



FROM COMPETITION TO WARBIRD

It's not about the numbers.

In childhood, the dream of flying a World War II fighter often provides the spark to initiate flight training later in life. Pilots are faced with the grim reality that the costs of owning and operating a warbird are beyond one's reach. They find other ways to satisfy these primal urges for speed and challenge. In some cases, this takes the form of aerobatic competition in high performance aircraft that possess a character remarkably similar to the piston warbirds that old dreams were made of. A single close encounter with one of these forgotten warriors is all that is needed to reawaken their desire from youth.

Remember what started it all for you? Before taking my private pilot test, I had a ride with one of the Northern Lights in a Pitts S2B that changed my world forever. The take-off acceleration and departure deck angle alone were worth the price. The handling and thought-following response rekindled my childhood warbird dreams. THIS was going to be my little fighter! Thus began my journey into the world of aerobatic competition and air shows. Eventually, I had the opportunity to watch a Mustang fly a beautiful air show display. Next, I made the mistake of flying my Sukhoi in formation with this fighter after

the show. Finally, I sat in a Spitfire on display at a private museum. Curiosity and desire rose to a fever pitch. I just had to know:

“ Does an advanced aerobatic competition pilot have what it takes to fly aerobatics in a WW2 fighter? “ The answer is a resounding “Yes!”

Aerobatic competition pilots know that aerobatics provide the best way to learn an aircraft's complete flight envelope and makes them safer pilots in handling and avoiding emergencies. Most of these pilots have become proficient in a large number of high performance aircraft in their quest for the perfect competition plane. Give an aerobatic competition pilot a new airplane and they will spin, snap, and tumble their way to proficiency in a heartbeat. Taken a step further, four minute freestyle flying, and the related complex development of aerobatic maneuvering for air show flying, produces an awareness and management of gyroscopic forces, 3D spatial problem solving, and energy management that is second to none. This skill set provides the pilot with great insight in understanding the character of a piston warbird. Conversion into a WW2 fighter becomes straightforward, without difficulty or surprise. In addition, currency can be maintained in an aerobatic competition aircraft, sparing the vintage warbird from the learning and proficiency exercises that diminish airframe and engine life.



The T-6 is known as the Harvard in Canada

I started down my warbird path by demonstrating proficiency in the T-6, widely considered the only litmus test available for predicting piston fighter aptitude. This advanced pilot maker has most of the fighter characteristics in spades but is underpowered. It has the reputation of being difficult to fly, and is incredibly challenging to fly well. People used to say that if you could fly a Corsair then you could fly the T-6, implying that the T-6 was more difficult to master than the fighter. One common suggestion is

that a pilot should get two hundred hours in the T-6 before even thinking about flying a WW2 fighter. But after flying various Unlimited aircraft in contests and air shows, the “Terrible” T-6 felt like a big lovable toy. I spent an hour putting it through its paces and immediately grew accustomed to the wing and weight. The T-6 was a quick rehearsal for managing fighter systems and procedures, not some beast that took hundreds of hours to finally master before stepping in a fighter. I flew it from the back seat and, after demonstrating three proper landings on my second flight, was given the opportunity to fly a Spitfire. It’s not always about the numbers. Most of my warbird preparation had already been accomplished by flying a Sukhoi in aerobatic competition and air shows for many years.

The Sukhoi proved to be a much better trainer than the T-6 in preparation for the Spitfire. Most of the critical operating requirements of the Spitfire are present in the Sukhoi to the same degree: Poor prop-to-ground clearance. Easy on the brakes to keep the tail down. Free-swivel tailwheel and brakes-only to taxi. Same power to weight ratio. Same engine torque. Equivalent gyroscopic forces. Same pitch sensitivity. Similar control harmony. Watch the radiator temp in the Spitfire, or watch the cylinder head temp and oil temp every few seconds during an eight minute aerobatic freestyle in the SU26. Curving approach with same speeds. Same sight picture. Same dumb grin on my face. My background had prepared me well for this warbird challenge.



The Spitfire Mk.IX was known to respond to thought and fit like a glove. Sound familiar?

When given the opportunity to fly the Messerschmitt Bf109E, it was again the experience with Pitts, Extra, and Sukhoi aircraft that eased my conversion. While the T-6 was again useful for systems review, the handling was too sedate to prepare for the frenetic behavior of the Bf109. Drawing on the experience of landing a Pitts S1 with a broken tail post in a crosswind was valuable. Experience controlling and utilizing huge gyroscopic forces in the Sukhoi during air show flying was priceless.



The BF109E shares more traits with the Pitts S1 than any other existing aircraft.

Having a complete power failure in a fighter made me cherish the experience of thousands of power-off Pitts and Sukhoi landings with 4:1 glide ratios or worse, and at the same speeds. If you fly a warbird piston fighter or a competition aerobatic aircraft long enough, mechanical emergencies will come, with blown engines, broken oil lines, lost canopies, and bad brakes (insert your own personal experience...) uncomfortably common in both. Seventy year old airframes should not be pushed to explore the edges of their original design envelope. An Extra 300L, however, provides a worthy alternative in rehearsing the necessary skills to simulate Warbird emergencies, with aileron use disciplined to 90 degree/sec roll rates. Engine outs, stalls, and snaps can be placed at all the dangerous places, preparing the pilot for warbird emergency management in an aircraft that will not be dangerous at G loads that would break or damage a fighter.

To better appreciate the similarities between warbirds and aerobatic competition aircraft, consider a flight in a WW2 fighter from the perspective of an aerobatic competition pilot:

Huge amounts of engine torque, p factor, and gyroscopic forces combine with inadequate control authority at slow speeds to require a gradual application of throttle on the takeoff roll. If you don't rush it, the forces will be similar to your aerobatic aircraft. You may even use up less runway width than your first Pitts takeoff. The noise is either ungodly wicked or heaven, depending on your testosterone level. Preflight use of competition style visualization is invaluable in keeping up with the airplane and preparing for emergencies.

WW2 fighters have half of the departure deck angle of an Extra, yet achieve the same climb rate with a V_y in the neighborhood of 170 mph. Many of the pilot notes recommend rudder trim on takeoff, but if you are not climbing to 30,000 ft in search of the enemy, most can be flown with neutral rudder. After gear and flaps are up, fighters have been designed to keep the workload down, with a panel scan requirement similar to a high performance competition plane. If you are a Sukhoi pilot, you will be used to monitoring and maintaining CHT and oil temp to a fine degree. This serves you well in a 1600 hp Merlin powered craft that will be on fire if a problem disables the radiator cooling system. In liquid cooled engines, you will need to substitute radiator temp for CHT in your continuous scan. Power changes should be slow to preserve engine life, with TBO's that can be anywhere from 100 to 1000 hours in different warbird types.

Several fighters were approved for dive speeds in excess of 500 mph, though control forces can stiffen until they feel locked in concrete at that speed. Aerobatic maneuver entry speeds for most piston fighters are usually in a range from 260 to 300mph., achievable in a Sukhoi, impossible in a T-6. Pitch forces can vary from 3 pounds per G in a Spitfire to almost 20 pounds per G in some US fighters. Ailerons can be fingertip light below max cruise speeds, while two hands may be required to achieve max roll rate at higher speeds. Roll rates are generally between 80 and 120 degrees per second. Some fighters will get an aileron stall and snatch the stick out of your hands if moved too quickly at low speeds.



This is no place to learn an aerobatic maneuver for the first time.

Loops in a 1600 hp warbird require significant rudder to compensate for propeller slipstream when slow. Gyroscopic forces are strong. Delayed or excessive rudder corrections during slow flight phases can produce a snap roll or spin in a fighter with as much surprise as in a Pitts but with far more dramatic results. The competition pilot is used to using similar forces in an aerobatic plane to complete advanced figures. Many fighters are not approved for spinning or are placarded against spinning below 10,000 ft. Some demand 5000 ft for a recovery from a one turn spin, suggesting that these particular aircraft might be intolerant of flying at this edge of the envelope. There are also piston fighters that could easily do a Sportsmen routine, if you had the money to risk the published oil pressure limitations. This would require at least a 6000 foot box to work in, due to speeds and loop diameters. The piston fighter has a freight train of momentum, making the prolonged 4G around a 2500 foot diameter loop require as much straining as 8 G in an aerobatic plane, exacerbated by an upright seat position. While design lim-

its allowed 7 G in combat, current WW2 fighters will benefit from skilled aerobatic pilots who have a feel for limiting G load to 4 G with enough accuracy to prevent increased wear and tear on a 70 year old air frame. These aircraft must be preserved for many generations, not discarded at 2000 hr like some plastic unlimited planes. Don't even think of snap rolls or tumbles unless you want to retire the airframe (or yourself) forever.

None of the fighters have a true inverted fuel and oil system. Inverted flight is limited to a few seconds. Or your wallet. You must keep ALL maneuvers positive to preserve the engine life. Setting elevator trim to maintain hands free level flight, point rolls are allowed to become barreled with about 0.3(three-tenths) G maintained at the stops with neutral stick. Warbird cubans demand that the roll component begin in a barreled manner before reaching zero G on the downlines. Verticals must stay slightly positive. If you see zero oil pressure during any maneuver, land immediately, lock yourself in a room with a Luger and do the right thing!



Bare minimum instrumentation + set and forget controls= pilot focused on one thing: winning

When flying an aerobatic competition plane, one can easily land from any approach angle, any airspeed, and make big changes at any altitude. With low mass and low wing loading, corrections happen immediately. The fighter demands a highly stabilized approach to keep a more predictable energy state before you rotate. A variance of 10 mph in speed can result in huge changes in attitude and sink rate during the approach. Corrections take time with heavier mass and high wing loads. Of course, this is important in all aircraft. You are just punished more severely for getting it wrong in the fighter. With some fighter types, there is the very real danger of an unwanted snap roll trying to go-around with a hurried full power input coupled with inadequate control authority at landing speeds.

Unlike the aerobatic competition plane, fighters also have very little control authority during roll outs. Once the tail starts to swing, it is gone! The good news is that the sight picture is the same in a fighter as an aerobatic competition plane, and that the footwork skills you have cultivated in your Pitts will directly translate into good fighter landings.



Multiply the pucker factor of your first Pitts landing by two

The current warbird culture does not have enough familiarity with the limited number of seasoned aerobatic competition pilots to understand and accept what this skill set has to offer- the ability to find the edge of a high performance airplane and play there, learning every idiosyncrasy. This is a skill that has been quantified by judges and refined with feedback from coaches. In comparison, two hundred hours of T-6 time MIGHT mean that a pilot has repeated the same one hour mistakes two hundred times, avoiding the challenging areas of the envelope that build the understanding necessary to fly piston fighters safely. Advanced competitors fly machines that are more like the fighters than the original trainers with a better match of power to weight, power-off glide ratio, gyroscopic forces, and speed of maneuvers. With sufficient altitude, performing aerobatics in the warbird will give the seasoned aerobatic competition pilot few surprises. The skills gained during the expansion of the aerobatic envelope allow the increased ability to respect boundaries imposed by age and/or type better than the rest. Situational awareness, engine management, and energy management - this is what the advanced aerobatic competition pilot does best. Contest box savvy transfers to warbird air show flying. Yes, the advanced aerobatic competition pilot has what it takes to fly aerobatics in a WW2 fighter! The greatest challenge remains convincing the warbird community of this new paradigm in building complete proficiency and finding the opportunities to prove it.



Photo of Canadian Heritage Flight by Dave Cheeseman.