

# Falco Builders Letter



Above: The 180 hp Dan Garn/Wendell Taylor Falco

## First Flight: Dan Garn & Wendell Taylor

The first 180 hp Falco has flown. Built by Dan Garn and Wendell Taylor of Salt Lake City, Utah, the plane flew for the first time on July 16, 1987 from Bountiful Sky Park field.

When it came time to pick which of the partners was to fly first, Dan deferred to Wendell, who has owned a Pitts S2A for a number of years and had flown with Larry Wohlers a couple of years ago. With all of the initial ground runs and taxi tests out of the way, Wendell strapped in. The whole process was recorded on video tape, and someone asked Wendell if he had any final words for posterity. "Keep the chewing end up front!" replied Wendell E. Taylor, D.D.S.

Wendell did one last high-speed taxi down the runway and then came back for the big event—a picture-perfect first flight takeoff, pulling the nose up well above stall speed and then climbing out at a shallow angle. Up she flew and circled the airport in a monotonous buzzard-pattern while Wendell felt out the plane. After checking out the low

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## Falco, The Best Air- plane in the World

*by Fernando Almeida. Translation by Luiz Guilherme Richieri. This article appeared in the Brazilian Voar magazine, in the spring of 1987.*

At 70 knots indicated, I turn from base to final, power off, lining up the plane right on the centerline of runway 18 at Wittman Field. My linkage to the flying machine is through my left thumb and index finger, very gently—like you would hold an injured bird by its neck. Millimetrically calculated move-ments, including the rudder inputs, right hand on the throttle, each and every nerve of

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## Around the Falco Patch

The Road Kill Inn is a seedy restaurant with a gravel parking lot in an industrial backwater of Appleton, Wisconsin. You won't find it in the telephone book or restaurant guide. Fact is, that's not the restaurant's name at all. But there's a friendly bar where you can roll dice with the bartender for double-or-nothing on your drink. There's a big salad bar. The potatoes are available in fifteen variations—have you ever heard a waitress rattle off all the variations in a Wisconsin accent? "Baked, twice baked, broasted, French fries, home fries, puffed..." And the steaks are juicy and *cheap*.

Which explains the name. A couple of years ago we were chowing down on a huge steak, soup and salad for less than six dollars when someone asked the waitress how they could serve a steak at such a price. "It's road kill," she said as she cut for the kitchen.

It has been The Road Kill Inn ever since—a safe house for SF.260/Falco pilots to hang out and talk about speed and real airplanes without being approached by canard pushers and 'glass smokers. It's a great place for a tall cool one after a long day at Oshkosh. The Road Kill Inn bar saw a lot of us this year because if you had to miss an Oshkosh air show, this was the year. The heat was unbearable for the first four days, reaching 100° in our booth on the opening Saturday.

I arrived at Oshkosh by way of Laconia, New Hampshire. Coming out of Richmond, I was climbing on top of the haze to 11,500, munching on some radishes when I noticed I still had my headset on. I stowed it in the back and then started digging through the map pocket for my ear plugs. I retrieved one ear plug and was looking for the other when I popped another radish—oh Lord, my ear plug!—in my mouth.

It was three hours and twenty-two minutes to Laconia. On parking I noticed

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## Taylor/Garn Falco

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speed handling, Wendell brought the gear up and was rewarded with his first taste of speed. "Wow, that's like taking the brakes off!" the radio crackled as the circular flight pattern suddenly became much larger.

After 20 minutes Wendell lowered the gear and shot a practice approach, going around at a couple of hundred feet before doing a beautiful landing. A friend, Jack Butler, flew it next. They didn't shut off the engine, just traded places and flew the thing. After Jack landed, Dan Garn had his turn.

A great first flight is an uneventful occasion. A stranger watching the whole thing across a fence might have been amused at the sight of three grown men taking turns flying an airplane around in circles above the field. But Wendell reported it was a "thrill of a lifetime" to do the first flight after years of evenings building the plane. The Falco "flew like a dream," he reported. For the last few years Wendell had only flown the Pitts, so he got some time in a Bonanza to reacquaint himself with tricycle gear airplanes. "The directional control on the ground is terrific," he said. "Please tell the other builders that flying the Falco is not a fearful transition from other airplanes."

Falco N69WD (for Wendell and Dan—don't ask!) is painted Ferrari red. White stripes are planned, but they decided to leave that for later. It clearly shows the value of the Lu Matthews paint schemes. In any dark color, the Falco looks short and fat without a stripe down the side. "Generic" is the word Wendell uses.

The required 25 hours were flown off just as the Oshkosh show was starting. Jack Butler, who has built three biplanes and worn out three 210's in his 20,000 hours of flying, told Wendell it was "immoral" not to go to Oshkosh with a new home-built. Two hours later Jack and Wendell were flying eastbound. They arrived on Monday after a pleasant flight. On the first day, the engine cluster gauges began to get very erratic. They landed and found that the nut for the case ground was sitting on the cockpit floor. That replaced and safetied with a lock nut, the rest of the flight was uneventful.

The Falco has an attractive red interior with a light grey instrument panel,



pedestal and nose gear cover. The quadrant cover and the center console covers are red which produces an unexpected contrast. The Falco weighs in at 1,151 lbs which includes dual navcoms, transponder with altitude encoder and a II Morrow loran. At Oshkosh they were having problems with the antenna, and they never really found out what was wrong, but they now attach the antenna coax to the stainless steel canopy rail. This way the canopy frame is used for the loran antenna, and nothing is done to insure that there is a good connection between the canopy track and the canopy frame—it just works.

The engine is a Type II dynafocal 180 hp Lycoming which began life with a carburetor on the bottom. After cutting the hole in the bottom of the cowl, Dan and Wendell decided they couldn't stand the sight of a carburetor scoop, so they exchanged the sump for an IO-320-B1A sump, which provides for induction from the aft end, and they installed an Ellison throttle body injector. Thus, the induction system is much like the standard system we use, but with the Ellison device instead of the Bendix fuel injector. The blisters on the cowl are not particularly noticeable or objectionable.

The Ellison throttle body injector is an improvement on the Posa/Lake carburetor for VW engine conversions. This type of device is essentially a carburetor that uses a variable venturi instead of a butterfly valve. Fuel is metered from a tube with many small holes and the engine is leaned by rotating the tube so that the holes are turned to the side,

thus exposing the fuel to less suction. As it does not have a bowl-and-float, it is suitable for inverted flight—Pitts drivers are the primary users of the system.

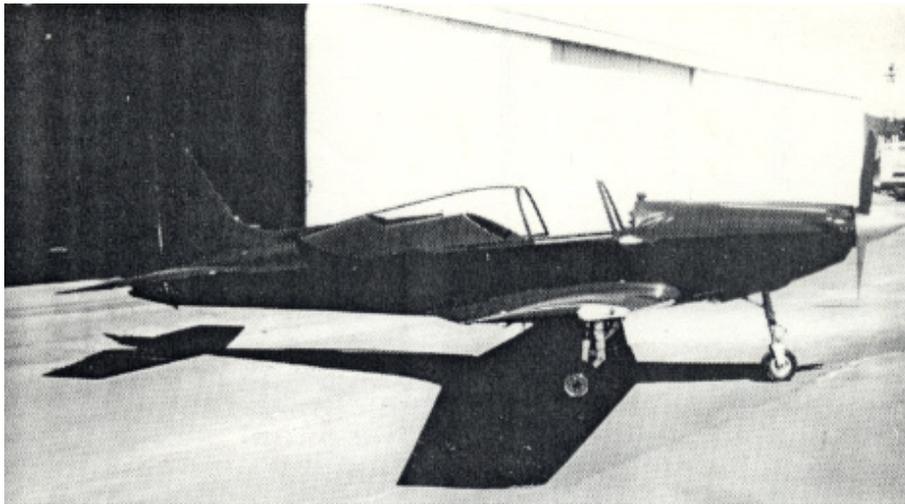
Wendell says they have been delighted with the system but don't think they are getting full power. This system is apparently sensitive to turbulence in the induction system and their engine has a slight tendency to run lean. Wendell is also not sure they are getting full manifold pressure, possibly 2" less than maximum.

At this time, they have about 65 hours on the Falco and are just enjoying flying the airplane as they slowly get little things the way they want them. They have made no attempt to nail down the performance numbers with any accuracy, but Wendell reports that it climbs at about 1500 fpm at full gross. At 23/2300 in the pattern at Salt Lake City, the plane indicated 160 knots without gear doors. On the trip to Oshkosh the gear

**The Falco Builders Letter** is published 4 times a year by Sequoia Aircraft Corporation, 2000 Tomlynn Street, Richmond, Virginia 23230. Publication dates are the 10th of March, June, September and December.

**Subscriptions:** \$12.00 a year, \$15.00 overseas. Available to Falco builders only.

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



doors were installed, and the plane indicated 150 knots at 11,500 feet, which worked out around 200 mph.

Wendell and Dan built the Falco using a few kits but made as much as they could. Dan Garn is an experienced homebuilder and flat likes to make things. He previously built a Midget Mustang and enjoyed the construction of both the aluminum single-seater and the wooden Falco. They spent about 7,000 hours building the Falco.

One construction detail which I questioned was the hinge bolt for the aileron control arm. They used a ball bearing on the control arm and installed no bushings on the two hinges on each side. This puts the quarter-inch bolt in bending rather than shear, and it is substantially weaker than the original design. I asked Dave Thurston what he thought of the change, and Dave was very specific. First, he said the installation has approximately one-fourth the strength of the original design. I asked Dave how he would categorize this change—worrisome, dangerous? Dave said, "Well, I would call it non-airworthy. They shouldn't fly with it like this. It is not safe for flight, and they should ground the airplane until it is fixed." Dave also wanted to know if there were other bolts in bending in the control system.

An AN4 bolt is good for 278 in/lbs in bending. That's the ultimate load. For design loads you divide by the 1.5 safety factor so that gives you 185 in/lbs. There is a one-inch spacing between the hinges, and with the control arm in the center, that puts the strength at about 360 lbs. There is a big difference in the strength of a bolt in bending and shear. Putting a bolt in bending is very poor design. Most of the bolts in the

Falco are in double-shear, some are in single-shear, but I can't think of a single one that is in bending.

I don't like coming down on Wendell and Dan. Clearly, they did not see any danger in it. But Dave Thurston is one of the most respected and capable aeronautical engineers in this country and when he calls something non-airworthy, I do not argue. There is nothing wrong with using a ball bearing in a control system. Many designers prefer them, but I could not see any reduction in friction. The proper fix for this is to install a pressed-in cadmium-plated steel or bronze bushing in P/N 745 just like the original design but long enough so that the bushing meets the inner race of the ball bearing. With the bolt torqued down, the design is actually stronger than the original design. Sorry guys, but this one could kill you.

This all has a happy ending. As we go to press, Wendell says that the hinge bolt has been changed. Happy flying!

—Alfred Scott

## Around the Falco Patch

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a bald spot on one main gear tire that was completely through the first layer of fabric and wearing on the second. My tires are "four ply rating" which only means that they are as strong as four plies of cotton. In reality, there are only two plies of fabric in a four ply tire. This cut short all plans of local trips in The Corporate Disgrace. I'd be lucky to get to Oshkosh and back home.

The old terminal building at Laconia was occupied by the Civil Air Patrol on an "exercise." Thirty uniformed men milled around doing nothing while one soul in the communications trailer fiddled with a radio. One of the militia knew his planes and came over.

"Nice plane you've got there. It's an Aircoupe, isn't it?"

"No, it's an Italian airplane—called a Falco."

"You sure it's not an Aircoupe? It sure looks like one."

"Nope. It's a Falco."

"Sure looks like an Aircoupe."

Someone in Laconia knows the Falco—five days later preparing to depart for Wisconsin, I found a note on the canopy from a local pilot inquiring if the Falco was for sale.

I made it to Appleton in two hops, stopping in Erie, Pennsylvania, on the way.



Once there, I parked it in the grass at Appleton and gave a sigh of relief. Gar Williams lives near Chicago and he has some Falco tires, so the chances are good I can borrow one for the trip home.

Two Falcos made it to Oshkosh this year. Ray Purkiser's Falco now has his plywood-skinned ailerons and flaps installed, and they look very smooth. Ray and Sherry had been at the Dayton Air Fair the previous weekend, so Sherry caught an oil-burner home while Ray stuck around for Oshkosh. It looked like Ray might be our only Falco in attendance, but Wendell Taylor arrived on Monday in his just-finished 180 hp Falco.

Karl Hansen arrived in a Cessna twin to keep a watchful eye on son Steve who had just gotten his twin rating. It was so hot that the Hansen gang headed west a couple of days early. Jim and Anita DeAngelo brought their excuse in their arms. Baby Jamie is not yet old enough for headsets and Falcos—besides, she is used to being the loudest one around, and the Falco might be competition!

Jim brought tales of his first emergency landing in his Falco. He was tooling around in New Hampshire when the throttle stopped working. The lever moved, but nothing happened to the engine. As the engine was at a normal cruise setting, he brought it down by shutting off the power with the mixture. The prop windmilled during the approach, and Jim just came in with the mixture whenever he wanted some power.

Once he was on the ground, Jim quickly found the problem. The control cable had become disconnected from the throttle control arm. The bolt and nut were both on the floor, and the cotter pin was not to be found. It wasn't clear, but I take it there is some possibility Jim might have forgotten to install it in the first place.

Buzz Glade has had his share of problems, too. His engine was running extremely rich, so much so that the engine was stumbling and the bottom of the Falco was covered with soot. He cleaned and checked the carburetor, but the problem still persisted. A local mechanic suggested that the only other potential source of excess fuel was the priming system. The priming tubes were removed and capped. That was the end of the problem.

Buzz had installed a primer system and somehow fuel was being pushed through the primer pump into the cylinders. If your carburetor has an accelerator pump (almost all Marvel Schebler carburetors do) you don't need a primer since you can pump the throttle. Then he began to have problems with vapor lock while flying, and this culminated with the engine completely shutting off. Buzz was very fortunate as he was just turning base with lots of altitude. Once on the runway, he was able to get the engine started again.

While Buzz attributes part of the problem to his use of auto gas, I'm not so sure about that. Winter fuel has lots of pentane for easy starting (pentane is the same volatile hydrocarbon used in the Edge Shaving Gel—the warmth of your skin causes it to boil, turning the gel to a foam) but summer fuel has about the same vapor pressure as avgas.



*Neville Langrick at Meppershall*

The problem, I think, has only to do with the location of his gascolator, which is installed down low on the firewall near an exhaust pipe. (I also wonder if the boiling fuel in the gascolator was the source of pressure into the priming system.) Like many homebuilders, Buzz installed the gascolator at a low point on the firewall thinking that was the sensible thing to do.

Actually it makes no sense at all! In the ideal fuel system, you should have low point drains to drain out any water that will get into the system. In the Falco, the fuel has just finished running slightly uphill when it comes through the firewall, and it must rise slightly more to enter the engine-driven fuel pump. The purpose of the gascolator is to catch any water or dirt that might push through and get to the engine. To reach the engine, the water has to be pushed uphill anyway, so you do not accomplish anything by putting a dip in the line.

On the production Falcos, the gascolator support bracket shares the rudder pedal supports' bolts (we do the same with our fuel system). With this arrangement, I have never heard of a single case of vapor lock. John Harns put his gascolator down low and had problems with vapor lock until he put a shroud and blast tube on it. Buzz is moving the gascolator up.

Buzz is also going to re-engine his Falco. Everyone had been telling him that the Falco performs much better with a constant speed propeller. Recently he found a 180 hp engine at a good price and picked it up. With the light weight of his airplane, it should be a dramatic improvement in takeoff and climb.

One of the interesting things that I learned at Oshkosh was about Lexan. All of my experience with Lexan has been that the plastic behaves like a tough sheet of metal—you can bend it back on itself, and it will groan and bend like copper. Most plastics are brittle and would break under such treatment. So when I flew Buzz's Falco and saw the windshield pulsing, I wasn't frightened because Lexan does not fail suddenly.

But at Oshkosh I saw a piece of Lexan that had been left in the sun for two years. It was yellow and as brittle as any other plastic. This sample was riddled with cracks and could be easily broken with your fingers. So much for polycarbonates—all plastics deteriorate in the sun. Buzz's well-hangared airplane isn't likely to see as much sun, but the behavior of the sun-yellowed sample certainly made me think of what an unpleasant event it would be if the windshield failed. That would take the canopy off, which might damage the vertical tail. And you don't know what might happen to the pilot. I told Buzz about this, and he had already been hearing the same thing. He plans to replace the windshield at some point.

At Oshkosh we received the sad news that Larry Wohlers had been rushed to the hospital for emergency heart surgery on July 10. Larry had triple bypass surgery and came home on July 23. At the Builder Dinner, we converted a place mat into a "get well" card, and everyone signed it.

After Oshkosh, Larry wrote, "Received your package with the table mat and all the signatures. I am real happy to know that I have so many good friends, although quite a few I had known were not there. Please add a note in your next

newsletter that I am slowly improving and want to thank all for their get-well wishes. I am now able to drive a car so I get around some but cannot do much. It looks like I am done flying as I will be 79 next year when I could try for my medical. I hate to give it up but guess I will have to. The Falco is in great shape, but my last flight was May 27."

The Falco Builder Dinner has grown to where we now call it by a variety of names to account for the inclusion of owners of other Frati aircraft. This year we had a good turnout of Falco builders/owners, SF.260 owners and other honored guests, including *Kitplanes* editor Dave Martin and even a LongEze builder!

Danish Falco owner Per Brüel came to the dinner and told about buying his Falco to develop sound measuring sensors for the Concorde. These sensors were mounted in the skin of the prototype at hundreds of locations to measure the air turbulence by its sound. In the middle 50's Mr. Brüel and another engineer started Brüel & Kjaer A/S which is today the world's premier manufacturer of sound measuring equipment.

By coincidence, Falco builder Jonas Dovydenas dragged along his neighbor Peter Sprague, who is chairman of another large electronics company, National Semiconductor. Peter lets Jonas fly his Super Cub in the hope that Jonas will reciprocate when the Falco is done. Some years ago, Peter bought the British car company, Aston Martin, while it was in bankruptcy, restored it to health and sold the thing. Peter said he was often approached by friends wanting to know if he could let them buy an Aston Martin at "factory cost". Happy to oblige, he'd say, "That will be two thousand pounds over list!"

Frank Stricker brought a video tape of the Jet Squalus, a lovely airplane indeed. The tape is a promotional piece which is intended for potential customers of the jet. The engine is extremely efficient and reliable, with a TBO that is so long it scarcely seems possible. (Mr. Frati reports that the Garrett engineer assigned to his office for the certification plans to build a Falco on his return to the U.S.)

One interesting new device on display at Oshkosh was the Bose noise-cancelling headset. You may remember hearing about an electronic noise suppression device on the Voyager when it set a new world's record for the slowest outside

loop. Unlike other headsets which protect the ear by absorbing sound, this device has a microphone inside the ear cup. This sound is compared with the incoming electronic signal to determine which is the unwanted noise, and then a computer generates the "opposite" noise so that the pulse of the incoming unwanted sound wave is met with the same wave going the opposite direction. These two cancel each other out.

It is a remarkably effective device and one that I think will succeed. At this time it is a year away from commercial production and at \$600.00 a copy will be expensive, but there are lots of high-noise environments where it will find an application. It requires a black box somewhere in the instrument panel. You don't need one for your Falco, but I would not be surprised to see this technology adopted by all of the headset manufacturers.

Gar Williams kindly brought a spare Falco wheel and tire to Oshkosh and before leaving Appleton, I changed to the new tire. It was a little low so I pumped it up, and then wheeled it over to the pump and filled up on gas. After paying for fuel, I noticed the tire was a little low so I pushed it back to the shop, rounded out the tire, fired it up and headed east.

Somewhere over northern Ohio it hit me. You fool! Why did the tire go down in that short time? What if the tire has a slow leak? Gar Williams had mentioned that the damage to his Falco was caused by a flat tire in a landing accident in Germany. The pilot, Heinz Pechthold (who flew a Messerschmitt Komet rocket in WWII) had a tire blow on a landing. Without differential brakes, he couldn't steer the plane. The right gear collapsed, and the Falco was a Big Mess.

So often accidents occur when some little thing goes wrong, and you ignore it. This was painfully obvious to me now, and I started to think about my landing in Zanesville. The specter of a busted Falco was bad enough—how would I get it home? Who would repair it? Then would come the accident investigators. Am I current on all of the regulations? They will probably find some technicality to get me on. With these thoughts I lumbered along in Ohio and considered the best approach for the landing. Touch down with full flaps at minimum speed and keep the weight on the wing as long as possible. Be ready to hold the rudder with all you have.

Finally, Zanesville appeared out of the haze, and there was nothing to do but get it over. I held it off as long as I could and then finally the tires touched the pavement. And that old lady rolled as straight and true as ever. I never enjoyed a landing more, nor was I more ready to happily endure whatever high prices, delays, smelly toilets and thieving vending machines Zanesville could offer. It had none of these, and I was soon on my way across the mountains to home. Best landing I ever had.

Speed reports. Tony Bingelis said that a recent speed check showed 157 mph indicated at 20°C, 7,000 ft at 22/2200 at a weight of 1760 lbs. Jim DeAngelo has now installed his main gear doors and picked up 12-14 knots. He saw an indicated speed of 164 knots at 2,000 ft, 4°C at 25/2500. Karl Hansen has continued to work on little drag reduction improvements. In July he did a speed check. The numbers: temperature 95°F, pressure altitude 3,500 ft, density altitude 6,500 ft, 26.75" (full throttle) manifold pressure, 2700 rpm, 12.9 gph fuel flow for 182 knots indicated. That calculates out to 232 mph true. The speed increase came from aileron gap seals (foam rubber strip along the wing against the leading edge of the aileron), blocking engine compartment air from entering the nose gear bay, and tightening up the main gear doors. So far, all of Karl's speed runs have been at much higher than standard-day temperatures, and I would love to see what the plane would do when the temperature is normal.

This year's Oshkosh was a low for numbers of Falcos in attendance, but I think next year will be a big year for Falcos. Pawel Kwiecinski didn't make it and without the pressure of making it for Oshkosh, he slowed down. His Falco is now at the Waukegan airport and is only days from flying. We've had fourteen Falcos fly now, and I count another dozen or so that could fly by the next Oshkosh. My list includes Pawel Kwiecinski, Jim Martin, Neville Langrick, Jan Waldahl, Dave Bowen, Larry Black, Joel Shankle, John Oliver, Jim Slaton, Richard Clements, Syd Jensen, John Shipler, and possibly Gil Davenport, Ralph Moore and Paul Miles.

Two Falcos may be flown over from Europe: Neville Langrick's partner Ray Holt says they are going to fly their Falco from England, and Heinz Wallerkowski plans to bring his production Falco from Germany. I'll buy a beer for anyone who does that, and maybe even a steak. So I'll see you all next year at The Road Kill Inn.—*Alfred Scott*

## The Best Airplane in the World

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my body is tuned to the reactions of the airplane. Her response is prompt to the most subtle touch, but an aerodynamic annoyance is clearly evident when such a machine feels she is treated like a common airplane.

Seconds later, the little speedster touches the asphalt with conviction, mains first. I make an intentionally long landing, after some floating in ground effect, stretching to the end the pleasure of piloting again the best airplane in the world—the F.8L Falco, a work of art by a genial designer, *Dottore Ingegnere Stelio Frati*.

Two days before, during the extraordinary aeronautical delirium of Oshkosh, I was invited to fly Karl Hansen's red Falco N805SH, the same airplane depicted in the Sequoia advertisements. Alfred Scott, the father of the homebuilt Falco, introduced me to Karl Hansen, a retired USAF pilot and first-time homebuilder. In the middle of our lively talk about the virtues and defects of the Glasair, Vari-Eze and Falco, Karl Hansen turned to me and said, "You need to fly a real Falco."—He knew I had already flown Alfred Scott's old Falco—"How about testing my airplane?" We set up our flight for two days later.

Eleven o'clock in the morning, a nice warm 25° C, the blue sky above us is filling with white cumulus, like giant popcorn over the green fields of Wisconsin. I follow Karl to the briefing room in a small wooden house near the taxiway. An adrenalin charge comes when Karl says, "You fly the left seat, son." The only problem is that I'll have to fly the Falco with my left hand on the stick and the right on the throttle.

The tower instructions for getting into and out of the pattern are precise, and we get a small card containing the basic VFR directives for our departure, something a lot simpler than the departures and arrivals at Marte Field at São Paulo. Beside me a familiar figure is talking on the telephone—Chuck Yeager himself, asking somebody on the other end not to forget to feed the dog.

Falco November 805 Sierra Hotel is waiting for us in the grass parking area in front of the tower. There are two more Falcos, one on each side of Karl's, a blue



*Above: Father/son partners, Karl and Steve Hansen. Steve is the quiet partner, but let it not be forgot that the Falco was all his idea.* and white one, built by Jim DeAngelo, who flew with Stelio Frati at Oshkosh '85, and the other one, Ray Purkiser's white and violet machine.

I follow Karl Hansen through the pre-flight, amazed at the superb finish and at the sensuous lines of the machine. He drains the two fuselage tanks and checks the oil level, when Alfred Scott joins us and shows the perfect fit of the cowlings—an incredible harmony of lines in the Frati tradition of form and function, beauty and efficiency. The Falco sits low on the ground, supported by the short trailing-link main gear legs. This makes the elegant nose very high, arrogant, in a pronounced pitch-

up attitude—the machine seems to want to leap into the air! The controls are feather light, the gaps are minimal, and the wing fillet and the sliding canopy are a flowing beauty.

It reminds me of something an old friend of mine used to say, except he always said it referring to the Bucker Jungmann: a bunch of wild inhabitants from some lost tribe suddenly find themselves before a Falco in a clearing in the middle of the jungle. Their comments would probably be, "We've never seen this before. We don't know what kind of beast this is, but one thing is for sure, *it flies!*"

I gently caress the fluid lines of the fu-



Above: The Hansen Falco has now been timed at 232 mph at 6,000 ft.

selage, following the subtle curve of the dorsal fin, starting right aft of the canopy. Karl Hansen explains to me that this airplane is equipped with a 160 hp Lycoming IO-320-BIA. He also has a Christen inverted oil system and a two gallon header tank for inverted flight. With a constant speed prop and an all-wood structure stressed for plus six and minus three g's, Falco N805SH is approved for unlimited aerobatics up to a maximum weight of 1,650 lbs and cruises at more than 206 mph. This is almost twice as fast as my Beech Sundowner which has 20 more horsepower on its nose!

The canopy is open, after having been slid back very gently. The red machine invites me to take her right there, on

the green grass. A little carpet strip is thrown on the wing to keep me from stepping on the painted wood on entering the cockpit. Now, all we have to do is ask the folks sitting on the grass to help us open up a way out for our Falco. The response is prompt and soon we have a clear way ahead. There is a spark in the eyes of those who share such moments—the ritual of the perfect machine preparing to take to the air.

While I get used to my position on the left seat, Karl and Alfred push the Falco carefully through the grass to the pavement while I ride the rudder pedals, experiencing the quite restricted visibility over the nose. Toe brakes exist only on the left side. The cockpit is comfortable,

with the feel of a Ferrari sports car. The finish and trimming are impeccable. The seats are adjustable fore and aft but have a too-reclined back which is a problem for me. It is difficult to reach the gear switch on the left or the flap lever on the right, under the pedestal. The seat belts are of the acrobatic five-point type, stressed for 40 g's. The shoulder harnesses are not inertially actuated, but there is a small lever that frees them in case the pilot needs to lean forward. The stick is S-shaped, like in a helicopter, but with too tall a grip, forcing me to fly with my thumb and index finger below the stick grip, so that my wrist lies on my left thigh for more lightness on the controls—a requisite for the Falco.

The panel is very professional—modern instruments in a correct layout, King avionics, including dual navcoms, glide slope, DME, transponder and marker beacon receiver. The airspeed indicator, g-meter and turn & bank are right in front of the pilot. The tachometer and manifold pressure are very visible, on the center of the panel. We've got a digital OAT, EGT, flowmeter with totalizer—everything logically displayed on the panel along with the other engine instruments and the usual paraphernalia of switches and circuit breakers.

We are ready now. The Lycoming starts easily, and the vibration level is low. I taxi slowly along the paved taxiway with the canopy open, in a smooth ritual of assimilation and domain. We wait for a yellow Stearman to take off, then the signalman clears us into position in front of a long, eclectic line of airplanes waiting for takeoff. We've got no time for a complete run-up, just a quick check of the mags, instruments, flaps and trim, during the roll. Canopy checked closed and latched, we have the two 20-gallon tanks almost full, plus the small inverted tank. Karl and I together weigh about 375 lbs. That puts the Falco a little over the 1650-lb maximum acrobatic weight. A light right crosswind of some 8 knots, throttle full forward, the acceleration is brisk for 160 hp. A little right rudder to track the centerline, I observe the Falco's attitude during the ground roll, about 5° of "natural" pitch up accompanied by the feeling of dragging the tail on the asphalt, so low is the airplane. This observation will be fundamental when it comes time to land.

At 65 kts, I pull lightly on the stick and the machine jumps into the air, reminding me of its sensitivity in pitch. We

accelerate to 80 knots, brakes on, gear up. Karl completes the electric motor action by manually turning a small crank between the seats, to make sure the gear doors are fully closed. I level off at 500 feet, still accelerating. The Stearman ahead seems to have stopped in the air. We pass by him like a bolt of lightning. The trim wheel between the seats doesn't need to be used, the airplane is practically insensitive in pitch to the gear position, and even to the flap position, as I would find out later.

And what superb controls! Quick, light ailerons makes rolling a natural pleasure. They remind me of the Bücker and the Pitts S2A, but without the adverse yaw. The rudder pedals are almost unnecessary! We leave Wittman Field on a heading of 180°, to be able to climb to a higher altitude. I firewall the controls to 2,700 rpm and 26 inches which produces 1,500 fpm on the VSI, with 90 knots and a light pressure on the right rudder pedal. I feel impatient and observe that at 100 knots and 25/2500 the Falco still climbs at 1,100 fpm as naturally as an enraged hawk. At the 4,500-foot base of the cumulus, I level off and look for an open corridor between the clouds, circling over Lake Winnebago.

Things happen quite fast in a Falco. At 25 square the airspeed indicator rides up to 165 knots. We have 23° C on our OAT, and our density altitude is around 6,000 feet. That gives us a true airspeed of 181 knots without too much effort—208 mph at 75% power! Firewall the throttle and prop to maximum power, and the Falco accelerates to 175 knots indicated—220 mph true. That's fantastic, but Karl promises more speed with additional drag reduction work he plans to do. What is incredible is that even at 2,100 rpm and 21 inches of manifold pressure, we can still cruise at 186 mph true sipping a mere 6.7 gallons per hour. That's almost 28 miles per gallon. This is what I call "efficiency".

Coming back to 25 square, 160 knots indicated and a feather touch on the stick, I pull 3.5 g for the entry of my first loop. To my surprise, we pass through the top at 100 knots. The recovery is made at 4 g which calls for a climbing slow roll to the left. The roll rate doesn't come close to that of a Pitts but is still

about 160°/sec at 140 knots. She's a miniature P-51! In one pass through inverted, I catch a glance of a silver shadow passing by very fast on our left. "What was that?" I ask, slightly shaken. "A P-51" replies Karl. For the first time ever I do not feel envious of a Mustang pilot. I have the full sensation of the agile flight of a hawk, and the cliché becomes inevitable. I can no longer feel where I end and where the machine starts. I am one with the wooden sculpture, revolving through the skies in the purest abandon. No sharp maneuvers, I avoid even the quick stops of a point roll. The Falco asks to be taken through swift and continuous revolutions with a light



but firm pressure on the stick—the wrist always resting on the left thigh—and microscopic feet movements. The ballet ends in an authentic aerial orgasm over the Wisconsin country farms!

The pitch force gradient is not greater than 2 lbs/g at 140 knots, with positive dynamic and static stability—the latter offers little dampening, showing the traditional long period phugoid with the stick free. She is neutral in roll, and very harmonized with pitch forces. The Falco is very stable directionally and recovers quickly from yaw inputs without lateral oscillations. The rudder forces are also light and correctly proportional to pedal deflection, however all this harmonized sensitivity requires attention and care below 80 knots. I can maneuver easily

in a tight climbing spiral at 75 knots indicated. Gear and flaps down, I make a tighter and tighter spiral descent to the left, over the lake. At 75-80 knots, I make a quick reversal of controls to the right, and I'm amazed at the agility and insensitivity to the configuration changes, and at the almost neutral pitch stability at low airspeeds.

I reduce the airspeed even more, now with the wings level at 65, 60 knots. Holding 15 inches and 2,000 rpm, I keep coming back on the stick until she finally gives up flying at 50 knots indicated, but not before giving a very pronounced buffet in the tail. There is

no wing dropping, and the ailerons remain effective through the total unsticking of the boundary layer. With full flaps and power off, the stall attitude at 52-53 knots is not very nose high, and the airplane flies again just as you release the back pressure on the stick—no bad habits. I retract the flaps and notice that a stall in the clean configuration happens a little over 60 knots, the nose very high and with a pronounced break over the right wing, but it's always easy to recover by simply releasing the back pressure on the stick. A more abrupt movement on recovery provokes tail buffeting and a secondary stall, if you insist on a pull-back.

The Falco is not, therefore, a hot airplane. The wing loading is relatively low, around 17 lbs/sq ft. However she seems to be very sensitive at low airspeed and must be treated like a thoroughbred, requiring more attention than a Piper, Cessna or Mooney—mainly on the landing. The harmony and precision of the controls, helped by the extra lift provided by the slotted flaps puts this masterpiece by Stelio Frati in the ultra-safe airplane category. And all this response is obtained on aerodynamics alone, without any kind of artificial means like springs, as in the Glasair.

Shall we compare the Falco with... what? The Neiva T-25 Universal, for example, is very similar in control response, but due to a higher wing loading and higher weight, its behaviour in maneuvering still owes a lot to Frati's airplane. I think I can say the same about the Embraer Tucano, but both of these airplanes show a Frati touch—right, José Kovacs? The Tucano is

heavier on the controls and less agile than a Falco, obviously. The Falco is a lot more stable laterally—or less unstable?—than a Glasair. At about 30 degrees of bank, hands off the stick, the Falco recovers somewhat but will enter a shallow descending spiral later, whereas the Glasair, due to its short fuselage and almost no dihedral, has little spiral stability, tending to tighten a hands-off spiral quickly, requiring immediate recovery.

To get some feel for the landing, we fly south to Fond-du-Lac, where there is an excellent paved runway. The traffic pattern is at 1,800 feet, and with 20 inches manifold pressure we reduce speed very slowly. This airplane is as slippery as a trout and has to be slowed gradually down to 110 knots before lowering the gear. Fond-du-Lac unicom calls our attention to "warbirds in the pattern." The Falco's visibility around all 360 degrees is excellent, a prime factor for safety in a congested traffic pattern. Downwind leg at 110, I'm a little low and feel like gaining some more speed for a "peel-off" starting low over the five Mustangs parked by the gas pump. Tranquil at my side, Karl seems to have confidence in my reasoning and suggests I slow the rate of descent by adding more power, keeping 500 fpm at 100 knots. How easy it is to handle a Falco in a traffic pattern, even with the gear down and 15° of flaps.

I turn final at 90 knots, reducing to 80 on a very gentle slope, turbulence and gusts jerking us on short final. Full flaps now, crossing the threshold at 70 and starting to feel for the runway. Karl recom-mends, "Mini-movements, Fernando, easy, easy!" Power-off, the Falco's attitude at the last moments of the flare is pronouncedly nose-high even with full flaps. The cowling blocks the view ahead, and the runway disappears. The tendency of the first time Falco pilot is to flare a little high. The touchdown surprises me with its gentleness and firmness at the same time. Now, all I have to do is to track true down the runway and go around, retracting the flaps slowly and putting the gear up. The Falco seems to be an easy landing airplane for feathertouch pilots, an absolutely honest and flawless airplane, but a lot more demanding than a Piper Arrow or a Beechcraft.

I climb back to 3,000 feet, on a north-

erly heading to Wittman Field. On this approach I feel I have assimilated the Falco, and she starts to be a part of me. I fly as naturally as riding a bicycle. I plan the descent ahead, remembering that the Falco is more demanding at this point and Oshkosh is not Fond-du-Lac. Oshkosh tower does not clear us to land, there's a P2V on a low pass over the runway and a flashing white light gun when I am turning base. Karl contacts the "glasshouse" on the radio and there comes an order, "Red Falco, we have a warbird in emergency, make another traffic entry." I obey, make a quick turn to the lake, and retract the gear. On the second try, we get a clear runway and a green light from the tower. I come in with some excess speed. The Falco floats down the runway in ground effect while Karl says, "Easy, easy, easy

now!" We touch the asphalt on the mains, holding the nosewheel in the air until the last moment.

The good part of a long landing is being able to taxi back slowly, open cockpit, parading before the Stag-gerwings, Ryans and Wacos —the general aviation of the thirties—in an incredible contrast with the flying Ferrari which purrs down the taxiway. Still enthralled, I cut off the engine in front of our parking slot, convinced that I have just flown a winged Stradivarius. The airplane and the musical instrument have in common the raw material, the perfection of the design and the final results—for one who knows how to play them well. *Bravissimo, Signore Frati!*



Above: Fernando Almeida with Renato Cairo & Stelio Frati at Oshkosh '85.

## About the Author

Brazilian Fernando Almeida has been an admirer of Stelio Frati from an early age. He was not alone—Almeida reports that during his training as an aeronautical engineer, one classmate spent his idle time sketching airplanes as he imaged Stelio Frati would design them. The student was José Kovacs, who later designed the Neiva T-25 Universal, a 300 hp military trainer which was used by the Brazilian Air Force for many years, and Kovacs based much of the overall design on the Falco. More recently Kovacs designed the Embraer T-27 Tucano, a superb 750 hp turboprop military trainer which has been sold to several air forces, including the

RAF. Unlike the Universal, which bears a strong resemblance to the Falco, the Tucano is a fresh new design, but Almeida reports that one of Kovacs's design goals was to duplicate the harmonized control handling of the Falco.

Fernando Almeida writes for aviation magazines and has served as a test pilot for a number of new designs. Among these was the 180-hp all-metal "Squalo," an attempt by a homebuilder to duplicate the Falco. Almeida reports that the stabilizer was too small, and the airplane was unstable in pitch. Fernando Almeida lives in São Paulo, Brazil, and his full-time job is at Volkswagen of Brazil. Trucks!

—Alfred Scott

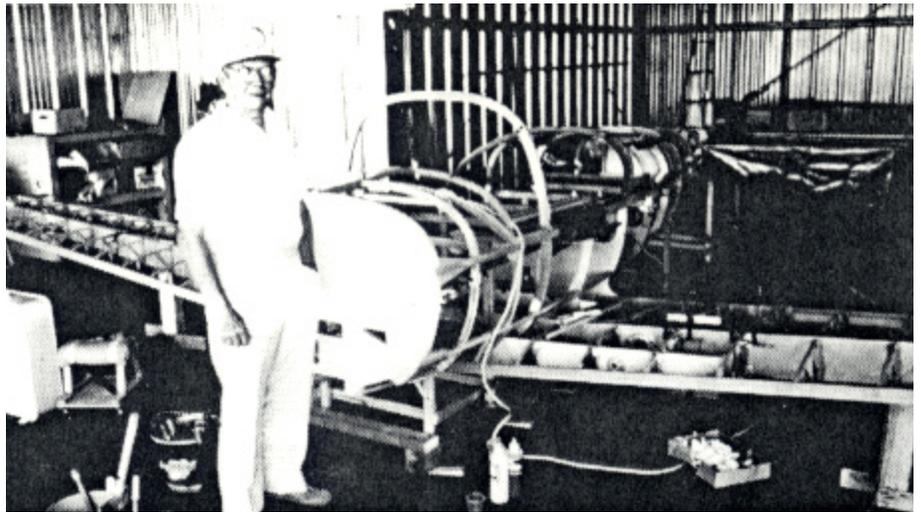
## Goings On at Sequoia Aircraft

I have been working on the construction manual chapters on the fuselage construction. There is still much to be done, but if you are getting ready to start your fuselage, please let me know. I am looking for builders who can use this preliminary version and report back on changes and improvements. Steve Wilkinson has been one step ahead of the manual but has proofed it. Richard Reichenbach is using it. Any more "beta sites" for the manual?

I have also been working on a future chapter on the subject of upholstery. This is probably a month away from being in an acceptable first-draft form. Initially, it will have a lot of general suggestions on the design, materials to choose and where to get them as well as construction details. I hope to eventually develop a series of interior designs, much as we have done for the paint schemes.

Jim Martin ran into a problem with his engine. When the Lycoming engines were first designed, only generators were used, but after alternators came along Lycoming changed the crankcase design to include a pad to mount an alternator. If you have one of the older model engines without this pad, you will need an alternator bracket. Jim Martin spent a lot of time locating a bracket, and finally bought one from Lycoming. It was \$572.00 for a piece of 3/16" steel cut to shape, drilled and with two tabs bent up. With a drawing, it's a part any metalworking homebuilder can make, so Jim sent me the part, and we now have a drawing. If you want a copy, drop us a note. I understand from High Performance Engines that Gibson Aviation in El Reno, Oklahoma, parts out lots of engines and usually has this bracket at a more reasonable price.

Right after I finished the last builder letter and price list, I realized I had made a stupid mistake. I put P/N 867 fuel pump mounting bracket and P/N 879 gasolator mounting bracket in Kit 817-2. That's fine for those who have all of the other kits, but it makes no sense at all in the construction sequence. These brackets should be installed on the front side of the firewall at the same time you mount the rudder pedals. By the same token, it's stupid for the nearly-finished builder to have to remove the bolts to install these brackets when he installs the fuel system kit.



*Top: John Oliver with his Falco project in 1984. Above: Steve Wilkinson, his horse barn and Falco. Steve is writing a series of articles on "Great Drives" for Traveler magazine. See the September issue for the first installment, wherein our man Steve reaches 163 in a "misdemeanor-red" Porsche 928S 4. Future editions will hit Scotland and Australia. Plans to combine a "Great Drive" in New Zealand with a visit with Syd Jensen and Luciano Nustrini have fallen on hard times due to lack of a fancy car to go with the scenery.*

Thus, we have removed these two parts from Kit 817-2 Fuel System and Engine Hoses and included them in Kit 802 Fuselage Equipment where they most logically belong. The two parts are relatively inexpensive, but this accounts for the slight change in the prices of the two kits.

There has been some confusion on the two gear door kits. The main gear wheel well doors are the doors which cover the main gear wheels. They are actuated with the three pushrods as shown on Drawing No. 102. The wheel well door kit just includes the pushrods, brackets, hinges and hardware for these two doors—nothing else. The gear door kits includes the hinges, pushrods, brackets and other little pieces for all of the other doors. If you are going to do an "open air" installation, you only need the gear door kit. If you

want fully enclosed wheel well doors, you will need both of the kits.

In the next two to three months we will be adding the induction scoop and "funnel" to Kit 817-2. Joel Shankle and I have been working on making a mold. Joel did the initial work of making a mold to fit the cowling and engine, and then I turned this into a finished production mold. It requires a two-piece mold, and it's one of those crazy parts that you cannot design on paper except for the basic idea. But what we have is going to be a real timesaver.

For those of you who are making your own induction scoop, there is an interference problem with the electric fuel pump. You need to install the fuel pump first and then make the induction scoop. As



*Above: Mr. Trimcraft Aero himself, Francis Dahlman at Oshkosh.*

we have made it, the filter is "twisted" relative to the induction scoop and ends up installed in a vertical position—sorry, hard to explain. With our pieces, you will assemble the filter with the induction scoop and funnel, and then locate it so that it clears the electric fuel pump. It is going to be a quick, easy installation for a part that heretofore has been a real bear.

One long term project that I have been working on nights and weekends is a section of the flight test guide on performance testing. This is an arcane branch of aeronautical engineering that few are familiar with. Any airplane behaves according to an equation, but you do not want to see the equation!

The process of flight testing is remarkably simple and well within the capabilities of anyone. The analysis of the flight data is a killer.

It is essential that you have accurate data. This means that your instruments must be calibrated. Normally this is done by an instrument shop, but I see no reason why those of you who are able to build your own airplane cannot do a simple thing like calibrating an airspeed indicator. All you need is a piece of plastic tubing to make a water manometer and some method of delivering a very light air pressure. A squeeze-bulb from a blood-pressure kit will do nicely, and I think you could also use a bicycle pump if you are gentle. All you need to do is to pump the thing up until you get a certain reading, say 80 knots, on the airspeed in-

dicator and then measure the column of water. Note the inches of water at every 10 knot increment for the full range of the indicator. You will then be able to use this information during the flight testing.

It's much easier to do this now rather than to pull the instrument panel out after the plane is finished. Since the airspeed indicator is the one instrument that you must calibrate, I'd like to encourage you to do this now. I would be interested in any observations you may have on simple methods to do this. If this confuses you, send me a note and I'll bang out a little memo on the calibration of the airspeed indicator with a sketch of how the manometer works.

In a proper performance flight test you also calibrate the tachometer, manifold pressure gauge and altimeter. I have no ideas how any of you would calibrate these last two because they require a considerable suction. You can use a very tall water manometer or a mercury manometer, but I don't know of any way you would get the suction. This is normally done with a vacuum pump attached to a chamber and with a very sensitive pressure regulator. Anybody got any ideas? I'm all out.

The tachometer is easy if you don't mind spending a little change. Frank Braal, one of the CAFE 400 bunch, has come up with a simple digital tachometer. The tachometer uses an optical encoder, just like an encoding altimeter or a fuel flow transducer. A strip of metallic tape is

installed on the inside of the starter ring and an optical sensor is mounted on a bracket installed on the crankcase using the existing case bolts.

The metallic tape has black stripes painted on it. The sensor has a light that shines on the tape and a photocell senses the reflection. A little digital device counts the electrical pulses and converts this to the engine rpm. It's a dead-simple little device and extremely accurate:  $\pm 1$  rpm.

The indicator is 1.00" x 1.50" with .20" tall liquid crystal numerals. You can stick it almost anywhere. As it is all electric, I think it's appropriate as an addition to the mechanical tach, not as a replacement. The tachometer is easily installed as part of our electrical system as it can use some of the spare wires provided. The tachometer is \$165.00 for the unlighted version and \$190.00 for the lighted model. Before you order one, they will need to know a few details about your engine, so send for order form the Braal Micro Instruments, Inc., 160 Eastman Lane, Petaluma, CA 94952. Telephone: (707) 763-9377.

The flight testing is simple. First you calibrate the instruments and plot the curve of indicated vs actual. Second, you determine the pitot-static system error by flying a measured-mile course at various indicated speeds, timing each run with a stop watch. That gives you another curve. Then you fly a "drag polar". Carefully noting the aircraft weight, you fly the airplane to any altitude (say 6,000 feet), set the prop at any rpm (2,700 is best), and then note the indicated speed of the plane at a succession of power settings (29", 28", 27", etc.) right down until the prop hits the stops, and you get an rpm change. You note fuel burned and the OAT on each run.

Although it's easy to dismiss the mathematics as impractical and difficult, to be accurate you must use an insanely precise method. For example, you cannot determine the true airspeed of the airplane without knowing the outside air temperature, but because of the friction of the air on the probe you can't know the temperature without knowing how fast you are going. The temperature difference is a couple of degrees at Falco speeds, and there are accurate methods of determining this.

Although there are formulas for this and

most of the other steps, there have been three steps in the process which have always made it impossible to automate the process: engine power, propeller efficiency, and fuel flow. Jim Petty's engine power equation solves the first of these, but it requires that you get three curves from the published engine chart.

Propeller efficiency is derived from a three-dimensional chart of empirical data based on a number of odd propeller values known as  $J/C_p^{1/3}$  and  $C_{px}$  and then adjusted as required with even stranger values. Jim Petty used a multivariate curve fitting program to crunch numbers and fit curves to data. The first attempt gave fairly accurate results, but I took the program and crunched again for a more accurate representation. I have recently discovered that our accurate polynomial curves sometimes go squirrely between points and do not generate the smooth curves that are on the propeller chart. I am now in the process of doing it all over again, but there is no doubt that I will shortly have the chart duplicated with extreme accuracy.

The final problem is some automatic way of representing the fuel flow of an engine. Again, the engine manufacturer publishes a chart which gives fuel flow as a curve and then explains how to adjust this for temperature and altitude. I'm just too stupid to figure out how to do it so this is one that Jim is going to have to solve when he gets the time. I have confidence that Jim can do it. There are just too many straight lines.

Originally I planned to do all of this with a spreadsheet program, but I've long since given up on this and have been writing a stand-alone computer program. Curve-fitting is something that you simply cannot do on a spreadsheet.

Without getting into too much detail, what you will be able to do is to quickly fit all of the curves from engine, instrument or flight data and then solve for the coefficient of drag and coefficient of lift at each drag polar data point. From this you solve for something known as "Oswald's e" and "Cdo". With this information you "have" the airplane and can accurately predict the performance at any altitude, temperature, weight and power setting.

You can use this information to see at an instant exactly how much speed

increase you got from a slight drag reduction modification. You can "install" other engines and propellers and see what the airplane will do. More importantly, you can produce performance charts for your airplane for the flight manual, just like those you see in a Mooney or Beech flight manual. But you will be able to do the calculations for your exact aircraft, and you will be able to do it in a matter of minutes versus the months that have been required in the past.

I have no idea how long all of this will take to accomplish, but in the meantime, I can use all the flight data you can produce. So if you are interested in this, start by calibrating your airspeed indicator. Those of you who are flying and want to participate in this should contact me for instructions on how to do the flight tests.

I'm often asked about the two accidents in the homebuilt Falcos. Is there anything about the Falco that may have contributed to the accident? I've asked myself the same question many times. I've concluded that there is one thing, something I have come to think of as "the superplane syndrome." When we learn to fly, it is in production aircraft. Factory-built airplanes that somebody else flew yesterday and Lord knows what they did to it. We learned to treat an airplane with a healthy suspicion, and there was never a total sense of trust.

Later flying other aircraft, even a plane that no one else flew, we still maintain that slight sense of paranoia. I wonder if we don't allow ourselves to lose some of this with the Falco. We have all become so used to hearing superlatives heaped on the plane. Its looks, speed, handling and strength. Its designer. What other aircraft is routinely called the "Ferrari of the air"? The Italians were calling the Falco that before many of us were out of high school. What other airplane has been reviewed in an article entitled "The best airplane in the world"?

The Falco deserves all of this praise, but we should keep the old paranoia alive. Check things. Get to know how much range your plane has. The Falco is truly one of the great aircraft of all time, but it is also a machine with moving parts. Overconfidence, complacency, lack of distrust—I don't know what the proper words are, but I can't help but think we could all benefit from a little paranoia.—*Alfred Scott*

## Construction Notes

I have slowly come to realize, from staring at them, that corner blocks such as those fitted at the junctures of the longerons with frames gain their strength not simply from the joining of block to longeron and to frame—the latter a relatively weak end-grain joint in any case—but from the fact that the corner block should be fitted in a way that allows it to be sanded smooth so it completely contacts the fuselage skin as well at the longeron and the frame. The skin thus provides the real strength, tying corner blocks, longeron and frame together as virtually one piece.

Until I figured this out, I'd been mounting some of the blocks so they were slightly inboard of where the skin will be and am having to now build the blocks up with a thickness or two of plywood so they will mate with the skin. I think this is worth a mention in the builder's manual—one of those things like bending plywood with the grain rather than against it: obvious to anybody who's done it before, but otherwise it becomes on-the-job training.—*Steve Wilkinson*

Steve Wilkinson wants to know if he is the last Falco builder to discover that you should not use Stits Microputty or any other polyester resin fillers on a wood airplane. The stuff absorbs water. Polyester resin is hygroscopic and pulls more than its fair share of moisture out of the atmosphere. Steve scraped the filler off and said the wood felt damp.

In all of our praise of West System epoxy, we seem to have failed to mention one property of the resin that's important. Many epoxies used as wood glues or laminating resins do not sand well. Safe-t-poxy mixed with microballons, for example, makes a substance that is just a little too gummy to sand. Cured West System becomes a hard, brittle, block of plastic, and you can sand it without the sandpaper loading up. European builders take note: the only European distributor of West System epoxy is Wessex Resin, 189/193 Spring Road, Choling, Southampton SO27NY, England. They probably sell to boatyards all over Europe, so drop them a letter if you live in another country.

John Rawlings is an engineer and tool-maker at McDonnell Douglas on those off hours when he is not building his Falco. With all the builder letter chatter about setting the gears in the landing gear retraction system, John offered the

comment that paper method is the correct one. This is the industry-standard method of setting gears for everything but ultra-precision gears. The method is to use a strip of bond paper no wider than the face of the gear teeth, so that's 3/8" in our case.

An embellishment on this method is to drill and tap a hole through the gear hub at 90° to the roll pin pilot hole. Use an 8-32x1/2" conical-point setscrew in this hole. It's important that it is a conical-point screw. The sharp point of the screw puts a tiny dimple in the shaft, just like a centerpunch. Now you can remove the gear and shaft from the housing and put them in a pair of vee-blocks for drilling. Because of the little dimple, you can put the gear right back in exactly the same position.

I'm often asked about using an HSI in the Falco. They are wonderful devices and a natural for our space-limited panel, but I have always advised against it. Most HSI are too long and will not fit. Second, none of the normal general-aviation HSI's stand up to acrobatics. Even King Radio salesmen advise against putting an HSI in the Falco—they have problems enough from the straight-and-level gang.

There is one HSI which will take the abuse, the Collins PN101. In the earliest versions, there was an excessive array of remote black boxes and power supplies. In later versions, the remote boxes have been reduced to a minimum. There are a lot of these installed in SF260s, and they do stand up to acrobatics. The only unanswered question is the length—we still don't know if they will fit. These things aren't cheap—best price around is \$4,995.00 from American Avionics, 7675 Perimeter Road South, Boeing Field, Seattle, Washington 98108. Telephone (206) 767-9781. Richard Clements has been looking long and hard at this. If anyone orders the installation instructions and drawings, get me an extra copy to check things out.

I get lots of questions about headroom in the Falco. What can you do to get more? If you are tall, my first advice is to stick with the standard canopy, and remember that the seat tracks are angled so that you get greater headroom as the seats are moved back. If the standard canopy and seat installation is not enough, there are some tricks you can pull.

First thing is to shave down the supports for the seat tracks. As things are de-



*Above: Bjørn Eriksen and friends take the Falco fuselage out to the street to turn it over. Bodø is near the arctic circle, note the fjord and snow-covered mountains in the background.*

signed, the seat clears the center console and cockpit side wall by about 10mm. You can get about 10mm more headroom by lowering the seats. Karl Hansen also shaved down the back of the seat track supports. This throws the seat back at a greater angle and some people have found this not to their liking.

Next thing is to make a bowl in the seat bottom. I don't advocate cutting the seat cushion down at all. Jim DeAngelo did this and found that taking an inch off was just enough to bring his tail bone in close proximity with the hard bottom of the seat. As it is designed, the seat cushion is very nearly the minimum you can have. The alternative is to create a little pocket for your bottom and let the cushion press down into this. You will be limited by the seat tracks, but you should be able to get about an inch of additional headroom.

If you just gotta have the Nustrini can-

opy and can't fit under it, there is still hope. Joel Shankle (six-five but short in the back) came up with a little wrinkle. He raised the canopy by 32mm—that's 1-1/2"—by installing a strip of spruce on top of the cockpit coaming. The windshield bow is installed on the "forward" side of frame No. 4. This allows him to still use the standard Nustrini canopy with only a minor amount of finagling. The dorsal fin has to be raised by 32mm as well.

The complications caused by this are relatively few. The windshield is no longer an exact fit, but that is not a major problem. The canopy skirt fairing must be extended, and *that* is one mean job. Pawel Kwiecinski has done the "high Nustrini" installation and says that the canopy installation was the hardest part of building the Falco—they celebrated its completion with a bottle of champagne. Because the canopy skirt is so long, it will

interfere with the battery box door. This is not a difficult problem to overcome. You can just install the door with four screws or a hinge at the bottom. The whole installation looks quite nice, and it's doubtful that many would notice the difference in the plane.

Bjørn Eriksen is building a Falco in his tiny one-car garage in Bodø, Norway. I had not thought that this was possible and some of the details of this amazing Houdini stunt escape me, but the shop is an inch or two wider than the horizontal tail. Eriksen says that "the wing is literally the last thing built." Clearly, he is building the tail, then the fuselage and finally the wing. The wing is built by standing the fuselage center section on end and building the wing as we show in our construction manual. This is the same method that Richard Clements and Jim Slaton have used. What is not clear to me is whether Eriksen plans to install the engine, cowling and canopy prior to building the wing. Once he has built the wing there is no longer room to install the engine and cowling, so that will either have to be done prior to building the wing or at the airport. I haven't thought through all of the ramifications of this, but Eriksen clearly has this intriguing idea worked out.

In our plans we specify a pitot tube sold by Instruments and Flight Research. This pitot tube is made with a Nylo-Seal fitting so it is perfect for the plastic tube we use. This pitot tube is no longer available. From what I can tell, the pitot tube was a Cessna part, and I don't know if IFR made them or bought them.

If we can't get the Cessna model, then we might as well change our ways and adapt. The industry-standard "mil-spec" pitot tube you have seen advertised in catalogues is the AN5812. It has a 3/16" tube about an eighth of an inch from the front of the top of the part and a brazed-on AN786-1 fitting at the top of the tube. This has 7/16-20 threads for a 1/4" flared tube—useless for polyethylene tubing. Just aft of the tube is a strange-looking electrical connector, an AN3115-1 bayonet connector—a depression-era labor-intensive WPA design if I ever saw one. If it were not for the difficulty in changing the mil-spec drawings, this would long ago have been changed to a more modern design.

But the Mayan toaster cord plug is still an acceptable connector. Two pins pro-

trude from the top of the pitot tube. The sockets are brass, and you strip the wire and solder it in place. The sockets are intricately machined pieces which are cross-sawed to give them some springing action and a machined inner depression matches a ridge on the pins. The two sockets are loosely held in place by two plastic pieces which make up the housing. Simple to install, easy to attach and if you pinch the sockets closed, the connection is very good.

The problem for the builder is when he or she interfaces it—*now* we're back to modern times!—with the plastic tube. I can't figure out any way of attaching the plastic tube to the flared-tube fitting without using an excessive number of conversion fittings—none of which will fit between the plug and the pitot tube mast. It appears that the simplest solution is to order the pitot tube without the fitting and just shove the plastic tube over the 3/16" copper tube. That's what Piper does. I've tried it with a piece of Poly-Flo tubing, and it's a good, tight fit.

You can order these from any catalogue house and cut the fitting off with a hacksaw, or you can get yours direct from the factory without the fitting. The pitot tube is made by the small Ohio firm of Aero Instrument Co. My kind of company—they don't do anything but make pitot tubes and the president is the one who answers the phone. We have a new entry from them in the price list.

Instruments and Flight Research continues to be the slowest bunch I've ever run into. The quality of the instruments is fine, but Pawel Kwiecinski has managed to build a Falco in twice the time it has taken them to deliver his instrument order. They also have a infuriating habit of sending us price increase notices one week after we send out our builder letter. Please be advised that their electric clock is just a little clock with hands that go round. It is not the Davtron digital clock-timer shown on the instrument panel drawing.

Some years ago when we set up the antenna kits with Radio System Technology we made a mistake by creating two kits. Kit 861 Antenna Components is exactly the same thing as Kit 860 except that they don't put the ferrite torroids on the cable for you. Anyone who can rub a soldering gun against a piece of heat-shrink tubing can do that, so just stick with Kit 861.

—Alfred Scott

## Tool Talk

A tool that might be of interest is a Dremel table saw, it's a miniature version of a standard size table saw and uses a four-inch blade. It works great for all the fine cutting and does not eat a lot of wood.

Senco also has a new staple gun, SJS-JG, which uses no oil and cost me \$184.00.—Michael Head

There are two ways of inflating the main gear oleo shock absorbers. The method used by most FBOs is to use a bottle of high pressure nitrogen. Nitrogen is used more out of convention than need. Some years ago military aircraft switched to nitrogen from compressed air since there were rare occasions where the struts would become very hot and the oxygen/oil combination would detonate. (A shock absorber does not actually "absorb" energy, it converts the energy to heat.) The Falco shock absorbers see very light duty, so there is no need to use nitrogen—it's just the most common thing around.

If you can't get an FBO to give you a fill-up, and you want to have your own source of compressed air, you have two choices. First, you can buy your own bottle and pressure regulator. Second, you can buy a high pressure oleo strut pump. This is a simple pump that operates on compressed air from a normal air compressor, boosting the pressure by about 10 times.

There is no magic to it—it's just one of those big-piston-little-piston devices. To my knowledge, only one company makes this type of pump, Aviation Products, 114 Bryant, Ojai, CA 93023. Telephone: (805) 646-6042. Their "1500 psi Oleo Strut Pump" lists for \$149.95.

If you haven't been able to find any transfer punches, Travers Tool Company sells them as "spotters". We've added the 3/16" and 1/4" models to the Travers Tool section of our price list. They also sell a set of 28 punches in an indexed stand, sizes 3/32" through 1/2" by 64ths, plus 17/32"—catalogue #71-600-028 for \$17.95.

There is an interesting zinc chromate primer available from Ditzler. Their DPE 1538 is a black primer that has all of the corrosion protection qualities of the usual green or yellow paint. It's perfect for pieces in the cockpit that you are going to paint black anyway.—Alfred Scott

## Brenda's Corner

When I got home from Oshkosh this year, everyone told me how lucky I was to have been on "vacation" in Wisconsin for the previous two weeks since the heat in Richmond had been oppressive with the high temperature being about 100° everyday. Yes, if you call being in a Chinese sweatbox with a half million people milling through lucky.

Of course, the heat does affect you. People who are normally very nice get vicious. One morning shortly after the exhibit building opened, one builder's wife (who shall remain nameless) could not wait to tell me about the day she had planned. She was going into Oshkosh for a wonderful lunch at this lovely little air-conditioned restaurant. She was going to have a crisp green salad, served on a chilled plate, and she thought they even chilled the salad forks. With that she turned, waved and off she went.

When you purchase kit 817-2 Fuel System & Engine Hoses, please indicate if you intend on using the inverted header tank. Included in the kit is a package of extra stuff for those builders using the inverted system, or a package of extra stuff for those builders not using the standard system so we need to know which package to send you.

If you plan to order your prop and spinner any time soon, you'd better do it now. Hartzell raises its prices effective January 1, and the price is determined by delivery date, not the date they receive the order. Last year we ordered several in October, and the builders had to pay the new price because the delivery date was not until January.

Those of you who know me probably won't believe it, but there are some things that really irritate me. One particular thing is the question I get several times a year about Falco vs. Glasair when it comes to cost. "Why should I build a Falco when I can build a Glasair for about \$25,000 less money and still get the same performance?"

Well my friends, on the last day of Oshkosh an Englishman stopped by the booth to talk. He had purchased a Falco information packet a couple of years ago and planned to purchase the plans in the near future. He is just putting the finishing touches on a Glasair which he is going to sell (he likes to build more than fly). He inquired about the kit

prices and wanted to know if they had increased very much since the time he purchased the information packet, so I gave him the handout sheet which had the prices on it. That gave me the perfect opportunity to ask him about how much his Glasair would end up costing him. He said he had kept precise records on time and money spent on the Glasair and the final count would be about 3,000 hours and \$80,000 with avionics. Need I say more!

Please let me know if I can assist you in any way.—Brenda Avery

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## Sawdust

• Media Watch. The August issue of Woodward Governor Company's *Prime Mover Control* had a cover article on the Falco with photos of Karl Hansen's, Pawel Kwiecinski's and John Oliver's Falcos. The August 30 issue of the Sunday *New York Times* carried an article, "The Big Business of Build-It-Yourself Planes," featuring photographs of a Christen Eagle and Bill Wink with his Falco project. The October issue of *Kitplanes* carried "Homebuilt Musings", an article featuring a photo of Brenda Avery along with various incoherent mutterings by A. Scott.

• Despite our insertion order to the contrary, *Flying* magazine's new production manager pulled a royal blunder by running our old advertisement featuring Richard Brown in the October issue. Our apologies to everyone. Please explain to anyone who asks that it was an inadvertant mistake.

• Falcos are invited to the annual SF.260 Owner's Fly-In on October 16-19 at the Farmerville (Louisiana) airport, which is located on the 303° radial and 19.7 nm from the Monroe VOR—see Memphis Sectional. Plan to stay at the Holiday Inn at Ruston or the Darbonne Lake Lodge at Farmerville. On Saturday and Sunday there is a full schedule of impromptu aerobatics, balloon busting, pistol shooting, barbeques, trading rides and general messing around with airplanes. This year twenty-five SF.260s are expected. Contact Homer Woodard at (318) 263-8482—if he's out flying secretary Linda will have the details.

• The biggest gathering of oyster-eating Falco builders in the world, the Great Oyster Fly-In and Gathering of Stelio Frati Aircraft, will be held at the Rosegill

Farm Airstrip on November 7. The Oyster Festival parade begins at 12:00 noon, and it's best to arrive by ten o'clock. Pawel Kwiecinski will bring his new red Falco. The Corporate Disgrace, several SF.260s, a CAP-10, a Bucker Jungmann, a rust-bucket Stinson are just a few of the aircraft that will be there, and if he doesn't have a rush on wedding cakes, Jim DeAngelo may even arrive. Best way to spend a November Saturday and still be legal.

• Falco exhaust system supplier, Kevin Murray's Frame-Up Engineer-ing, has moved to the hills of Virginia and is now operating as a Virginia corporation under the name of Sky Dynamics. Kevin reports that the move ran into a number of unexpected delays, and at this time they are just getting the shop set up and the trucks unloaded. Checks and orders sent to the old address will be forwarded and processed without any further action required by you. Kevin expects to be back in the swing of prompt delivery in a couple of months. Sky Dynamics Corp., Rt. 1, Box 170, Moneta, VA 24121. Telephone: (703) 297-6754

• The first builder to build two Falcos at one time is just getting under way. Tim Baker, Federal Express pilot and experienced homebuilder, says that "I just like the airplane so much I had to build two of them." Tim and his father have a shop just off the Slatington, Pennsylvania, airport where they are finishing up a couple of Pazmany PL-2s which they will sell after flying off the hours. Watch for these kit-built Falcos to be assembled in short order.

• Trimcraft Aero is apparently the only U.S. supplier of 50" x 50" birch plywood, essential for the wing construction if you are to avoid scarfing pieces together.

• Glad To See It Happens To Someone Else. At Oshkosh I overheard an aviation writer telling a Bose headset salesman, "If you can get the price down, you could sell a lot of these." What an interesting and original suggestion! Can't you imagine the boardroom? "Gentle-men, Bill and I just got back from the big show yesterday and while we were there this writer made a suggestion that we thought you might like to hear. It could make a big difference in how many Model XT-43 Widgets we can sell. Why don't you explain the concept, Bill, since you were the one who talked to him...."

## MailBox

Progress still going well but always a thousand more jobs to do. Induction box made and installed—will return plan showing our amendment after control cables fitted. Having modified cowling scoop made by professional fiberglass man and engine is going to be plumbed by qualified engineer at Sherburn-in-Elmet where the Falco is going to be test flown and based.

Neville Langrick  
Huddersfield, England

My biggest problem has been with P/N 620 steering arm. Ray Purkiser had a similar problem. I built mine to the latest drawing, FF18B—not even close. I tried to heat and bend the ends but ended up cutting off approximately one inch and welding in new pieces on each end. Joggled the rudder cables holes vertically 15 mm and rotated about 20 degrees to eliminate cable pull-off. The problem is to clear the engine mount tubing braces. Send me drawings of the new parts. You surely have corrected this situation by now.

Rex Hume  
Williams, Oregon

*First, whenever you encounter such a problem, please contact us by letter or phone before breaking out the cutting torch or kicking the dog. Rex Hume is at least the third Falco builder to go to extreme lengths to fix this problem. Second, there is no problem with P/N 620. You need to install it with the AN43-5 eyebolts shown on Sheet A25. You can also see how the cable, eyebolts and steering arm are connected in the isometric drawing for Kit No. 805 in The Falco Kits brochure.—Alfred Scott*

It has been one year since I started my Falco project and I thought I would write on this occasion. I started last July and then stopped in September. I resumed again in July of this year, and I am making fairly decent progress. I have only to complete the wing spars and a couple of fuselage frames, and I will be done with making the parts that I could have bought in kits from Trimcraft. My first actual assembly work has begun on the tail group, and I love working with airplane-shaped parts. I have found this project enjoyable and relatively easy.

I would recommend that if you can afford to buy all the kits, do so. You still have a lot of woodwork left to do even with the kits. If your choice is to build from scratch or no Falco, by all means



**Above:** This Falco has a cut-down canopy and Nustrini-style induction.

buy some aircraft grade Sitka spruce and start making chips. I urge you all however to at the very least buy the tail and wing rib kits from Trimcraft. Included in these kits are the numerous small parts that are so time-consuming to make. The amount of time and effort it takes to build the rib fixtures far exceeds the time it takes to actually make them. I found the service from Trimcraft excellent and the parts to be of very good quality.

I would like to invite any of you flying through the Denver area to plan to stop at the Jeffco airport so Richard Clements and I can fondle your completed Falco. If you are planning to stop in Denver, call me at (303) 469-1304 during office hours, and I will meet you at the airport which is only minutes away from my office.

Robert K. Cordray  
Denver, Colorado

The electrical kit is really great! There has been a hell of a lot of work put in it! There is only one little bitty problem—who gets credit? Every-body knows that corporate presidents don't do anything but clip coupons and plan the next merger.

John Rawlings  
St. Charles, Missouri

*Aw shucks! Glad to see John Rawlings back working on his Falco. John had a major disaster last fall when the Mississippi River flooded, destroyed his Grumman-American Tiger, brought three feet of mud into his hangar and turned his Falco wing, tail and fuselage framework on its nose. Miraculously, only fuselage frame No. 1 required replacement. John built the first one, but this time ordered a replacement from Trimcraft!—Alfred Scott*

If you read the *Wall Street Journal*, I'm sure you read with interest the recent article about the FAA Forensic Laboratory in Atlanta. If you missed it, I strongly recommend that you look it up at your local library. It's at the top left of the front page in a late July issue.

This lab has been doing the Forensic tests for the NTSB for several years. The chief toxicologist *didn't know how to perform* the tests—and had been faking them! Now I can understand the confusion connected with poor Dave Aronson's reported blood content. This part of the NTSB report was pure fiction.

On a pleasanter note: Desser Tire & Rubber Company appears to be an excellent source of tires and tubes. They sent a pair of 5.30x6 tubes with 90° valve stems so quick it made my head swim. Contrasted with Aircraft Spruce, who took three months—and then sent tubes with straight stems—there's no comparison.

Allan W. Hall  
Vista, California

*I missed the Journal article. Actually, the test on Dave Aronson and John Holm was done by the county medical examiner and the test data is completely believable to me since it shows that both men had not been drinking. The only problem arose out of the interpretation of the data and the NTSB examiner made the common mistake of misinterpreting an alcohol level of .010% as .010.—Alfred Scott*

Spars, fuselage frames, fuselage spruce arrived from Trimcraft Aero and have been executed with the usual flare for precision and beauty. Enjoyed the article on A. P. Scott in the recent *Kitplanes*. Noted the



**Above: Mike Wynn's F.14 Nibbio just imported to England from Switzerland.**

tweak on your propensity to question the competence/motives of others in the field; not always out of order of course, but there have been times in the past when I have wanted to remind you that you are preaching to the choir! The newsletter continues to improve over what has always been a fine effort.

*John Brooks Devoe  
Stratham, New Hampshire*

I feel that I'm part of the family now and not a wanna be! I've built the tail group ribs and several spars and continuing step by step. I also have the madness, my whole life has been consumed by this Falco. But I must admit that I love it, and I think I've found true happiness. My girl friend wishes that she was an airplane!

I went to visit John Shipler and see his Falco project. I've never seen a Falco before, and it was quite an experience! John's work is superb, and I'm sure I have to pour on the effort to come up to that standard. I ordered the wood-to-size kit from Western Aircraft in Canada, which only increased the pleasure of this project. The spruce is beautifully cut and labeled.

*Michael Head  
La Quinta, California*

I am still plugging away. The new construction drawings are a big help. I am looking forward to the remainder of the new construction drawings.

*Edward J. Gooch  
New Orleans, Louisiana*

All wood components except fuselage frames are made. Starting tail group assembly. No construction problems met until now. The biggest problem is dealing

with buying the kits. I need 60 cruzados to buy one dollar, next month 70, August 90 and so on....

*Marcelo Bellodi  
Jaboticabal, Brazil*

No progress. Rebuilding my BD-4 wings and converting to a tail-dragger. Being President of Chapter 45 takes quite a bit of my time also. One of these days however I will get started on the Falco—I'm anxious! Fuselage ribs and wing ribs completed. All spar lumber is cut and planed. Twenty-six-foot work bench is built. Garage has been extended to accommodate the assembly of the airplane and for car storage.

*Ernest Lanyi  
Elizabeth, Pennsylvania*

Wing ribs now completed. Fuselage frame spruce on order. Tail ribs and spars already complete. Although it is nearly 5 years since I ordered the plans, and progress has been painfully slow due to the total refurbishment of our house, my commitment to building the Falco is still as strong as ever. We may be the last builder to finish in the world, but finish it we will. When work on the Falco is actually in progress, we are impressed with how quick and easy the parts are to build, but as someone else has said, the hardest part is getting started again when you stop for a while. The moral is "Don't stop".

*Bob Dell and Keith Brooks  
Melton Mowbray, England*

All fuselage rings (standard canopy), wing ribs, tail group ribs and spars are complete. Ready to jig wing and glue ribs as soon as hinges and equipment are completed and installed on the spars. If

you ever get a Falco to Van Nuys, California, please call (818) 705-3551 days or 345-2970 evenings. I need a Falco Fix!

*Richard Fitzwater  
Van Nuys, California*

All jigs produced, most of material acquired. Spars, ribs and frames nearly finished. Start to assemble by the end of 1987. I moved into a new house and have to build a new workshed—another delay. This will be the Falco "with the longest construction time."

*Wolfram Spiess  
Wynnvale, South Australia*

I was pleased to see the nice article about your activities in the October *Kitplanes* magazine, and appreciated your favorable opinion of my design work. I trust the Falco program is going well despite intrusion by the Graflite copy (modification). The Graflite has just what every small airplane needs—winglets to decrease directional stability. So much for the "sound" engineering of that design.

*David B. Thurston  
Cumberland Foreside, Maine*

Building halted due to layoff from my full time job. Will resume just as soon as my employment situation is stabilized. Keep them revisions and updated drawings coming. You're doing an excellent job with the newsletter.

*Richard Dickerson  
Ft. Worth, Texas*

My son and I bought a Grumman AA-1A that had gone through a fence. Our hopes are to get it going again so we can get back into the air. I'm also finishing extensive house remodeling which gives me a 28'x44' shop and two-car garage for building room. I'm in the same EAA chapter with Don Stark and live about 15 miles from him, so I occasionally get to look over his project. I hope to be able to begin some work in the next two years.

*Robert Thomas  
Brookline, Missouri*

Thanks for continued excellent "Builder Letter". Really enjoy it! Am still not actively working on my Falco, but am looking forward to it. In recent high water on "Buggs Island Lake" seepage caused some 8" of water to flood my basement workshop, but losses were minimal. About halfway through cleaning up the silt and mud, rearranging for Falco construction convenience in the process.

*Garlington Wilburn  
Clarksville, Virginia*



*Above: Brian McBride's Falco at Meppershall.*

On August 22, I looked at Chuck Moran's "Little River" Falco project. The fuselage assembly appears to be suffering from moisture exposure, mildew and general deterioration. There is a lot of dust/dirt, etc. Plywood is warping, and glue joints are coming unbonded. Overall, the project is in fair to poor condition, and an A&P mechanic I talked to observed that it would probably not be airworthy. Due to the extensive rebuilding/rework required, as well as the problem of moving the project, I have elected not to buy it. If any other builders show interests in it, please feel free to share my comments.

Work on my Falco is coming along. Tail group equipment is complete, and I'm starting on the elevator. Jigs for elevator ribs are complete, and about half of the jigs for the stabilizer ribs. The wood kit from Western Aircraft is on order and that should keep me busy for quite some time to come. All considered, it's going slower than planned, but I'm keeping the goal in mind.

*Charles Cross, Jr.  
Walled Lake, Michigan*

I tried to time the roll. I'd say it is 2-1/2 to 3 seconds, but I didn't have any help with a stopwatch. I did a bit of fooling around and found out how fast speed builds up. You might say I flutter-checked it to 220 knots indicated. Smooth as glass. I couldn't help think about the Falco with the thin windshield. If he gets careless and pokes out the windshield, he may lose the canopy, etc.

Just a comment on so-called clean-ups and overdetailing. I prefer to call clean-ups "finishing the aircraft" and over-detailing "not leaving loose ends." We fly to get our feet off the ground and

go reasonably fast. If you don't take time to finish the airplane, it will go slower. Finishing something like the Falco means keeping the straight lines straight and the curved lines curved. Eliminate joggles and holes and protuberances, and the airplane looks better and goes faster with no apologies. In every way we followed the airfoils and plans to the letter, not feeling that we could improve on Mr. Frati's design an iota. We have a stock Falco. No tricks.

All I'm trying to say is, contrary to what some may think, our Falco is stock in every way. It is no faster than any that is finished to the same extent as ours. I feel that there is probably another ten knots indicated available in the design just by a bit more finishing here and there. I would like to see a Falco that is really detailed aerodynamically to see how it runs. I still think the Falco is the best 2/3 place design available.

Alfred, we collectively sometimes bitch at you, but behind all of that there is a real appreciation of the humongous task you took on and the capable way you pulled it all together so we'd have a chance to build an aircraft that is second to none in its area of use. It would be neat to see one of them in the air show circuit.

*Karl Hansen  
Rosegill, California*

*Everyone please remember that seeing 220 knots indicated—Lordy Karl, that's 253 mph!—is not a flutter test. In a flutter test, you must pulse the stick to excite the flutter. All airplanes will flutter, it's just a question of determining the speed at which this happens.*

*—Alfred Scott*

## Kindergarten

Most of what I really need to know about how to live, and what to do, and how to be, I learned in kindergarten. Wisdom was not at the top of the graduate school mountain but there in the sandbox at nursery school.

These are the things I learned: Share everything. Play fair. Don't hit people. Put things back where you found them. Clean up your own mess. Don't take things that aren't yours. Say you're sorry when you hurt someone. Wash your hands before you eat. Flush. Warm cookies and cold milk are good for you. Live a balanced life. Learn some and think some and draw and paint and sing and dance and play and work some every day.

Take a nap every afternoon. When you go out into the world, watch out for traffic, hold hands and stick together. Be aware of wonder. Remember the little seed in the plastic cup. The roots go down and the plant goes up and nobody really knows how or why, but we are all like that.

Goldfish and hamsters and white mice and even the little seed in the plastic cup—they all die. So do we.

And then remember about Dick and Jane and the first word you ever learned, the biggest word of all: *look*. Everything you need to know is in there somewhere. The Golden Rule and love and basic sanitation. Ecology and politics and sane living.

Think of what a better world it would be if we all—the whole world—had cookies and milk about 3 o'clock every afternoon and then lay down with our blankets for a nap. Or if we had a basic policy in our nation and other nations to always put things back where we found them and cleaned up our own messes. And it is still true, no matter how old you are, when you go out into the world it is best to hold hands and stick together.

*By Robert Fulghum, who has nothing to do with Falcos, but the nice thing about publishing your own newsletter is that you can publish anything you like!*