Falco Builders Letter

Steve and Al Dubiak with the 67th Sequoia Falco to fly.

N1443D

by Al Aitken
Falco builder Al Aitken is a graduate of the Patuxent River Navy Test Pilot School and is largely responsible for the Falco Flight Test Guide.

Somewhere hidden among the thousands of names etched into the walls of Ellis Island can be found inscribed the names of a young Ukrainian couple whose destiny was to start a chain of events that would eventually result in the birth of a magnificent new Falco. They came to America sometime before 1914 and settled into central Wisconsin, became dairy farmers and carved out a new life for themselves and the twelve children they would soon begin having. Among their children was a young boy they named Steve Dubiak who was born in April of 1914. Growing up and working on his parents' farm, Steve developed a mechanical acumen that would eventually lead him from that farm and add the catalyst needed to continue this chain to the main event in this story.

Eventually Steve, having migrated to the Chicago area and working as a mechanic mostly on machinery, grew into a hard-working young man with mid-western values and an eye for things of mechanical beauty. He had an eye as well for the beauty of a young Polish girl named Ann and married her sometime before 1943 thus setting the final course in this chain of events.

In 1943, Al Dubiak was born to Steve and Ann, and within days it seems, he was able to machine a flywheel driveshaft to within tolerances of less than one half of one thousandth of a millimeter. Indeed, Al had inherited his parents' mid-western values and his father's mechanical abilities and then some. Connoisseurs of mechanical beauty naturally gravitate toward aviation, for the beauty of flight and the gracefulness of curve found in the vehicles that produce it are unmistakable. This was the basis for Al Dubiak's aspiration to join the Air Force, an aspiration that passed unfulfilled due to his family's needs. And thus began Al's attraction to private aviation, a path that would lead him eventually to the Falco.

It was, in fact, in a private rental airplane that Al Dubiak had his first date with a young, attractive woman named Debbie, a future beautician and an animated girl with a witty sense of humor who spoke Chicagoian fluently and who would eventually become his wife and the mother of two of his daughters. Al's affinity for airplanes and Debbie's tolerance for Al's affinity lead them to own a Piper Arrow for a number of years and summoned them to the airplane lovers' Mecca known as Oshkosh. It was here that Al Dubiak met Alfred Scott and discovered the Sequoia Falco. Not long after, in the early 90's, Nancy and I met Al and Debbie at Rosegill during one of Alfred's Great Oyster Fly-ins.

Actually, the crossing of our paths was set in motion in 1922 when my father, Thomas Aitken, arrived at Ellis Island with his sister and parents from Scotland. He was the son of a carpenter named Alexander, a good man who was a meticulous craftsman. They settled in Stamford, Connecticut where my father grew to become an adventurous young man who joined the Navy and learned to work on aircraft radial engines. He met and married my mother, Muriel Ann, the daughter of an Irish couple from Troy, New York and after World War II, they settled in California where I, their second son, was born in Oakland.

It was my father's work with aircraft in the Navy that attracted me to flying and led me to my Marine Corps flying career and my attendance at the Navy's Test Pilot School. And it was there in 1979 that I met a fellow test pilot named Ken Cockrell, now a Space Shuttle Astronaut, who introduced me to the Falco brochure and set the wheels in motion for my involvement in my own Falco project and my attendance with my wife, Nancy, at that same Great

In This Issue:

Oyster Fly-in where we met Al and Debbie Dubiak in the fall of 1993.

In 1995, I flew to Chicago and had dinner with Al and Debbie and had an opportunity to meet his father, Steve, and see first hand the meticulousness with which they crafted his Falco wing. It was nearly complete but not yet fully skinned. Their woodworking skills were enviable, and it was obvious they worked well together as a father-and-son team and thoroughly enjoyed their project together. We talked casually about flight-test philosophies and processes, and I agreed to Al's request that I fly his Falco on its first flight. Judging from what I saw that night, I was confident his Falco would be well built.

Five years later, Al called me and announced they were getting close to completion. We talked about the logistics involved and of the fullness of my schedule. We agreed to stay in touch more frequently as their project drew to a close. That was sometime in the spring of 2000. And finally in January of this year, Al Dubiak asked me to come to Chicago to fly his Falco, that he had obtained his experimental certificate and that he was anxious to see his airplane in the air. My schedule delayed us for another few months until March 27, 2001, my father's birthday, when I had the honor of breathing life into Al Dubiak's Falco.

I had arrived at Chicago's O'Hare airport on an early flight from Washington, D.C. at 7:30 that morning, and drove with Al to the DuPage airport nearly 30 miles west of the city. My first look at his Falco gave me pause. With its flat gray primer and cowling blisters to accommodate its hidden 180 horsepower Lycoming, it seemed majestic yet graceful like a cross between a Cheetah in full stride and a whiskered Tasmanian Devil daring me to mess with it. It looked bigger and sturdier than other Falcos I have flown. And it looked like it was ready to fly.

I walked around it twice intending simply to view it in a macro sense but kept getting drawn to closer inspection of details that begged for attention. Details like the absolute straightness of the elevator and rudder trailing edges and the installation of countersunk machine threads buried in the spruce allowing the use of machine instead of wood screws for the attachment of the rudder and elevator hinge point covers. Details like the perfectly fitting Nustrini canopy shirt fairing that Al and his father had made from scratch because they were not satisfied with the fit of the stock fairing. And most impressive to me, after having flown more than ten different Falcos was the ease with which I could move the canopy. Very light pressure with one finger was all that was required to glide the canopy effortlessly on its rails. As I looked, Al explained his registration number, N1443D, "14" for the year his father was born, "43" for the year he was born and "D" for Dubiak. I commented to Al that he should plan to show his Falco at Oshkosh after painting and then I set about to thoroughly inspect it inside and out for the next four and a half hours or so.

Try as I did, I found literally nothing wrong with it. And so, after a welcome ham sandwich, some chips and soda pop provided by Debbie, it was time to get on with the high-speed taxi tests as described in the Falco Flight Test Guide. Al had installed only the left seat for the first flight, leaving the other seat and all of the internal covers out to enable us to monitor the inner workings between taxi runs and prior to flying for the first time. As I strapped in, I was immediately aware of the lack of headroom with the standard height Nustrini canopy that Al and his father had installed. They had not elevated the canopy as some other Nustrini builders, like Pawel Kwiecinski and

The Falco Builders Letter is published 4 times a year by Sequoia Aircraft Corporation, 2000 Tomlynn Street, Richmond, Virginia 23230. Telephone: (804) 353-1713. Fax: (804) 359-2618. E-mail: support@seqair.com Publication dates are the 10th of March, June, September and December.

Subscriptions: $16.00 a year, $20.00 overseas. Available only to Falco builders and Frati airplane owners.

Articles, news items and tips are welcome and should be submitted at least 10 days prior to publication date.

Joel Shankle had done. With the canopy closed, there was little room for my shoulder and head without hunching slightly forward and leaning slightly inward.

The Garmin GNS-430 GPS worked perfectly and allowed me to compare the GPS ground speed readout with the airspeed indicator, satisfying me the airspeed gauge had adequate accuracy for flight. Directional control taxi tests proved adequate directional control existed at airspeeds on the runway up to about 50 KIAS. Lateral control taxi tests indicated slightly different results between left and right applications of full aileron. As I slowly accelerated with full left stick, there seemed to be little response in terms of right wing rise until about 43 KIAS, at which point the right wing showed a slightly abrupt rise. The same test repeated with full right stick produced a more typically gradual rise of the left wing beginning at about 20 KIAS.

The elevator control test was a little dicier. Holding full aft stick from the beginning of the run, I slowly accelerated and, at about 10 to 20 KIAS, I pumped the stick full forward and was able to compress the nose strut as expected. Returning the stick to full aft, I noticed no rise in the nose until about 45 KIAS at which point the nose began a slightly abrupt rise. I immediately neutralized the stick and retarded the throttle to idle but somehow bumped the throttle back up and the Falco lurched forward in what seemed like a hop and a skip before I was able to get the throttle back and the airplane under control again. It definitely wanted to fly.

The taxi tests now complete, I taxied into the ramp area at the base of the DuPage airport tower. There was a sizable crowd of Al and Debbie's friends and family members, all with cameras and many with video cameras and tripods. We gassed back up to half a tank in each of the front and aft tanks and looked the airplane over carefully for signs of problems of which we found none. The weather had almost completely cleared up, there was still a little over an hour of daylight left and there just wasn't any longer any reason to stay on the ground. I had a mission to accomplish and thought it best I get it done.

Fired up again, I taxied to runway 19R and accomplished one last engine run up and check, completed the checklists and called tower for takeoff clearance requesting a gradual climbing right turn to remain over the airport at 3,500 feet MSL. Clearance received, I taxied onto the runway, stopped and reset the directional gyro and, at 5:00 pm CST that Tuesday, smoothly added full power and began the takeoff roll that completed this chain of events started by two young Ukrainians nearly a century ago.

Acceleration was quick, requiring a moderate amount of right rudder to counter the torque, and with slight aft stick the Falco broke ground at 60 KIAS and climbed away at about 12 degrees attitude and an estimated 30 degrees climb angle. I left the gear down, the power full, raised the flaps at 2,000 feet MSL and turned off the auxiliary fuel pump. Leveling at 3,500 feet MSL required a reduction in power to about 17 inches of manifold pressure and about 2,400 RPM in order to remain below the gear speed of 108.5 KIAS. All of the engine instruments had remained in the green and the engine ran smoothly throughout the climb and level off. Now there was time to simply enjoy the smoothness and harmony of the Falco's famous controls and get to know Al's airplane a little better.

After a few racetrack patterns over the field in both directions, I performed a series of controlled descents and climbs in the flaps up configuration first and then in the flaps 20 degree configuration. Noting the power requirements for each, I recorded engine parameters once again in level flight, reviewed the spin recovery procedures I had included in my test cards, and prepared for a series of approaches to stall and then actual stalls.

The purpose for the approaches to stall testing was to determine the type, degree and duration of stall warning, if any, prior to a stall in any of several configurations and power conditions. It is important to know what to expect in terms of stall warning before attempting a landing approach at normal approach speeds. The Falco usually provides a narrow, 5-to-7 KIAS duration of slight buffet or burble prior to actual stall, depending on where the builder installed the stall strips on the leading edge of the wing. Al's Falco provide light but noticeable buffet at 65 KIAS in the flaps up configuration with power at idle. In the flaps 20 degree configuration and idle, stall warning was more in the form of low frequency nose bob beginning at 56 KIAS.

Due to traffic inbound to Chicago's O'Hare airport, I was constrained to 3,500 feet MSL or below and therefore had to dispense with the power-on approaches to stall and stall tests. It was just as well considering I was quickly running out of usable daylight and would have to land soon. So I focused on the priority of finding the actual stall speed in the landing configuration of gear down, flaps 20 degrees and power at idle. I found the stall speed at 54 KIAS and the stall was defined as a mild nose drop with no tendency to drop a wing on either side. That was a surprise for me as my experience with Falcos has taught me to expect a rather abrupt wing drop at stall. I suppose the reluctance of Al's Falco to do so is testimony the accuracy of alignment with which he and his father built the wing and tail structures.

Armed now with the dirty stall speed data, it was a simple calculation of 1.3 times that stall speed to determine the minimum "over the fence" approach speed of 70 KIAS. I descended into the right downwind for runway 19R at 85 KIAS in the landing configuration and slowed to 70 KIAS on short final. The wind was light out of the south, and the Falco was flying smooth and felt very solid. The flare was easily controllable and Al's Falco touched down softly on it main wheels at 5:55 pm after what I would characterize as a very successful first flight.

I taxied all the way back to Al's hangar where the crowd met me shutting down. Al Dubiak was walking briskly toward me, his wide smile recognizable I'm sure from the other side of the field. I slid the canopy back with one finger and struck a now familiar and very gratifying pose of me extending my hand in congratulations to the builder of what I view in this case to be an exceedingly exemplary specimen of designer Stelio Frati's wooden masterpiece—the Falco.

After putting his airplane to bed for the night, Al drove me home to his house for dinner. We were quiet. Al is naturally a man of few words, and I was drained from the day's efforts, the 3:00 am get up in Washington and having just begun to contemplate the gravity and responsibility I had assumed in placing at some risk this invaluable asset that had become a focal point of his family's life over the course of 11 years. Not to mention the fact that I was in pain having been crunched and hunched over under that Nustrini canopy for over two hours total. After some time, Al asked me what it was like to do that—to test fly a new airplane like that. He said it must take a lot of "guts". I quite honestly didn't know how to answer that. I've never really given it much thought. I've never really allowed emotion to enter the process. So I simply said I thought it was merely an exercise in managing risk and that's the reason for the logical progression of events as laid out in the Falco Flight Test Guide.

Then I asked Al what it was like to watch his own creation take to the air for the first time. I explained I did not know because I haven't yet finished mine and probably never will know because when I finally do finish my Falco, I'll be the test pilot. Al thought for a moment and quietly said, "I got choked up".

In the morning, we picked up his father and returned to DuPage airport for another day of flying. The weather was beautiful early in the morning, but the snow clouds were moving in. We needed to remove

Steve, Ann, Debbie and Al Dubiak.

the cowling to investigate a small leak of some kind that we noticed caramelizing on the number two cylinder exhaust stack. It turned out to be fuel leakage from the exhaust stack gasket, those thin little copper gaskets that hardly seem capable of stopping water let alone hot cylinder exhaust gas escaping under pressure. Al had installed one at each exhaust stack, and as it turns out, two are required by an obscure Lycoming Service Bulletin, a copy of which Al had neatly filed in his fastidiously kept records of his project. That fixed, we buttoned her back up and were on our way.

The second flight found Al Dubiak in the left seat at the controls of his own creation. His sitting height appeared to be somewhat shorter than mine, and he seemed to feel relatively comfortable in his cozy cockpit. I returned to my hunched over and inward leaning position this time in the right seat. Starting and taxiing were now already familiar events for Al, and we arrived at the hold short line for runway 19R in short order. Run up and checklists complete, I explained to Al the sensitivity of the Falco to control inputs and suggested he rest his forearm on his leg and delicately hold the stick with only his thumb and two finger tips.

Lined up with clearance, Al smoothly advanced the throttle to full and off we went. Al seemed amazed at the acceleration of his Falco to the point he was a little late in rotating which resulted in the Falco sort of skipping down the runway on all three tires for a short distance at flying speed not unlike a smooth flat stone skipping across

Steve Dubiak, Al Aitken and Al Dubiak.

a glassy lake. Airborne on climb-out, Al was learning rapidly the realities of the Falco control sensitivity I had been talking about at the hold short line. I looked at his left hand on the control stick and found it clenched like a fist around the grip with his forearm freely hanging well away from his leg. In that fashion, we wiggle-waggled our way out west to the approved operating area. Over time, Al settled down from what I am sure must have been near unbridled excitement, and we climbed to 4,500 feet AGL over a frozen lake to allow time for Al and his Falco to get acquainted.

Landing gear retraction tests were on the schedule for this flight. After 30 minutes or so of climbing, descending and turning, it was time to fly level in a straight line and accomplish our purpose. I held the Falco Flight Test Guide while Al flew. Slowed to 100 KIAS, we ensured the gear retraction motor knob was disengaged and then Al placed the gear switch to up. The gear motor ran in the gear up direction for a few seconds until Al placed the gear switch back down. I re-engaged the gear motor knob and ensured the gear crank handle was disengaged and out of the way. Al placed the gear switch up once again, and the gear motor and all three screw jacks came to life. I never asked Al which motor he had installed, the slow or the fast, but judging from the 12 to 14 seconds or so of up travel before the in-transit light went out, I would say he has the slower, higher torque motor. We double-checked the gear circuit breaker and found it had remained in. Then we did one last test on the gear warning light and horn by reducing the throttle to less than 17 inches of manifold pressure at which time the amber gear warning light and horn came on as advertised.

With the gear up and the throttle advanced to about 20 inches or so, Al's Falco accelerated without hesitation to about 140 KIAS. It was now time for the moment of truth. So we slowed back down below 108.5 KIAS and placed the gear switch back down. Again, the gear mechanism sprang to life, shortly followed by a very welcome little green light indicating the gear was probably down and adequately locked. I say probably because it was still necessary to determine if the gear overcenter linkages were in fact over center. The only way to be sure of that was to see if the screw jacks had pushed themselves sufficiently into the springs, and that could only be determined by hand cranking the gear further in the down direction and counting the turns. Since it takes approximately three and a half turns to fully compress the overcenter springs, we were looking for less than three and a half turns in our hand cranking effort. We were able to turn the crank only one half of a turn before bottoming out, indicating the springs were near fully compressed and the overcenter linkages were in fact over center. We tried the test twice and achieved the same result each time, so we were satisfied the gear were safely down and locked.

We had been in the area nearly an hour now, and I wanted plenty of time and fuel left for Al to get multiple landings and takeoffs before we quit. So I demonstrated for Al both a clean and a dirty stall, and we headed back to the DuPage airport. I showed Al the first landing, and he did the next ten or twelve himself… we lost count. With each landing, Al became more familiar with his Falco in its landing configuration and in the flare. His twelfth was near perfect, and after nearly two hours and 20 minutes of fun, we decided to call it a day and return to his hangar. As we taxied to his ramp, I could see his father coming through the gate toward us, wearing an unmistakable smile on his 86-year-old face and obviously very proud of his son. He had longing in his eyes, a definite yearning to go flying with Al in this magnificent machine of beauty he had helped create. Be patient, my friend. The 25 hours of required fly-off time will pass quickly enough. Maybe you'll have your first flight in your Falco on your 87th birthday next month.

The whole two-day affair was surprisingly efficient, and I thank Al Dubiak and his family for their hospitality and their trust. It was an honor, and a rare and satisfying opportunity to be a part of it.

The Glider

Part 19 of a Series

by Dr. Ing. Stelio Frati
translated by Maurizio Branzanti

41. Frontal View
There is little to say in regards to the frontal view design. In a mid-wing design, it is convenient to make it as a M-configuration. This is to raise the wing tips as far as possible from the ground and to increase lateral stability by increasing the aircraft's keel effect. In this type of wing the dihedral is between 4 to 8° for the central section and of 0 or 1° from the formed elbow to the tips.

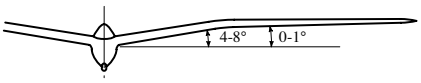


Figure 7-12

In the case of the high wing, the M shape is not necessary, and a dihedral of 2 to 3° is sufficient to give good spiral stability.

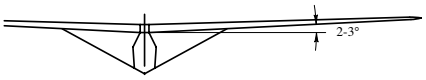


Figure 7-13

Having so determined the position and shape of the wing from the frontal view, it's now important to check the position in height of the horizontal empennage. With the aircraft in a rest condition, that is with the wing and both landing skids on the ground, the horizontal empennage should not touch the ground, or even worst, it should not touch before the wing. In such case the empennage would have to support portion of the aircraft weight. It's desirable that at rest, the horizontal empennage be at least 8 to 10 cm. from the ground.

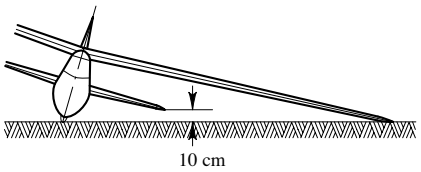


Figure 7-14

42. Top View.
In the top view, we are going to define the shape of the wing, the fuselage and the horizontal tail. For the wing we had already established, at the beginning, the opening, and the surface, therefore the mean chord and the span. What is required now is to establish the actual shape. In gliders, the wing could be tapered, rectangular, or a combination of both, rectangular for a central portion and then tapered.

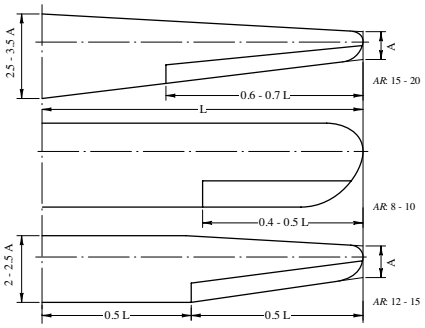


Figure 7-15

For wings of greater span, the first design is preferable, since a greater chord is possible at the fuselage thus allowing for a thicker spar. The tapering ratio, the ratio between the maximum and minimum chord, may vary between 2.5 and 3.5, with greater ratio for longer span.

The rectangular wing is more suitable for smaller gliders with a short wing span, mostly used in trainer gliders, due to the relative simple construction. Furthermore the rectangular wing presents troublesome design characteristics in regard to sturdiness, in fact, at equal span and surface to a tapered wing, the chord and therefore the spar thickness at the fuselage connection is much smaller. Also the maximum bending moment is much greater in the rectangular wing due to its geometrical center being much further away from the fuselage junction than the one in the tapered wing. This type of wing is therefore not suitable for serious gliders or gliders with longer wing spans.

The third design in Figure 7-15 shows a compromise between the trapezoid wing and the rectangular, a square wing up to the center portion and tapered from there to the tip. This shape is suitable in the case of wings with external strut supports, since the maximum bending strain is not longer at the fuselage, but it coincides with the strut mountings. In the center portion the wing airfoils remains constant, while in the tapered portion the airfoil varies.

The fuselage top view should offer the largest width corresponding to the pilot seating area and have a minimum width of 60 cm. The width of the fuselage at the tail should be at least 15-18 cm. to offer sufficient support and attachment for the tail itself.

43. Control Surfaces.
Having designed the plane in its complexity, it is now necessary to determine the dimensions of the control surfaces, such as ailerons, elevators and rudder. In gliders, these surfaces have to be fairly large due to the aircraft's low speeds.

For the ailerons, based on numerous practical experiences, it has been found that their maximum efficiency is reached when their chord is approximately 25-30% of the corresponding wing. Practically though, the chord is kept constant with the wing span and with little tapering, but at its extremities should never be more than 40-45% of the corresponding wing. The length of the aileron may vary between 45% to 70% the length of the half wing span, while its surface may vary between 18% to 22% the one of the half wing.

The ratio between the ailerons and the wing span is greater in gliders with longer wing span.

The elevators area is kept at 45% to 50% the area of the horizontal stabilizer. The area of the rudder is kept between 60% to 75% the area of the vertical fin.

44. Landing Apparatus
There is a great difference between gliders and motorized aircraft in their landing gear designs.

In gliders, due to the lack of a propeller, the low wing loading, therefore low landing speed, the landing gear may be just a simple ski or sliding block that may or may not be shock-absorbed. The application of a small wheel with low pressure tire is very common and its location is just aft the center of gravity. Lateral stability when the craft is stationary is not there. As it's commonly known, at the beginning of the takeoff run a person runs along side, holding one wing until enough velocity is reached and stability from aerodynamic forces through aileron control is obtained.

It was mentioned that the ski may or may not have shock absorbers. In training gliders, the ski is a wooden rail, rigidly attached to the fuselage. Generally though, the ski is attached by interposing rubber pads, tennis balls, or even metal springs.

The use of a wheel, does not mean that it replaces the ski, it is only an aid. It reduces friction at the start and facilitates the takeoff, and also it's very useful for ground maneuverings. Generally it is placed just aft the center of gravity, and it should protrude at least 5 cm.

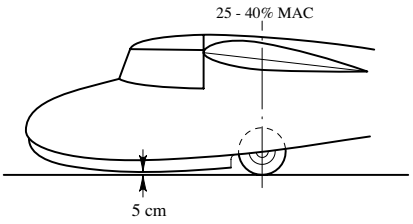


Figure 7-16

This is a preferable location because it gives the pilot some freedom in choosing landing rolls, long or short as required. With elevator control, at touch down, one could ride on the wheel for a lenthy and smooth landing, or vice versa, drive the ski to the ground in order to brake the run.

In better gliders, the wheel is completely retractable. In this case, its position is slightly ahead of the center of gravity and is equipped with a brake. The ski in this case is nonexistent. This solution, brings some complications to the construction design and adds weight, but also makes the fuselage more aerodynamic, not having protruding parts, such as the ski and the fixed wheel, which add drag and deteriorate flight efficiency.

The disadvantage of not having a front ski is appreciable when having to perform forced landings; plowed fields, river beds, or any other uneven field can easily damage the fuselage undercarriage.

To determine the type of the landing gear to be used, it is necessary to pre-determine the the use of the aircraft and the type of person that will be flying it.

Such daring construction designs as retractable gear, are then only used in high performance gliders, used by experienced pilots, where the risks of sustaining possible damage are offset by the possibilities of winning races or establishing new records.

45. Control of Maneuvering Surfaces

The development and design of these controls is very important on any type of aircraft, but more so on gliders. Their controls have to be "very sweet". Because of the light aerodynamic loads exerted to the control surfaces, due to low speeds encountered in this type of flying, and the modest wing loading on these aircraft, the mechanical resistance found in the transmission's linkages should not mask the reactions to the controls and prevent the pilot from "feeling" the aircraft at all times. Since the various linkages must be mechanically sound, it is necessary to reduce to the minimum all the possible friction causing apparatus such as pulleys, levers and elbows.

The simpler the transmission the better it works. The development of the aircraft's structure and the development of its various controls should be carried out simultaneously, and if necessary, adapt the aircraft's design to the design of the controls, not the other way around. If it's necessary, in the end, it may be more convenient to design a more complex fuselage section, in order to facilitate the implementation of the control assemblies, rather than doing it the other way around.

Let us briefly point out the most common methods in use to control the movable surfaces. The ailerons, elevators, and rudder, are controlled by the pilot via linkages that may be made up of cables, rods or a combination of both.

The Control Stick

The ailerons are activated with a lateral movement of the control stick, while a longitudinal movement controls the elevators. The rudder is controlled with the pedals. In most gliders and powered aircraft, the stick movements are transmitted to the control surfaces with steel cables.

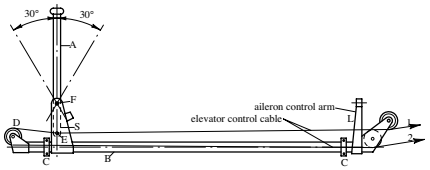


Figure 7-17

In high-performance gliders, the use of solid rods is becoming acceptable, these give a better feel to the pilot because of the low friction. These types of controls, though, are expensive and present fussier tune-ups. For these reasons, the cable method is more popular. The diagram on Figure 7-17, shows the most common method used for the transmission of movements by cables.

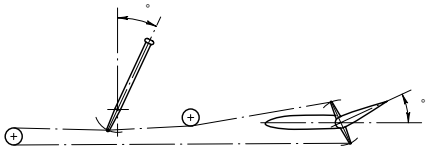


Figure 7-18

The control stick A is hinged at F on a supporting bracket S which in turn is fixed to rod B that liberally rotates on bearings C-C. The control stick rotates at F in a longitudinal plane, and it extends beneath as a lever to which at point B the control cable for the stabilizer is connected. From here, one end of the cable (1), goes directly to the upper stabilizer lever, the other end (2) through a pulley situated in front of the control stick, returns and is attached to the lower stabilizer lever.

Pulling the bar backwards, the connection E moves to E' pulling on the control cable (1) and the stabilizer moves up. The aircraft pitches up. On the contrary, if the control stick is pushed forward, the pull is now on the cable (2), the stabilizer moves down and the aircraft pitches down.

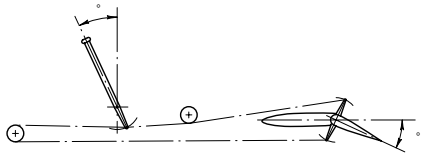


Figure 7-19

The control to the ailerons is obtained through a lateral movement of the control stick, which in turn rotates rod B. On rod B there are attached two levers L, and attached to them there are two rods T that transmit the movement via a three-arm lever to a cabling system connected to the ailerons.

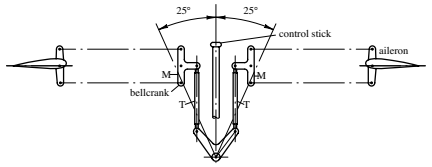


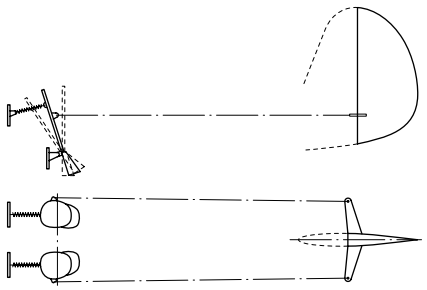
Figure 7-20

The three-arm lever is fixed to a wing longeron. By disconnecting the lever T from it, it allows the disassembling of the wings. In standard gliders the radius of the lever is kept between 80-120 mm. If space is not a concern, it is better to adopt the larger radius in order to reduce the system resistance.

Pedals

The pedal system in gliders is different from the ones used in powered aircraft. In powered aircraft, the rudder movement is achieved by the longitudinal movement of the pilot's leg. This rotates a bar around a vertical support or the footboard moves entirelly forward.

In gliders, in order to diminish pilot fatigue, due to occasionally lengthy flights, and also because the forces required in the controls are not that big, the command is achieved by the rotation of the pilot's foot by pressing the pedal with the toes; the pedal is pivoted at the bottom, and the



foot rests on it.

Figure 7-21

On the pedal above the rotational axis are attached the control cables that run to two levers connected to the rudder. Behind the pedal there are springs for proper tensioning of the cables.

The diagram on Figure 7-22 shows the location of the controls, the levers, and the distribution of cables as generally used in gliders.

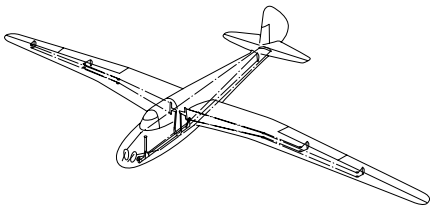


Figure 7-22

46. Options

Spoilers. For years now, the use of spoilers has become essential. By design, they are generally flat surfaces, that when deployed by the pilot they open in a position perpendicular to the wing's surface.

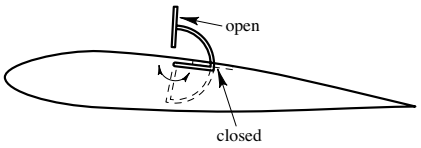


Figure 7-23

Their purpose is that of disturbing or spoiling the airflow over the wings surface, thus their name. This causes a loss of lift, therefore a decrease in efficiency and speed. This is a must for landing to reduce the landing roll especially in forced landings, situations that are very frequent in soaring. Spoilers are always placed on the dorsal side of the wing to get the maximum disturbance effect.

It is obvious that their size is related to the characteristics of the glider they are installed on. It is recommended, though, not to oversize them in order to increase their efficiency, because their deployment would require too much force. Their location should be such that once deployed their effect does not pose interferance with other control surfaces and cause unwanted vibration, that, even if not dangerous definitely not welcomed.

With the increased popularity of the sport and its extreme ranges, such as flying into thunderstorms as well as into clouds, it has become necessary to be able to reduce the maximum achievable speed when in a dive. One may find himself in situation, sometime unavoidable, or without knowledge, where dangerous speeds are reached that could even compromise the integrity of the aircraft.

The thinking of limiting the maximum speed in a dive, increasing the aerodynamic drag, by designing oversized spoilers was entertained. (We have shown previously by a numeric example how to calculate the surface size of such air brakes.)

But in order not to exert an excessive strain when deploying such a large surface, designers have decide on dividing the calculated surface in two, locating one on the upper side of the wing and one on the lower side. The two sections are connected in such a way that the deployment of one is aerodynamically compensated by the other. In fact, the resistance encountered on the deployment of the upper spoiler is balanced by the wind assisted opening of the lower spoiler.

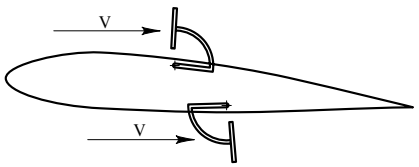


Figure 7-24

The use of a double spoiler systems has become widespread in the soaring. Their duty is twofold: Lessen the aircraft efficiency and descending speed, and bring the maximum speed attainable within the safety values of the aircraft structure. The speed with the double spoiler deployed in modern gliders is within the 200 and 250 km/h.

Towing hooks.

In the first chapter, we discussed the various methods used in the towing gliders. These methods may be divided in two distinct categories: ground tow (elastic cable, winch, towing car) and towing in flight by aircraft.

The hooks, and their location on the aircraft, have to be consistent with the particular method used in towing. In the ground tow, the aircraft trajectory is sloped upwards in order to reach elevation quickly. In this condition it is necessary to place the hook much lower than the center of gravity and not too much forward of it.

Also the release has to happen automatically at the very end of the pull. For these reasons the hook employed in such systems has to be located under the front ski and has to be of the open type.

To prevent premature cable release, due to the higher inclination the glider presents in relation to the pulling cable, it is necessary for the hook to have an angle of approximately 25° from its vertical when the glider is in straight attitude.

For flight towing, the glider is usually slightly higher than the towing plane: therefore the hook should be just a little lower than the center of gravity but as forward as possible.

It is important to note that when towing this way, the towing cable is not always under tension. At times, due to different flight conditions between the two aircrafts, some caused by external effects, or caused by pilot's inexperience, it may happen that the cable slacks. It is understandable then, that, to prevent premature release, the hook cannot be of the open type, but closed with pilot control on its opening.

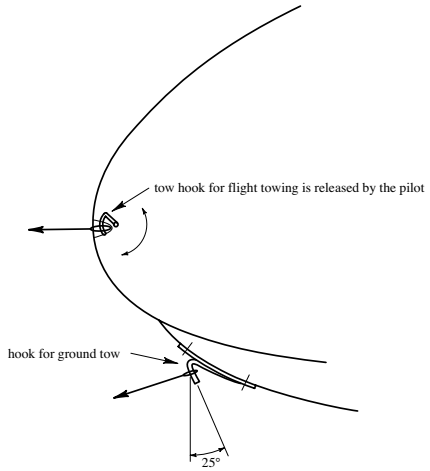


Figure 7-25

The two type of hooks are shown in Figure 7-25. In most gliders both types of hooks are installed in order to accommodate the use of either system.

George Barrett Unique

by Al Aitken

Among Falco builders, and indeed among mortal men as well, is a rather unique, 79-year-old package of energy named George Barrett. I first met George and his lovely wife, Joy, at a gathering of Falco builders that has become known as the Great Oyster Fly-in. It was sometime around the year 1989, and Nancy and I were at Rosegill to experience for only our third time the unwritten, unspoken kinship that exists among folks who build Mr. Frati's wooden masterpiece called the Falco. Several builders were there, people of widely divergent backgrounds and interests who all shared a handful of common characteristics such as meticulousness, persistence, patience and generosity. Among them was George Barrett.

George was about 68 at the time and had just recently begun working on his Falco, as had I. Alfred Scott had introduced us, and after several hours of sharing thoughts on blueprints, parts and flying characteristics, George asked if I would fly the first flight on his Falco whenever he finished it. His wife Joy was standing next to him, her fight with Parkinson's disease not more than a few years old. I looked into her eyes and in spite of her trembling and obvious weakening, saw an exuberance, a thrill at the thought of her husband building his own airplane. It was a look I would see several more times in the coming years. Of course, I agreed to fly George's Falco and we have been good friends ever since.

Five years and nearly the same number of Oyster Fly-ins later, I had the honor of flying George's Falco from the Gordonsville, Virginia airport. I had been to his home in Charlottesville on a few occasions and saw the meticulous craftsmanship he had used in creating it. It was a cool early morning in the fall of 1994 when George and I met at his hangar and began preparing his Falco for flight. Joy was with him, still battling her Parkinson's, looking noticeably weaker but always with that love-of-life glimmer in her eyes. She was very excited for George who was all business and whose quickness of step and level of energy belied his now nearly 73-year age. At one point during my lengthy preflight, I asked him to remove the panel behind the baggage shelf so that I could inspect inside the aft fuselage. I watched as George sprang from the wing, jogged over to his indescribably neat and organized hangar, fetched a screwdriver, the whereabouts of which he knew precisely, jogged back to the Falco and leaped back onto the wing. He was nearly 73.

Top: Joy and George Barrett at the Oyster Fly-in. Above: George Barrett and Al Aitken after the first flight of George's Falco. Lower Left: Joy Barrett.

The taxi tests and first flight went very well. As I taxied out for the first takeoff, I passed a small gathering of friends including Alfred, Joel and Carolyn Shankle and of course Joy, sitting in her lawn chair waving and beaming her now familiar look of excitement and pride. One of the greatest satisfactions of my life was to sit in George and Joy's Falco having taxied to a stop after the first flight and reach out to shake his hand and congratulate him for the fine job he had done.

As the years since passed, Nancy and I have been blessed with the continued friendship of George and Joy Barrett. We were happy to know that in spite of Joy's losing battle with Parkinson's, she somehow found the energy to join her husband often as they flew together in their Falco. We last saw Joy late in February of this year. She was much weaker then but still had her sense of humor and of course that same look of life in her eyes. Weeks later, at a gathering of friends and family George Barrett held at his home in memory of Joy, I wandered into his porch and noticed a framed photograph of Joy sitting on his desk. As I walked toward it, I saw that it was a photograph of her when she was much younger and healthier and obviously very attractive. I realized what drew me nearer were her eyes, the same look of youth and life I had noticed so many times before. We will all miss her.

George is now 79, still full of energy and remains a good friend and one of the most unique individuals I have ever met.

Flat Six

by Stephan Wilkinson

My wife gives great Christmas presents. And she has figured out how to do it without it costing her a thing. Her best presents are… permissions.

Sixteen years ago, her present was "permission to build a Falco." Two years ago, she upgraded me from a four-cylinder machine to an air-cooled flat six. "You look bored," Susan said. "The barn is empty, you sold the Falco, Merry Christmas, you have permission to restore a Porsche. You've always wanted to do that."

Not a Porsche-powered Mooney—I'm pretty much through with serious flying—but a classic 911, a car I've always loved. As a car writer, I've driven just about every Porsche model ever made—356s, 911s, 912s, 914s, 930 Turbos, 935 RSRs, 959s, 993s, 996s—and even once got a racetrack ride in the flat-12, turbocharged, 1,200-horsepower Porsche 917, the most outrageously powerful sports-racer ever made. But I've never owned a 911.

Now I do. As soon as the snow melts and the mud magically turns to grass here in the Hudson River Valley, the product of my last two years of labor will roll out of our barn and onto the road. A yellowbird-yellow, black-on-black-interior 1983 Porsche 911 coupe that arrived here on a flatbed as a sadly neglected Guards red beater with a diarrhea-brown interior and an oily-but-running engine. In the interim, I have spent $60,000 making a brand-new $20,000 car. (Okay, I also inserted about 100 new horsepower, taking the engine from a 3.0-liter, primitively fuel-injected 180-hp to a 3.4-liter, twin-plugged, carbureted 280 or so, which should make it substantially faster than at least the early Porsche Turbos.)

Some people get it. Most don't. It's like the MasterCard ads: "Car, $10,500. Parts, $49,500. The experience, priceless."

What does this have to do with Falcos, other than the air-cooled flat engine? Well, in the great tradition of Falco builders everywhere, I Did It All Myself.

The car-restoration world is filled with people who boast that they "restored a Ferrari" or "rebuilt a Duesenberg." It usually turns out that they don't know a torque wrench from a tapemeasure, and all they actually did was sign checks. Checks to the engine overhauler, checks to the interior specialist, checks to the body shop, checks to the transmission rebuilder, checks to the upholsterer. Sort of like those guys who "build" Lancairs that they never actually touched in a workshop.

Where a Falco once birthed. Now, Steve has a Porsche restoration in the barn.

Like everybody reading this Builder Letter, I would rather have a good, competent machine—Falco, car, boat, motorcyle, model airplane—that I built, rebuilt or restored all by myself than a perfect one that I paid somebody else to do for me. So I tore that puppy apart to the point where, with the remains of the Porsche's platform sitting on four jackstands, I could lift either end with what little strength a 64-year-old pencil-pusher could still summon. Then I started putting it back together.

I rebuilt the transmission—first time I'd ever been inside one of those boxes, but it all made sense once I saw what was in there. I replaced every moving part on the chassis, most of the bushings with raceworthy, noncompliant polyurethane pieces that will provide a punishingly, delightfully harsh and noisy ride. I added trick adjustable anti-roll bars, heavier torsion arms and adjustable rear suspension arms. I gutted the interior, redyed the leather black, recarpeted everything and installed Recaro street/race seats.

And I rebuilt the engine.

A Porsche engine makes a Lycoming or a Continental look positively agricultural, and it's *really* nice to be dealing with a powerplant that isn't subject to monthly ADs announcing that 6,000 crankshafts need to be removed and junked because some moron in Williamsport went home for the weekend after forgetting to turn on the annealing oven, or whatever.

Timing the engine at 6,000 rpm requires racer earplugs. The noise is unbearable.

Some years ago, I replaced the crankshaft in my Falco's engine—my fault, not Lycoming's—and that, of course, involved disassembly/reassembly of the block. It was a scary prospect, since I had never done such a job before, but with the help of a watchful mechanic friend and Lycoming's so-called "Overhaul Manual," I did the job cleanly and carefully, and the engine ran just fine. Still is.

In fact, it's soon to power a brave professional ferry pilot on a flight from Portland, Oregon to Sydney, Australia, via a loop around the Aleutians, Midway and a variety of other islands. My Falco's owner, Bob Hendry, is an Ozzie and has moved back to the old sod after a hectic and rewarding sales career as one of Cisco's longest-term employees—his badge numbered in the low hundreds—and his Falco will follow him, God and a ferry tank willing.

But starting the Porsche's engine for the first time after its rebuild was far scarier than firing up the Falco. For one thing, a 911 engine is even more expensive than a Lycoming, particularly with the trick cylinders, pistons, cams and valves I'd installed. For another, the clearances, timings and working tolerances of a Porsche are more critical than a Lycoming's. Germans work in micrometers. Williamsportians work in give-or-take-a-few-thou.

Prime, crank (with one set of sparkplugs removed), get a good oil-pressure reading, replace the plugs, and stand by with the fire extinguishers and waterbuckets.

Why the five-gallon Spackle buckets filled with water? Because 35 years ago, when I was an enthusiastic Aston Martin DB-4 owner, I had a friend who spent two years building a very special DB-4 that he re-engined with one of the rare engines that Aston had built to race in, of all things, the Indy 500. Aston's venture went nowhere—I don't think they even qualified a car—but the leftover engines were about as strong a DB-4 straight-six as you could find.

So Walter Jezewski worked for 24 months building the ultimate DB-4, and finally, one bitter-cold January evening, wheeled it out of his shop—on the Upper East Side of Manhattan, which is about like having a hangar facing Central Park—and tried to fire it up. Prime, crank, sputter, fart, pop, prime, crank, fart, backfire, BONFIRE.

Walter's very special DB-4 burned to the ground, its aluminum body literally melting. Nobody had thought to consider the consequences of a strong backfire through three flooded, double-throat Weber carburetors.

Well, I had two huge triple-throat PMO carbs (21st century Weber copies) on the 911, and I wasn't about to make that mistake. So I made sure to have a friend standing by the buckets while he watched for major first-start oil leaks. It was my neighbor Jim Catalano, who like me crosses vehicular lines: in one of his two rustic garages he has a rare Lotus Elite S2 that he restored, in the other is a 1930s Fleet biplane undergoing a total rebuild to join the J3 and Aeronca Defender that he's already flying.

We didn't need the water. The engine started just fine, although it was almost as complex a procedure as starting a radial. Racing carburetors have no chokes—remember chokes?—and there's no such thing as a primer on a car, so starting a carbureted engine in December involves a judicious amount of accelerator-pumping, cranking, re-cranking and persuading.

Finally, with only basic static ignition timing done, the engine came to life and grumbled through its stainless-steel headers and into a "muffler" that's more a collector box with twin four-inch-diameter outlet pipes. I was so thrilled I called my daughter at college—she'll be the driver when we put the car on the track—and made her listen to the bark.

And then I called my wife. After all, permission to restore the car had been her present to me. But wouldn't you know, busy magazine exec that she is, she was "in a meeting."

So I made her baffled secretary listen. "Ah, gee, that's very nice, Mr. Wilkinson, I guess. I'll be sure to let Susan know…"

You Bought a WHAT?

by Pierre Wildman

"You bought a WHAT?"

"A de Havilland Vampire. An ex-Swiss Air Force two-seater."

"Why?"

"Um, because I couldn't afford a Mosquito?"

The Mosquito is the WWII British fighter bomber that defied all conventional wisdom and soldiered on through the war serving in bomber, reconnaissance, night fighter, and a host of other roles. Of particular interest to Falco builders, it's an all-wood two-seater that is a blast to fly, and a real beauty to look at.

Crazy as it sounds, the Mosquito got me interested in the Falco. You see, I always wanted a Mosquito, and I long ago figured out the only way I'll ever have one is to build one. So I needed some experience with wood, and I'd need something to fly while I was at it, so I figured I'd build a Falco real quick and get on to the Mosquito project.

Ahem. Reality check. Ten years later I'm still at the 10% finished stage on the Falco, and the Mosquito is never going to happen. In spite of that, I've been very lucky with my flying. My regular ride is a Cessna 421 that some West Coast Falco Fly-In folks have seen.

One day another 421-owner friend of mine called me. He said "the 421 is a great limo,

John Harns puts on his g-suit.

Pierre Wildman not building his Falco, but if you're going to sin…

but we need something FUN." It turns out he was thinking of a Christen Eagle, or Extra 300 or something. In an effort to defuse this fantasy, I offered my opinion. "Nah, forget those things. For that kind of money you want to get a jet fighter." Mark was not a warbird guy, but his "wow meter" was pegged. "Yeah, you want an ex-Swiss Airforce two-seat de Havilland Vampire." And I sent him on his way. I thought he'd superficially look into it and turn his interests elsewhere.

Three months later Mark called me again.

"I found it."

"You found what?"

"The Vampire you told me to find."

The situation had gotten serious. I had enough airplanes to look after, and didn't need another one. I didn't need another distraction from building my Falco. But Mark persisted, and soon we were on an airliner half way across the country to check it out. Once we were in the hangar, crawling all over it and talking to the owner, Mark said what I feared he'd say, "Buddy, we NEED this airplane!" I tried to inject reason, but to no avail. We each took a demo/training flight, and of course we were hooked. We bought it. That's when I called home with the news.

How does one get licensed to fly such an airplane? In the US, pilots must have a type rating to fly a jet. But the Vampire, a British military airplane, was never certified in the US (just like most of the other warbirds). So the FAA invented the "Letter of Authorization" (LOA) process. A pilot gets the necessary training from an authorized instructor, and the instructor recommends the FAA issue you an LOA. As you might imagine, there aren't many instructors qualified in '40's vintage jet

fighters. As luck would have it, the seller was just such a person. We did a very thorough checkout and got our paperwork. Then we were able to solo the airplane. We flew it around locally for a day, and then ferried it back home to California.

I must say I have no military experience, and no prior warbird experience. I learned fast. Flying around in blue jeans is not the answer. Strapped into a parachute with stuff in your pockets gets uncomfortable real fast. There's no place to put anything. OK, get a flight suit. Pockets in all the right places, and none in the wrong places. Headsets don't work well because they fall off your head when you pull G's. Get a helmet. G-suits are pretty nice, as my unathletic 40-something body gets worn out quickly pulling 4 to 6 G's repeatedly. So all of a sudden I ended up with all this gear.

Robin was feeling rather excluded from all this activity. What to do? Get her all the same gear so we can fly together. Ladies, you will be surprised how good you look in a flight suit. Go on and get one to wear at air shows. You won' regret it!

Flying the airplane is VERY cool. Just starting it is fun. The Vampire has a tendency to shoot flame out the jet pipe on start-up, which those outside the cockpit find entrancing. At idle it is very loud outside, but not so much inside. The nosewheel is a castering unit, and steering is done with differential braking. It's hard to make it look smooth.

By the time you're ready for takeoff, you've burned 30 gallons of Jet-A. Oh well. Push the throttle forward for takeoff and look for 10,250 RPM on the tach. It accelerates slowly at first, but then picks up as you go through 100 knots. It lifts off very smoothly, and your goal is to accelerate to 250 knots for the initial climb. Hot days make this a dicey affair on anything less than a 5000 foot runway. Once you have some speed up, it gets really fun. The controls are well harmonized, but heavier than you'd expect. Aerobatics are quite easy, but you need a lot of speed and altitude, especially for vertical maneuvers. The entry speed for a loop is 370 KIAS.

We generally do aerobatics between 10,000 and 18,000 feet. The pressurized cockpit allows you to do this without the need for oxygen, and makes it a little easier on your ears.

It also means you can go faster than 250 KIAS. Fuel burn is about 250 GPH when we're doing this. (You have to remember that this airplane was designed in 1943, and was one of the very first jets. The engines were hugely inefficient.) After an hour, we're ready to go home as we like to land with 100 gallons on board, and we've usually been pulling some G's.

Approaching the airport requires a little attention. One must heed the 250 KIAS limit below 10,000, and the 200 KIAS limit in class D airspace. Getting slowed down can be a little challenging, but speed brakes help some. Gear and flaps at 175 KIAS. No turns below 140 KIAS (stalling at low altitude is a BAD thing), and final at 125 KIAS. Touchdown at about 95 KIAS with 80 degrees of flaps. Oh, but you're not done yet, as the pneumatic brakes and castering nosewheel make the roll-out as much work as anything else.

I called John Harns and asked him "how long has it been since you've flown a jet fighter?".

"Hmmm, about 30 years. Why do you ask?"

When I explained that I'd like to fly with someone who flew this sort of airplane before (John had flown straight wing jet fighters for the Navy), he was all ears. He flew down a few weeks later, and we went flying. What a pleasure! John was in the groove almost immediately. He showed me a few things, and I found him to be every bit as smooth as he is in his Falco. We flew down to Hollister to meet up with Larry Black and Dan Dorr and have some lunch. We took the long way home and ended up doing barrel rolls over Yosemite National Park. Half Dome looks quite nice inverted! A week later, his wife Pat sent me a thank-you note. Reading between the lines, I'm guessing that rocking and rolling in a jet for a day is a good alternative to Viagra! (Just teasing, John.)

The Vampire is no Falco, but it's great fun anyway. I guess if I'm not finishing my Sequoia Slingshot fast enough I had better have a good reason. I'll leave it to my Falco peers to judge if this is an acceptable one. In the meantime, I think I'll head out to the garage and make some sawdust.

If you need an excuse for not finishing your Falco, this is as good as any.

This Way, That Way

by David E. Carroll

My two favorite times of every year are attending Oshkosh and Christmas. Oshkosh because of the exposure I receive to the world of Sport Aviation, and Christmas because everything I ordered at Oshkosh has arrived by then. When attending either Sun-n-Fun or Oshkosh there is a period of adjustment that must follow which usually lasts several weeks. I always prepare my trips by carefully taking note of the materials and specific items required ensuring the Falco project moves forward to greet the next great Fly-In. As it always happens, I am flooded with new information, products, specifications, features and "nothing performs like this!" It is not until the last day that I can recover my senses and make a meager attempt to drive home with at least one of my 101 questions answered.

Oshkosh 2000 was no different than any in the past, one of the many questions I carried with me was "What autopilot shall I install?" I was not attracted to the Century line of products. In my opinion, today's cost for the Century autopilot systems exceed the functionality when compared to other systems.

Prior to Oshkosh, my first idea towards considering another system was one offered by S-TEC, the System-30. I quickly called Alfred and fired my idea at him, it ricocheted and came right back at me! For the one or two simple reasons I offered for even considering another system, my ideas were out-numbered 10-1 with reasons not to consider another system. Alfred was right, I lowered my head and kept on building, right up to the point of Oshkosh 2000, and I still had this crazy idea about considering another autopilot system.

Many of my friends, well all of them actually, are building RV aircraft, everything from the RV-3 up to the RV-9. A couple of them have built two in the time I have taken to complete 55% of my Falco! That's okay though, I'll have the last laugh. All they will see is this dot in front of them getting smaller, and smaller, and soon after I am out-of-sight!

The point of mentioning the RV's is that many builders are installing the new Navaid Device's autopilot system. This is a simple, cost-effective means towards claiming your aircraft has an autopilot system. It probably works just fine most of the time in several different planes. I intensely studied the design and characteristics of the Navaid's layout and responses

TrueTrak autopilots start with a simple, all-electric, single-axis autopilot and offer options up to full-featured three-axis autopilots.

to varying conditions. I spent several hours talking to the owner/designer (and he is very intelligent) but I walked away with a sense that it just didn't belong in a Falco.

I gave up on the idea of an alternate (affordable) autopilot system until I rounded the corner in one of the exhibition hangers. Here I saw a young man sitting on a bar stool (looking like a damm fool …ed. Charlie Daniel's fan), holding what looked like various parts to an autopilot system. He was banking and yawing the heck out of this little black box (like one of my boys with a 3-inch 10-pound metal plane doing everything possible to get it flying). He was speaking to a crowd three or four deep. I looked up above the spokesperson to read the company name. I do not remember what I saw, but it sure had nothing to do with autopilots. I listened further to learn a new company was formed, to bring to market new technology advances in digital control systems. The servos, as he demonstrated, were impressively smooth and quick and beamed with quality. The torque is adjusted digitally, in only a matter of seconds from the control screen on the panel-mounted programmer; a clutch does not exist inside the servo. All control movements are precisely digitally controlled through a digital-stepping motor.

After a few minutes of listening, another gentleman walked up to continue discussions with the crowd. His appearance seemed recognizable and his voice was familiar, but I could not associate a name. One person from the crowd ask this older gentleman what planes he has flown with the new TruTrak Flight Systems autopilot installed. The response was "A Piper Colt and Mr. Mulligan". "Did he say Mr. Mulligan" I said to myself. "This was my absolute most favorite plane in the world" from my younger days. Okay, so now I am biased, any chances for good judgement on my part are now out the window.

Jim Younkin, owner/pilot of Mr. Mulligan, is also the co-designer of the TruTrak autopilot systems. Chuck Bilbe is the other co-designer. Jim Younkin is also the designer of many (if not most) of the Century line of autopilots and devoted his career to creating reliable and effective auto-control systems for several different companies. Jim's work is installed in many different production aircraft. Jim has emerged from retirement to pursue yet another major breakthrough, bringing TruTrak's innovative design features and use of new technology to sport aviation.

Chuck is a software genius and knows how to integrate computer logic with a pilot's hand. In my opinion, the functionality of their systems is unmatched; not even the high-priced competitors come close. For roughly $3,000 we receive a 100% complete single-axis digital autopilot which is completely programmable to exactly match your specific aircraft's flying characteristics. Double this cost, and we have a two-axis digitally controlled autopilot system that will out-live my airplane and me. One programmer/servo combination can be quickly programmed for system activity and torque to match just about any airplane, I find this truly amazing.

If you are considering an autopilot system for your Falco and wish to survey what the market has brought to sport aviation (and what may be potentially the most advanced system for your dollar), then I encourage you to visit TruTrak's website at www.trutrakflightsystems.com and contact either Jim Younkin or Chuck Bilbe. Your time will be well worth the education.

Sawdust

• Close pass. With men and women in the same work environment, there are all these rules and subtleties of behavior that you have to follow. Dan Dorr reports that at the Southwest Airlines Training Center, a female captain was getting her annual check ride in the simulator. It's a tight cockpit with lots of activity when things get busy. During the 'flight', the check airman reached for a switch and brushed her, um, chest. After a moment of uncomfortable silence, she said "I think I just passed my check ride." And the check airman said, "I think you did".

• Drew Done got his Falco into the air on March 31 for the first time. Stephen Friend was the test pilot. All is fine, but it happened too late for a report in this newsletter. Also, Bob Brantley has moved his Falco to the airport and threatens to fly soon.

• Tony Bingelis died on March 29 in Austin, Texas, due to heart problems. Tony was one of the founders of EAA Chapter 187 and the Southwest Regional Fly-in, and one of the greatest contributors to the homebuilt aircraft community through his four books, his 25 years of articles in *Sport Aviation*, his building of nine aircraft, including a Falco, and his many years as a technical counselor, answering questions from all over the country. We will all miss Tony. If you would like to write a letter to Morine Bingelis, please address it to her at 8509 Greenflint Lane, Austin, TX 78759.

• Plan to attend the 12th Annual West Coast Falco Fly-In, held this year in Galveston, Texas, on September 27-30. Hosts Bill Russell and Cecil Rives report all hotels rooms at the Moody Garden's Hotel are already booked, and they have seven Falcos scheduled to be there—and it's still six months away.

Angela's Corner

Hello, there's been progress! I've had a lot to learn these last few months and every day I'm learning something new. I want to thank those of you who call and e-mail in with supportive words. I really appreciate it.

As Spring approaches, I'm sure most of you will be able to work more on your Falcos. Please remember there's only one of me, and I'll get parts to you as quickly as I can. Bill and I have been going through the warehouse and keeping it up to par. We currently have a lot of parts on order, and there are always a few of you with back orders. Be assured I have a good system of keeping track of what people have ordered, what they have received, and what they still need. Although I am becoming more familiar with this business and the Falco, if you need parts, it would be helpful if you either knew the part number, the name of the part, the drawing the part is on, or the kit that the part is in. I want to help everyone as efficiently as I can, but I do need some assistance from your end.

The pictures that you have sent in are great! We love seeing the progress that you are making. It's very interesting to see each project being built piece by piece. If you haven't sent us any information lately, get it in here!

Alfred and I are going to Oshkosh this year. I'm really looking forward to the trip. It will be a totally new experience and will be great to put a face with a name for those of you that I have the opportunity to meet. I'll be handling the room reservations and extras and will keep you all up to date as the time approaches.—*Angela Winstead*

Top: Drew Done chainsaws his way to the airport.
Above: Harry Castermans and friends flip over his Falco.

Goings On at Sequoia Aircraft

Things are always busy here and I planned to include more in this newsletter, but Al Aitken's report on Al Dubiak's Falco took up more space and there's not much left for me. Angela is working out great, we're making a batch of spars right now, lots of stuff going into the website including a new parts department, and that's all the news that will fit in this space!—*Alfred Scott*

Calendar of Events

West Coast Falco Fly-In. September 27-30, 2001 at Galveston, Texas. Contact: Bill Russell (713) 952-7771 email: Lsruss1@aol.com or Cecil Rives (713) 467-9894 email: Falco@flash.net.

Oshkosh 2001. Andrea Tremolada plans to fly over from Italy, this time avoiding Brazilian customs officials. And we'll be there so Angela can see what the world's greatest air show is all about.

Mailbox

When I finished my Falco about four years ago I didn't have any Aeroshell 17 for the landing gear jack screws. I went down to our local purveyor of lubricants, and he informed me that he didn't have it, but he had the equivilent. Lesson No. 1: Beware of anyone who works in sales definition or equivilent. He handed me a tube and said, "This will work. This stuff is slicker than snot on a door knob." I used it on the jack screws and at every annual thereafter.

This past Christmas, I loaded up the Falco with gifts for the grandkids and headed south. I noticed that the climb seemed sluggish. When I leveled off at altitude, the airspeed went to an astounding 140 mph. My very quick mind ascertained that something was sticking out that shouldn't be. At my age, this doesn't happen too often.

My landing gear switch, in-transit light and circuit breaker are located on a small console between the seats and are not overly visible. The circuit breaker had opened. I closed it, and it instantly reopened. I headed back home. Lesson No. 2: If the grandkids will not come and get their Christmas gifts, call the Salvation Army because they pick up.

I started to crank the gear down, and it was so stiff that I could barely move it. From the number of turns until I got three green lights the gear that stopped when it was halfway up. I landed very tenderly.

That night I put a sample of the grease in the fidge and another in the freezer. The next morning the sample from the fridge was like jello and the one from the freezer was like road tar. I called Alfred Scott and told him my sad story. He gave me a 30-minute lecture on lubrication. I learned that since the jack screws are under constant pressure, you must use grease that contains molybdenum. Lesson No. 3: If you don't have the proper lubricant, you may as well use snot.

Ralph Braswell
Ocala, Florida

Aeroshell 17 grease is important for the screwjacks to operate in all temperatures. It is a synthetic grease that is relatively unaffected by temperatures, and it also contains molydenum disulfide, which acts like tiny little ball bearings for the first few turns of the screwjacks when the grease is squeezed out when the screwjacks are at rest.—Scoti

I thought someone may be interested in this… actually I worry when I come up with an idea… it usually means that I have missed the really obvious way! I was having a hell of a time getting my seat tracks to slide worth a damn, so I came up with the following:

Mel Olson's Falco is now essentially finished.

Firstly though, whoever came up with the idea of using valve grinding paste on the seat track first deserves a medal. Bloody great idea. That solved half my problems.

I have cut down the bearers to add head (or is it bottom?) room. Despite my best efforts, when the bearers are thin, it is very difficult to get them absolutely straight. Added to this was the fact that I routed out a bit to allow the notched and riveted rail to sit flat—well flatter! I found that any time I tightened the bolts the rails wouldn't slide so after much swearing I removed them, used the grinding paste trick (thanks again) then I smeared Vaseline on the bottom of the track and its associated bolts. Then I mixed up some dry flox and put a generous layer on the bearers. Next I seated the tracks in place ensuring everything slid nicely with the bolts in place but not tightened. After cleaning up the squeeze-out and waiting for the epoxy to dry I tightened the bolt. Voila! They now slide nicely!

George Richards
Auckland
New Zealand

My prints arrived in October 1998. After assuring the finance committee it would be a 5- to 7-year project, I ordered the first kit (tail). It took a couple of weeks to clean up the garage, relocate vehicles, etc., and I was off and running. My dedication to the project has been referred to as an "obsession" but I am fortunate to have an understanding wife.

The manual was a terrific guide as far as preparation and progression throughout the project. At this point, I am waiting for warm temperatures to complete that final step... painting. The upholstery is keeping me occupied in the interim.

I want to thank you for your support via telephone on those occasions when I had a problem with materials or technical questions.

Mel Olson
Parker, Colorado