Falco Builders Letter

Fanie and Diana Hendriks with the first Falco in South Africa.

Falco 567 ZU-SCH

by Fanie Hendriks

Ever since I can remember I have had a strong interest in aviation. That interest was turned into a passion when at the age of six I had my first flight squeezed into the single-seat cockpit of a Piper Super Cub cropsprayer spraying on my father's farm.

As the years went by, I pursued my passion for aviation by building and flying model aircraft. I got my PPL in 1982 and bought a Cessna 172 which I flew for 15 years, I sold it and bought a Partenavia 64B, an Italian design. From those early years of flying came my dream of building my own aircraft.

In 1985, while visiting a friend we paged through lots of homebuilders mags looking for a suitable project to start on. I saw the Falco and thought it to be the best of all. My friend told me about a KR2 project that was for sale and which he thought of buying and planned to look at the following day. Imagine my surprise when he phoned me the next evening to tell me that "his" KR2 had turned out to be a Falco and that I should go and have a look at it!

In This Issue:

What, exactly, is Fanie doing?

The Falco was at a very early stage of construction, but included with the plans were, what appeared to be most of the materials required to complete the aircraft, as well as a newly overhauled 160 hp fuel injected Lycoming engine. I decided to buy the project without any hesitation, from Errol Williams.

At that stage we had just moved from Johannesburg to Standerton in the countryside and were living in a small house with a small single garage. I bought a lathe and

a milling machine (three-phase industrial stuff). I turned the garage into a workshop and started on the ribs and the hardware of the Falco. Making all of the hardware was really an enjoyable experience and made me appreciate the very high standard of the plans, to the last detail.

After looking in vain to find a large enough workshop, with an adjacent dwelling, we decided to build our own. In 1987, we moved into the new house and after another two and a half years of making all the woodwork in the house, I could start with serious building on the Falco.

I did it the hard way and with the exception of a few kits, built the Falco from scratch, exactly like a kit-built. It took me 12.5 years over a span of 15 to complete.

Most of the building was done in the evenings until late at night as my practice kept me busy from Mondays to Saturdays. I sacrificed most of my holidays to get some serious building done.

The Falco is fitted with a full set of wheel doors, a Century 1 auto pilot, transponder, encoding altimeter, Garmin 100 GPS, 4-cylinder EGT, Shadin fuel totalizer and G-meter amongst others. It is painted in Beechcraft white with red and burgundy trim. The paint is Courthaulds.

It was with great excitement then, when on the 20th of November '99, we celebrated the completion with a daylong party, around the Falco, attended by 160 guests.

I planned the first flight for the 1st December but due to bad weather we got our first chance only late the afternoon of the 15th December. The test pilot Brian Zederberg, (with more than 180 aircraft on his license) took it up and all went well. Due to the rain

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we could not do much of the testing as we got only enough time for three short flights.

Due to much rain and unusually bad weather we got our next chance only on the 20th of January. We had good weather and could do most of the testing. I also got my conversion during that weekend.

The Falco flew like the dream I had had for 15 years, she handles very responsively and is very fast. We have not done any speed tests yet but I constantly see 175 to 180 knots ground speed on the GPS.

We live in the countryside and with open skies next to the runway I get a lot of flying done.

I now have 26 hours on the plane and with the sun only setting at seven each evening, I get one hour or more in every weekday and many more on weekends.

French Renaissance Falco

by Alfred Scott

We're in for a real treat at Oshkosh this year. In addition to our normal group of Italian-American beauties, we're going to have a couple of visitors from Europe. Andrea Tremolada will be flying his Falco over from Italy, by way of Africa, Brazil, Venezuala and Cuba. Say howdy to Fidel for us, Andrea. And Xavier Beck will be arriving in his French Falco by way of England, Iceland, Greenland and Canada.

Two European Falcos at Oshkosh? Yes, you heard that right.

We know a lot about Andrea's Falco and only a tiny little bit about Xavier's machine, and the reason is that Xavier speaks French and I do not. And so, over the years, we've had little to report on the Falco. But let's try to make amends.

You may remember Bernard Chabbert's "Falco-issimo" article, originally published in a magazine and later as chapter from his book, Manche et Manette (Stick and Throttle). Chabbert is one of the most respected journalists in France and his raving about the handling qualities had a lot to do with the passion that many of the French feel for the airplane.

It led Xavier Beck to buy an old production Falco, a Series III Aeromere Falco with carbureted engine and fixed pitch propeller. Xavier bought the Falco in 1992, and restored it. All of this was new territory for Xavier, and he took photos of the process because "I knew nothing about it." After two years and 2500 hours of restoration work, the airplane was approved for flight, and the Falco was back in the air.

Top: The orginal Falco. Center: The mishap. Above: Note the lack of dihedral.

It's not clear to us how long Beck flew the airplane, but in August of 1994, the airplane was destroyed when the Falco inhaled its air filter on takeoff. The engine stopped at 100 feet in the air, and they put the Falco back on the ground, with the landing gear partially retracted, and they had the additional misfortune of putting the airplane into a field that contained two enormous ruts—from a farm tractor that had gotten stuck. The landing gear caught the first rut and the propeller the other.

Above: Xavier Beck and the Falco. It will have tip tanks installed for the Oshkosh trip.

There wasn't a lot left of the Falco when Xavier hauled the wreckage home, but he went back to work to get the Falco back into the air. And this lack of remaining components and structure left Xavier with what designers sometimes call a 'blank sheet of paper'. Accordingly, in the reconstruction of the Falco there are a lot of new ideas and construction techniques, and Xavier called it a 'Falco F.8LBX'.

It's difficult to tell from Xavier's notes, exactly what he did, but I know that he made extensive use of carbon fiber, sometimes with a foam sandwich construction, and he built the wing with no dihedral and full span ailerons. The engine survived the crash and was rebuilt in Sodemo by Magny-Cours, a company specializing in race-car engines.

He was interested in building a Falco that would go very fast and be extremely acrobatic. Xavier says, "I kept the spirit of the Falco and improved on the points, which, in my opinion, could be improved. I feel great satisfaction. I maybe ought to make the ailerons smaller and the flaps larger. I'm getting older."

In all, Xavier spent 6,500 hours restoring the Falco, and the completed Falco weighed 608 Kg (1340 lbs) empty.

Is it fast? Well Xavier set a new city-to-city world speed record at 308 km/hr (190 mph) from Paris to Cannes. The plane was prepared for the speed run by taping over rough spots, screw heads and any other rough opening. "The Falco must go fast; the beast is sleek and ready to slice through the air."

And how does Falco F-PBEC fly? Gabriel Gavard of *Experimental* magazine flew the plane and he reported "By my standards, the controls prove themselves to be 'perfect' with a resistance that is ideal with speed. Chabbert did not lie. The stick and throttle of the Falco steer a masterpiece. A masterpiece in equilibrium with the mood of the pilot. Because this machine is really usable by pilots of all levels. It goes where you point it and that could be a long distance."

Indeed. It's a long distance from Nevers, France to Oshkosh, America—and it won't be long before we all get a look at this machine. We'll see you there, Xavier!

To Esperence and Return by Falco

by Juliet Ferguson

You can go anywhere if you have a Falco. I wanted to see the sand dunes at Eucla which is on the edge of the Nullabor Plain, and about a thousand miles from home. We felt if we were going there we might as well continue on to visit friends in Esperence only a few more hundred miles to the west.

It was to be a six day trip and our first stop was just thirty miles to the north. There we re-fuelled (our usual supply was contaminated; news of this disaster has undoubtedly reached the States) and found ourselves propped up on jacks due to the undercarriage circuit breaker popping on retraction. All seemed well, and we had no further problems on the trip.

Off at last following the Murray river to the northwest, over salt lakes at Hattah and then over the southern end of the ancient Flinders Ranges before landing to refuel at Port Augusta. Flying at nine thousand five hundred feet and still being tossed about, even above the cloud.

On over iron-stained country with vast salt lakes, initially above cloud, then between, among, above and below and finally through to nine thousand plus again where Ian prefers to be—'though I prefer bumping around at lower altitudes taking photographs.

On over the red/green Gawler Ranges, over a myriad of small salt lakes and tree-covered sand ridges—the southern tip of the Great Victoria Desert. Virtually no habitation here.

Abeam Ceduna then along the coast of the Great Australian Bight with long long surf beaches and pale dunes interspersed with cliffs. Below the Eyre Highway going west across the Nullabor Plains with the Great Victoria Desert in the haze to the North.

Descent over the clear turquoise water and fantastically sculptured dunes to land at the Nullabor road-house; just a few buildings in flat salt bush country stretching to the horizon, but the best place in the world to watch the Southern Right Whale breed and calve.

The next day we had a quick 4WD drive to the coast to the whale watching area (Aboriginal land with all sorts of restrictions, and no whales at this time of year), then headed off in hazy warmth for the trip to

Top: Juliet, one of the few women who flies a Falco.
Center: Multiple salt lakes 50-60 miles northeast of Esperence.
Above: An old telegraph station, once the end of the line from London in the 1800's.

Top: Approaching the cliffs of the Great Australian Bight. Center: The cliffs of Dover are white, these are just dirt-colored with miles of tree-less plains behind. Above: A cove in the cliffs. No swimmers in the water up from the Antartic.

Eucla. Wispy roll clouds over the fantastic cliffs which run for hundreds of miles and mark the southern edge of Australia.

Cloud increased, and we had to fly inland then return to the coast near Eucla. Turquoise sea, sandy beaches and enormous dunes. Buzzed the motel for a pick up, and landed on the strip in a sandy depression. The motel proprietor picked us up and gave us her 4WD for the duration of our visit!

We checked into a very comfortable room overlooking sandy, colourful scrub and the dunes, then set off North to explore some limestone caves. These are huge holes in the ground with passages leading off to further subterranean depths. We did a lot of driving over the plains and with torches and Ian in his best trousers, descended to the depths of one of the caves which after a lot of crawling, opened up into a huge cavern.

We slept well after a very good meal and a bottle of wine and spent the next day exploring the old telegraph station half buried in sand, the dunes and the beach. The beach is unbelievable. White sand and surf which stretches forever and not a soul to be seen.

We woke to low cloud and a bleak forecast 'though things weren't bad when we set off flying now along the endless beach with white sand, clear green water and the low scrub of the Nullabor to the north. Calm over the water flying in and out of low broken cloud.

Then more cliffs with the weather ahead looking gloomy and the sea becoming wilder. Thick cloud and rain developed, and we turned inland, flying low over Caiguna in rain. We flew around a storm and the weather gradually improved. Over scrub-covered plains, vast paddocks and a mass of tiny water-filled salt lakes to green Esperence where we were met by our friends.

We spent the afternoon looking at beaches west of Esperence—I need to mention our beaches again. Really these are fantastic; deep Mediterranean-blue sea, pale blue near the shore, gleaming white surf, yellow sand with huge slabs of granite projecting into the water. Scarcely a person to be seen and the water, up from the Antarctic, absolutely brrr-acing.

We spent the next day on the property northwest of Esperence with our friends Margaret and Keith, then departed to fly home the following day with a somewhat inclement forecast of a trough ahead of us. Initially the weather wasn't bad, and

A cave on the Nullabor Plain region.

we refuelled at Caiguna after a couple of diversions to look at the mountain of Cape le Grand and some more colossal dunes.

Then back along the coast, sunny and warm but with increasing cloud—climbing up, then down to avoid it. Our plan was to refuel and overnight at Ceduna, but as we approached the weather deteriorated rapidly. Glimpses of brown paddocks and the sea in rain and ever-decreasing visibility. We descended to seven hundred then five hundred feet above ground with lower cloud ahead. At seven miles from Ceduna we had to turn back. Ian's out-of-date instrument rating would not have helped as we would not have become visual at the minimum descent altitude.

We picked up the Eyre Highway and followed it forty miles back to the little town of Penong and spent the night in a small square room in an old hotel. We did get a drink and a good meal.

It rained all night, and we slushed around on the clay strip (covered with white snails) and set off in marginal conditions in turbulence beneath a ragged cloud-base of five hundred feet in rain. The weather looked better ahead, and we refuelled at Ceduna and got to Port Augusta which was sunny, with little trouble.

From there it was up and down to avoid cloud then over broken cumulus running abeam the trough—a thick band of dense white cloud with long gray streaks and towering cumulus within, which was pushing us constantly to the South. Later we descended through turbulent wind shear and cloud to about two thousand feet, and from there we were pushed steadily down until

Life's a beach, and then you die. These are the surf beaches of Experence. Mediterranean blue waters and fantastically sculptured dunes are breeding grounds for the Southern Right Whales.

Top: The airstrip at the Caiguna Roadhouse. Note the taxiway to the motel.
Center: Airstrip of the Nullabor Roadhouse.
Above: On the ground at Penong—a tiny town, but relieved to get there.

Ian Ferguson and friend.

we were sandwiched between a dense gray cloud base and mallee-covered sand ridges with a narrow arc of light visible along the horizon between the layers. Quite eerie and very rough and not a good place for a landing if one should suddenly be required.

At last over large friendly, though wet paddocks but cloud base and visibility dropped even further, and we decided to return to Mildura. The conditions got even worse so we selected Renmark on the GPS. Then low in turbulence and rain, rubbing the cloud base with the canopy. We finally broke out into a sunny day at Renmark.

The following day we awoke to rain and more rain so we resigned ourselves to cruising along the mighty Murray—in the rain—and having some nice meals and some local wine. Better than work where we should have been.

It rained all night but was somewhat improved in the morning so we decided to give it a go and left under low, wet-looking cumulus. Over red sand ridges again and salt pans now full of water. Flying lower and lower into more rain and lowering cloud.

Our final crossing of the Murray into Victoria was rough and wet with a further decrease in visibility and, to use the modern parlance, was scary. We remained in rain for the rest of the trip checking the track carefully on the GPS and anxiously scanning the WAC chart for high obstacles. We thought that when we reached home we might lose the strip in the circuit, but magically, a few miles from home we broke out of the gloom, our friendly windsock in its usual position at right angles to the pole and at right angles to the strip.

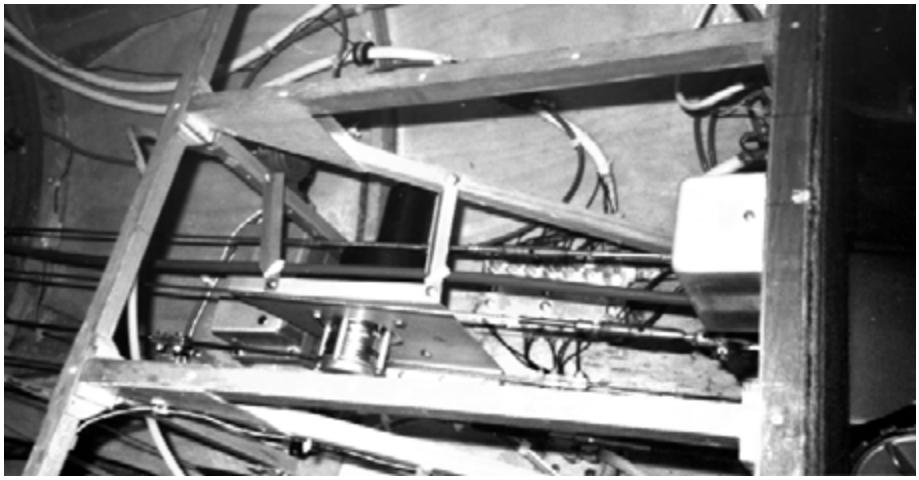
Two-Axis Autopilot for the Falco

After making several long cross-country trips in 63KC it became clear that a two-axis autopilot would be a welcome addition to the aircraft. I had installed an overhauled Century I upon completion of the Falco and had enjoyed its use on all these trips. The thought of having the additional pitch control however, was too much to resist. (Honestly, I'm just a gadget freak.)

An article in *The Aviation Consumer* (Oct.'97) convinced me that the S-Tec System 30 would be the unit of choice. The author of that article stated that "there isn't anything on the market quite like the System 30". The S-Tec 20/30 is a rate-based system which means that it responds only to the rate of change of the aircraft's actual position in space at any given moment. The System 20 is Heading Hold only and the addition of the System 30 provides the Altitude Hold. The Heading Hold gyro, computer, mode annunciator and mode selector are all contained in the same instrument case as the turn coordinator and are electrically driven (similar to the Century I). The instrument is installed in the instrument panel in a standard 3-1/8 hole. Adding the System 30 Altitude Hold requires the installation of the pitch computer, pitch servo, and pressure transducer.

In operation, the system requires about a one- to two-minute warm-up before the "Ready" light illuminates. Then, you make your choice of heading modes: Roll Stabilization, Heading (requires a D.G. with a heading bug and electronic sensors to provide heading information to the autopilot), Nav/GPS Tracking-Lo Sensitivity and Nav/GPS Tracking-Hi Sensitivity. The Altitude Hold may be engaged or disengaged by a switch mounted in the instrument panel or in the control stick grip. The Altitude Hold provides no modifier, no vertical speed and no glideslope. Nor does it have automatic pitch trim. Annunciator lights on the instrument face warn the pilot when the pilot needs to either trim up or down with the aircraft trim control.

In order to install the S-Tec in the Falco two modifications to the aircraft (Ouch! Stop that, Alfred!) must be made. First, the instrument panel must be permanently moved 1/2" aft in order to accommodate the turn coordinator/roll computer. This is not as difficult as it may sound. You must replace the mounting bolts for the instrument panel in fuselage frame #3 with ones that are 1/2" longer. Then, by using 1/2" spacers the panel can be mounted in the required position.



Also, the pedestal below the panel must be moved aft by the same amount and the center console trimmed to fit. (By the way, this relocation of the panel relieves some of the strain on the three connector plugs at the back of the panel and provides a little more room to remove individual instruments when necessary.)

The second mod requires the carving out of the lower spruce mounting block for the roll servo as the capstan of the S-Tec is slightly larger than the Century I. After the servo is mounted its cables are attached to the aft aileron cable.

With the instrument panel out of the airplane, I took it to the avionics shop where I had purchased the autopilot and had them do the wiring. (I had also added an S-Tec D.G. with heading bug.)

The wiring in the aircraft I did myself and in the process added stick grips that accommodate the mike switches plus the autopilot disconnect, mode, and altitude hold switches.

The mounting of the pitch computer is a little more complicated in that a small platform must be fabricated and attached to the lower center longeron and adjacent skin area of the fuselage just aft of fuselage frame #7. This platform must be shaped so that the computer is no more than 10 degrees off the horizontal when the airplane is in level flight. It should also be parallel to the lateral axis of the airplane.

The pitch servo is mounted in an aluminum bracket (available from S-Tec) and then mounted in the airplane so that it's capstan is in proximity to the lower elevator control cable (see photos).

The pressure transducer can be mounted on one of the vertical members of fuselage frame #7 and its tubing connected to the Falco's static lines on the right side of the aircraft.

After connecting all the receptacles and plugs and performing all the pre-flight tests as outlined in the installation manual, the S-Tec worked on the first try—except the roll and pitch commands were reversed! This was corrected by swapping two wires in the servo plug connectors.

In flight, the S-Tec works beautifully! It certainly gives you more time to look for other aircraft, admire the scenery or look at maps.

If you have any questions or comments I may be contacted at Falco@flash.net or 713/461-4203.—*Cecil Rives*

Goings On at Sequoia Aircraft

I hope most of you are keeping up with the changes on our website. I could never in my wildest dreams have imagined that one marketing tool could do as much for us as the Internet. We have been very busy as a result. Sales are about double for the year, and we have been in a major re-stocking cycle. The re-orders are exceptionally large for one year, about four times normal, but it's just in the nature of the Falco that we get these surges.

Part of the website is the Falco Workshop, where we spotlight builders at work on their projects. I wish more of you would send us photographs and notes for the Workshop. Ideally, I would like a photo of you, something about yourself, photos of your Falco project and a few words. What I suggest is saying what you already say to someone when they come into your shop and ask you about the Falco. Typically, you tell them how you got started on the Falco, and you talk a bit about the project, what you like and don't like. Just put it in your own words and let your personality come through.

Some of you, when you call or write, ask with a touch of anxiety in your voice about the 'search for a successor', and how it is going. First, let me explain that I've always regarded this as a five- to ten-year process, and I have always thought it would be five years before a qualified purchaser would walk through the door. In the meantime, I want everyone out there to be talking about it so we will have the best chance of finding someone with the right talents and abilities. And with the surge in the business that we are currently experiencing, Sequoia is healthy, growing rapidly, and I'm in no hurry at all.

I have a lot of plans for additions to our website, and I see it as a way to dramatically increase our abilities to communicate with current and potential Falco builders without the costs associated with printed literature. We now have high-speed, full-time access to the Internet, so I can make changes to large sections of the website without having to think about the time it will take to update things. We've changed to a new webserver so that we can have e-commerce in the Falco Store, if only for Falco caps and shirts.

I hope we will have a big turnout at Oshkosh for the 45th birthday party for the Falco. When I was in Italy two years ago, Mr. Frati said he would come. Now he's not so sure, but Mr. Frati has always been one to make up his mind in June or July, so let's hope he will come. From all reports, we are going to have a big turnout, and if you are coming with your Falco, please let us know. The EAA will be saving a parking area for us, and we need to let them know how many Falcos to expect.

Alfred Scott

Willard Hofler tears up the North Carolina sky.

Susan's Corner

Spring has finally sprung here in Virginia, and it's now time to start firming up some of the Oshkosh plans.

The Paper Valley Hotel was unable to provide us any more rooms, so we only have the original 10. I really wish I could accommodate more of you that wanted rooms, but it's now beyond my control. Those of you that do have rooms, please confirm your dates and such with me by the first week of June.

Our big Falco Builder Dinner will be on Friday night at Paretti's, which used to be the Green Mill Restaurant, adjacent to the Best Western/Midway Hotel on College Avenue. The bar will open at 7:00 p.m. and dinner will be at 8:30. Your choices of dinner this year will be grilled salmon fillets or broiled fillet mignon. The cost will be $20 per person, which includes gratuity and tax.

To avoid the confusion of everyone wanting to pay separately and/or at once, I'll be collecting the money in advance and issuing paid dinner tickets. Please call, write or e-mail me with your choices, number of people and payment, and I'll get the tickets out to you. I do need to give the restaurant a final head count for dinner at least a week ahead of time, so please get your tickets as soon as possible. Also, please remember to bring your dinner tickets with you—you will need them the night of the banquet, and I won't have duplicates.

Wednesday night we'll plan on getting together at Victoria's and Thursday night at the Road Kill Inn (Dick and Joan's) for those of you that just can't get enough of the "Falco fix".

Alfred and I will be arriving in Appleton on Wednesday, July 26th. If any of you need or want to reach me, please leave a message at the hotel and a number where I can call you back.

As for other news—we just keep bumping along at a pretty steady pace. We've got some very active builders out there who are building up a storm.

We're expecting a great turnout at Oshkosh this year, so I expect the 45th birthday party will be a lot of fun. See you all there.

Susan Stinnett

Calendar of Events

Oshkosh 2000. Plan now to attend the 45th Birthday Party for the Falco. All Falco owners are ordered to attend.

Construction Notes

Jacob Brouwer reported that he experienced the same difficulty with his landing gear that Jonas Dovydenas earlier reported. In Jonas's case, the nose gear adjustment rod, installed in the nose gear upper drag strip, turned 90° on retraction and bent at right angles when he selected gear down.

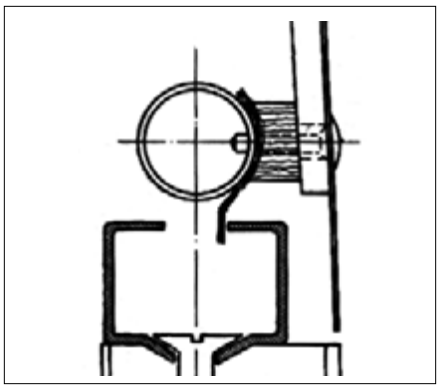
In Jacob's case, the bending was not as severe, and he reported that the rod was bent about 20°. This required replacement, and Jacob commented that he had the nut tightened down tightly, or so he thought, but he had not installed a roll pin to prevent the rod from turning. You can be sure that the new adjustment rod will be properly safetied this time with a roll pin, and for those of you who haven't taken this safety step, well, your day could come soon.

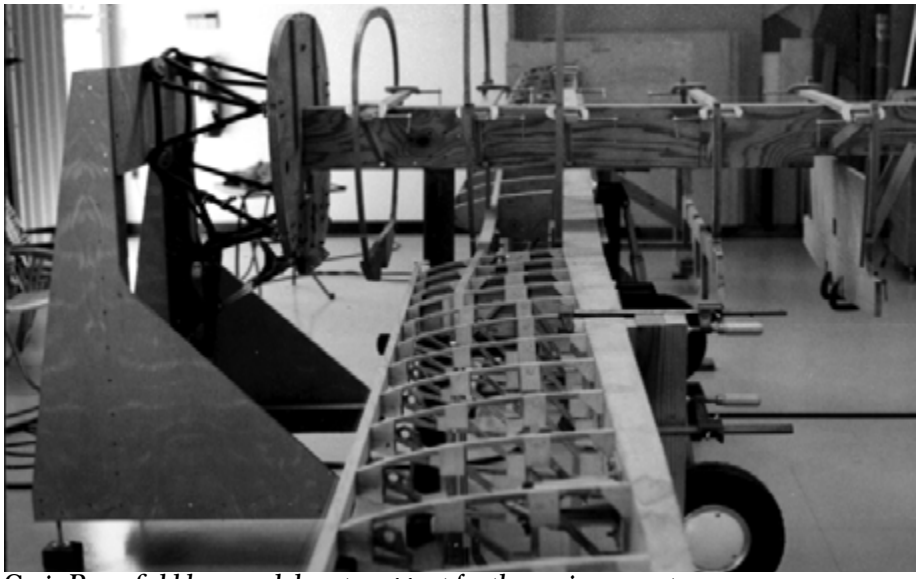
At the West Coast Falco Fly-In, as always Falco builders gather around and look at little things that each builder has done to their plane, compare notes and consider the merits. There was broad agreement that Richard Clements had come up with an exceptional idea for a canopy seal on the sides of the canopy.

We seal the sides with a foam rubber strip in the shape of the letter "P", and while it works well, it is subject to damage when people get in and out of the airplane. Richard omitted the foam rubber strip, and instead he installed a strip of aluminum sheet outside of the canopy frame and inside of the acrylic canopy. As I understand it, the aluminum strip is bent in two places so that it rides lightly on the canopy track. The air pressure in the cockpit is slightly higher than outside the airplane, so the air tends to rush out and this presses the Richard's canopy seal tightly against the canopy track.

I'm sure I don't have the exact details straight here, because the strip could be installed next to the canopy frame and thus would require less bending. And Fred Doppelt remembered that there was a strip of wood in there somewhere, but he couldn't exactly remember the detail. Even so, it's an intriguing and innovative idea that many of you might want to consider.

Richard Clements' canopy seal.





Craig Bransfield has an elaborate support for the engine mount.

Somewhere, long ago, we described the finishing process of the Falco, but let's cover this subject again. When the airplane is complete with all of the plywood skins installed, the next step is to cover it with a thin layer of fiberglass cloth and epoxy resin. This is to protect the wood from moisture and to provide a toughened surface to survive hangar rash and the fondling of the truly twisted perverts of aviation.

The best procedure is to use West System epoxy resin and a very light fiberglass cloth, typically a 2 oz fiberglass cloth. There is no special brand of cloth required, and the type of cloth used here is typically sold as a deck cloth for boats. It's intended as a moisture protection layer only and to be used on top of wood. Some people use some of the extremely lightweight cloths sold in model airplane shops, but I doubt the effort is worth it.

Lay the fiberglass cloth on the dry plywood skin, then brush on an ample supply of mixed epoxy resin and use a brush to work the epoxy into the cloth and so that all bubbles under the cloth are eliminated and so that all white areas in the cloth are eliminated. You want a completely saturated cloth and to get this, you must use an excessive amount of resin. When the fiberglass cloth is completely wetted out and the epoxy has penetrated completely to the plywood, then use a plastic squeegee to squeeze the excess resin out and work this resin into a new area of the skin.

If you're working on the wing, you would typically start by brushing an area, say 6 to 12 inches wide, along the leading edge, and then squeegee the excess resin into the dry area aft of this strip, brush on more resin and then squeegee it again back until the entire wing is covered.

Some people use a heat gun in one hand to heat the resin so it flows easily. With a little heat, the viscosity of epoxy changes dramatically, and it becomes very thin and watery with a little extra heat. Others have blotted the entire surface when finished with a layer of paper towels to absorb any excessive resin.

The weave of the thin fiberglass cloth typically becomes completely invisible when it is wetted out with epoxy. The birch plywood looks as if it had been varnished.

Let's also remember why we use a fiberglass cloth at all. For one thing, when you use a thin fiberglass cloth and squeegee out all excessive resin, you get an exceptionally consistent film thickness, and it is much thinner and weighs much less than if you had simply brushed on a coat of epoxy. Second, the fiberglass cloth displaces the resin and the combination is very light and it adds some stiffness to the plywood panel.

Third, the combination of the resin and cloth produces a tough membrane over the wood. Cured epoxy by itself is brittle, and it's susceptible to cracking and crazing, while a combination of cloth and resin is not. You want a layer of fiberglass under the paint so that if the paint cracks over time, the crack will stop at the fiberglass layer. Without the fiberglass cloth, who is to know if a crack in the paint would continue on into the wood?

When the epoxy is set up, the next step is to fill the low spots with microballoons and ep-

And Craig plans for an enormous panel—probably a glass cockpit by the time he flies.

oxy. Microballoons come in two types, glass and phenolic. Glass microballoons are white and the phenolic ones are brownish purple. Either material is fine, and there really is no appreciable difference in the choice of microballoons. You can buy microballoons from Aircraft Spruce, Wicks Aircraft, Gougeon Brothers (manufacturers of West System epoxy) and many other suppliers.

To apply the microballoons, mix the two parts of epoxy together in a cup and then add microballoons. In the world of fiberglass airplanes, they talk of 'wet micro' and 'dry micro'. Dry micro is a mixture with so much microballoons that it resembles a cake icing. Wet micro is somewhat runny. In our case, typically you want a 'dry micro' mix that you will squeegee into the low spots. Do not try to be too accurate here, but just try to fill in the low spots, let the epoxy harden overnight and then start sanding.

This is a good time to remind ourselves why we use West System in the first place. First off, West System is formulated as a moisture protection layer, and thus it has a different composition from an epoxy intended for some other purpose. Second, West System sands easily when it hardens, and this is a critical difference. Many epoxies become gummy when hard, and they are impossible to sand, while a hardened dry micro mixture will sand almost as easily as a block of rigid foam. If you try using a brand of epoxy that becomes gummy when hard, you will have a nightmare on your hands.

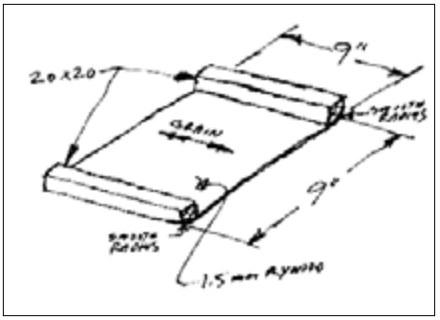
There has always been a healthy debate about whether to use microballoons under the fiberglass layer or on top of it. The argument for using microballoons first is simply that you want to fill the depressions before you put on the fiberglass cloth. While there's no right or wrong way, typically we recommend putting the microballoons on after the cloth because of the difficulty of sanding the micro without also sanding into the plywood—but if you're pigheaded then you're going to do it the way you want anyway.

When you sand the microballoons smooth, be sure to use a bright light held at a shallow angle to the surface to cast shadows into the low spots. It's very easy to convince yourself that you have a super smooth surface in a normally lighted garage, and then suffer the indignities of painting it and wheeling the plane out into the sunlight.

When the microballoon surface is smooth, typically you use a sanding primer/surfacer and then the final paint. A primer/surfacer is a thick paint-like substance that's heavily filled with industrial talc or some similar material. You can brush or spray it on, and then sand off the high spots. This is where the incredibly smooth surfaces of composite aircraft come from, but be warned, this material is also very heavy.

In the early days of fiberglass aircraft, the primer/surfacer of choice of Featherfill, and while it's an excellent material, it has a polyester resin base, and polyester is hygroscopic. It's like salt; it attracts and retains moisture from the air—it becomes heavy, defeats the whole moisture-protection scheme, and often causes the finish coat of paint to flake off. You're much better off getting an epoxy-based primer/surfacer. There are many on the market these day, and they are used on all of the composite kitplanes out there.

And when it comes to sanding, there are two tools which I would like to recommend.



A sanding spline.

Forget all about power tools here, you simply don't have the fine control. I like to use both a board sander and a sanding spline, often alternating between the two.

A board sander is a standard device sold in automotive paint stores, and it's for use with sandpaper sheets that measure 2.74"x17.5" (70x444mm). These are used in auto body shops, and you can buy the sandpaper in a wide variety of grades, from the very rough 36 grit, medium 80 or 100 grit, or 180 grit for a final sanding. Start out with rough paper and work your way up to the finer grits as you get closer to the final finish.

You can, of course, also make your own sanding boards by gluing these strips to long, smooth boards or aluminum tees or angles. I prefer the board sanders for the heavy work because you go through so many strips of sandpaper and it's easy to replace the strips.

But I think the most valuable tool is a 'sanding spline'. These were first promoted by Burt Rutan on his earliest designs and it's a deceptively simple device. In the U.S., a standard sheet of sandpaper measures 9 x 11 inches, so a sanding spline measures about 9 inches square and with a couple of 3/4" square strips of wood glued to each end. Make it from 1.5mm mahogany or birch plywood with the grain direction of the plywood parallel to the two square strips of wood. Round off the edges and then use it with a sheet of sandpaper to sand the wing.

The idea is that the sandpaper will wrap up around the two strips, which you use as handles for each hand, and with your fingers you hold both the sandpaper and the strips. The plywood will flex with the curvature of the wing or fuselage, and you sand at 45° to the leading edge, always moving around and never sanding in the same place twice.

You won't understand the genius of this device until you work with it, and it will quickly become clear where the high and low spots are on the airplane.

Sawdust

• Media Watch. Andrea Tremolada and his Falco grace the cover of *Volare* magazine in Italy. We will have a copy of this article in the next Falco Builder Letter. There's a big article on Andrea and his Falco in the Italian and Spanish issues of GG magazine. And that's just the tip of the iceberg—there have been about 30 other articles in Italian newspapers, magazines and journals. By virture of his position as marketing manager of Gianni Versace and his enormous advertising budget, magazines that ordinarily would not be interested in homebuilt aircraft are covering Andrea. With Andrea's upcoming flight to Oshkosh via Africa, Brazil, Venezuela and Cuba, we can expect a flurry of media interest in the Falco, and when Andrea makes his flight, we will have daily reports of his progress at www.SeqAir.com.

• He'll never stop. Stelio Frati is hard at work on a new design, a four-place, 300-hp turbocharged design much like the SF.260 for a company in Rome.

• Swing-Wing Virus. Rick Fitzwater reports: "After viewing multiple pictures of Jonas' swing-wing Falco, I was getting 'Swing-Wing Envy". I am too far along on my Falco to change the wing, so I settled on a father/son guitar-building project. The design includes Ibinez humbucking picks and a Floyd Rose whammie. The body is solid poplar and the neck/headstock blank was purchased from Performance Guitar in Hollywood. As for the obvious question, the answer is: No, it does not play swing music."

• Do you ever wonder, sometimes, as you pursue your passions at the expense of things that you know you really *ought* to be doing, that maybe you're just a wee bit over the edge? Well, if building a Falco seems a little extreme at times, then take comfort in the case of Paul Moller and his Skycar project.

He's been at it since 1963, pursuing his personal dream of a machine that you can pull out of your garage, lift off vertically and cruise at 350 mph completely under computer control for a range of 900 miles. In 37 years, he's been through numerous designs and has actually flown one in tethered flight to an altitude of 40 feet. So if you're bored with your Falco for a while, check out the Moller Skycar in the June issue of *Car & Driver*, or at Moller's website at www.Moller.com. Positions on the waiting list are only $5,000, while "My Next Car Will Be a Skycar" license-plate frames goes for only $15.

Rick's swing-wing guitar, the Moller Skycar, and ferry tanks go into Andrea's Falco for the flight to Oshkosh.

Mailbox

Thanks again for the FBL. I read this issue word for word, cover to cover. There is always some really good stuff in it. I even forgive the gratuitous condescending remark by one of your writers about the lack of class in us RVers, however valid it may be.

I found the article by Stephan Wilkinson to be fascinating for a variety of reasons. It was well written which is not new nor surprising. It expressed a theme which we rarely hear about in the aviation community, but which I have come to embrace more as the years go by. Maybe that tells you more about me and my advancing years, but it does reflect some of the bad experiences which have accumulated over the years. The simple fact is that I have lost an almost incredible number of friends and acquaintances through the years beginning even before I started flying 54 years ago. Most recently, I lost a good friend in the prime of his life who was burned fatally in a forced landing in a LongEze back in your part of the world.

I recently celebrated—if that is the word, and it isn't—my 75th, and I just passed my flight physical and so am good for another couple of years. But the handwriting is on the wall that I probably will not meet the visual requirements the next time. For now, I will continue to fly, to enjoy it, and even will continue to twist the tigers tail on occasion—aerobatics on almost every flight, 'crop dusting', flying close to the big rocks in the mountains, etc.—but I am beginning to accept, for this odd fusion of chimerical reasons the imminent end to this wonderful experience to which our little fraternity is privileged as have been few in the history of mankind. In continuing as long as I can, I have elected to accept the risks. But I have empathy with Stephan's concerns. I much admire him for expressing them so articulately, and I envy him the ability to walk away without a whimper.

I think that it was Shakespeare, or some other Irishman, who said that a graceful exit is life's masterwork. May I do as well.

Dean Hall
Ft. Collins, Colorado

Sorry to hear that you are looking for someone to take over Sequoia. I am consoled by the fact that you will have a hard time finding someone as hard-working, intelligent, onery, and gutsy enough to take on Pope Paul the way you did. You might just be a unique SOB. I am just selfish enough to hope it takes you a while to find your replacement.

I finally painted my Falco, and it now looks almost as good as it flies. I took it to Sun 'n' Fun at Lakeland and got a trophy for best all wood homebuilt, the only thing ever won except for my wife and actually I stole her.

Ralph Braswell
Ocala, Florida

Congratulations. And don't fret about me, I've always known this would be a long process so I'm in no bigger hurry than you are.—Scoti

My Falco-dream started back in 1981 during an airshow in my home country. I remember two things of this event: The first was the astonishing show of the Italian Alpi Eagles in their Marchetti SF.260, demonstrating the perfectly harmonic and for me only real acrobatic flying (in which aerodynamic were not yet replaced by sheer power!). The second was the first Falco I saw, a grey and black specimen with German registration, which stood there in line together with other wonderfully glaring oldtimers.

That's why I'm the owner of No. 1104 of your plans and devouring your builders letter the day they arrive for already 13 years, and my preparations to realize the dream were made five years ago; tools and shop are still ready!

But till now, the people deciding about promotions and retirements didn't care about my dreams, they made me some more years to go… and so I didn't dare to begin.

It seems now that the way it went was right. Mother fluke was unexpectedly benevolent to me by suddenly fullfilling my long wishful thinking. Last July the 76-year-old owner of the HB-UOD, giving up both flying and aircraft, sold his wonderful aircraft to me!

It's a Falco Series IV, No 402, built by Laverda in 1963. The O-320 has 90 hrs since new, the prop is new, cell, interior and paint need a compete renovation and some components (i.e. windshield, canopy, instruments) have to be repaired or replaced. There is a small amount of wood repair to do in spots where the water has caused some damage. The work has already started by taking apart the fuselage and the further dismantling is in progress.

I dreamed about and finally purchased my Falco exclusively to have a manual labour which sets a counterpoint to my daily business. After half a year of work and an investment of already 500 hours, I join all those who are talking about the

Max Riner is restoring a 1968 Falco with 90 hours on the engine.

big benefit of daily satisfaction. The steps of the progress are little, but I enjoy every one of them. For every step and every part I am consulting your great plans, and they do me a big favor. It impresses me all the time to see how accurate and valid they are even in respect to my 'old' airplane. Furthermore I'm lucky to have my wife Marianne stimulating and supporting me.

Max Riner
Schinznach-Dorf
Switzerland

I am attaching the leading edge ribs to the wing spars and plan to finish the wing this year.

I recently learned of a neat way to remove pencil marks from wood. Use a rag or paper towel soaked with denatured alcohol to rub away the unwanted lines.

Wayne Rampley
Muskogee, Oklahoma

Making progress (steady by jerks) and enjoying it! Light at end of tunnel not a train. Panel, instruments and all wiring complete aft of firewall and into the engine compartment. Getting ready to skin the forward section of the fuselage and go to Arizona for a few weeks. I'm hoping to make the West Coast Falco Fly-In this fall as part of our planned west coast motor home tour.

Bill Roerig
Kaukauna, Wisconsin

It's been some time since I last put pen to paper. In fact, the letters page of this month's Falco Newsletter reminded me that it was in 1997 when I commented on the subject of Aerodux adhesive. I still think it is the best, not least because of its crimson colour—you can see clearly where the adhesive is and how thick your glue lines are, plus you can alter the setting times using "slow, medium or fast" in simple 1:1 ratios of adhesive and hardener. The best way of measuring is to use a digital postal scale, cheaply obtained from somewhere like "Office Depot".

Well, to remind those who were not building then, I decided that I would construct the fuselage first. This was mainly because my workshop at that time was only big enough for the fuselage, not the wing. Since then I have done what most builders seem to do at some stage—that is, remodel my house and build an additional bedroom over my garage. I also had to extend my workshop to be able to get the main spar in place to start wing construction. My workshop is at the bottom of my garden.

Just before Christmas, I decided that the time had come to move forward. So I enlisted the help of a neighbour and his two sons and cut the fuselage in half at frames #8, passed it over my next door neighbour's fence, down his garden, down the road and finally up my driveway into my new garage! The tail section now hangs from the ceiling of the garage where the cars can just be parked beneath it!

Ralph Braswell's Falco has a warbird sky-and-sand camoflage paint scheme.

I have now drilled the holes for the main undercarriage legs in the main spar. I must admit that it took me some time to figure out your instructions. It is probably because I have been a little out of touch with the drawings and instructions. However I do think that a simpler instruction would help.

After much head scratching and reading I decided that the main dimensions are: (1) The distance from the centre line of the main spar to the point where you have to drill the 2-1/2" hole and (2) the 85mm dimension from the top of the spar "down" to the face of the spar where the hole goes through the large block. This is critical, because (as you clearly state) you don't want to cut into the top spar cap.

I also recommend drilling this 2-1/2" hole before closing the spar with plywood on the tapered face. (You, Scoti, do this anyway with the spars supplied to builders, one side of the spar has plywood attached, the other is left open so that the inspector can see the interior). This is purely a "comfort procedure" because then you can actually see that the hole is not going to go through the top spar cap. It would be a very simple matter after you have glued on the final closing ply, to cut the plywood out and clean up the 2-1/2" hole of glue runs afterward gluing.

NB: To all future builders, the location of the forward spar to the main spar for the purpose of drilling the undercarriage holes is achieved by using the bolt retaining ring on the front bearing mount which just fits inside the main undercarriage bearing carrier. Don't do what I did and fix the main bearing in place otherwise you will have to remove it to use these parts to jig it up properly!

Well that's about it for now. I hope to move the spar into my workshop at the end of March and start construction on the wing. The weather and temperature should be more in line with gluing at that time. So, hang on in there guys. It all seems very daunting when you first start, and when you pick it up again after a considerable break. But it really is worth it.

Alan Powell
Ewell, Epsom
England