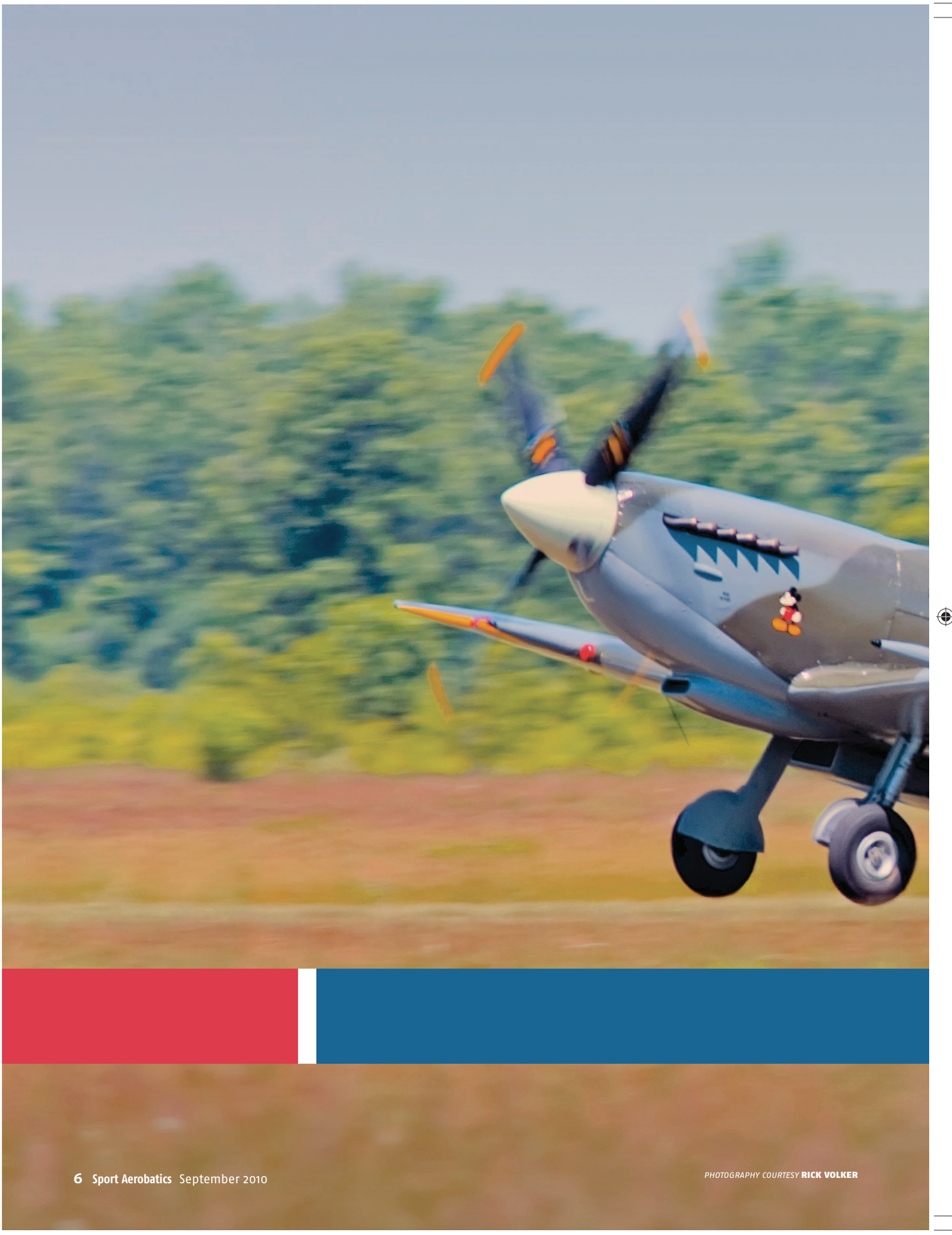

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From Competition to WARBIRD

BY RICK VOLKER

. . . It's not about the numbers

During childhood, the dream of flying a World War II fighter often provides the spark to initiate flight training later in life. Many pilots are faced, however, with the grim reality that the costs of owning and operating a warbird are beyond their 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 of which old dreams were made. For those who have pushed the dreams aside, a single close encounter with one of these forgotten warriors is all that is needed to reawaken their youthful desire.

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 S-2B that changed my world forever. The takeoff acceleration and departure deck angle alone were worth the price. The handling and exhilaration 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 WWII fighter? The answer is a resounding yes!

CROSS OVER

Aerobatic competition pilots know that aerobatics provides 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 he'll spin, snap, and tumble his 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 produce an awareness and management of gyroscopic forces, three-dimensional spatial problem solving, and energy management that are second to none. This skill set provides the pilot with great insight in understanding the character of a piston warbird. Adapting to a WWII 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.

I started down my warbird path by demonstrating proficiency in the T-6, widely considered the only litmus test available for

ABOVE: Rick flies his Sukhoi SU-26M with Patti Wagstaff in Jim Beasley's P-51 Mustang.

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

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 Corsair. One common suggestion is that a pilot should get 200 hours in the T-6 before even thinking about flying a WWII 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

CANADIAN HERITAGE FLIGHT PHOTOGRAPHY BY **DAVE CHEESEMAN**

The T-6 is known as the Harvard in Canada.

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

demonstrating three proper landings on my second flight, I 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 Sukhoi SU-26. Curving approach with same speeds. Same sight picture. Same dumb grin on my face. My background had prepared me well for this warbird challenge.

When given the opportunity to fly the Messerschmitt Bf 109E, again it was the experience with different Pitts, Sukhoi, as well as the Extra that eased my conversion. While the T-6 experience was again useful for systems review, the handling was too sedate to prepare for the frenetic behavior of the Bf 109E. Drawing on the experience of landing a Pitts S-1 with a broken tail post in a crosswind was valuable. The experience of controlling and utilizing huge gyroscopic forces in the Sukhoi during air show flying was priceless.

Having a complete power failure in a fighter made me cherish the experience of thousands of power-off Pitts and Sukhoi landings with 4-to-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 shouldn't 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

CANADIAN HERITAGE FLIGHT PHOTOGRAPHY BY **DAVE CHEESEMAN**

degree/second 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 won't be dangerous at *g*-loads that would break or damage a fighter.

COMPARISONS

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

Huge amounts of engine torque, P-factor (left-turning tendencies of aircraft with a propeller), 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 heavenly, depending on your testosterone level. Preflight use of competition-style visualization is invaluable in keeping up with the airplane and preparing for emergencies.

WWII fighters have half of the departure deck angle of an Extra, yet achieve the same climb rate with a V_Y (best rate of climb speed) in the neighborhood of 170 mph. Many of the pilot notes recommend rudder trim on takeoff, but if you aren't climbing to 30,000 feet 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're a Sukhoi pilot, you'll be used to monitoring and maintaining cylinder head temperature (CHT) and oil temperature to a fine degree. This serves you well in a 1,600-hp Merlin-powered craft that will be on fire if a problem disables the radiator cooling system. In liquid-cooled engines, you'll need to substitute radiator temp for CHT in your continuous scan. Power changes should be slow to preserve engine life, with time between overhauls that can be anywhere from 100 to 1,000 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 300 mph—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 U.S. 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.

. . . control forces can stiffen until they feel locked in concrete . . .

Loops in a 1,600-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 applying similar forces in an aerobatic plane to complete advanced figures. Many fighters aren't approved for spinning or are placarded against spinning below 10,000 feet. Some airplanes demand 5,000 feet 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 Sportsman routine, if you had the money to risk the published oil pressure limitations. This would require at least a 6,000-foot box to work in, due to speeds and loop diameters. The piston fighter has a freight train of momentum, making the prolonged 4*g* around a 2,500-foot-diameter loop require as much straining as 8*g* in an aerobatic plane, exacerbated by an upright seat position. While design limits allowed 7*g* in combat, current WWII 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 airframe. These aircraft must be preserved for many generations, not discarded at 2,000 hours 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,

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

point rolls are allowed to become barreled with about 0.3*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!

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 when 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 rollouts. Once the tail starts to swing, it's 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.

The current warbird culture doesn't 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, 200 hours of T-6 time *might* mean that a pilot has repeated the same one-hour mistakes 200 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 ratio, 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—these are 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 WWII fighter! The greatest challenges remain convincing the warbird community of this new paradigm in building complete proficiency and finding the opportunities to prove it. IAC