

# Falco Builders Letter

## First Flight: Ray Purkiser

Ray Purkiser went home to Rogue River, Oregon, from Oshkosh with a short list of things to do to his Falco before he flew the bird. These were soon done and a big rollout party was scheduled for September 21 at the Grants Pass airport. Ray planned to do the first flight a few days before. As luck would have it, the FAA inspector was unable to make it until a month later. Finally, the inspection was done, and on the afternoon of October 29, Ray Purkiser became the ninth homebuilder to fly his Falco.

Ray had been worried about how he would find flying the Falco. He has a Swift and is used to landing that tail-dragger, but Ray didn't know how he would do with a nose-dragger like the Falco. So, while he was waiting for the inspection, Ray whiled away his time trying to simulate what he thought a Falco would feel like with his Swift. It was a lot of nothing, since the Falco flew beautifully, and Ray found it the easiest landing airplane he has flown.

Ray had a chase plane on the first flight and received word that there was smoke coming out of the cowling. After a quick precautionary landing, Ray found that he had forgotten to tighten one line to the oil cooler. A little oil had gotten on the exhaust pipe. The problem was quickly fixed. Other minor problems had to do with the cowling. Ray made his own, and found minor interference problems with the alternator fan and the exhaust pipe.

When I talked to Ray, he had flown it for about 2 hours, and all of that time was with the landing gear extended, so I don't have any performance figures for you. Ray's Falco, N25RP, has the Nustrini canopy and is painted in the Modena paint scheme, white overall with silver and three shades of plum on

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*Above: Karl Hansen's Italian Stallion—Ferrari red with white trim.*

## Around the Falco Patch

*Heck, you tell me a better name. With a bunch of Falcos now flying and the list growing, we need a regular column for news about Falcos in the air.*

Karl Hansen has painted his Falco. Oh, my Lord, you should see that plane! It is painted in the same red paint scheme we used in our advertisement. The only thing that is different is the numbers on the tail. We have a few photos of the plane, but reproduced here in black and white they do no justice to the plane. It is a beautiful, striking looking airplane. Shortly after it was painted, Nigel Moll from Flying, arrived on the scene to do a flight report. Nigel said the plane was covered with bugs, which think the Falco is a giant flower. Nigel said the Falco would indicate 161 kts at 25"/2500 at 3,000 feet and 82°F. At

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## Frati

*The following article appeared in the October 1985 issue of Pilot magazine in England.*

There aren't many Stelio Fratis left, in this day of anonymous airplane designers. Geoffrey de Havilland, Ed Heinemann, Willy Messerschmitt, Tony Fokker, Artem Mikoyan, Ted Smith, Ed Swearingen... all put a personal stamp of line and form on their designs, but few others themselves designed and built as many or as varied a line of airplanes as the quiet, shy Italian genius Stelio Frati, the master of classic light-aircraft design.

Frati, a 60ish bachelor who hasn't taken a vacation in 20 years because he'd far rather work than travel, nevertheless came to the annual EAA Oshkosh fly-in this year. Not because he likes to look at airplanes but—I suspect—because he couldn't quite believe the fuss being made over an ancient design of his of which he thought he'd long ago seen the last: the small, splendidly conventional F.8L Falco, which is on the verge of the kind of popularity that few homebuilt designs ever achieve and that has never before come to an airplane a third of a century after it was designed. Last year, there were two homebuilt Falcos at Oshkosh, this year three, next year probably at least a dozen and then increasing numbers of

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*Top: Falco designer Stelio Frati straps in for his first ride in a homebuilt Falco. Middle: Jim DeAngelo's Falco in the air. Bottom: After the ride, Mr. Frati and Jim DeAngelo.*

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the 150 currently under construction. (Over 400 complete sets of Falco plans have been sold by Sequoia Aircraft, the admirable and efficient Virginia firm that reincarnated the design.)

The tiny, birdlike Frati, a stooped figure with a thin neck, thick medicine-bottle glasses and frame so slight his pants bunch under his belt as though he's wearing somebody else's clothes, took his first ride in a homebuilt Falco at Oshkosh, during a fly-by of various commercially available kit-built airplanes. It was an occasion that inspired a bit of apprehension, for the man looks too frail to take much pleasure from a series of low passes, but Falco builder Jim DeAngelo landed to report that Frati, who speaks no English, spent most of the demo flight making unmistakable balls-to-the-wall, pedal-to-the-metal, firewall-this-sucker motions. (At a dinner in his honor that evening, Frati was toasted by another Falco builder who commended his courage "for riding in a home-made airplane built by an Italian baker who can't even speak Italian.")

I'd dined with Frati the night before, thanks to Sequoia President and Frati host Alfred Scott, the "crazy person"—Frati's words—responsible for the Falco renaissance. Though it's difficult to interview through an interpreter an elderly, jet-lagged Italian who has just been attacked by a Wisconsin restaurant's version of veal Parmigiana, Frati did admit that he was pleased to see his first homebuilt Falco because he'd been a bit worried how it would turn out. (So pleased, in fact, that on first meeting he'd grabbed the wingtip of DeAngelo's plane and racked it up and down vigorously to assess its stiffness, cracking the nav/strobe-light Lucite fairing in the process. The otherwise compulsive DeAngelo plans to leave the crack where it is as a mark of the master's touch.)

Frati also revealed that perhaps he'd been too hasty in agreeing, in 1977, to allow Scott the plans-reproduction

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privileges. For nine months after the contract was signed, Scott had received nothing but a few general, tattered sheets of the hundreds of pages of plans. Scott got on the telephone to Milan, and Frati admitted that in truth, his small freelance design firm, General Avia, simply didn't have the time to do all the necessary redrawing and consolidating of the old Falco

plans. "Why don't I do it?" Scott asked and submitted to Frati for his approval a single redrawn plan sheet that looked perfectly professional. On the basis of that sheet, Frati agreed, never knowing that it was the very first engineering drawing that Alfred Scott had ever done.

I asked Frati about his most recent production design, the twin-engine Siai-Marchetti Canguro utility turboprop, and his interpreter/associate/shop director Renato Cairo erupted that the Canguro was an airplane they simply did not want to talk about. He and Frati then spent the next 15 minutes not talking about the Canguro, explaining that it could have taken over the market since handily filled by the Cessna Caravan if SIAI-Marchetti had ever stopped "playing with" the design, which stretches back to 1975, which once was on the verge of copping the huge Federal Express order that has since gone to Cessna for Caravans, and which is only now going into the inimitably Italian version of serious marketing and production.

To my surprise, neither Frati nor Cairo seemed familiar with the name of Luigi Colani, the industrial designer responsible for the configuration of the RFM Fanliner/Fantrainer as well as the delta-winged, twin-Wankel "Mach .9" propfan intended to take the world propeller-driven speed record, which was introduced at the Aero 85 show in Friedrichshaven earlier this year. It was either an intentional Italian put-down of a flashy rival or the sign of insularity.

Frati's favorite of all his designs? "It is hard for a designer not to be proudest of the airplane that has sold in the largest numbers," he growled at Cairo in his gravelly Godfather voice, "so the SF.260. But then there is the Falco...." For me, too, there is the Falco. S/N 878 slowly takes shape in my barn, and for a first-time homebuilder, it gives me great confidence that I am assembling a totally proven design that is the product of neither a dentist nor a self-taught experimenter but one of the world's great aeronautical engineers. Equally important, as I trudge the flightline at Oshkosh and view the variety of ways in which homebuilt designers have made gross and ugly the lines that lead to flight, I can take pride in Frati's work as not only engineer but sculptor.—Stephan Wilkinson

## Ray Purkiser

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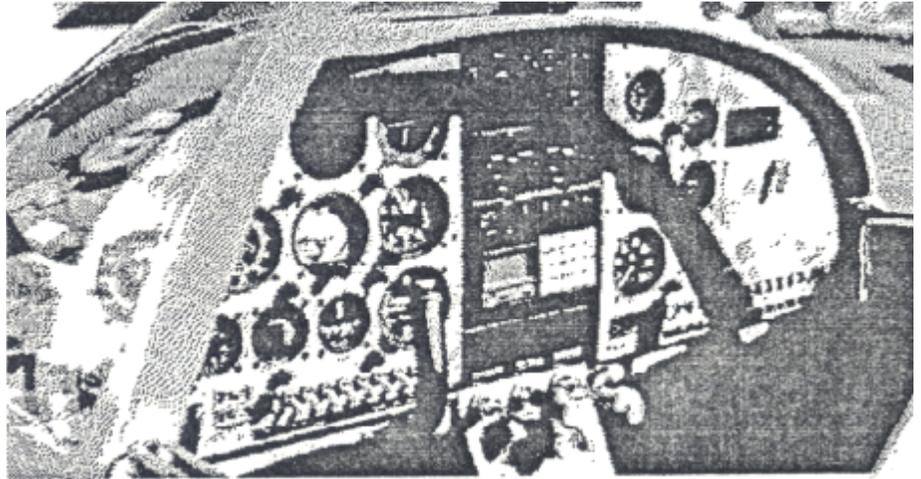
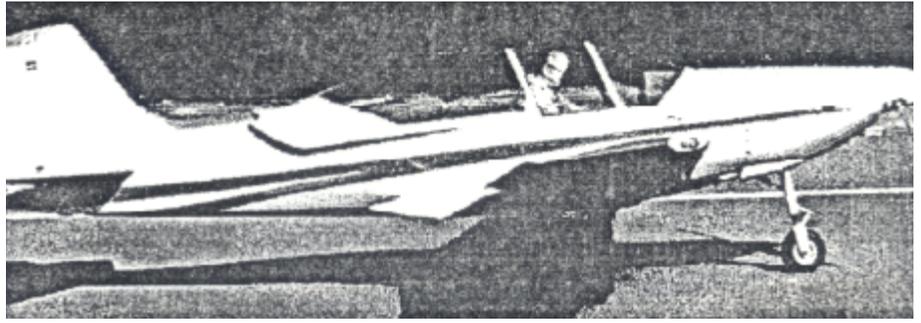
the sides using Dupont Dulux enamel. The interior is medium gray with plum trim and silver carpet. The airplane weighed in at 1,273 lbs empty and has a 160 hp IO-320-B1A engine. I don't have the CG location yet, but Ray said it was fine.

Ray Purkiser's Falco has an unusual beginning. The Falco was actually begun by Bob Esau, one of our earliest Falco builders. Bob bought the Falco plans in August 1979, receiving plans No. 536. This was back in the Dark Ages of the Falco, when I was just starting to work on the kits. Bob intended to be the first to finish a homebuilt Falco, and he began construction right away, making all of his own wood parts. At the same time, Bob Esau became the lead Falco builder in the eyes of most of us—although the truth of the matter was that Larry Wohlers was ahead of everyone else from the beginning, but Larry was very quiet about it.

Bob Esau was an exceptionally colorful character, with a string of off-color jokes as long as his list of ex-wives. The construction began in the basement of his condominium in Heyward, California. The next thing I knew, Bob was up at Lower Lake, California, living in a hangar and working on his Falco—and his latest wife had just become another “ex”! Bob worked on the Falco full-time along with a helper. He had a cot next to the Falco, and he would set the alarm clock to wake him at any hour so he could get something glued and in the clamps.

Bob's Falco was to have been the first of many. He intended to build Falcos for sale to others and even printed a brochure. Bob made good progress and was in the process of installing the last few skins when he died in an automobile accident on November 13, 1980. The Falco then languished in Bob Esau's estate until Ray Purkiser bought it.

Ray had purchased plans No. 541 just after Bob in August 1979. Ray began construction on his Falco and worked with Aero Cabinet to make the wing spar jigs for their kits. Partially because he enjoyed building the Falco more than his job as sales manager for a pharmaceutical company, Ray took early retirement and moved to



Rogue River, Oregon, from Glendale, California. Then in January 1982, Ray purchased Bob Esau's Falco project.

It turned out there was a considerable amount of remedial work that had to be done. Ray removed some of the wing skins and had to re-work the fuselage since Bob had made fuselage and tail cone as a single assembly. The rest of the work on the Falco took longer than Ray expected, in fact most of the past year was taken up with painting and little details. Ray had hoped to fly the Falco by Oshkosh, but it just didn't work out like that.

There are a couple of things about Ray's Falco that are unique. Bob Esau discovered the 12mm error in the fuselage drawings, but he elected to complete the airplane without tearing things apart. As a result, the wing is installed 12mm aft. Ray has adjusted his CG calculation to compensate and finds that things still come out nicely. Also, Bob Esau had started work on the instrument panel, and it has the radios in the center. Bob had purchased a large sheet of Carpathian Elm burl veneer. Since it came with the airplane, Ray decided to use it. Ray doesn't care for wood panels in aircraft, but he said this one looks good. In addition to putting the veneer on the panel, Ray ran

*Top: Ray Purkiser's 160 hp Falco first flew on October 29, 1985. Below: His panel is covered with Carpathian elm burl for a Mercedes/Rolls Royce appearance.*

it along the inside of the cockpit. Ray says that no one believes the Falco is made of wood. Congratulations, Ray, and also to Sherry Purkiser for putting up with it all!

If you go to Lower Lake and look for Prosser's Hangar where Bob Esau once worked on the Falco, you won't find it—it's long since been torn down. And the memories have been blown away with the dust. Nothing remains of the colorful man who started that Falco except his work and his dream—a small, special airplane now winging the skies over Grants Pass. Ray, when you fly over Lower Lake, do one roll for our old friend.—*Alfred Scott*



Above: Karl Hansen's Falco

## Around the Falco Patch

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20"/2000 it indicated 135 kts at 4,000 feet and 81°F.

In our last builder letter, I doubted Karl's report that he was getting 2-1/4 inches of ram air boost, but Karl read me off the numbers, and it's a fact. So high is the pressure that the single-layer SCAT tubing would only last a single flight. Karl has since gone to Aeroduct tubing with an extra inner layer. With this boost, Karl is able to hold his air-speeds at much higher altitudes. The result is that Karl reports that he can cruise the Falco at 218 mph at 25"/2500 and 8500 feet. This is without the nose gear door, nose gear bay doors or main wheel well doors—all of which Karl intends to install.

Karl and his son Steve have three other airplanes, a Cessna 175, T-210 and 320. Karl says the Falco can out-climb the T-210 and will beat both the T-210 and 320 under 10,000' at the same power settings. It will be interesting to see what sort of speeds Karl will be able to get out of the Falco. My guess is that he will be able to get it to cruise over 230 mph, but we shall see. Karl is quite happy with the speeds he is getting now and prefers to throttle back and cruise at 135-150 kts indicated.

This is an airplane you just have to see to believe. James Gilbert's old comment that the Falco should be painted Ferrari red was right. Keep your eyes peeled for an article on the Falco on the pages of *Flying*, most likely the February issue.

Jimmy Shaw is now at Ellsworth AFB in Rapid City, South Dakota. Jimmy flew the Falco up to South Dakota and plans to spend some time getting the Falco finally fixed up and painted. Jimmy and Sharon now have a baby boy, born just two weeks after Jimmy flew his Falco. This has diverted his attention and time.

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### Karl Hansen

*Karl reports that he can cruise the Falco at 218 mph at 25"/2500 and 8500 feet.*

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In September, Col. Fernando Tellez called from Santiago, Chile, and reported that the Chilean Air Force Falco had flown about 15 hours. The first flight took place in the middle of July. The pilots are very happy with the flying characteristics and report no problems. A severe earthquake hit Chile this spring and the windshield and canopy were broken. In a mix-up, we shipped them the Nustrini version, so they are still flying with broken plexiglass all around, which explains why they don't have more time on the Falco. The Falco is painted in white and a complete paint scheme is to be

done shortly after the new plexiglass is installed. Col. Tellez promises to send a photograph when the Falco is painted. No direct news from John Harns, but we get reports that John is spending nearly as much time flying his Falco as he used to spend building it. He flies it in all weather and is down in Baja California with the Falco at this time.

Tony Bingelis has been working the wrinkles out of his Falco and has put a moderate amount of time on the Falco. We have had occasional reports of very slow leaks with the shock absorber struts, and it was just Tony's luck that he got a double case. The problem has been difficult to locate, but it's everyone else's good fortune that Tony had the problem, since through his efforts we have now found the elusive culprit.

It was an agonizingly difficult problem to find, since no one ever saw a single bubble leak from the strut, despite hours of watching the freshly inflated struts in a tub of water. We finally concluded that the only place it could be leaking was under the strut valve. I failed to note a smooth surface finish on the drawings, and the finish varies from one strut to another. Tony had the surface ground smooth and all leaks have stopped. Now that we know the cause of the problem, the solution is rather simple. We will be sending repair kits with instruction to all of you who have the shock absorber struts. It will consist of a mushroom-shaped steel tool which you will use to polish the surface. It's a method that Tony came up with, using valve grinding compound, and it can be done by hand or with a power tool spinning the tool.—*Alfred Scott*



Above: Jim DeAngelo over Connecticut

## Test Falco F.8L

*This article appeared in the "Sommerausgabe" 1960 issue of Motor Revue, a German magazine devoted to cars, planes, motorcycles, etc. The author, Mano Zeigler, deserves mention. We include the Motor Revue description at the end of the article.*

People with the proper touch know the difference between driving as a means of locomotion and driving as an art. For the latter, special vehicles and special people are necessary. Flying is no different. Generally speaking you can characterize air trips as flying, but when real flyers meet they speak of piloting. To follow this track carefully, observe a sparrow and a swallow in flight.

Bear these considerations in mind as we approach a plane designed by a man—an Italian—who was entirely concerned with the art and glory, as well as the delight, of flying.

Stelio Frati is a very well-known Italian aircraft designer and sculpturer. In 1952, he built a very sporting turbojet-powered airplane of wooden construction with a 350 pound Turboméca-Pallas turbine and turned it over to the Italian Air Force for testing. Although the Air Force was very happy with the pretty little machine and considered it as a trainer, they said "No" to series production. Thus the Caproni plant, under whose roof the F.5 was created, also said "No". Stelio Frati then went to the small Aviamilano factory and built there a new plane, with all the care of a groom seeking his lost bride. This one has conventional propeller drive. It was the Falco F.8L, the beautiful daughter of a beautiful mother.

As with women, beauty alone means absolutely nothing in airplanes. Stelio Frati carefully balanced power with el-

egance, and form with maneuverability. A so-called zero series of twenty Falcos was completed at Aviamilano before matters ceased to move smoothly there, and Stelio Frati found his way back to the Caproni works in Trento. They had gone independent in the meantime, under the Aeromere name, and are run by the clever aerodynamicist, Sergio Delli Zotti. Between them, they gave the Falco its final touches, producing the plane we see today on sale and in flight.

The Falco F.8L is a sports car of the air in the finest sense of the word. It is well-balanced, racy and solidly quiet. With the Falco the Italians created something nearly unique. The plane is made entirely of wood, yet looks as if it were all metal. You must look very closely to be sure. The plane is actually cut and fitted together in a manner normal with wooden airplane construction, being assembled of many wooden parts. Neither the tail nor the wings with the normal ribs, main and auxiliary spars are unusual. Even the rudder, of light alloy, is absolutely conventional. The Italian flair only appears as they attack the finished product. A plastic filler is sprayed over the wings and fuselage and so neatly reworked and smoothed that little hint is left of the wood. This smooth surface is sprayed with an aluminum lacquer, resulting in an almost completely unblemished surface that gives the metallic impression and simultaneously aids in reducing surface friction. In addition, this happy combination of wood, plastic and aluminum lacquer has an important advantage for private plane owners. Wood damage is easier and cheaper to repair than damage to metal. It is often unnecessary to exchange entire assemblies, and those spot repairs that occur can be covered invisibly. With reasonably proper care, there is no decisive disadvantage in this type of wooden structure while the advantages of the repair and mending are strongly in the majority.

The Falco rests and rolls on an oleo-sprung and suspended tricycle landing gear which retracts electrically. The effective hydraulic brakes are particularly pleasant when landing on small fields, and the steerable nose wheel, controlled by the rudder pedals, is notable for amazing ground maneuverability.

The Italian love for pleasant detail is particularly obvious in the cockpit of the Falco. The sliding canopy which blends nicely into the tail barely interrupts the beauty of line. Canopy pull and lock are easy to use, as are all the other detail controls necessary in takeoff preparation. This Falco cockpit is a showpiece of well thought-out arrangement, installation and easy accessibility. It begins with a well-formed stick, and the solid seats are not tiring, even on longer flights. There is a new, adjustable and very quickly-worked seat belt.

The instrument panel is effective both for its easy readability and, in particular, for the sensible placards used for all the necessary switches. Ignition, landing gear and flaps are electrically operated by means of small silver toggles, and a pointer indicates flap positions. You are reminded of the landing gear by light and horn signals which are easily noticed. In its standard version, the Falco includes these instruments: rate of climb, altimeter, magnetic compass, fuel gauge and the usual engine gauges. A radio set can be installed in the middle of the panel, between the two seats, where both pilot and co-pilot can reach it easily.

The excellent balance of the Falco shows itself on takeoff from the home field in Trento, which is not the best. The Lycoming O-320 of 150 hp has no special job in lifting the light machine from the grass. It climbs swiftly between the steep rock walls of the Etsch valley, and the few strong gusts which rocked the wings were shrugged off by the Falco, like a girl tossing her pigtails. The Brenta range looms on the horizon, misty, steep and apparently only a stone's throw from the airfield. It is a pleasure to feel the Falco climb and to see the threatening rocks retreat as we glide over them in the free blue sky.

In the seat beside me the chief pilot for the Falco, Ernesto Zanlucchi, a man as happy as his name, blinked in the

bright light. We are both old pursuit pilots and couldn't resist loops, rolls, Immelmans, dives and a few more rolls and loops. It was a program as they say but never constricted. It was the joy of flying like the swallows...

Rolls are completely without shudder—like in a jet—and loops are as easy as waltzing over a polished floor. This plane glides like a feather and flits like a butterfly. It reacts to your call like a fine horse, and the rudder needs no curb. All this can easily be explained on technical grounds by the very good stability around all axes, by the rudder that must have been balanced on an apothecary's scale, and by the almost perfect aerodynamic form of the airframe. Yet who thinks of the technical details during such a flight?

They are even more firmly fixed in your memory after the program and during the precise test flight. They confirm the sensations of the aerobatics. The Falco holds its course despite its dainty form and can only be diverted with difficulty, once trimmed. If your hand is stick-sensitive, you should rest it on one knee rather than on the stick. This is no trick, because in the absence of sharp gusts the Falco maintains heading and altitude by itself. A violent kick on the rudder pedal will swing it twice or at the most three times at the hips, as if unwillingly, before it quickly returns to the original heading. She stalls at first with a slight shiver in the tail, and then tilts forward. Sometimes there is a slight inclination to the side which can be counteracted without difficulty. All this, and the good sideslip stability, is not surprising after the experiences in stunt flying the plane. It is surprising, however—and immensely quieting—to feel the willingness, despite the ship's temperament. This is unique in the current circle of sport planes, considering the relation of design and price.

The Falco has a top speed of 200 mph, to make it the fastest plane in its class today. The cruising speed remains a very respectable 175 mph, and top economy is achieved at 155 mph. These are remarkable figures for a two seater with a child's seat and a consumption of around \$3.50 worth of fuel and oil per flying hour, or about \$2.50 per 100 miles. Assuming 500 hours a year the hourly costs, including all fees, insurance, maintenance and airport charges, run some \$13.00, or



*Mano Ziegler*

\$6.50 per passenger. The per person cost (with child aboard) for 100 miles is around \$4.15. This is approximately half of the first class railroad rate in Europe, at four times the speed.

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### *Falco*

*Rolls are completely without shutter—like in a jet—and loops are as easy as waltzing over a polished floor.*

*This plane glides like a feather and flits like a butterfly.*

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Trento's "home mountain", the Bondone, is now white in April as the lofty peak of Palon throws its wide slopes over the already-blooming valley. Four lifts boost the skiers uphill, to be countered by the appearance of fleas jumping on a white wool blanket.

Our swooping Falco hugs the slope and pulls up over the caterpillars so that heads duck. It is a game on the first step between heaven and earth, a real game where schooled hands and an efficient plane dare danger to prove the dependability of good design. On the other side of the Palon the narrow wings tilt; the glow of the propeller is wiped out in the mist of the approaching valley. We bank around the small field, flip switches for flaps and landing gear, drop to 95, then 85 and finally to 75 over the field. The tricycle gear touches down at approximately 70 mph, and we chug neatly along the rough ground. Zanlucchi has made this flight a thousand times, but the black eyes of the no-longer-young Italian glow like those of a proud boy.—Mano Ziegler

MANO ZIEGLER, 51, has been up in the air since childhood. At four he dove from the 3-meter board, at eight he wrote Manfred Baron von Richthofen to ask if he could fly with him, and at 16 he ran across a six-inch wide bridge guard rail—which cost him eight hours in the student pokey. At 21, he learned to fly sailplanes, wrote his first newspaper article and joined the Olympic team as a high diver. He was student world champion in high diving in 1932 and 1934. A motor journalist from 1935 to 1939, he learned to fly during that period and was a flight instructor during the war. From 1943 to the end of the war, he flew the rocket-powered Me.163 ("powered egg") in the Experimental Group 16 and Pursuit Squadron 400. In between he wrote several novels and books, including one on marriage. He was released from a Russian camp after the war ended and played—after returning to Berlin—the part of Spitta in Hauptmann's "Ratten" in the first theatre to reopen there. He gave a short guest performance as a high-wire artist with the Camilla Mayer troupe in Berlin, walking the 80-foot wire for a newspaper, without any training. Then he wrote and directed a literary cabaret until 1948 and was a Volkswagen salesman after the currency reform, returning to writing and flying, as soon as flying was resumed. Currently, he is editor-in-chief of "Flug-Revue" in Stuttgart. In this capacity, he made his first supersonic flight a few weeks ago in an English fighter. The funniest thing about this life history—it's all true.

## Goings On at Sequoia Aircraft

You may notice a few differences with this builders letter. For some time I have wanted to include more photographs, and we are now able to do so. We use a device called Thunderscan, which digitizes an image. Mounted as part of a computer printer, it will scan only flat sheets of paper. It will scan a color photograph but since it uses infrared light, the colors may be picked up in strange ways. For example, on the first page, the background is a nearly-white field of dry grass, and it shows little contrast with Karl's dark red Falco.

But this contraption does give us the ability to print photographs, no matter how crude they may be. I hope you will find this change one for the better. If you like all of this, then keep me supplied with photographs of your project. Obviously, we will not be able to print them all, but we'll sprinkle each issue with an assortment.

We can also use articles, comments and other entries for the Builder Letter. While they weren't intended as articles, I have used a letter from Jonas Dovydenas "as is," and Jerry Ward's instructions in this issue. We can use all sorts of things. So send in your articles, letters, cards and photographs. Who knows, years from now, people will ask "How did he make his money?" and others will say "Sending articles in to Sequoia Aircraft!"

For the past couple of months, I have spent most of my time working on new wing drawings. I am doing to the wing exactly what I did to the tail. At this time, I am inking the mylars, so I expect that the first copies might be available in January. With my record for predicting when things will happen, that probably means March!

What I have done is to "build the wing" on paper. I have used the original drawings, and I drew out each part in pencil, inking only when I knew the dimension was correct. I have checked every dimension, and I have found that the original drawings were surprisingly accurate. The new drawings present the same information as before, but with things in a more convenient format for the builder. In addition, there are a number of new details that were not shown before. Most of these are little things like the access panels—the sort of thing most builders have been able to figure out without too

much difficulty.

There is one change that I will have for the main wing spar. It's difficult to believe after 30 years, but it is not possible to build the Falco wing spar according to the drawing! The problem is simple to see—at the center of the airplane the spar is 220mm "tall". At wing station 1, the spar is 200mm high and the bottom of the spar is 20mm above the base line; however, since the wing station is at an angle, the top of the wing spar would be below the top of the center of the spar. Clearly, Mr. Frati did not intend for the upper spar cap to have a joggle down and then back up. Everyone has been able to build the spar so far; in fact, I've never had a builder complain about the dimensional impossibility—I found it myself.

In the new wing drawings, I have worked this out and will be showing the main wing spar using a different system of dimensioning, all of which is too complicated to describe here. But don't worry about this, as long as the forward wing spar matches the main wing spar, you can build the wing in a number of different interpretations, none of which is structurally inferior to the others.

RST has dropped the Apollo II Lorans from the items they sell. For some reason, they were not successful in getting orders for the radio. I have spoken to II Morrow regarding a recommended source. Apparently, the radios are not sold through discounters. Since we are an OEM, we qualify for the biggest discount possible. We should be set up as an OEM within the next month or so. Prices will be going up about \$300.00 in January, so if you can get anything at a good price now, be sure to do it. I should mention that the warranty will only apply to Lorans installed in Falcos. We will not be selling the Lorans to others.

You may remember the saga of the old Falco that Charlie Yates brought over from Europe. When we started selling the Falco, Charlie contacted me and told me about the airplane. Charlie started to rebuild the Falco but after his company was bought out by Square-D, Charlie asked me to find a new home for the Falco, since he didn't have the time to work on it. That new home was Travis Edwards, a local machinist and aviator, but on the shipment here the trucking company ran a fork-lift truck through the airplane, smashing part of it to bits.

Even though I kept telling Travis that

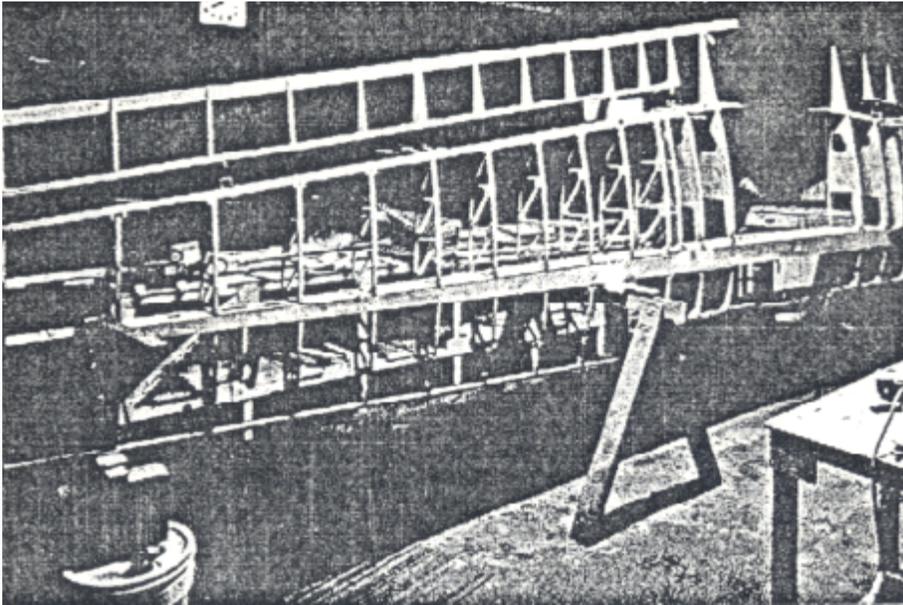
the repair was quite simple, he became discouraged and never got started on the repairs. Finally this fall, he asked me to find another home for the old bird. The new home is in Naperville, Illinois, in the shop of Gar Williams. Gar is a name you may know, as he is a professional aircraft restorer. Gar restored a 1940 Cessna Airmaster which was Grand Champion everywhere but Oshkosh, and then he restored a Cessna AW which was the 1981 Grand Champion at Oshkosh. The AW was Cessna's first production aircraft, revolutionary for its cantilever monoplane construction in an era of biplanes. Gar has been working on homebuilts and antiques since 1955 and had decided that the Falco was the one aircraft he was interested in as a personal transportation/retirement project.

Like those '60s string band musicians who wore badges saying "I'm lost, take me back to 1930," Gar likes old things and is going to restore the Falco in the most original manner possible. Everytime I would show Gar one of the horrible things done to the original Falcos, he would agree that you should never build an airplane that way, but that he wanted to put it back just the way it was!

It's interesting to talk to Gar and hear of his views. He doesn't care for all of the latest homebuilt designs, particularly the plastic ones. He does not like to use polyurethane paint—he is currently operating on 90% lung capacity as a result of using it once in an unventilated shop. I received a letter from Richard Clements the other day—a diatribe against Aerolite which he had used without success. Gar's favorite glue? Aerolite.

Gar now has all of the fork-lift damage repaired and is working on the other repairs. He could have the Falco back in the air in 6 months if he wanted to, but he has a shop full of airplanes that he gets paid for working on. His original plan was to spread the work over two years, but he has found himself working on the Falco more than he intended.

Let's talk engines for a moment. There are several ways to get additional power. The most obvious one is to go to a larger engine. If you look at the Lycoming power curves in the owners manual, you'll see that each inch of manifold pressure is good for about 5 hp, so Karl Hansen's 2-1/4" of boost is worth about 12 additional hp. The cross-over exhaust system we use is good for about 7-8% more power. This would give Karl Hansen about 23



*Above: Jonas Dovydenas's wing under construction.*

additional hp for his 160 hp IO-320-B1A.

There is more power available. High Performance Aircraft Engines (P.O. Box 1242, Mena, Arkansas 71953, telephone: 501-394-6026 or 800-233-1099) specializes in cylinder work. What they do is work on the ports to improve the flow of air into and out of the cylinders. This is a standard engine tweaking technique, and they claim an additional 5 hp per cylinder. Thus, our four cylinder engines would get an increase of 20 hp. I have a number of friends who are engine experts, and they say that what this company is doing is good work based on known techniques. I have talked to Terry Capehart at High Performance, and he said he would be happy to help Falco builders with their engines. He would prefer to have you bring him an engine, but given time he can find you the engine you need.

The porting gives you an extra inch of manifold pressure, and they balance the flow to each cylinder within 1.5% for each .001" of valve clearance. This means that each cylinder is putting out nearly the same power and the engine runs smoother as a result. With the IO-320-B1A, the volumetric efficiency of the cylinder can be raised from 66% to 82%. If you really want to go for everything, they can install high compression pistons for 9:1 compression, lightweight piston pins and complete balancing. The work they can do to an engine is impressive. Marion Cole's 180 hp engine now puts out 230 hp. This is not one of those snake-oil Teflon oil potions.

If you want to know what all of this power will give you, the speed of an airplane goes up with the cube root of the power increase. What you do is divide the new power, say 180 hp, by the old power, say 160 hp, and then take the cube root of that. In this case you would get 1.040 as the answer, so you would have 4 per cent more speed.

While writing this, Karl Hansen called to report on some speed checks he had done. He had just installed the nose gear door and thinks that he has picked up 5 kts—the same thing Jim DeAngelo reported. In our Falco brochure, we quote Nustrini's normal cruise as 170 kts (195.5 mph) with 20"/2450 and 10,000 feet. Karl decided to see what his Falco would do. He set the altimeter to 29.92" and climbed to 10,200' indicated on the altimeter. With the OAT at 8°C, this put him at a density altitude of 11,900'. (Karl said he was climbing at 900 fpm when he leveled out. Son Steve Hansen had already taken the Falco to 17,000 feet and said the Falco was climbing at 5-600 fpm.)

Karl then set the throttle to full open, for 20.5" and at 2450 rpm. This gave an indicated 147 kts at 8.2 gph, which works out to 176 kts (202 mph) true at 24.9 mpg. Then he reduced the rpm to 2200. This gave an indicated 142 kts at 7 gph, which works out to 170 kts (196 mph) true at 28 mpg. Further reducing the rpm to 2000, he got an indicated 139 kts at 6.7 gph, which works out to 166 kts (190 mph) true at 28.4 mpg.

Thus, Karl is 6.5 mph faster than Nustrini at 10,000 feet, and with full gear doors he will have an even greater margin. Nustrini's Falco is optimized for low altitudes—with his reflexed wing trailing edge—but Karl's standard Falco wing is better at altitude. Karl also has the edge in induction pressures.

In earlier speed checks, Karl has been getting 22.75" at 10,000 feet density altitude and full throttle and at 11,000 feet density altitude he got 174 kts (200 mph) at 22" and 2300 rpm. These full throttle manifold pressures confirm Karl's claims for the ram air boost, but the boost on the latest figures is not as great. Karl can't explain this.

Hartzell raises their prices on their propellers and spinners effective December 31. These prices are good for the next 12 months; however, their prices are set for shipping date. This seems to be a strange way to do business, but they say that is their pricing policy to OEMs. With 12 week delivery on propellers, this means that the prices are good for orders entered by October 1 or so, though some deliveries are quicker than 12 weeks. I am sorry about the confusion, but this one is beyond our control.

## Construction Notes

Re: Revision FF29a, I don't know how it happened, but somewhere along the way the nose gear for the Falco grew 18mm. I know where there are a couple of millimeters, but the rest is a mystery to me. I have an extra nose gear for my Falco, and I have measured it. It was clear that the nose gear was too long when we started getting reports that the nose wheel tire was hitting the aft end of the nose gear bay. After seeing how some of the finished Falcos sat on the ground—too nose high—I decided to change the part. We have the new P/N 660A now and will be sending them out shortly to all of you who have purchased the nose gear.

Re: Revision A19e, the original production Falcos used only felt on the fuel tanks. When we did this drawing, we specified 3mm rubber or 6mm felt, thinking that the felt would compress to 3mm thick. While I see no harm in using rubber along the top, I do feel that we should go to felt only at the bottom straps. Jim DeAngelo had a crack develop in his front fuel tank at the front end of the tank along the seam of the weld. The result was a slight wet spot and the aroma of gasoline. The tank was removed and re-welded. I think the cause was the buildup of loads on the seam caused by the use of rubber, which will cold-flow. It is clear that this is an area that bears watching, and that a good cushion of felt should be used to prevent any local build-up of loads on the edge of the tank.

Remember, there are considerable loads caused by aerobatics. With 20 gallons in the front tank, that's 120 lbs at level flight and 720 lbs at 6 g's. Half of that load is carried by each strap, and the strap should be bent to a large radius to spread the load into the tank.

Using our construction manual, Terry Smith built the ailerons and flaps as a single unit. He said the construction went along nicely, and he had no trouble getting everything together. Along the way, he made a mistake, and Terry asks me to pass on word of his boo-boo so that others won't repeat it.

When Terry glued the trailing edge ribs to the spar, he assumed that they were cut to the right angle. Without a jig, there was no way of checking these. As luck had it, one side came

out nicely, but the other didn't. Terry just sawed the ailerons and flaps off aft of the spar and re-built the things with little trouble. This time he used a jig to hold things in position when he skinned it, and Terry offers that jigless construction of the aileron and flaps is not the way to go.

That said, the next thing I have for you is a letter from Falco builder Jonas Dovydenas on his jigless way of building the ailerons and flaps! So, take it away, Jonas.

### Jonas and the Aileron

"Dear Alfred, Let me tell you about my jigless way to build the aileron-flap structure. The wing is vertical across two saw horses, leading edge down, and level in both planes. The spar is prepared in the usual way. Drill the holes, draw the lines, glue on the pads and fillets, etc.

"See photos top right and center right. The ribs are cut on a radial arm saw to the proper angle so they stand vertically without support. Put the spar on the wing and raise the inside end 155mm, the amount of hinge axis displacement.

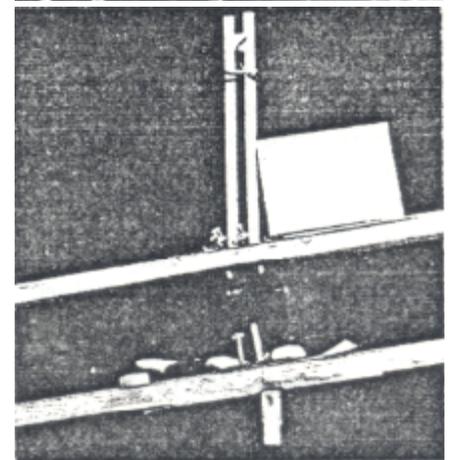
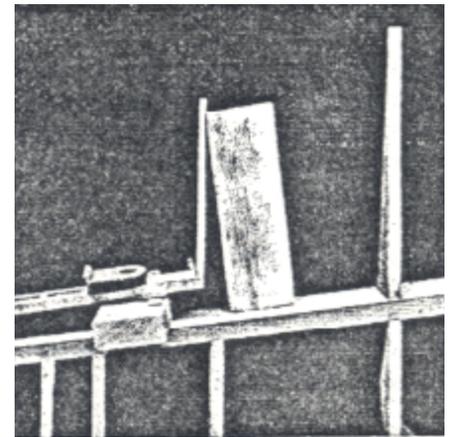
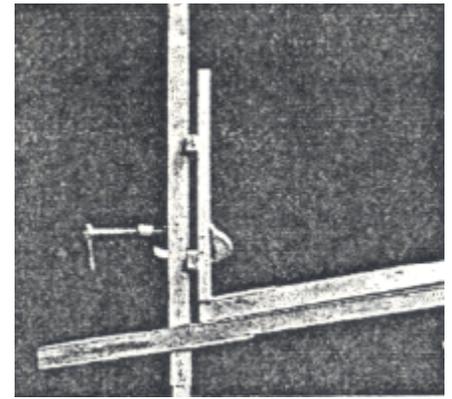
"Clamp the outside rib to station 14 rib with a 10mm spacer. Secure the inside rib with push pins and a wooden block. I use T-88 so the clamping pressure and joint thickness are not critical, a weighted spring looped over the rib is sufficient.

"Fabricate the hinge shims and clamp the hinges in place. Check for free action, alignment, etc.

"See photo bottom right. String a fish-line between the tips of the wing ribs. String two lines on the sides, about 25mm from the spar. Line up the ribs, top and bottom. Note the spacer for the double rib. Use pushpins to keep the ribs from sliding downhill, a block of wood to keep them from falling over the other way. I pushed the ribs down into a thick glueline—they stayed put without weight on them.

"The rib tips are cut at the 8mm thickness line, the trailing edge is clamped all the way across, the lines traced for the notches.

"The fish line is raised slightly above the tips, glue applied to the notches, the length of the trailing edge is aligned with the string; if weight is



needed to secure the alignment, I clamped a weight to the place where the line wandered off.

"The virtue of this method for me is that most of the measuring is done along sight lines and verticality is easily checked with a bob or a sighting along the wing ribs. Also, to me, this is a common sense way of working, one thing leads to another. The geometry of the wing is always there in front of you.

"I dislike making abstract measurements, numbers taken from a table or a plan. The origins and purpose of the measurements are in sight, errors can be more easily spotted—when something doesn't look right, it probably isn't. For example, the ribs are

free standing on the spar, they can be moved in and out of alignment, you see the thing in perspective and realize that referring to a + or - .5mm measurement (as you like to point out when waxing eloquent about the plans) is neither necessary nor helpful toward maintaining project sanity.

"I suppose some people like to be programmed like a computer—tiny tedious steps at a time—but I can't stand it. Furthermore, as you know, I will go to great lengths to avoid jigs (though I do like the Scottish), at least until the big contract for three planes a month comes in from the Bolivian Air Force... oops, proprietary info., delete that last line... Yours in affectionate madness—Jonas Dovydenas"

Okay, I don't have any trouble with the method that Jonas describes here. My hang-up comes when you install the leading edge ribs, leading edge strip, then sand the ailerons and flaps for the skin and then skin them. I cannot see how you can skin these things without holding them in a jig. A few Falco builders have skinned the ailerons and flaps "on the wing" but to my knowledge, all ended up with twisted control surfaces.

The method that we will be describing in the construction manual is similar to the one used by Jim DeAngelo, John Oliver and some other Falco builders. What you do is build the ailerons on a flat bench. The spar is on the edge of the table and the trailing edge ribs are positioned with a long tapered wedge at the 95% chord station. Working from the new drawings, the dimensions are easy to come by. Steve Wilkinson has used the method and reports as follows:

"I haven't tackled the problem of skinning a flap/aileron unit yet, but I did want to let you know that your single-long-wedge method of jiggling the flap and aileron ribs for washout seems to work just fine. I actually used an inch-square piece of clear pine 10 feet long and made two-inch wide notches in it centered on every rib station, then carefully filed and sanded those notches to the precise depth for the necessary "lift" at each station at 95 percent of chord, figuring that would be easier and more precise than ripping an extremely narrow 10-foot-long wedge.

"One disadvantage of my method, however, is that the piece becomes quite delicate by the time you weaken it with a series of the deepest notches. Another is that the inch-high areas that stand up between the notches now need to be removed in order to use the jig during skinning. I think if I had to do it again, I'd rip a wedge to roughly the right shape along its entire length and then do fine-tuning by hand, with file and sanding block, at each specific rib location.

"Another thing I'd do is try to use a piece of wood considerably less than an inch thick, since an inch of thickness, when its forward edge is aligned with the 95-percent-of-chord locations along the ribs, means the rear edge gets in the way of affixing the trailing edge strip at the more outboard of the stations.

"Naturally, the jiggling process however done presupposes an absolutely flat and level jiggling table, with the spar clamped to its edge and if necessary shimmed slightly for absolute verticality.—*Steve Wilkinson*"

Gordon Cook wrote me that his ailerons and flaps were the most difficult part of building the Falco. He said that the left side took him two months and the right side took one week. Now, that's a good learning curve! I wrote Gordon to see what notes he could pass on.

Gordon assembled his wing with the trailing edge up. Before assembly, he drilled all holes possible in the main wing spar, then he marked the chord lines and the rib location on the spar. He used a tight line to insure that there was no sag in the spar.

Before gluing on the aft ribs, he sanded an angle on the ribs to accept the aft spar. To properly locate the aft end of the wing ribs, he constructed two templates of the outline of rib No. 1 and No. 14. With these clamped in place, he ran a tight line for the intersection of the chord line and the forward face of the aft wing spar. This line was used to align the chord lines on the ribs. He glued ribs 3, 9 and 13 in place first and then used these to support the others while the glue dried. This was done by placing a 3x15mm strip across the ribs. Gordon held it in place with lead gluing weights (about 1"x1"x3") over each ribs.

After all aft wing ribs were glued, the aft wing spar was glued in place. Gordon drilled no holes in the aft wing spar at the time. He did drill the flap/aileron spar for the hinges, using a 13/64"Ø drill instead of a 3/16"Ø drill for the bolts. These holes were oversized on purpose to allow Gordon to get everything lined up and later Gordon filled the holes with epoxy.

The flap/aileron spar was blocked and clamped in place. To align the flap/aileron spar, Gordon lined it up with the templates at Sta. 1 and 14, extending the bottom forward face of the spar to the outline of the rib. Like Jonas Dovydenas, he used a tight line to align the ribs just aft of the flap/aileron spar. He also used a tight line along the trailing edge. The ribs were aligned with the tight lines, and they were held in place with wood blocks cut to the required rib-to-spar angle.

Gordon assembled and loosely bolted the hinges to the flap/aileron spar, and he clamped the hinges to the aft wing spar, using tapered wedges to properly align them. When the hinge bolts could be easily removed by hand in all flap and aileron positions, Gordon found that the alignment was right. He started the holes by drilling with a 3/16"Ø drill. After all holes were just started, he finished the holes off with a 13/64"Ø drill in an alignment block. This was a 1-3/4" piece of oak which he had drilled on a drill press. With the point of the 13/64"Ø drill in the started hole, he clamped the alignment block securely and completed the hole.

To install the bolts, Gordon coated the hinges, bolts and channel-nuts with mold release. He bedded hinges, channel-nuts in epoxy and coated the bolts with epoxy. This filled out the oversized holes.

It seems that Gordon's primary hurdle cleared is the proper alignment of the hinges. I still think the aileron and flap hinges should be installed before the aft wing spar is installed in the airplane. This will be easier to do once you have our new drawings in which you will be dealing with dimensions that are more convenient for your purposes. Steve Wilkinson expressed a high frustration factor with getting the aileron and flap hinges all lined up with each other until he tried Jim DeAngelo's trick with a long 1/4"Ø

steel rod. All you do is set all of the 1/4" hinge bolts to one side and put the long rod in their place. This way, the hinges all align themselves. Then all you have to do is to clamp and drill for the hinges. Actually, Steve says he cheated and used a couple of three-foot-long wood dowels which he spliced together.

### **Jerry Ward on Fuselage Frames**

Let's see if you can follow this. Jerry Ward made his fuselage frames and sent in a description of the method he used. What follows is a description of his method, which uses plywood for a female laminating form. One 4'x4' piece of 1/2" plywood is used for fuselage Stations 12, 11, 10, 9, 7, 6 and 5, made in that order. These laminations are 15mm thick, and Jerry made them 17mm to start with. The 1/2" plywood form insures that the lamination is higher than the form, making the sanding to thickness easy. The forms for all 20mm thick laminations were made from 3/4" plywood.

At the time Jerry made these frames, the formula for the fuselage frames was not yet available so he had to lay them out the old way of drawing all the diagonal lines. Because of the mess that would be created by doing this for all of the frames on a single piece of plywood, Jerry made separate half-patterns for each fuselage station. He used 1/4" Luan mahogany plywood, which he painted with white flat house paint. He laid out half of each fuselage station and cut these out of the plywood. He then used these to draw the shape of the laminations on the plywood form. Please note that with a programmable calculator and the fuselage curve formula, it should be possible to eliminate this half-pattern step.

On a 4'x4' piece of 1/2" plywood, Jerry drew W.L. 0 and the aircraft C/L, then drew the outline for Station 12. With a jigsaw, he cut to within about 1/16" of the frame outline. Remember, this is a female mold, so you should cut out the inside of the form.

Jerry mounted his 1/4" electric drill with sanding drum in a wooden frame to sand the inside of the form. Jerry's method effectively mounts the drill so that it is used like an ordinary router, and he would slide it around on the plywood. Because the plywood sheet is so large, you cannot use a sanding drum mounted in a drill press, but you

could use a sanding drum mounted in a work table—like a large router turned upside down. Using the sanding drum, Jerry sanded the inside of the form at four places to the final inside dimensions. He did that at the top and bottom center and at W.L. 0 on each side. The form is to be mounted on a flat jigboard—also made of plywood—and this sanding will allow you to check the proper positioning of the form on the jigboard. (I am not convinced of the necessity of the work in this paragraph.)

Jerry drilled a series of small nail holes 3/8" out from the shape of the lamination. These holes are drilled every 2-1/2" or so, all the way around the form. The size of the nail holes were determined by the size of the nails that he selected to hold the form to the jigboard. The form was then placed on the jigboard, and Jerry inserted a nail into each hole and drove it to a depth of about 1/8". He then pulled all nails out and saved them for later use.

Jerry then used a jigsaw to cut the form 3/4" out from the shape of the lamination. Thus, he had a ring 3/4" thick that would fit the outside of the fuselage lamination. Jerry then attached his sander beneath the table and completed the sanding of the inside of the form, although it could also be done with a sanding drum mounted in a drill press.

Jerry covered the jigboard with a sheet of 4-mil polyethylene plastic and taped this in place. He applied a thin coat of paste wax to the plastic. (Jerry also reported that he found adhesive-backed plastic shelf paper good for covering up jigs—but in this case he wanted to be able to see through the plastic.) The inside of the form was lined with vinyl electrical tape.

Jerry placed the form on the jigboard and inserted the nails back in their old holes in the form and in the jigboard. At a width of only 3/4", the form is a little flimsy, and that is the reason for starting the nails earlier. The female form was complete.

Jerry used 17mm wide stock for the 15mm thick laminations—and 22mm wide stock for 20mm thick laminations—to allow for trimming to final thickness. Jerry installed the first four laminations with butt joints at the longeron cutout areas and then

scarfed the rest on a stationary disc sander. He made a simple jig which allowed each scarf to be done in about 2 seconds. This consisted of a block of wood clamped right up next to the sanding disc. The wood block had a 1:15 slope on it, forcing the laminating strip to the proper angle. After the laminations were installed, clamps were applied and the glue allowed to set.

The initial bit of wood and glue squeeze-out was removed with a router mounted on a 1/4" aluminum plate. To raise the plate above the jigboard, Jerry used 4 C-clamps clamped to the plate. The bottom heel of the clamps was enough to do the job. With this arrangement, he trimmed the lamination to about 16.5mm thick.

The lamination was then sanded to 16mm thick. To sand the lamination, Jerry used a "sanding skid", nothing more than a sanding board or Disston Abrader mounted to 16mm thick pieces of wood, which raised the sanding board off the table the required amount. Jerry's sanding skid looks like an extra-wide snow sleigh, with sandpaper wrapped on the bottom side of the "seat". The skids were attached with countersunk nails up from the bottom, through the sandpaper and into the "seat".

Jerry then drilled four nail holes in each spruce lamination—one hole in each longeron cutout location—and he drove an 18 gauge 1" nail through each hole into the jigboard. These were alignment pins, and they were so Jerry could put his frame into the form later and have it in exactly the same position.

Jerry then removed the lamination from the form, turned it over and secured it to a flat table. He removed the glue (and about .5mm of wood) with a router to bring the lamination to 15.5mm thick. Using his sanding skid with 15mm thick "tracks", he sanded it to the final thickness. Jerry said he had trouble securing the lamination and finally made a vacuum table and let the suction from an industrial shop-vac hold the lamination in place.

The vacuum table was made with 2x4's and with a hole for the shop vac on one edge piece. There were holes in the internal cross bracing to let the vacuum pull from all quadrants. The table

was covered with 1/2" particle board on each side and sealed with a bead of caulking compound before nailing the top and bottom down.

To use the vacuum table, Jerry would put the lamination in place with a few small jig blocks to hold it in position. After tracing its outline, he removed it and drilled 1/2"Ø holes, replaced the lamination and turned on the vacuum. After the frame was sanded, he used a plug cutter to make 1/2" plugs and glued them in the holes. (Jerry advises that the noise of the router and shop vac is incredible and that you should use ear plugs.)

After sanding, Jerry put the lamination back in the form and added the internal bracing.

Jerry says "Repeat process about 16 times and begin assembly. Nothing to it!" He also offers a word of caution. "These female forms are flimsy, and after removal from jigboard, they should not be re-used unless nails can be driven back into the same holes, particularly on frame No. 12, so be sure to laminate all gluing strips before removing form from the jigboard."

This description may be just the thing you need to get started making fuselage frames, or it might be just what you needed to send off your check for the Trimcraft kits! In fairness to all, in the same time that Jerry has been making these fuselage frames, wing and tail ribs, and a few other parts including a canoe, Karl Hansen built his entire Falco. Jerry admits to a high piddle factor and holds the record on the wing ribs at 700 hours—but he enjoys working in his shop so the time is not important. Jerry's sandings skids are very clever, and there are other things that he has done here that are bound to be a help to anyone building a Falco.—*Alfred Scott*



*Above: Chief of Hall Aircraft Factory, Allan Hall, of Vista, California.*

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## Tool Talk

The latest newsletter mentioned once again the Disston Abrader. This is a fine tool, but to my knowledge it has been discontinued by Disston. Stanley Tools has recently introduced similar grit blades for some of their Surform tools. I purchased one 1-5/8" x 5-1/2" blade to fit the #399 Pocket Plane, and one 1-5/8" x 9-3/4" blade which fits either the #285 File/Plane or the 9" file. The blades I purchased were listed as 80 grit, and appear to be carbide grit bonded to a steel substrate.—*William Slaughter*

I am enclosing an AMT catalogue (American Machine and Tool Co, Fourth Avenue and Spring Street, Royersford, PA 19468, phone 215-948-0400). I bought the scroll saw (page 15), the sanding drums (page 6) and the caliper set (page 5). Great tools... good quality for the price.—*Jerry Ward*

Jerry Ward also sends the following notes on drilling holes: "I drill holes with a brad point bit, using high speed and slow feed. This gives a very smooth hole. The brad point bit will not wander through the grain like normal bits. This bit will, however, cause quite a lot of splintering as it comes out, so be sure to use a back-up block. After drilling holes, make sure everything fits, if drilling for hinge fitting or other hardware. Using a cotton swab, coat the inside of the hole with epoxy glue or resin, wait about 2 hours and add another coat of resin... stick a waxed bolt, with threaded portion sawed off, through the hole and allow resin to cure. Instead of a bolt, a drill bit blank works well. After the resin cures, give the bolt a twist and remove it. A look through the resultant hole is reminiscent of looking

down a gun barrel. I have not tried this procedure with polyurethane varnish, but it will probably work equally well."

John Oliver reports that Leon Slocomb lent him a pneumatic staple gun, which he is finding a wonderful tool to use while skinning. He also did some experimenting with the best material to staple through. He found that it was best to staple through a scrap strip of birch plywood and then through nylon banding—the type used for strapping crates and heavy boxes. When the glue is dry, the nylon banding is strong enough so that you can pull all of the staples out in one swift yank. John tried fiberglass-reinforced strapping tape and found it did not work.

Steve Wilkinson offered a couple of suggestions. In our construction manual, we call for drilling the tail group hinges with a drill press while the hinge is still clamped in place. Steve's clamps and drill press did not permit this, so he used a hand-held drill to start the hole, then removed the hinge and drilled the rest of the hole on a drill press. He was also unable to clamp the main landing gear fittings to the main wing spar, so he just used a couple of "collar-button size" blobs of epoxy to hold the fitting in place. After drilling, the fitting was easily knocked loose.

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## Brenda's Corner

The past few months have not been as eventful as those I reported in the last couple of builders letters....no flying in a Falco, no Oshkosh, just business as usual.

I hope all of you have seen our new ad featuring Jim DeAngelo's Falco. We have been getting lots of comments about it. A number of people have telephoned to order the brochure and have said they have been seeing our ads for several years, but this is the one that finally got to them. We did get a call from the advertising representative at *Flying* right after the December issue came out to tell us there was a typo in the ad. Can you find it? By the way, Jim and his wife, Anita, are expecting

a baby in late Spring. Jim says "think blue!"

We try to keep a good handle on all backorders and to ship you the parts as soon as we check them in. If you have been waiting for a part with a long time (with the exception of the Cleveland arms—which are being made now) please let us know, and we will advise you of its status.

There have been a couple instances recently when the U.S. Postal Service failed us. When you place an order, we try to get it out to you the same day we receive it. If there is going to be a delay, we will let you know. If you don't hear from us within a fairly short period from the time you placed your order, double check with us to make sure the order was received.

Best wishes to you and yours for a joyous holiday season.—*Brenda Avery*

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## Sawdust

- The Great Oyster Fly-In was rained out, but a few of us brave souls gathered the following weekend for a rain check. John and Midge Oliver came as did Wilkinsons all. Steve said that Brook—for whom he is building the Falco—has announced that she is not going to fly in the Falco. She has thought it over and has decided that anything made out of wood is not going to fly.

- Syd Jensen reports that his final inspection is scheduled for December 11, and he plans to fly his Falco immediately thereafter. When he does, he will become the tenth builder to fly. Syd's Falco is all-white with the Nustrini canopy and 180 hp engine. The empty weight is 1,185 lbs, so Syd will find the Falco a real screamer—with one on board and front-fuel-only the power loading is 8.9 lbs/hp. Stay tuned.

- Watch the March issue of *Kitplanes* for a cover story on Karl Hansen's Falco. The issue will be out on the first of February.

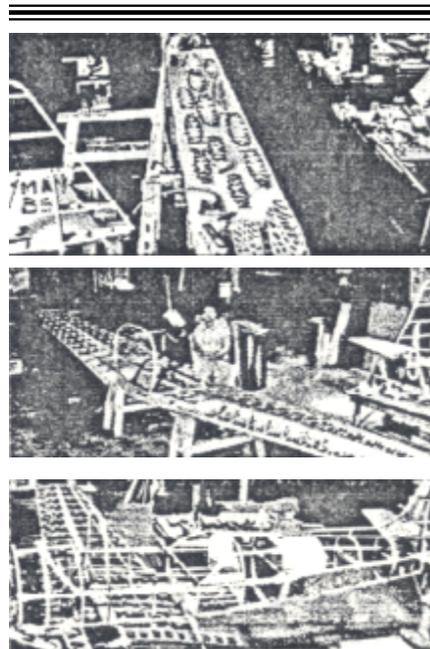
- Engine rebuilder Dick Waters called the other day to say that he just got a couple of IO-320-B1A engines in and expects two more in January. Give him a call at either (305) 422-0188 or

(813) 422-8087 if you are interested. The second phone number is for his prop shop where he can be found most of the time.

- For those who need more, there is *Woodsmith* magazine. It seems to be directed at the bookshelves-oak ice-box-dining table projects. Free router table plans with a subscription order. Six issues a year for \$10.00. Woodsmith, 2200 Grand Avenue, P.O. Box 842, Des Moines, IA 50304-9961

- Possibly the fastest assembly of the basic airframe has been done by Steve Bachnak. Steve has done all of his woodwork and has made about half of the rest. The first year was spent making pieces, and this spring he started on the assembly. The photographs from May show the tail going together next to the wing ribs being made. In October the entire airframe was complete but not skinned yet.

- Perry Burholm probably holds the record for the tightest working space. His garage is so small that his wing was built leading edge up. Perry is now wiring the Falco, and it remains in the same vertical position since it won't fit in the shop any other way.



*Above: Steve Bachnak's Falco Project. Top photo is May 1985, middle photo is June 1985 and bottom photo is October 1985.*

## Mailbox

After waiting for eight weeks for the Hillsboro FAA office to send down an inspector, the first flight of Falco N25RP was accomplished on October 29, 1985 at 2:35 PM. With Hal Averyt flying wing with his RV-4 and Art Schmidt manning the video camera the first flight was very satisfying. Acceleration was much quicker than I remembered your fixed pitch Falco with two aboard at Oshkosh. I climbed to about 3000' AGL and put it through some stalls—no wing drop and very mild. Then I did some coordination maneuvers and steep turns—when my wing man called on the radio to tell me he saw smoke coming out of the left side at the exhaust stack. My scan had just then shown a wide fluctuation of oil pressure from 5 through 70 psi so I came in and made a surprisingly smooth landing. I had to slip the last 200' of the approach because I was much higher than would have been the case in my Swift.

Investigation revealed one loose line to the oil cooler, after clean-up and tightening, I took off again. After about 25 minutes I could smell burning paint and landed again to check the cause. My homemade cowl was too close to the left exhaust. After enlarging the cowl to clear the exhaust and the alternator fan, I flew for about 35 minutes two days later and really enjoyed the flight. I relocated the propeller flange bushings to move the prop 90 degrees in relation to the crankshaft. This removed the slight vibration I had noticed at increased throttle settings.

All the above flights have been made with the gear down. I plan to retract today in flight with just the gear leg doors on. I am waiting for your details for Nustrini-type nose gear bay doors before I install the doors I made. At 2350 RPM I have been indicating 120 kts—gear down—so I expect to be in the ballpark as far as speeds are concerned and I'm pleased with the sound level. I am very glad I followed Tony's suggestion to hinge both sides of the instrument panel, as it sure makes service a breeze. Look forward to flying off the 25 hours so Sherry and I can start to do some cross country trips with the Falco.

I do not intend to finish the other Falco and would appreciate you let-

ting your builders know that the first main spar built by Aero Cabinet is for sale along with a complete tail cone skinned except for one quarter of the fuselage and open at the horizontal stabilizer/fuselage joint. I also have the balance of the fuselage frames for sale plus full set of hinges and other parts.

*Ray Purkiser  
Rogue River, Oregon  
(503) 582-4420*

If you're truly desperate for material for the next builder's letter, here's a vaguely relevant section from a new book I got, *The Ferrari 365GTB/4 Daytona*, by Pat Braden and Gerald Roush. (The Daytona, as you may know, was the last of the Ferrari front-engined V-12s, a magnificent late '60s/early '70s coupe.)

"The mechanical components also show a pervasive old-school charm that touches the very soul of the Ferrari mystique: that is Ferrari's willingness to build up components with a large number of individual pieces. The parts count from the Daytona is staggering. The linkage between the accelerator pedal and the carburetors is a good example: the parts book calls out 38 individual items, a festival of clevis pins, threaded shafts and bearing assemblies. This is more than just charming: the technique is very expensive.

"In contrast to Ferrari's built-up linkage assembly, modern manufacturing practice dictates a few stamped sheet metal pieces and a sheathed cable. The modern design is lighter and much cheaper to manufacture. When worn out, the part can be replaced as a complete unit. In the process, no doubt, some serviceable parts are also discarded, but not at discernable cost. Ferrari's approach makes just the worn parts replaceable—more economical of resources, perhaps, but much more time-consuming. He is still building cars that are designed around cheap labor. Skillful labor, no doubt, but Ferrari is labor-intensive in a way which few manufactures can now afford."

It makes me think of your description of the original Falco, before "rationalization," so I send it on.

*Steve Wilkinson  
Cornwall-on-Hudson  
NY*

Tail group complete (including metal fittings). Wing ribs complete. Hope

to start fuselage frames soon. Very impressed with the Builder Letter. Plans superb.

*George Minto  
Northumberland  
England*

I don't have the room to build a Falco right now. My desire to build one however has not changed. I'm interested in the experiences of other builders and am interested in receiving the construction manual when complete. Till then, keep up the good work!

*Martin Phipps  
Palo Alto  
California*

One half plus done! I have made all wood and metal parts from raw material and have had no trouble following the blueprints. They are equal or better than the ones we use in the construction business. The main gear is installed, and the wing is ready to turn over so I can fair the bottom side.

*Dwight Lapearce  
Sarnia, Ontario*

Have you registered with the Feds yet this new religion you've started? I say Stelio Frati for Pope!

*Bob Dell  
Melton Mowbray, Leics.  
England*

The last time I wrote a letter to you was when I was contemplating buying the plans. I think that was in 1979; I was still in high school, dreaming of going to college to become an aerospace engineer and learning how to build airplanes. I did buy the plans, and I did go to college and graduate; unfortunately no classes were offered in wooden aircraft construction! I shocked many classmates with my devotion to wood as a primary construction material, particularly with the composite revolution in full swing. You folks, and the Falco, are fully to blame for my affliction.

"So," you ask "Why aren't you building yet?" I have all the standard excuses, plus some more imaginative ones that I won't burden you with. I still intend to build a Falco, and I will; but not just yet. In the meantime, I'm exercising my interest and background in design to develop a small side-by-side cabin bipe with an extreme negative stagger, of which I am building a 1/4-scale model. I am using, where-ever possible, full scale construction techniques. It

is virtually all wood but will have foam wing cores.

Let me say that I am continually impressed with the quality of the plans and information I receive from you; it truly reflects the time and energy you have devoted.

*Michael Lovett  
St. Charles  
Missouri*

The Dahlmans dropped in on us for a short visit one day in October! We found out what we had expected (and you knew all the time), that they are really nice people. Also, it's a genuine pleasure doing business with them.

*Allan Hall  
Vista  
California*

Progress on Falco going well—tail section and all flying controls all painted white (ready for colour scheme) for removal from workshop to storage to give more room for firewall forward.

*Neville Langrick  
Huddersfield  
England*

All ribs complete. Fuselage frames 7 through 13 complete. Fuselage frame 5 and 6 will be finished this week. As usual, my progress is slow, making-a-living is interfering with my Falco building. My employer has experienced explosive growth over the last few years, this growth coupled with some job-related schools has imposed unbelievable constraints on my time. I now have wife's permission to set up shop in the living room, my shop is unheated and with winter just-around-the-corner, I need to get those fuselage frames completed so I can start on the spars by spring. Another winter of the house being filled with that wonderful fragrance of epoxy glue.

Kudo's for '85 to Fine Woodworking, WoodenBoat, Garrett-Wade and Wicks Aircraft Supply. The new construction manual is a Godsend...it's excellent. I'm not scratching nearly as many holes in my head as I was before.

*Jerry Ward  
Greensboro  
North Carolina*