The Messerschmitt Bf109G Rick Volker

It was a most unexpected phone call. Mike Spalding, chief pilot at the Fighter Factory and friend, had warned me a year ago that the museum was awaiting delivery of a newly restored Bf109G. Since I had Bf109E experience, I would be asked to help check him out when it arrived. But todays' call contained far more intrigue. The Fighter Factory was holding its annual air show in one week. The Bf109G had arrived late, and no one was trained yet to fly it in the show. Would I like to fly it?

I can think of no other aircraft in the history of the world that elicits a wider range of strong emotions in all who are exposed to its character. The Spitfire, you say? It is full of resourcefulness, love, passion, and grace. The "Spit" is indeed much more than the sum of its parts, like the Bf109. But without any challenging traits, it is as German Aces have declared, an impossibly simple kiddie toy. It has no way of biting you. When a novice Spitfire pilot has applied too much brake on the ground, the tail comes up so slowly that they have time to wind their watch and tear up their pilot license before flipping the switches off to save their prop and reputation. The Spitfire has the soul of a kind being, reluctant but still quite capable in the hunt.

The Bf109, in comparison, drains blood from all whom it touches. It makes no design compromise to coddle toddler pilots. It demands the very best performance from the very best pilots and charges the ultimate price for inattention. When the Bf109's idiosyncrasies were embraced and utilized by "Experten", it forever became the Darth Vader of aviation. Those who have witnessed the aircraft's soul experience the same eerie feeling prompted by lines in "The Terminator" motion picture: "It can't be reasoned with. It can't be bargained with. It doesn't feel pity or remorse or fear, and it absolutely will not stop. Ever. Until you are dead. After 3 flights to sort out the newly restored Bf109G, it is my obligation to provide the following window into the character of this weapon for both aviators and non-aviators.

My brief history: Unlimited category aerobatic competition in Pitts and Sukhoi, followed by many years of air show flying, with 10's of thousands of lomcevaks and related maneuvers from every possible condition of flight. I have also been lucky enough to fly years of surface level aerobatic solos in a Spitfire Mark IX, an air show dogfight demo in a Messerschmitt Bf109E versus a Hurricane, a solo Hurricane demo, and finally, extreme air show flying in my own North American Harvard, replete with tail-slides, avalanches, rolling turns, hammerheads, etc. I am stimulated by finding ways to make aircraft fly at the edge of their envelope. When given the opportunity to fly a Messerschmitt, it was my experience with Pitts and Sukhoi that eased the conversion. While the Harvard was useful for systems review, the handling was too sedate to emulate 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.

My perceptions of the Bf109G:

"Black 1" has angular sharp lines, and a beauty created when form follows function. This beauty belies great underlying strength. Open any compartment or cowl, move any lever or switch, and your impression is of precise fit and finish. The wings are small. The tail is tiny. The aircraft is built around the massive Daimler Benz DB605 masterpiece of an engine as if its creators had vacuum formed every part, so as not to allow 1 mm of space to enlarge the final product. This aircraft is significantly smaller than other contemporary fighters. Think of an armored Extra 300 with 1500 hp., painted in shades of grey and black. The dark soul of this aircraft would turn any other paint scheme black in one flight. In comparison, shark tooth paint schemes on other fighters seem like aircraft codpieces. Cheers to Meier Motors in Germany for achieving both mechanical and esthetic perfection of this restoration.

Entering the cockpit is similar to putting on a bespoke suit. The fit and ergonomics are way ahead of the time. The seating area seems to have a perfect human size shape carved out of a steel ingot. The pilot never has to brace to prevent body movement during maneuvers. Feet are raised. Knees are raised. Seat is reclined for G tolerance. The geometry of the 4-point seat belt attachment is perfect for emergency negative G flight. Relax while all the other pilots burst their blood vessels straining in their upright seats. As you visualize your flight and go through all of the usual procedures, close your eyes and imagine where something should be at each step. Reach out and touch. Open your eyes now. That is exactly where it is.

The E model has a busy workload with manual oil cooler doors, manual radiator doors, manual propeller pitch and a stiff T handle for landing gear retraction that requires the same wrist movement as pulling a tooth. The G model has a drastically reduced workload and effort. There are little push buttons for selecting landing gear, automatic oil cooler doors, automatic radiator flaps, and finally, automatic propeller pitch control that works. There is no mixture control. The stick design is of perfect angle and length. There is no friction of any kind in the flight controls. The rudder pedals copy and contain the exact shape of the foot, so that in negative G flight, your feet stay put.

The canopy is small and full of vision blocking metal between panes but the pilot's head is so close to the glass that he can see down and around much better than expected. You will need to be able to do 20 kg dumbbell presses to move the heavy canopy up and down. Of course, this is expected of pilots who also possess the strength of character needed to satisfy this aircraft.

The DB605 starts explosively and easily, hot or cold. If any amount of throttle is left open, the aircraft literally jumps into the air with excitement. Throttle response is violently quick. This engine behaves like a nitroglycerin-powered dragster with a light flywheel. Moving the throttle too quickly produces 2600 rpm and full boost in ½ of a second. The prop design converts this power into seemingly infinite static thrust. In comparison, a Merlin responds much slower to throttle inputs, but is

equally smooth in flight. Pulling the spark plug cleaner handle changes the ignition timing, retards the rpm, and belches fire and smoke from the exhaust. The engine crackles and is slightly irregular at idle, as if it had been highly modified for racing. The aircraft is saying, "Do I have your attention yet? Because in a minute, I will demand all your courage, all your love of country, and a laser focus to fully utilize the forces I am about to reveal to you."

Taxiing the airplane is easy. Blasts of power with frequent stabs of brake are needed to initiate turns, with no risk of the heavy tail coming up. In less than ten minutes, you must either take off or shutdown, due to rising radiator temps.

Bf109 takeoff drama is the stuff of nightmares. Everything you have ever heard is true. German aces all experienced loss of control accidents. Recent test pilots have not been immune either. Everyone will be challenged to the limits of their ability sooner or later. I thank German ace Oskar Boesch for giving me my Bf109E check out. Despite this preparation, the Bf109 has at times required everything in my playbook, all in one moment, to keep under control. I treat this aircraft as a priceless jewel, changing all parameters of use to limit risk. Never use hard runways. Never accept more than a 10-knot crosswind on grass. Never use runways with any obstructions anywhere in sight. Running off the runway should involve embarrassment, not injury. The pilot must respect the constraints of a landing gear design that permitted the wingless fuselage to be rolled into a rail car.

Poor ground handling traits are only partly caused by the narrow wheel track. The extreme tipped outward angle of the wheels as they meet the ground is what instigates most excursions off of the runway. If any more weight is placed on one main wheel than the other, that wheel gets more traction and turns the plane to the other side. Every bump, crosswind, and the rotational torque from any power change makes this craft carve a turn like a bicycle wheel rolled while leaning to one side. Watching a Bf109 take off on grass from behind sheds much light. Once the tail comes up, the aircraft yaws to the side by 10 degrees. Each tire struggles for dominance over the other. Grass is thrown out in little rooster tails. Imagine each wheel as a heavyweight boxer in a title fight, with you as the undersized referee, too weak to guarantee complete control. To stop a divergent arcing turn, there is at your disposal one tiny rudder optimized for high-speed flight and weak brakes that were rarely needed on large, open fields.
Ground stability is further degraded by the high center of mass of the engine and the overpowering gyroscopic behavior of the propeller. Raising the tail fast gives such a large yaw to the left that the small rudder is unable to compensate. Oskar Boesch felt the most important information for me to learn was first, the correct rate of throttle movement from idle until tail raise, and second, the ideal rate of moving the control stick forward to raise the tail into the exact flight attitude. Huge increases in safety would come from that discipline alone. He put his hand on mine and rehearsed the exact speed of all control movements, imagining a glass of champagne sitting undisturbed on the panel through the entire takeoff roll. The Bf109 rudder must be frenetically moved to maintain heading on takeoff, never allowing the

aircraft to diverge. It has been said that if the direction of takeoff roll is allowed to change, one must not try to correct, but instead accept the new heading until off the ground. Attempts to correct with strong opposite rudder result in such severe over-steer, that the ensuing high-speed ground loop toward the other direction could be deadly. Can you see how this is unlikely to work on a narrow runway with trees on each side?

A Bf109 always skips a few times before starting to fly, as it must be convinced of your competence again and again before finally handing over the reins of control. Once airborne, acceleration and climb angle are extreme, and combined with runaway freight train acceleration downhill, this fighter plays the energy card better than most.

The E model has a lightning fast roll rate and response at slower speeds, but stiffens up to match the competitors from cruise speed and up. The G is slower in roll than the E, but varies less with speed change. Roll performance in the G is similar to the Spitfire Mark IX, but feels better at high speeds. Elevator forces in the Spitfire are always light. The Bf109E and G have elevator forces that increase logarithmically with speed. The stick forces used in pulling out of a fast dive remind that German pilots were naturally assumed to be strong. Pilots are advised not to use trim to compensate.

Fluid yaw stability is a shared trait of all the Bf109 series. It wants to be told what to do with the rudders every second and it delivers instantly, giving opportunity to yaw with minimal drag for a deflection shot or to provide subterfuge and evasion. Precise controls feel hand made and adjusted like a fine watch. Move anything one mm, and you will get exactly one mm of aircraft movement, with no slop or delay. There is the feeling of enough airframe rigidity and strength to fly through a tornado unscathed. Controls for radiator and propeller are switched into automatic once gear and flaps are retracted. All that is left is a desire to hunt.

Wing loading is high, even for a WW2 fighter. Leading edge slats automatically drift out during increased angles of attack to mimic a larger wing. It works brilliantly. On paper, the Bf109 should not be able to stay with a Spitfire in a turn. In the real world, half of the German aces claimed they were always able to stay with Spitfires and Hurricanes in turns. How is this possible? The Bf109 accelerated stall behavior is more benign than its competitors, allowing highly skilled pilots to fly closer to the edge of control without penalty. At any speed and G load, slight relaxation of the stick instantly returns the stalled wing to normal flight. While the winners of wars have written the history books and declared the Spitfire as King, I agree with the German aces that the Bf109G is every bit the match of the Spitfire Mk IX in overall flight performance.

Landing the Bf109G brings you into the final of this challenge match. Longitudinal stability and speed control befitting a DC3, combined with a steep nose down attitude and great visibility lull you into a false sense of security. The E model

droops the ailerons as full flaps are rolled in, making roll response very heavy and approaches at 140kph. The G model approaches at 180 km/hr. to smoothly flare and land in a 3-point attitude. This plane sits down very well and suggests to you it does not feel like flying any more. Rollouts are short. I flew an E model out of an 800-meter grass strip with a 15-meter obstruction at the approach end without any problems. The Bf109 usually rolls straight after touchdown, but sometimes careens and arcs wildly off on a new direction as if you jumped onto a curving railroad track. Landing gear geometry, combined with high motor CG, aft longitudinal CG, and ineffective rudder, can demand occasional strong brake use to keep rolling straight. In comparison, take offs are far more traumatic. Aces said that if you survived the takeoff, you would likely survive the landing.

Listen to a Merlin engine and hear a beautiful symphonic sound. To hear a sound like a Daimler Benz DB605, start with a Merlin, put in a racing camshaft to make the idle coarse, jack up the compression and cut down the exhaust pipes until each cylinder crackles, and then garnish with the shriek of 1000 tortured souls that is the DB605 supercharger. It is simply the most sinister sound in the universe. Being attacked by something with this sound would make any person curl up in the fetal position on the floor and cry like a baby. Any exposure to this instrument of war will permeate your soul and imprint itself there forever. Non-aviation people who stumble upon it at an air show can be talkative and laughing around all the rest of the aircraft, but when they lay eyes on the 109, all go quiet, not knowing but feeling this unstoppable force that is the Bf109G. Witness the Bf109G. You will forever regard it with reverence and respect