is a good night’s rest. Don’t be in a rush to go home on Sunday, after a clinic. Get up late and take your time getting home.

Caffeine is often used to combat fatigue but caution should be used to apply it appropriately. The strategic use of caffeine approximately 30 minutes before you need to be at your best is recommended, however too much caffeine can lead to dehydration.

Dehydration needs to be combated at all cost. It leads to a lower G tolerance and other physical problems. It will not aid you in your efforts to combat fatigue if you don’t get in enough water in the day. At some point you need to say to yourself I’ve had enough to drink tonight and get some rest.
Although we don’t know for sure, we can point to evidence surrounding a couple of fatalities in our group that fatigue, dehydration and other physical problems may have played a big role in the cause of the accident.

One final note about fatigue, if you are someone who has been identified as a snorer be aware that sleep apnea is a leading cause of chronic fatigue. If you are concerned that you may have sleep apnea, seek out treatment. My father’s life ended too early when he suffered a heart attack brought on by the severe fatigue to his vital organs as a result of sleep apnea. ★

Fly Safe and Fly Smart,
KONG RPA VP

Disclaimer: I am not a medical professional nor am I providing medical advice. The FAA and NTSB have several publication related to both G LOC and fatigue management. I highly recommend that you consult these sources for additional information.
In addition, Dr. Samuel Strauss has written a very in-depth study about pilot fatigue. It can be found at:
http://aeromedical.org/Articles/Pilot_Fatigue.html

GADGETS

Propeller Gear Case Window

By Craig Payne yakman@joimail.com

This “window” fits the M-14P Series II propeller drive case and allows positioning of the crankshaft to top dead center (TDC) on the #1 piston. Leaving the crank in this position greatly reduces oil drain down into the cylinders and out through the exhaust stacks. Look through open “gills” to line up a pointer with a painted TDC mark by pulling the prop through. During the annual general condition inspection, calibrated marks on the big gear ring allow precise positioning of the crankshaft at the firing point where magneto points are adjusted to open. Timing marks are positioned on the gear by means of careful measurements from #4 TDC, and hand painted with an oil-based paint.

I make kits to perform this mod using water-jet cut polycarbonate parts designed to fit the opening the same way that the existing access cover does, with an inner ring to stop oil seepage. Using this technique will allow me to remove the oil tank shutoff system that once failed on me. Currently, I sell these kits for $90—that includes all necessary parts, new screws to replace existing studs, and gaskets. The nuts holding the metal pointer were re-used from the original installation. ★
For anyone new to our aerobatic-capable warbirds, the concept of “pulling Gs” can be very foreign. For those who went through military pilot training, G awareness was taught early in the program. And for those of us who flew high-performance fighters, we knew that not respecting G forces could lead to G-induced loss of consciousness (GLOC), and almost certain death. The purpose of this article is to outline the propensity of our planes to pull high G-loads, the proper way to execute a G-straining maneuver, and how to increase your personal G-tolerance.

It’s Not the G, it’s the Onset Rate
In the F-16, we could generate a maximum of 9 Gs with full internal fuel and a full external missile load, with an onset rate in excess of 9 Gs per second, and sustain that 9 G load until the jet ran out of gas. While our CJs, Yaks and L-series jets cannot sustain 9 Gs, we can generate onset rates nearly equal the F-16, up to our structural maximums. The difference is that we cannot sustain those high G-loads for any length of time because of thrust and aerodynamic factors. In looking at GLOC incidents, and studying USAF and USN centrifuge data, we know that the onset rate produces the majority of GLOC incidents. GLOC events have been documented as low as 3 Gs, if the onset rate is rapid enough.

There are many factors that affect our G-tolerance. Surprisingly enough, age is not really a factor. I went through my last centrifuge training in spring of 2000, at age 41, at Holloman AFB, NM and completed the required F-16 profile of sustaining 9 Gs for 15 seconds (which also included another 6+Gs for 10 seconds while looking over your shoulder). While I was there, our new F-16 students were undergoing initial training, and some of them (all in their 20s) experienced GLOC. The value of training, experience and recent G exposure cannot be underestimated. Diet, exercise, physical makeup (being short or tall), resting pulse rate, blood pressure and dehydration level all contribute to G-tolerance. All of us have good days, and bad days, at pulling Gs. The goal is to tailor your flying to your personal limit for that particular day and not exceed it.

Typically between 3 to 4 Gs, without a straining maneuver, a person will begin to lose their visual acuity, this is the first sign of G-induced symptoms. It usually includes loss of peripheral vision, followed by tunnel vision as the load increases or is sustained and is commonly referred to as grey-out. Normally, between 4 and 4.5 Gs, with no straining maneuver, all visual acuity is lost. This period is known as blackout. Pilots are still able to fly the aircraft during this time, including being able to speak and hear. In the centrifuge, we were trained to increase straining, or decrease G-loading at the fist sign of vision loss. Obviously, with the rapid onset of G, you may bypass the vision effects and go straight into a GLOC event.

When a pilot experiences GLOC, the eyes will typically roll back into the head and complete loss of muscular ability ensues shortly thereafter. At this point, the pilot is completely incapacitated and no one is flying the aircraft. This phase lasts approximately 15 seconds. After this period of “absolute incapacitation period,” the pilot will enter into a stage known as the "relative incapacitation period." This lasts approximately 10 to 15 seconds, during which the pilot is technically conscious, but not capable of decided action. The first 5 seconds of the relative incapacitation period is when the neurological system regains control. The remaining time is spent reorienting to the cockpit environment. This period is usually accompanied by short periods of confusion, disorientation, fear, anxiety, and embarrassment. The pilot’s ability to recognize their environment and to regain control of their aircraft signifies the ending point of the relative incapacitation period and the G-LOC episode in general. The average G-LOC total incapacitation period lasts approximately 30 seconds. Look up “military centrifuge training” on YouTube if you want to see for yourself and laugh at some of the trainees (most of whom are test subjects, and not pilots). You can also look up some pretty exciting video from actual airborne GLOCs where the pilot was fortunate enough to wake up and live.

The seriousness of this is simple to understand—if you release the stick for 30 seconds during any aerobatic maneuver, what do you think the chances are of recovering the aircraft, especially if you’re disoriented? Unfortunately, the military knows the sad result. This is not meant to scare any pilot out of pulling Gs (it’s one of the most fun things we can do in an aircraft)! What it is meant to do is instill a healthy respect for what GLOC can do during extended trail, standard aerobatics or any high-performance maneuver.

**Performing the Anti-G Straining Maneuver (AGSM)**
The goal of the AGSM is to increase blood flow to the brain. You may have heard of, or been trained in the L-1 and M-1 techniques for AGSM. Rather than get into a detailed discussion of each maneuver, I’m going to outline a technique that has gained favor in the last 10 years or so, and is very close to what the most fighter pilots do in the real world, outside of the centrifuge.

There are two components to any AGSM. The first component is a continuous and maximum contraction (if necessary) of all skeletal muscles. This includes the arms, legs, chest, and abdominal muscles. Tensing of the skeletal muscles reduces the pooling of blood (especially the abdomen and legs), retaining or returning the blood to the heart and subsequently the brain. Tensing the skeletal muscles inherently raises blood pressure. The second component of the AGSM is the respiratory component. The purpose of the respiratory component is to increase the chest pressure. Increased chest pressure in the lungs is transmitted to the heart and large arteries in the chest, which in turn increases the driving pressure and blood flow to the brain against the downward G, force. The AGSM is performed for approximately 3 seconds, followed by a quick exhale/inhale (less than ½ second), then another AGSM. The pilot would continue this cycle until the G-load is released.

The optimum generation of increased chest pressure is achieved by completely closing the glottis. The glottis is located behind the “Adams apple” in the throat. You can find it and close it off...
by saying the word “Hook” with your mouth open. Say the word “Hook” and catch it about 3/4 of the way through the word—“Hoo.” This should be said following a deep inspiration and forcefully closing the glottis as you say "HOO." Bear down maximally for 2.5 to 3.0 seconds. Then rapidly and forcefully exhale by finishing the word Hook . . . “ka.” This is followed immediately by the next deep inhalation and again saying “Hook,” and catching it about 3/4 of the way through the word..."Hoooo." The exhalation and inhalation phase should last no more than 0.5 to 1.0 seconds. The chest pressure falls dramatically during the short exhalation and inhalation phase. The muscle strain must be maintained continuously, even when breathing. If the muscles are relaxed while still under G, the blood will immediately rush into the extremities making it almost impossible to catch up if at moderate G (4-5 G) and may even result in instantaneous GLOC.

We do not have access to centrifuge training. But you can hangar fly this AGSM. Begin by sitting upright in a chair at home, and practicing the “HOOK” technique above. Do the straining maneuver for three to four iterations, then relax for 10 seconds, then perform it again. You will definitely feel the increase in blood pressure to your cranium. Next, prior to your next flight, strap yourself in the cockpit, and practice again, with your hand on stick and throttle. I practice a couple of AGSM sequences while waiting for temps to come up after engine start. Even though I have flown high-G aircraft for over 30 years, I still practice my AGSM. The intent is to ingrain into the subconscious (muscle memory) the ability to automatically apply the proper AGSM anytime G-loading is applied or anticipated.

Common Errors in Performing the AGSM
- The biggest error is failure to apply the AGSM technique while integrating it into other flying skills. The AGSM must be consciously practiced correctly until its performance becomes automatic and correct. This takes a lot of discipline and practice.
- A very dangerous error is developing good chest pressure while failing to tense the rest of the body musculature. This causes the blood to pool in the extremities and the overpressure in the chest impedes the return of blood to the chest. Result can be GLOC (or severe visual loss at best), depending on the G.
- Failure to anticipate the G. Performance of the AGSM should begin, ideally, just before the aircraft is loaded. Failure to do so will result in the pilot either trying to catch up on the AGSM (a very dangerous practice) or having to unload in order to buy time to catch up.
- Failure to maintain chest pressure (loss of air). Occurs while talking or whenever the strain is audible. As air is lost from the chest the amount of pressure generated falls. This directly reduces blood pressure to the brain. If air loss is heavy, as might occur with speech, the subsequent loss of blood pressure in the brain may result in GLOC without the prior warning of visual loss. Other causes of air loss are “groaning” (letting the air escape slowly) and trying to hold the chest pressure by sealing the lips rather than with the glottis.
- Holding the glottis closed less than the required 2.5 to 3.0 seconds results in lower average blood pressure in the brain than would be obtained otherwise. G-tolerance is reduced and fatigue is accelerated.
- Holding the glottis closed longer than 3.0 seconds. The increased chest pressure impedes return of blood to the chest where it is available to the heart. If blood return to the chest is blocked for 4 to 5 seconds, the heart may run out of blood to pump. The result is a rapid or precipitous drop in blood pressure in the brain with high potential for GLOC.
- Taking too long to complete the exhalation and inhalation cycle. During the time chest pressure is absent, blood pressure at the brain may drop to zero. GLOC does not occur as long as the blood supply is not interrupted for too long. However, if the blood flow is interrupted too many times, for as much as 2 to 3 seconds, GLOC potential is markedly increased.

The G-Awareness Maneuver
A dedicated G-awareness exercise should be conducted when high-G flight is planned. The key to GLOC avoidance is pilot awareness, and the pilot alone has the ultimate control over G-stress factors. For this reason, the G-awareness exercise is designed to heighten pilot awareness and the G-stresses of the mission at hand. If you are planning to perform aerobatics, or even just extended trail, a G-awareness maneuver should be mandatory.

As a minimum, the G-awareness exercise should be flown as follows:
- Establish adequate aircraft separation and airspeed to allow tactical maneuvering. (This can be performed in a gradual fashion during extended trail formations)
- With a smooth application of G, perform a 3 to 4 G turn for 90° to 180°. Use this opportunity to practice the timing and coordination of your anti-G straining maneuver.
- Reestablish airspeed and perform another 90° to 180° turn. Turn initially with 4 to 5 Gs and then let off to a minimum of 3 to 4 Gs during the last 90°, as energy bleeds off. Again use this opportunity to establish your awareness for operating in the increased-G environment while practicing the anti-G straining maneuver.

The G-awareness exercise is not, nor is it meant to be, the only way to protect you from GLOC. It can only afford the opportunity to test yourself, practice the anti-G straining maneuver and bring the G environment to the forefront of your mind. G-awareness is a mindset, not a set of exercises to be done and forgotten. G-awareness must be practiced and observed throughout the flight. Remember GLOC incidents typically do not occur when pilots are physically and mentally prepared for the onset of Gs. They occur when pilots channelize their attention on some other facet of the flight and place themselves in the high-G environment without preparing their bodies to do so.

Increasing Your Personal G-Tolerance
A pilot’s level of physical fitness, health and physical attributes also have a direct correlation to the number of Gs he or she is able to sustain. Flying with a sickness can greatly reduce the abil-
tory to tolerate G forces. Not only does an illness typically reduce your strength, fevers can often dilate blood vessels, which will allow an increased effect of blood pooling under G. Dehydration also has negative effects on G tolerance. When dehydrated, the body possesses a smaller volume of blood. This allows a greater amount of it to be taken to your lower extremities and away from the brain. Being dehydrated is often a direct result from consumption of alcohol or caffeine. It has been found that alcohol can reduce a pilot's G tolerance by up to 0.5 Gs. The typical hangover symptoms of alcohol include headache, fatigue and digestion problems can last up to 48 hours. This time period typically exceeds the normal legislation regarding how long a pilot must wait before flying after consuming alcohol.

The length of time one can sustain high Gs can be increased by over 50% by participating in an aggressive physical training program. Today's military pilots are usually required to follow strict exercise programs. These programs usually focus mainly on strength training, and rely moderately on aerobic training. This is because of the finding that people who possess a high level of aerobic fitness actually are less tolerant to G forces. Anaerobic training such as lifting weights is more helpful to pilots. This training not only helps prevent fatigue but also improves their anti-G strain maneuver (AGSM). The bottom line is to be well rested, well hydrated and prepared to fly. If, during your G warm-up maneuver, you do not feel ready for the high-G environment, then do not participate in high-G flight.

G-Awareness Summary
We cherish the ability to fly our warbirds in the manner in which they were designed. While the machinery is capable, we need to ensure that we are physically and mentally capable of exploiting the performance envelope. Please take to heart the information provided here, and practice your G-straining maneuver often. Performing it correctly can indeed save your life.

Mike "Beav" Carter is co-owner of a CJ-6A. He is a retired USAF Lt. Colonel, with experience in the F-4 and F-16. He is a graduate of the USAF F-16 Fighter Weapons School, and was an operational test and evaluation pilot, instructor pilot, flight examiner and F-16 squadron commander. He is currently an airline pilot.

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Installing a CEP Kit

After reading Gil Lipaz's piece on the Communication Ear Protection (CEP) unit (page 5), I decided to get a kit and install it on my personal HGU-55 helmet. The installation only took 35 minutes to complete. The tools required were: a 3/8 drill, a small adjustable wrench, a soldering pencil, and two jeweler's screwdrivers (one Phillips and one slotted).

I removed the right side inner ear pad and drilled a 3/8 hole in the helmet's shell for the bulkhead jack and wiring. I then threaded the wiring interface assembly through the hole, and added the lock washer and nut to the inside. The washer has a tab to which the ground wire is soldered. As with any electrical equipment, grounding is necessary to reduce noise. Pulling this tab up makes the soldering easier. Once complete the tab is bent down.

With the external jack receptacle mounted, I connected the ends of the CEP wiring assembly to the earphone's wiring—white-to-white and black-to-black. These are screw connections that only require jeweler's screwdrivers. The final step on the helmet is to slip the earphone back into the ear pad and tuck the wiring out of sight in the liner.

The last step was to add the foam tips to the earpieces. CEP includes two pair of foam tips with the kit; one small one large. The foam tips screw onto the earplug transducers. A slight roll between your fingertips will reduce the size of the foam plugs for easy insertion, similar to regular foam, noise-reducing earplugs. Add your helmet, and plug the CEP jack into the receptacle. It's that easy.

While this article describes installation into a helmet, CEP also has assemblies that fit headsets. Check out CEP’s website, www.cep-usa.com, for more detailed information on its units and installation.

By Robert “Speedo” Genat  robertgenat@yahoo.com
Yaknanza—a highly modified, one-of-a-kind, Yak-52TW. N57AZ, was delivered to the US in June of 2004. I am the second owner and this is the story of its life, and the work that went into making it the airplane I wanted.

My first Yak was a great, standard -52 that I flew for six years and over 450 hours. I named it “Lucky Me” because I figured anyone with a Yak is lucky to have one. I purchased it off of Ebay, at auction, without ever sitting in, or flying, or knowing anyone who had one. That’s another story! I enjoyed it so much I decided to get a TW. I did, like all of us do, and scoured all the ads looking for my new bird. I found it in Arizona, with only 200 hours TT on it, and promptly purchased it. The owner of the plane thought it had a lot of electrical issues but, as it turned out, it was just a bad alternator winding that kept blowing the field circuit breaker.

Like my standard Yak, it needed some TLC, so I started to make it my airplane. Forty hours of flight time later, I decided the propeller was too long so I shortened it by about two inches—the hard way! The best and fastest way to shorten a prop on a TW is to fly as #3 and wheel land on a short runway, uphill, while your other buddies are still on rollout at the other end. Unfortunately, I was led to believe, by some articles I had read, that the TW needs to be wheel landed. Not true, as this is an urban legend—at least for my plane. Not a method I would recommend for modifying your prop length.

With the plane sitting in the wheel landing configuration there are only six inches of ground clearance, as measured empty, and you have about eight inches of strut travel.

A note at this point—MT can repair the blades for ¼ the cost of a new blade and it is considered an overhaul. Up to ⅓ of the blade can be destroyed and can still be repaired as an overhaul. Try that with a carbon/fiberglass, or metal blade. When you consider buying a propeller, most people never consider what can be done if there is damage. With the MT, the life-limit of a repaired blade is the same as a new one! When I sent the blades in, MT told me I could have them back four inches shorter or four inches longer. When I asked about the diameter, the answer was that the 260 cm blade was originally made for the Sukoi and they just sent them all out that way. I asked MT to rebuild my propeller two inches smaller in diameter and was told that I might expect a slightly higher cruise speed but would not notice much else. I personally have flown a TW with a 10” smaller diameter propeller and did notice a higher cruise speed. The rebuilt blades now give me eight inches of ground clearance.

Of the 36, or so, TWs that were built, you can see the changes Aerostar made just by walking down the line at Oshkosh. I understand you can still buy a Yak 52TW, called a Mark 5 model, for $456,000.00.

The engine was sent to Barrett for a strike inspection, as a matter of safety. My main concern stemmed from the knowledge that the original propeller had one new blade and two overhauled blades. The prior owner told me he had chipped the tip off the propeller on the door as he was pulling it out of the hangar. Remember, I said up to ⅓ of the propeller could be destroyed and still repaired. During Barrett’s inspection, nothing was found except that a rocker arm needed to be replaced because of a stripped adjuster screw. I was offered a chance to upgrade the engine at this time, which I did. The Barrett upgrades included new Barrett three-ring pistons, gear polishing, fuel injection, complete inspection, test run, and an overhaul to new limits.

For those thinking of fuel injection, you need the Airflow Performance fuel controller and the Barrett-Kimball fuel nozzle. You must have an electric fuel boost pump set at 30 to 40 psi (you need the higher fuel pressure to start). Also added were electrical switches, circuit breaker, and a fuel-line filter installed prior to the
electric pump. The engine-driven fuel pump regulator needs to be modified with a spring for 35 psi and then flow checked. Also installed were new fuel gages for the front and back cockpits, new senders and associated wiring for gages, since these have different connectors and power needs for the new senders. We installed new fuel lines from the tank to the controller—don’t forget you need to go from US to metric along the way at several junctures. A lot of the fuel lines are under the floorboards. You also need a mixture control, custom brackets on the engine to hold the other end of the cable and, as if that’s not enough, the throttle cable now needs to be switched from the left side of the, now removed, old carburetor to the right side of the new controller. You no longer use carb heat so it gets removed, as does the air-box screen. I custom built a new stainless steel air box and screen that uses ram air similar to the Pitts Model 12. If you add up the hours it takes to do the conversion, you can see that it is not a bolt on and go. Lots of hours were spent making these modifications—if you are paying someone to do it, it would double the cost of the installation.

The Yak also has an electric starter. The start procedure that works for me is to turn on the electric fuel boost pump, mag switch on (M-35 mags), throttle open ⅓, engage starter and slowly advance mixture until the engine starts. No priming is used. Two things of interest are that, unlike the carburetor, the fuel controller will pump fuel out the intake at a alarming rate if you have the mixture set anywhere but full idle cut-off when you start. When using this method, because of the electric start, the engine has 30 psi of oil pressure on the gage by the time it fires. My TW is also equipped with air start—not all TW’s have this feature, as it was a five thousand dollar, factory option. Not finished yet. Now install a JPI or similar 9-cylinder engine monitor for the EGT and CHT because you now have a handle on the dash that says mixture and you need to move it, a lot! The JPI is a big job all it’s own, and more cost— but it does a great job of monitoring your engine and gives a heads-up to a lot of problems before they start.

I have an oil temperature gage on the JPI that reads oil temp exiting the engine prior to the oil cooler. This is located on the spin-on oil filter, which is another modification I installed. The filter is a Hamburg-
I have an extremely smooth idle at 700 rpm, with no hesitation—I think you could leave it there all day and it wouldn’t change rpm, hiccup or lobe. Throttle response is also crisp, at all settings. At full throttle, max takeoff rpm, I get 40 inches of manifold pressure, operating from 5000’ field elevation. A small advantage of the fuel injection is leaning at high altitudes for lower fuel burn.

My cowling is modified so I have less air escaping from the back of the cowl—allowing for higher temps, as needed, for cylinder heads. The TW uses air control doors on the outside of the cowling—more like cowl flaps as opposed to gills. The gills would get in the way of the starter ring gear and starter. The Aerostar cowl flap system isn’t very sturdy, so my TW has new, modified, hinged doors and a newer-style, control push-rod assembly, which allows adjustment of the cowl flaps, as needed, at any speed. This required new welded steel brackets for the firewall and pilot controls in cockpit. I am working on a change to the door design, so it will work even better.

I have an Advanced AOA, professional model, installed in the right wing, with the computer located behind the dash. The AOA display is on top of the glare shield. It is not at all in the way, yet in plain view. So far, the most amazing thing is how much I can pull, without running out of lift. With micro-switches located on the gear and flaps, the display will show a gear down donut and I get a verbal “flaps down” through the intercom—one more safety check for the gear is good. The AOA computes all aircraft flight and load parameters and gives the solution as an easy-to-see, visual marker.

A Dynon D-6 sits center stage in the dash as a backup. The most challenging part, was installing the electronic compass/sender in the tail, away from electrical and magnetic interference. The sender installs on the same plane as the display, within one degree of horizontal. I also have a vertical card compass on the dash.

A TruTrak, two-axis autopilot is connected to an Avmap-5 GPS. I had a Garmin Area-560 that worked fine, when it was cloudy, but when the sun was out, the screen washed out. Plus, when the heat of the sun was on the display, the touch screen would have trouble reading my finger. I was tired of poking and poking at the screen, like I was playing some video game. The Avmap is easy to see in direct sun and it’s easy for me to zip through the menu and find what I am looking for. TruTrak does not have any install help for Yaks—I had to build special brackets and work on my head to install the servos.

A 10 pound, halon fire control system, with two spray heads, is installed—one in the engine compartment and one behind the pilot’s panel. The bottle is mounted vertically, behind the pilots seat, and it’s easy to check the pressure on a walk-around. The discharge handle is on the dash and in plane view of the pilot.

This is a list of some of the other changes I made. I did all the work on the TW myself, otherwise I would have to go back to work to pay for it all.

- Powder-coated engine mounts to match engine color (metallic gray)
- LED landing and taxi lights
- Oil tank heater and quick drain
- Oil cooler heat pads and quick drain
- All oil and fuel hoses replaced with AQ Aeroquip fittings/hoses with fire sleeves
- Alaskan Bush tail wheel
- Custom 3.5 gallon smoke system, with fiberglass tank, located under the baggage bay
- Flight, custom-three tires
- Vans Aircraft window vent
- 406 mhz ELT

I would like to thank the Colorado Yak Pak pilots for helping me with their time and patience. Without them, I would not have been able to have such a fantastic start with the Yaks.

A special thanks to the late Roy “Popeye” Murray, who always made sure I was included in his flights, and my wife Tina, “Mini,” my favorite GIB, who supports my affliction with Yaks, and says the Yak is her favorite airplane. ★

Dale “Chip” Matuska is an A&P PPL, with 450 hours of Yak-52 time and 160 hours in his Yak 52TW. Dale is also a RPA/FAST qualified Wingman.
PISTON MOD

By Dick Hoss  hossdeb@aol.com

F

irst, I would like to commend the “Arizona Boys” for having the courage and the foresight to step out of the box and pioneer the use of higher compression, American made pistons, and gapless rings. These modifications are particularly valuable in the high-density altitude environment in which they frequently operate.

Being a former high performance auto shop owner myself, I was very interested in these modifications, and working with Vladimir Yastremski, decided to develop our own piston/ring combination, utilizing a more conservative approach which, while producing less power than the high compression, domed pistons, does not require the use of special guides and valves, thereby keeping the cost down. This decision was reached after analyzing the data from the Engine Design Bureau in Russia.

When a customer arrived at Vladimir’s shop with an M-14P powered CJ-6 with three dead cylinders, we had the opportunity to do a post mortem on the engine. I do not know where the pistons came from, and that is not important.

Upon disassembly, we found evidence of detonation, the old enemy of high-compression engines—probably caused by an over-leaning, as this engine was equipped with a throttle-body system that replaced the carburetor. I took one of the pistons from this engine, along with a stock, Russian M-14 piston, and a stock Housai HS6a piston to a well known performance piston manufacturer with whom I had dealt with in the past. We decided to come up with a totally new, clean slate design, eliminating the bottom scraper ring completely, and utilizing a new oil ring design. The high performance shop folks decided to use slightly wider compression rings and, in conjunction with Total Seal, came up with a new ring package. Another issue that we addressed was piston weight. The stock pistons, both Russian and Chinese, have an allowable weight range of 706-710 grams, bare. The domed, high compression piston weighed 748 grams. While I am not sure how important this really is, I insisted that all our pistons weigh 710 grams, maximum. Since everything is CNC machined, we have a ±1 gram tolerance, both bare, and with pins and buttons. We were able to achieve this weight because our M-14 pistons are flat-topped, with stock compression height.

We have yet to test an M-14 with these pistons, and anticipate only a modest increase in power resulting from the much-improved cylinder sealing resulting from the tighter piston/cylinder clearance, gapless rings, and three-ring piston design.

We are currently testing the Housai piston ring setup, along with intake valve stem seals, on my personal airplane, a CJ-6A, with these, very promising results:

- Decreased oil consumption to one quart in four hours
- No oil dripping out of the exhaust stacks after engine shut-down, between flights
- A solid five knot increase in TAS at all altitudes through 10,000 feet
- Increase of rate of climb by 300 to 400 fpm
- Smoother overall operation
- Cooler CHT temperatures
- Oil remains cleaner far longer

The Housai pistons have a 0.125 inch compression height increase but still weigh 710 grams, maximum, raising compression ratio slightly, from 6.2 to approximately 6.7. Since the Housai engine was originally designed for 70 octane fuel, the use of 87 octane auto gas is still allowable with these pistons—I’ve been using a 50/50 mix of auto gas and 100LL.
The engine currently has 30 hours since the modifications were installed and I anticipate the performance will continue to improve slightly through the 50 hour break-in period.

When Vladimir is completely satisfied with the test results, he will then offer this combination for sale. The modification package will include:

- Pistons
- Rings
- Intake valve stem seals
- Valves ground
- Cylinders hot tanked, checked and honed

An M-14P test engine will be similarly modified and tested in the future. We will update you on our progress as we continue the testing.

Dick Hoss and Vladimir Yastremski are based out of the Romona Airport (KRN) in Romona, California. Vladimir can be reached at 619-379-1860.

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- Overhauled cylinders with new, custom designed US pistons, gapless rings, and valve stem seals (intake)

$75,000.00

Contact Dick Hoss 760-822-1611
hossdeb@aol.com
Ever Since my exhaust was new, 10 years ago, it has leaked. To stop CO, exhaust, and smoke oil smoke from entering the cockpit, I sealed my firewall and all the fuselage gaps I could get to. This improved the situation but didn’t eliminate the contamination. During my 2012 annual, I installed my third set of new shims, gaskets, and clamps. I also talked with Dennis Savarese about a different exhaust. He gave me the name of Rich Lopez at Aircraft Exhaust, Inc and also told me to talk to Buddy Moman. I said I would call if I needed to.

Well, after five hours on the new shims, gaskets, and clamps, I opened my cowl to inspect the exhaust joints. All of them showed evidence of leakage. I knew I needed to call!

I called Buddy, a fellow Yak-52TW owner, and talked to him about his system. He said it was an outstanding investment. He said it eliminated all blow-by leakage in the exhaust system and the extension of the stacks protruding from the cowling eliminated most of the exhaust and oil residue on the aircraft. I asked him if the cost was worth the benefits and he enthusiastically said yes!

Buddy’s exhaust was made by Sonny Porch (I know, I know!). He got out of the business a while back and sold all his tools and jigs to Jim Kimble. I talked to Jim and learned this was true but some tools and jigs were lost during shipment and he was working on replacing them. He also said he had about 20 systems on back order. I then called Aircraft Exhaust, Inc and talked to Rich Lopez.

Rich did indeed build slip joint exhausts. He has also been building these exhausts for the Murphy Moose M-14 application for years, and has an M-14 engine he uses for his jig. In our discussions, I told him I was convinced a large part of my high oil temperature problem was because of hot exhaust entering the oil cooler—this in turn is because of the short stack extension of the left ring protruding from the bottom of the cowling. The large amount of oil splatter on the oil cooler doghouse, the oil cooler itself, the belly, and the leading edge of the right wing coupled with the counter clockwise prop wash flow was my evidence. I asked if there was some way we could increase the rearward angle of each ring after it protruded from the cowling and increase the stack length, as well. He said he could ship my exhaust with a temporary swivel joint on the bottom of each ring and two lengths of PVC pipe to attach to the swivel joints to enable me to determine the rake angle and length of each extension. The extensions (aka “fangs”) would be secured to each ring with a pin clamp so I could use normal procedures to remove and reattach the lower cowl.

The last two items we discussed were a cabin heat muff and my smoke system. I fly in Boerne, TX. I don’t fly in winter any more, so I declined the heat muff. I wanted to use the same size smoke fitting on the new exhaust as my old one, so I sent Rich a picture of my current fitting locations and the section of my old exhaust containing the fitting. The price we settled on was $3800.

About two weeks later, a very big box showed up at my FBO! Over a two day period, I fitted the two rings, mounted the lower cowl, and played with the swivel joints to find the perfect rake angle and fang (I like this term) length.

The pictures show my 45° choice. I chose two fang lengths. The short set would end approximately flush with the bottom of the oil cooler doghouse and the longer set would end approximately one inch below the bottom of the oil cooler.

I bolted the swivel joints tight at the 45° rake and marked the PVC fangs at the two desired lengths. I then dismounted the rings and shipped the exhaust back to Rich for finishing.

About two weeks later, another giant box appeared at my FBO! Over three days drilling holes for my JPI EGT probes, mounting the exhaust, and putting the carburetor intake box and some other bits back on the engine. I had to tap two indentations in the left carburetor heat horn to fit around the new #5 cylinder.
exhaust pipe, and then I was ready to mount the lower cowl.

I wanted to mount the short fangs first to get a data point. I drilled the 0.25 inch pin clamp hole in each lower ring extension and fang. The holes are on the front side, so the bracket ends, bolts, and nuts are on the back side for streamlining purposes. With the top cowl latched into place, I was ready to fly.

I flew on a beautiful Texas February day with blue skies and 75° OAT. I did a normal takeoff and climbed to 6500 feet MSL. I flew a 10 minute cruise leg, gentlemanly aerobatics at max continuous power, and a normal pattern and landing. The sortie duration was 1.4 hours. These are my observations:

1. The exhaust is quieter. This may be because of the slightly thicker walls of the material Rich uses, the 45° rake, and the fang length.

2. My oil temperature ran much cooler than normal, and I had to actually close my oil cooler door and cowl flaps to get the oil temp up to 150°.

3. Post flight inspection revealed that the oil cooler dog house, leading edge of the right wing, and the belly were 90% cleaner with the new exhaust.

I was ecstatic! I’m hoping this cooler, cleaner running trend continues into the hotter, summer weather. I’m going to leave the short fangs on for the time being to collect further data points. When hotter weather comes, I will switch to the longer fangs to collect additional data.

I did notice that there was some blow-by at each of the slip joints and asked Rich about it. He said this was normal and it would take up to 25 hours for exhaust residue to build up in each of the joints and seal them.

As you can tell from the pictures, my new exhaust is very good looking. When the slip joints seal, and, if the cooler oil temperatures and cleaner airframe continue, I think I will be every bit as satisfied with my exhaust as Buddy was with his.

I will keep you informed and, if you have any questions, don’t hesitate to call or send an email to me.

Flying cooler, and oil free in Boerne, TX! ★

Terry “Mags” Slawinski
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