



Northern California
Aerobatic Club

CHAPTER 38

THE TACRONAUT

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Yak Attack. Harry Hirschman in form with his mother, Wilma.

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PLEASE PAY YOUR DUES. SEE THE LAST PAGE FOR DETAILS!

From the Editor

Che Barnes

Special thanks this month to Harry Hirschman and Michael Lloyd for taking the time to write a couple of excellent articles. It is much appreciated by the guy who put this newsletter together and they are great articles for all aviation enthusiast to read. Our club consists of an impressive cross section of folks with all different levels of experience and backgrounds and any opportunities to share stories and experiences via the newsletter are welcomed.

I pulled the plug early on Cory for the President's Post this month on account of my departure tomorrow for 30 days. He has been busy with Tracy Airport Day and critique sessions this weekend I am sure.

In the spirit of aviation stories and experiences, last month I was at the NTSB Training center in Sterling, Virginia. According to one of the directors, the facility was funded as a



Picture is from the internet. Pics were not allowed during the brief.

of the aircraft and we were privileged enough to get a briefing on the investigation and shown the aircraft remains.

It was pretty impressive. Some things I learned was that the accident boards are made up mostly of members not working for the NTSB. However, they have plenty of expertise and volunteers because of the amount of industry representatives with a vested interest. In this case, Boeing engineers were able to take a look at the metal remains found and match them to a large blue print that, eventually, led them to attach it to a large wire structure. The end result included seats in place on the inside of fuselage and a scene that brought on a tone of reverence in respect for the calamity that occurred on that evening in July. The gentleman giving the tour said that, on occasion, family members of victims still come by and lay flowers on the respective seat.

To make a long story short, the explosion was determined to be caused from some sort of errant spark that ignited fuel vapors in the center fuel tank. The situation that led to this was an empty tank with a small amount of unusable fuel in the bottom. The rather large air conditioner packs are located underneath this tank, and were running on the ground for an extended period. The heat generated was enough to heat the fuel above

its flash point. All that was needed was a spark. They are not sure what caused this spark, but believe it could have come from the fuel quantity measurement system.

When the explosion occurred at around 13,000 feet or so the front broke off just ahead of the wing and fell. The rest of the aircraft - burning from fuel leakage, pitched up to almost vertical. It was at this point that the sound from the explosion hit many of the witnesses on the shore. When they looked up, they saw a vertical smoke trail and fire and hence, most people thought what they saw was a missile. The plane then rolled right and entered a vertical descent with the right wing breaking off prior to impact with the water.

The missile theory was disproved in more than one way - and the evidence of the fuel tank exploding was very apparent when looking at the rebuilt wreckage.

The NTSB still has a recommendation to industry to install inert gas systems in fuel tanks - but it is not implemented. Currently, 747 drivers don't ever let the center wing tank get completely empty while running the AC packs on deck. Adding just a couple of thousand of pounds of fuel (not a lot for 747s) in the tank makes it impossible to heat the fuel up enough to cause the conditions for an explosion.

I hope all those at the various airport days and the critique sessions had a good weekend.

- Che

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Air Combat and Aerobatics: Yin and Yang?

Michael Lloyd



Cory asked me to write an article comparing and contrasting competition aerobatics with formation flying and air combat. Prior to getting into the meat of the subject, I feel compelled to offer two caveats. First, I'm new to competition aerobatics. While I've flown aerobatics for over 25 years, first in the Air Force, then the Yak 50 and Yak 52 over the last decade or so, and most recently with my new Panzl, the competition scene is new to me. This may lead to some obvious or naive observations; for that I beg your indulgence. Second, even with rigorous adherence to safety procedures, Formation flying, Tactical Formation (more on that below), and Air Combat Maneuvering (ACM) are inherently dangerous activities, and this article in no way should be taken as encouragement to participate in these activities without experienced instruction.

I'll begin with some brief descriptions to provide a basis for comparison to competition aerobatics. Formation flying, Tactical Formation, and ACM are building blocks developed by the flying military for the purpose of gaining and maintaining air superiority over an area by denying an adversary free use of airspace. More prosaically, the ultimate goal of all these flying disciplines is to shoot down other airplanes, and to avoid getting shot.

Formation flying was developed to effectively move multiple aircraft around the sky, and provides for mutual support in navigation, decision making, and threat detection. Good

formation flying requires discipline, predictability, and in general, smooth maneuvering.

Tactical Formation , or "Tac Form", is formation flying in a combat area with the goal of maneuvering two or more aircraft while maintaining maximum readiness to engage a threat aircraft. The Tac Form position for two aircraft is line abeam approximately 1,500' apart, and generally within several hundred feet altitude. From this basic position, the flight can be turned in any direction quickly to meet a threat by using a few standard types of turns.

ACM is what happens when a threat is engaged and each aircraft attempts to maneuver to a position to employ a weapon. When flying ACM between single engine propeller aircraft, the assumed weapon is typically a gun (as opposed to missiles), and the position from which a "shot" can be made is generally a 30 degree cone extending aft from the tail of the aircraft several hundred feet. This is the weapons employment zone (WEZ). ACM can involve aggressive, highly dynamic maneuvering, but more importantly, done well,

it requires strategic thinking and good situational awareness (SA), which is an awareness of the aircraft in space (where's the ground?; where's the other aircraft?), time (what will likely happen next?) and energy state (what is the airspeed, altitude and available thrust?).

One can see from the description above that there are some obvious differences between competition aerobatics and ACM. Perhaps the first and most apparent is that of aesthetics and precision vs. positioning the aircraft for a shot by whatever means available. Or as my ACM buddy Frosty aptly analogizes, "figure skating vs. ice hockey."

The goal of competition aerobatics is to fly each figure within the box with no deviations from the standard and with the timing, rhythm and symmetry of placement to produce an aesthetically appealing sequence. ACM, conversely, is solely about flying into your opponent's WEZ and keeping him (her) out of your WEZ, regardless of how the flying looks. Depending on the tactics used and how the engagement evolves, the flying can be pretty ugly by aerobatic standards, with massively skidded turns, abrupt jinking and other techniques to deny an adversary a shot. As famously put by a WWI ace, "Pretty flying never killed an enemy yet."

A second primary difference is that of a relatively controlled environment in competition aerobatics vs. a more dynamic

environment in ACM. While flying aerobatics in the box, the requirements of the flight and the majority of variables are known prior to entering the box, such as the dimensions of the box, the sequence to be flown, and the forecast wind. With ACM one clearly must start the engagement with a strategy, but depending on the opponent's actions, that strategy could change within seconds, and continue to change throughout the engagement. Each pilot must pursue a strategy to win, but also must react instantly to the other pilot's actions. The environment therefore is highly dynamic and requires pursuing a premeditated plan on one hand while anticipating and reacting to the other pilot's actions on the other.

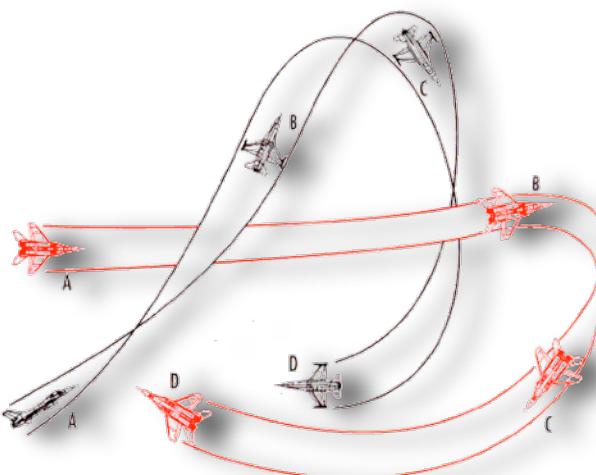
Lastly, and on the physiological side, is the character and duration of G loading. Competition aerobatics can produce extremely high G loading, both positive and negative, usually for relatively brief periods. In ACM, negative G loading is rarely used simply because it is not energy efficient or tactically effective, and extremely high positive G loading (9+) is rarely used because it is not energy efficient. ACM, however, can yield relatively high G loads (6-8 G) for quite a sustained period (30+ seconds) if the engagement progresses into a nose-low maximum rate-of-turn fight. An effective anti-G straining technique is essential to pursuing this type of fight.

Turning to the similarities between competition aerobatics and ACM, perhaps the most significant similarity is the need to balance aggressiveness with safety and good judgment. An aerobatic sequence flown aggressively and in complete control or engaging in ACM aggressively will both win the day over a hesitant aerobatic competitor or ACM opponent. Too much aggressiveness, however, jeopardizes safety, and an appropriate balance with safety considerations must be maintained. A good mental attitude on the part of all pilots is key to this balance, and pilots who sacrifice safety in the pursuit of winning need to be checked.

A second similarity is the need for both "stick & rudder" flying skill as well as the intellectual components of flying, including situational awareness, reacting effectively, pursuing a game plan, preparing thoroughly and maintaining discipline. Maneuvering the aircraft exactly as intended is clearly required in both disciplines, but the ability to deal with the "fog of war" in the form of an unplanned crosswind in the box, flying an unknown sequence intelligently, or countering a crafty ACM opponent, is

often the deciding factor in both types of competitions. Further to this point, committing the physical flying component to muscle memory is very beneficial in both disciplines as this allows more mental energy to be devoted to dealing with other factors that arise during the flight.

Another important similarity is the need for excellent familiarity with the aircraft and the ability to max perform the aircraft throughout the flight envelope. Knowing when you can squeeze out another second on a vertical line, hold altitude at maximum power and minimum airspeed while an opponent falls off, or snap efficiently while maintaining good energy all are the product of intimately knowing the aircraft's capabilities in all attitudes and airspeeds.



A related point is managing energy effectively and trading off airspeed for altitude at the appropriate time, or the ability to "know when to hold 'em, know when to fold 'em." Other than blatant errors, most ACM engagements are won or lost primarily through the pilot's ability to manage energy intelligently, just as an aerobatic sequence can score high or low depending on the quality of energy management.

Apart from the obvious differences between aerobatic competition and Formation/Tac Form/ACM, many of the skills required for aerobatic competition carry over directly to the formation world, and provide an excellent foundation for this type of flying. For aerobatic pilots interested in pursuing formation flying in a safety-oriented training environment, I encourage you to get involved in the RedStar Pilot's Association (RPA), and attend the annual fly-in, All Red Star, in Porterville, California every May. The RPA was originally formed to provide formation training and certification for owners and pilots of Yak and Nanchang aircraft, but is now expanding to include other formation-friendly aircraft with single or tandem seating, a bubble canopy and a low/mid wing. It's a great time, and you just may come away with a callsign you can repeat to your mother.

Michael Lloyd

"Freezer"

Mother-Son Formation Flight

Harry Hirschman

I owe my start in aviation to my mom. I would guess that when 95% of 15-year olds ask their parents if they can learn to fly the answer that comes from lack of familiarity is, "You're too young" or "It's too expensive" or some other form of "No chance". Since my mom had a pilot's license and had built a Vari Eze in our garage, the answer for me was, "If you take the ground school and pass the FAA written I'll pay for your first few lessons." And when those first few lessons had come and gone she had a conversation with the line manager at an FBO that lead to a job for me driving the fuel truck. This earned me money for flying and a discount on airplane rentals. Almost 30 years later I'm still at it, but she took a twenty year hiatus. A few years ago she jumped back in with both feet and now lives in a hangar at Santa Paula airport and flies an RV-10. She recently got her taildragger qual and completed an aerobatics course.



Wilma flew up to Palo Alto on a Saturday to spend a little quality time with two of her grandkids. Sam (7) and Julia (5) are mini fixtures at KPAO. They each learned to ride two-wheeled bikes on the tarmac. On this trip, Wilma got to watch Julia parade onto the baseball diamond with her team for the Little League opening night ceremony, then we had dinner at the house and watched a movie ("Lonely Hearts" directed by a flying friend, Todd Robinson -- good flick, go rent it). On Sunday it was time for her to head back to Santa Paula (KSZP).

My Yak was at Reid-Hillview airport for maintenance and this made the logistics a bit complex -- which by now I should realize is par for the course for me. So mother and son hopped in the RV-10 for the ten minute flight from KPAO to KRHV. There we were met by a good friend in his Yak-50 so my wife's fancy-schmancy camera could get passed to him. Wilma took off as a single while Keith and I departed as a flight of two behind her. There is something quite cool about sitting on deck at the hold-short line with a friend and watching your mom depart. I told him as much over the radio even though we were on the ground freq at the time.

There is certainly something about coming full-circle in me having such a feeling. It wasn't all that many years ago when she must have had the very same feeling watching me fly off the departure end of some airport as a teenager behind the yoke of an airplane. Since then I've had a lot of years flying a lot of planes in a lot of conditions, including flying FA-18 Hornets off of aircraft carriers. At this point of my life I've been flying more years than I haven't and somewhere in there the tables turned. Now it was the son's turn to be proud of the mom, who is young at 75. I would guess that she didn't give anything like that a second thought. She was busy flying her plane.

Mom circled over South County at 4500 feet so we could

rendezvous with her. My friend uses the callsign "Sniper" for the flights he leads and he checked us in on the pre-briefed tactical frequency, "Sniper flight, check in" -- to which I replied over the radio, "Sniper Two" (since I was the wingman, or second plane in the flight). A few seconds later mom surprised us from ten miles away by chirping in with the only transmission appropriate for that moment in a formation flight, "Sniper Three!" The smile in my cockpit was wide enough to break the canopy glass. Lead looked over his shoulder at me flying on his wing and gave a head-nod that told me he was thinking the same thing, "Your mom is the coolest!" But, of course, we maintained radio discipline and transmitted nothing.

Mom went from flying in circles all by her lonesome to having a Yak-50 off either wing in very short order. The actual photo-ex went very smoothly, despite the turbulent air. Anti-climactic is how formation flights are supposed to be and this one certainly lived down to that. Throughout the ten or fifteen minutes we flew in circles together Wilma was smooth and predictable, exactly as briefed. With her in a constant left turn, me stacked up on her right wing, and my friend on the inside of the turn snapping pictures we might have turned some heads had we not been up high over an unpopulated area.

When the photo-taking was all done my friend and I detached so that Wilma could resume her southward flight home. After a few minutes we relaxed our usual radio discipline to talk about how lucky we are to live in a country where we're able to do this kind of flying and how we want to be like Wilma when we grow up. Mom, you rock!

Keep your knots up,

Harry

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Che Barnes
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Next Chapter Meeting:
Sunday, May 10th, 4pm
Attitude Aviation
Livermore Airport, CA.