

# Falco Builders Letter



*Al Dubiak with his award-winning Falco at Oshkosh 2003.*

## Al Dubiak's Bronze Lindy

*by Alfred Scott*

When someone is building a Falco, it's always been pretty obvious to me when the builder is turning out a great machine. Karl Hansen used to go on and on about how he had worked very hard on something and how it came out just right. There was real pleasure in his voice when he described all this.

And from the time Al Dubiak started working on his Falco, it has been equally obvious that he would build a near-perfect machine. It's hard to imagine a more careful workman, more interested in getting everything exactly right, and looking 'right'.

So when Al got his Falco flying in March 2000, I've been curious how the airplane would show at Oshkosh, which is just 'up the road' from his Chicago home base. But Al is a quiet sort and never seeks public exposure, and a few years have passed.

Even this year, Al did not plan to go to Oshkosh, and he really wasn't interested in going at all, but then one week before Oshkosh, someone out of the blue prompted him to go. Even today, he can't quite explain what pushed him to do it. One thing was that with three years on the airplane, it was starting to accumulate some hangar rash, and if he waited any longer, the age would start to show. Al was also skeptical about his ability to handle the traffic into the airport, but a friend in the EAA chapter offered to fly with him in the right seat and help him. Having someone

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*On the way to Wisconsin.*

to go with him made a big difference, particularly since his friend had flown there a number of times.

And, he thought, if I don't do it now, I'll never do it.

So Al lined up a spot in the campground for his tent, and arrived on Tuesday morning. There were only two spaces left in the homebuilt section, and they parked him between two rows at the end, over next to the fence.

Then Al went over to register, and they asked him if he wanted to be judged. I guess so. So he got his judge-me sticker and put it on the airplane. Bill Russell, Cecil Rives and Dave Nason were already at Oshkosh, and Dave's Falco was in a special Grand Champion circle for previous winners, since he effectively came in second in judging one year. Dave explained to Al that the more signatures you get on the judge-me sticker, the better it was. At the end of the first day, Al counted four signatures, and then there were five more on the second day. By the end of the show, he had 14 signatures in all.



This was a wet Oshkosh year and on the night of the Falco Builder Dinner, Appleton had nine inches of rain, and 1-1/2" of rain fell at Oshkosh. There was a lot of water around his tent, but somehow, Al managed to survive it all.

Then the EAA show organizers approached him and asked him if he would like to join in the fly-by for homebuilts on Saturday. At first, Al was afraid he would screw up and land with the gear up or something, but they said to relax. So he said OK, filled out the

paperwork and then did the flight briefing. Then on Saturday, he did the fly-by, and he did not screw up. "It turned out to be exceptionally thrilling."

After the fly-by, he tied the airplane down and went to lunch. When he got back, there was an envelope on the windshield with a note suggesting it would be to his benefit to attend the awards ceremony on Sunday night. The wording is, of course,

*Debbie and Al Dubiak with their Bronze Lindy.*



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intentionally vague, but it's clear that he was going to win some sort of award.

Debbie Dubiak came up on Saturday with some friends, and on Sunday night Al and Debbie went to the awards ceremony in the Theater in the Woods. In all, something like 2000 to 2900 airplanes had been judged and there were 123 awards.

Most awards were plaques, and then they got to the Bronze Lindy's, a third-place award for various categories of kit-built, antiques, etc. As the last Bronze Lindy was announced, it was for Al Dubiak.

For a modest quiet man, this was a big moment. "I didn't go there to win an award." Which is, by itself significant, because normally to win any of the top awards, you have to polish every piece of the plane and have a good understanding of what the judges are looking for.

Some people who take their Falcos to Oshkosh are so overwhelmed by the crowds that they vow never to return, but Al said he was glad he went. He had a really good time, met a lot of people and 'I ate more brats than I care to again.'

Most of the questions from people was that they were amazed that the Falco is made out of wood, and Al patiently explained it over and over and over. Nobody wanted to believe it.

But for a quiet guy who just flew up with his Falco at the last minute, it's perhaps a good example of Woody Allen's famous quote that 95% of life is just showing up. And all the exposure and recognition didn't hurt his feelings one little tiny bit.

"I'll never forget it."



*Right: Al Dubiak receives his Bronze Lindy at the Oshkosh 2003 Award Ceremonies.*



## Falcos Descend on the California Wine Country

by Dan Dorr

Each year Falco builders and flyers in the western United States get together for an event known as the West Coast Falco Fly-In. This year's fly-in was held at the Sonoma County Airport in Santa Rosa, California Sept. 11-14. It may have been the 13<sup>th</sup> annual, but there's a little confusion about the sequence, because we had to cancel a few of them due to a terrorist attack and a very large hurricane. The regulars have gotten to know each other over the years, but at each fly-in there are a few new faces, and we always encourage as many Falcoholics to show up as we can. There were a total of 41 people who attended, most for the entire weekend, and a few just for a day. Northern California experienced a little heat wave during this time, so temperatures were in the high 90s. Because of the heat, most of the flying was done in the mornings, with social events in the afternoons and evenings.

An added bonus this year was the presence of the CEO of Sequoia Aircraft Corp.—Alfred Scott and his lovely wife Meredith. It's well known among the regulars that Alfred has never made it to a West Coast Falco Fly-In until now. In fact prior to the event I got a few e-mails asking how I got Alfred to show up. Well, it just happened that the Scotts were planning a vacation to Hawaii at about the same time as the fly-in, and that provided the perfect opportunity to spend a little time with us left coasters. The Scotts were actually the first to arrive, and on Thursday morning I met with Alfred at my hangar to show off my Falco. It was quite a disappointment for me that my Falco was not complete for the festivities. The airplane is actually finished, except for a coat of red paint—and I'm still waiting for that paint, as I have been going on five months now. It's very frustrating, but that's an entirely different story.

*[Hey! I was at McCall in 1991, Coeur d'Alene in 1992, and I was in Jackson Hole waiting for a ride to the Durango Fly-In but Jonas ran into weather. All of this was before Dan was born, of course, so how could he have known? And I'd like to point out that not one of you West Coast pukes has come to the Oyster Fly-In!—Dr. Ing. Alfredo Scoti]*

On Thursday afternoon the visiting Falcos began to arrive. Larry & Ann Black and John & Pat Harns flying from Cottonwood, California were the first to land (John &



Top: Group shot of eight Falcos. Center: Dave McMurray takes Alyson Dorr for a ride. Above: Bill Russell in his red machine.



*Top and Center: Dave McMurray and Kate Chipps fly and polish the Falco. Above: Cecil and Karen Rives.*

Pat started the day before from Coeur d'Alene, Idaho). Larry was anxious to fly along side John, since he had made some recent speed mods to his aircraft in secret skunkworks fashion. Apparently they had an effect, since Larry was quite proud of how he can now easily outrun John (I'm sure Larry will contribute a few words in a future newsletter article to share his ideas). The next aircraft to arrive were both former Oshkosh Reserve Grand Champions: Dave McMurray & Kate Chipps arrived from Bend, Oregon, and Dave & Tamera Nason flew in from Seattle. Four more Falcos arrived in loose formation to round out the afternoon. Bill Russell and Cecil & Karen Rives started from Houston. They gathered up Jim & Jane Quinn in Dallas, and on the final leg met up with Per & Lena Burholm from San Diego. The local EAA chapter provided tie down spaces and a hangar for us to find some shade and refreshments. It was quite a sight to see all those beautiful Falcos parked together.

Several other Falco builders and enthusiasts arrived by auto during the afternoon, and that evening, everyone met at our house for a BBQ dinner. It's a big effort to have a party for a group this size when you do it yourself, and I have to give all the credit to Alyson (my wife) and both our parents for doing all the work. Alyson and I really enjoyed the evening—renewing old friendships and starting a few new ones. We had a great time!

Friday morning we all rallied back at the airport to open cowlings, allow everyone to look closely at the Falcos, and take anyone who wanted to go for a flight. Sonoma County airport is tower-controlled, and we tested the controller's patience a few times with our swarm of little experimental aircraft. One pilot from Seattle, who shall remain nameless, managed to taxi out to the runway without contacting the tower, momentarily forgetting he was at a controlled airport. The ground controller asked Dave McMurray if that was his wingman, and Dave replied that it might be if he could ever contact him. By now the tower was quite impressed. Fortunately, tower contact was made prior to takeoff, and only a brief scolding ensued.

We were joined later that morning by Tristano Caracciolo, who arrived in his Falco from Carson City, Nevada just for the day. This brought the total number of Falcos up to nine. Kris Shieler Lott intended to fly her Falco up on Saturday, which would have made ten Falcos, but an oil leak changed her plans, and she drove with friend Chuck Dutting instead.

Tristano, as you might guess, is from Italy. This was his first time to attend the west coast fly-in, and it was great to meet him. Somehow it seems very appropriate for an Italian to be flying a Falco.

By afternoon it was getting quite hot, so we looked for activities that would keep us out of the sun. The ladies went to lunch at a winery and then did a little shopping in the quaint town of Healdsburg. Meanwhile, the guys gathered at my hangar for a close inspection of my Falco. I appreciated the opportunity to pick up a few pointers from these guys who have so much Falco building and flying experience, and I will definitely put their advice to good use. Friday ended with dinner at a Mexican restaurant in Santa Rosa, followed by a few of the usual suspects gathering for some late night drinks and storytelling at the hotel.

A fly-out breakfast is the traditional event for Saturday morning, and this year the destination was Half Moon Bay, which is on the coast just a little south of San Francisco. We try to take as many people as we can, and often there is a larger aircraft in the pack, which provides several seats. In the past Pierre Wildman has generously provided the "limo" in the form of a Piper Seneca or a Cessna 421. But Pierre sold the 421 and is down to owning only his Vampire jet (and many Falco parts). The Vampire is down for major maintenance, but, not being someone who likes to travel on the ground, Pierre borrowed a friend's twin Commanche (we'll just call it a double Falco, since it has four seats and two IO-320-B1A engines). So, Pierre and his wife Robin Owen had two extra seats, and Karen Rives, Lena Burholm, Pat Harns, and Ann Black graciously offered their seats to others wishing to fly out to breakfast in a Falco. After eager volunteers filled all the available seats, several people were still left on the ground, so another group drove to Bodega Bay and had their own breakfast outing to the coast.

A little briefing was conducted before departure to ensure that the nine aircraft would fly beneath the San Francisco Class B airspace enroute to Half Moon Bay without breaking any laws and without hurting anybody. Pierre led the pack in the double Falco, and the eight Falcos taxied out behind him. Unfortunately Cecil Rives had a radio malfunction, and he elected to turn back. Cecil spent the rest of the fly-in trying to track down the frustrating problem with the help of former avionics technician and long-time Falco groupie Ken Christensen. Ken and Cecil



**Top: Dave and Tamera Nason. Above: Jim Quinn, Dave Nason, Bill Russell, Dave McMurray, Cecil Rives, Per Burholm, John Harns and Larry Black.**

kept a good attitude and worked tirelessly, but the problem was not solved until Cecil got the aircraft back to Houston (flying as Bill Russell's wingman). It turned out that there was a short in each of his two COM antennas.

Meanwhile the rest of the Falcos launched and headed to the coast. I rode with Bill Russell, and he kindly offered me the left seat and the controls. It's always a thrill to be at the controls of a Falco, and it was great practice for my upcoming first flight. We flew in extended trail formation down the coast, past the opening to San Francisco Bay spanned by the Golden Gate Bridge, and descended into Half Moon Bay. The scenery was spectacular, and the seven Falcos provided a dramatic sight as they arrived in sequence at the uncontrolled field! As you might guess, the landing

sight-picture is different for a Falco than it is for a 737 (my usual ride). So when I landed Bill's beautiful red Falco, I thought I did a very nice job, but finished about two feet in the air. Fortunately we dropped in without any damage to the aircraft, and Bill didn't seem overly concerned.

After breakfast we took to the skies for the return flight. The fellow manning the Half Moon Bay Unicom frequency recognized the graceful Falcos, and remarked over the radio that he appreciated us stopping by for the morning. The route for the return was a little different. Again in extended trail formation, we cut into San Francisco Bay, flying over the Golden Gate Bridge, around Alcatraz Island, up the bay and through Sonoma Valley. This time John Harns was in the lead, and as we approached Sonoma County airport,



**Top:** Bill Russell explains a thing or two to Per Burholm and Gayle Boddy. **Center:** Karen Rives, Alyson Dorr and Lena Burholm. **Above:** Dan Dorr and his panel.

the tower controller requested John to enter left downwind. The next two aircraft received the same instructions, and

then the fourth and subsequent aircraft were told to enter right downwind behind the other Falcos also on right downwind.

Shortly after that John turned left base, and the tower scolded him for not flying right traffic. Showing his experience, John wisely kept his cool and said nothing back. The other two Falcos flying left traffic were similarly reprimanded. I don't know if the controller ever realized his mistake, but I'm sure the Falco reputation in the tower deteriorated further (just can't wait to call them up when I taxi out for my first flight).

On Saturday night we gathered for the traditional banquet dinner. After dinner John Harns was the first to speak. He proposed a toast to Alfred Scott saying that without Alfred and all his hard work to provide Falco plans and kits, none of us would be here at the fly-in. Everyone readily agreed and drank a toast to Alfred. Then John expressed his disappointment that Alfred was able to attend the fly-in only on Thursday before departing on vacation. John didn't know that in advance, and thought the banquet dinner would be an ideal opportunity to roast Alfred. I'm also sorry we missed out on that, because I'm sure it would have been very entertaining... another time.

Ken Christensen was the formal speaker for the evening. Ken is a C-130 navigator with an air rescue squadron in the Air National Guard, and his unit was recently activated and sent to participate in the war with Iraq. He did an excellent job recounting his experiences, and we all got quite an education on modern combat rescue operations.

Late Saturday night there was another gathering of the usual suspects at the hotel for some scotch, cigars and jokes. It was a lively group, with Dave McMurray, John Harns, Larry Black, and Pierre Wildman contributing the most stories. Every time her husband, John would begin to tell a joke, Pat Harns would instantly recognize it as less than squeaky-clean. Fearing embarrassment, she'd say, "No John, you're not telling that one." John, of course, always proceeded anyway. No one else seemed to mind.

The departures started fairly early on Sunday, since many of the visitors had a lot of traveling ahead of them. Those who have Falcos under construction left with a new dose of enthusiasm for the project. I know that these fly-ins always gave me a boost whenever I would attend, and I'd return home to start a new flurry of activity in the workshop. The last of the Falcos departed at about 9:30 AM, and the 13<sup>th</sup> annual West Coast Falco Fly-In was history.

## Construction Notes

Well, my Falco project has begun! I would appreciate some advice on plywood. I ordered (and received) aircraft grade Birch ply from Demel Aircraft up here in Canada. When they delivered it, it had Mahogany OY printed on the sheets as well as Birch plywood. My immediate response was one of concern as you state that Mahogany ply is not to be used on the Falco. I have since learned that the company is called Mahogany OY in Finland, and the ply is aircraft grade birch. My concern is that there is Birch on both surfaces but the centre sandwich is unspecified, and is a dark brown colour. Could this be a Mahogany centre, and if so, is that a concern?—Roger Wright

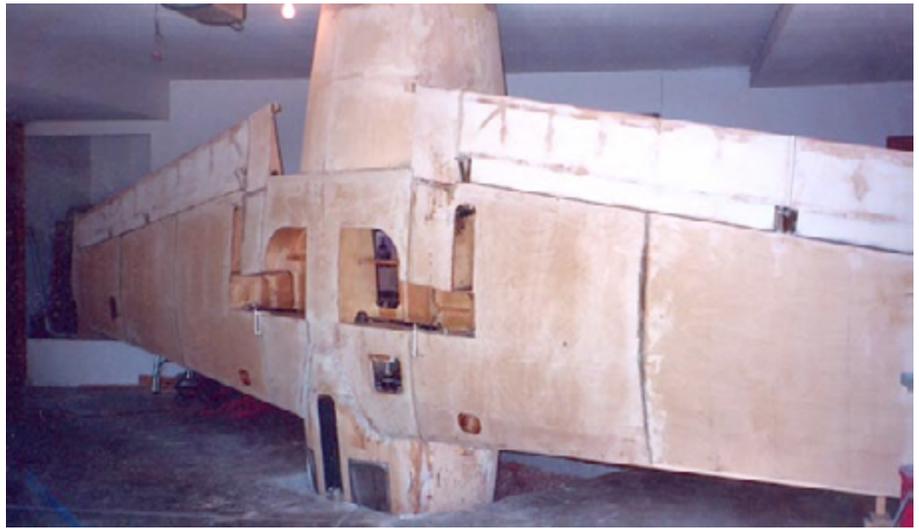
As the president of your company, I'm sure you can understand the difficulty of being asked to comment on something you've never seen or that someone has not bought from your company! But I'll try.

First, there is no such thing as 'aircraft grade' birch plywood. Instead, there is a specification of the grade, which for plywood made in Finland typically is GL I, GL II or GL III. That stands for Germanisch Lloyd, and it's the split-off from Lloyd's of London during the unpleasantness of WW 1 and WW 2. The specification is for a grade of plywood suitable for marine construction, and it was required by the insurance companies before they would insure a boat or ship made of the stuff. As it happens, aircraft use the same plywood.

Generally, what you want is GL II or "GL 2". The three grades are all made at the same time and in the same process, but it's simply a matter of grading the finished product, with GL I allowing for fewer imperfections in the wood that GL II or GL III. GL II is by far the most common grade and it's all we use. Only occasionally over the past thirty years or so have I heard of someone who had some GL I, and I always had the impression it was more a matter of snobbery than any real understanding of the quality of the wood.

All of our GL II plywood is made by Mahogany OY, and there is a red stamp in the corner of most of the sheets, with handwriting for the GL specification, the thickness of the plywood and the number of plies. I think you will find the Roman numeral "II" to the left and the millimeter thickness and number of plies to the right.

The plywood is always made with alternating plies at ninety degrees to each other,



*Duane Root's ceiling was too low for his Falco, so he cut a hole in the floor.*

so you will see a different color for each layer, but if you turn the sheet and look at the other sides, you will see that the light-dark-light pattern will change to dark-light-dark.

I once saw the specification for GL II plywood, and I don't remember much of what it said. I don't know for sure if it specifies that all layers are made of birch, but I think that's true. In any event, when you buy plywood from Finland, you can be very, very sure that they are making the plywood of their native birch and not importing mahogany from South America! Even when mahogany is used in plywood, it is typically only used on the outer plies, because it is so expensive.

Mahogany or birch plywood made in the US is typically made with the inner plies of poplar. But since we only use GL II birch, I haven't spent a lot of time weighing the merits of the various grades.—Scott

I was thinking about the accident of N33LW last night, and I thought I would mention to you that you may want to add to the check lists on the website for annual inspection "Inspect the intake filter and frame for cleanliness and integrity". There could be some more planes out there with frame problems.—Glyn Russell

Thanks for the note. We've made the change to the check list that Cecil Rives did and also put a note at the bottom of "How to annual your Falco" by Steve Wilkinson. Also, because the accident was apparently caused by the collapse of the internal spring structure of the engine air intake tubing, we have included something about that.

Recently we have received a number of requests for screwjacks or a landing gear motor from owners of production Falcos. The production Falcos have a different thread from what we use and the parts are



***Flipping the plane over on a moment's notice, when a group of students showed up.***

not interchangeable. The landing gear motor is also completely different. We are in the process of locating the original drawings and we will make them available in the Falco Skunkworks on our website.

Wayne Rampley asks "Revision F on A14, Equipment Installation Frame #1 tells me 'There will be substantial changes to the location of equipment installed... details will follow in a later drawing.' I have not received this later drawing so I wonder how to find these changes. I am working on fuselage frames now and want to find the latest info."

We haven't issued a new drawing for that particular sheet, which shows things that were installed on the production Falcos, but all of the changes are shown in the construction manual and the other drawings.

From Christchurch, New Zealand, Bruce

Frazier and Russell Woods report that they are now making steady progress after their 15 year layoff. Wing skins are all bent up for gluing when the warmer weather comes, and most of the metalwork is now done. They ask:

"The main gear oleo orifice fitting, No. 551, shows two holes 1.5mm. Is this correct? As the rebound damper No. 552 also have two 1.5mm holes, I would have expected No. 551 to have more holes or larger holes!"

Yes, the drawing is correct. The holes are the same in both parts for downward flow on the rebound, but the damper lifts up and allows for greater flow when the strut is being collapsed. In all cases, the drawings always mean what they say, unless we have issued a revision.

"In the throttle quadrant, P/N 831-12 is not listed. Are these AN970-4 washers?

And are they to be bonded each side of the levers?"

These are custom washers made of rubberized cork and they are used for friction.

"The tank band tightening P/N 733-7 is not listed. What screw or bolt?"

P/N 733-7 is a custom screw, same as any fillister head screw but much longer.

Bob Hendry reports that "the gear on VH-SWF (N747SW) would not retract cleanly when I went out for some touch and goes. The motor kept trying to run and it would run and then not run, etc. Eventually the gear came all the way up, and it came down with no problems. On the second takeoff, it refused to retract at all, so I pulled the breaker and hand-cranked it up. I reset the breaker and the gear came down perfectly. I am going to put it up on jacks tomorrow and check for end-lan, etc. But it sounds like I may be having the screwjack wear issue that the service bulletin talked about."

I would go very slowly and first analyze and confirm what the problem is. I doubt that it has anything to do with screwjack wear. First check for end play, but I doubt that's the problem. Then I would check the system and confirm that all of the parts work properly when hand-cranked. Then try it with the motor. Are the screwjacks properly greased?—*Scoti*

I have been searching for years for a serviceable Century I autopilot and have decided they don't exist. Surely in that time a lot has happened to cause a re-evaluation of what's the best autopilot for the Falco. I'm thinking Digi-Trak as it seems to have been around long enough now. Is anyone flying with one. Incidentally, Aircraft Spruce are selling a new basic Century I for \$2,850 US dollars.—*Stephen Friend*

Even though it is an old design, they are available in the US if you watch *Trade-A-Plane*. What I like about the design is that it is all-electric and will fly the airplane very well, even when the vacuum gauges go out. I really don't like systems that require both electric and vacuum to work since they fail you at the moment that you need them the most.

Unfortunately, I'm not up to date on the latest autopilots. Cecil Rives flew with a Century I for a while, then took it out and put in an S-Tec System 30, which is a two-axis system. Jim Petty started with a Navaid autopilot, then took it out, sold

it to Mike Wiebe, and installed an S-Tec System 50, also a two-axis system. Both Cecil and Jim wrote articles that are in the Falco Skunkworks. I believe Dave Nason has an S-Tec autopilot and Fred Doppelt is now installing one.

(Incidentally, Fred was trying to buy the bracket from S-Tec that Jim Petty mentioned, but he mistook the airplane name for a part number. It was an SF.260 bracket and that's not an S-Tec part number but rather a bracket that they make for the SIAI Marchetti SF.260, the big brother to the Falco.)

David Carroll looked at the Navaid Devices autopilot, and concluded that it is "a simple, cost-effective means towards claiming your aircraft has an autopilot system. It probably works just fine most of the time... intensely studied the design... spent several hours talking to the owner/designer, but I walked away with a sense that it just doesn't belong in a Falco."

I have also looked at the design and talked to the designer once at Oshkosh. I explained that we sold the Falco kit and suggested that we could work together to produce an installation drawing. I was so turned off by the man, I lost interest after hearing a few sentences. I am drawn to people who are interested in quality, doing things right, talk in precise terms, and have an appreciation for all aspects of doing a proper installation. I came away with exactly the same impression that David Carroll did.

David Carroll is installing a TruTrak autopilot and he has written an article that's in the Skunkworks, and it's clearly a quality design and produced by people who are my kind of people, and who you can have some real confidence in. Tom Buttenbach has been flying with one of their systems for years and raves about it.

I would stick to a simple system that depends on electrical power only, and which doesn't fill the airplane with thirty pounds of stuff just to keep the wings level. You would be amazed at how much some autopilots weigh. The Century II and III systems are heavy, complicated systems that require both electrical and vacuum to work, and I think they should be avoided.

My conclusion is that the S-Tec and TruTrak systems are the ones you should consider, and both have been successfully installed in Falco and have pilots who rave about them.—*Scoti*

We get all sorts of questions from potential builders. For example, Jorge Vargas sent us the following questions:

"I plan to start construction but the place where I live (Puerto Rico) is extremely humid and termite damage to wood is very common. How resistant to termite damage is the wood used in the Falco?"

Ah, the 'termite' question. Easy answer: It's nothing to worry about at all. Termites live in the ground and they are blind. They create tunnels of mud up to wood in buildings, but they aren't going to be able to get to a Falco.

"How good is the Falco in adverse weather conditions, specifically heavy rain?"

Typically, a Falco is built with epoxy or polyurethane coatings on the wood, so the wood is very, very well protected. The epoxies that we use were developed for use on wooden boats, which sit in the water, and Falcos are only rained on from time to time or fly through rain.

Anyone who builds a Falco will treat it like a member of the family, so the idea of leaving the airplane out in the open all year long is something no Falco builder or owner would ever consider.

I will also mention that sometimes people in 'humid' climates worry about an airplane just turning into rotten wood. The airplane will stabilize to a moisture content that is much lower than you would think. Stored in a hangar or under a roof, the wood will stabilize to the same moisture content that you have in the furniture of any unheated house. So if furniture doesn't have a problem, neither will the Falco.

"How good is the Falco as an IFR airplane?"

Some people say a good IFR airplane is one that will go where you want to when you want to. The Falco is this type of plane.

Other people say a good IFR airplane is one that you can sit back, eat a sandwich, read a map and the airplane will happily keep flying with almost no attention. The Cessna 172 or 182 is this type of airplane, and the Falco is definitely not this type. It is very maneuverable, a lot of fun to fly, but it will not fly straight and level without attention.

But the answer is to get a single-axis autopilot and then the Falco becomes a rock-solid IFR airplane with the flick of

a switch. This is what you would want to do, and it's what all Falco pilots do, except for the few 'real men', expert pilots and ex-military types.

George Barrett has now turned his Falco over to his son David, who has the airplane in Denton, Texas. David asks "I would like to add the 'optional child's seat to the Falco. Any notes on this?"

The original Falco offered this option, and I repeated it all, without knowing much of what they were talking about. All they ever did was put a cushion in the middle of the luggage compartment, and another on the back of the luggage compartment vertical wall. I'm not even sure if they put seat belts in there.

Dan Dorr asks "My manifold/fuel pressure gauge has three connections on the back. They are labeled: manifold pressure, fuel pressure, and fuel vent. The drawings show the one labeled fuel vent connected to the pitot static line. Is that the correct connection for the one labeled fuel vent?"

Yes. It's just to make sure the inside of the instrument is at the ambient air pressure.

Roger Home asks "When the construction manual calls for a test block (2"x2" maple) glued up for each batch of glue used, are builders gluing one of these blocks and testing them for each and every batch of glue mixed? As an example, I am gluing my ribs in three sittings. First the rib caps and support braces, then the ply gussets, then the ply overlay sheet. Does that mean I will end up with three test blocks per ribs?"

Just run some test blocks to confirm that you are getting good glue joints and that your technique is right. You will know when you know what you are doing, and then you can work with confidence. Also, if you get a new batch of glue and worry about that, then do some test blocks.

And also "In these early days of building, would it be possible to get some kind of weight comparison with the pre-assembled ribs, i.e., am I building too heavy, with too thick an epoxy, etc. I would be interested to compare the weight of the pre-assembled ribs from station 0 and 1 on the stabilizer, just to confirm that I am in the ballpark."

We don't have any numbers on this, but you can really add a lot of weight by slopping the epoxy on.

## Texas to New Zealand

by Arthur Dovey

I received the “certificate of airworthiness” three days ago [July 22] and have put almost two hours in the air in ZK JPG its NZ registration.

Apart from being light on the controls compared with the Cub or 747-400, the two other planes I fly, I already know that this aircraft is one which I shall love. I have spent the first two flights getting to know the Falco, doing stalls, steep turns, circuits, but I have done a couple of wing overs and rolls. It has slight static leak in the pitot static system (I know where the leak is and it means taking out the rear tank) which is causing the ASI to overread slightly as its indicating 170 kts when the GPS is 165 kts with 24” and 2400 rpm.

So back to the beginning. I had noticed the Falco in an advertisement and was attracted immediately to it. I had contacted Thomas Towle from the web page about two years ago regarding his, but then thought I would build. I purchased the plans and had put them away as a project for retirement. My last flying contract was not renewed and last February I found myself retired a bit ahead of what I had planned. I have a Piper Super Cub but wanted an aircraft to do aerobatics in so once again found myself in contact with Thomas as I couldn’t see myself building as well as my other activities. Both having backgrounds in the military and a Korean association must have struck a chord as I bought Thomas’s Falco.

I had spent some time trying to work out how to get the Falco to NZ and after studying the plans and making some careful measurements realized that I could, by taking the tail off at the No 8 frame and completely clearing the firewall forward, get the body into a 40’ hi cube container with about 3/4” to spare. After it was in the container we had an extra 4” due to the door frame.

Ray Mulqueen of the Alpine Fighter Collection (Warbirds over Wanaka) here in Wanaka provided me with a contact in Houston: Charles Hutchins. After a number of emails and phone calls Charles had arranged for me to use the “Confederate” hangar at Ellington field and offered “assistance” as well. With that in hand I flew out of Queenstown via Auckland, Los Angeles, to Dallas, hired a car and drove over to Mineola. I arrived at midnight from that non-stop journey to meet Thomas at his hangar. He had a campervan in the hangar



**Top: Loading the Falco into the container in Houston.  
Above: Arrival in New Zealand.**

as well and that’s where we spent the night. The following morning after dropping the “rental” off at “Tyler” we did a few circuits, and I then flew down to Ellington Field (1 hr 25 mins) in Houston.

Robert Bowline (fabulous guy and enormous help) who was Charles Hutchins’ hangar neighbor met me and we got the Falco into the “Confederate” park. Also found a motel for me and arranged to meet the following morning. We—but mostly Robert—took the tail and the engine off on Saturday and on Sunday with further assistance from Tom Newton loaded it into the container. Tom worked the hoist and I have to say if anybody needed some expert help in that field then Tom is your man, as it was fairly tricky getting it in with such fine tolerances.

I made up supporting structures in line with what Ray Mulqueen uses when he moves his “warbirds” around and the proof of how good they were was when it came out of the container unmarked.

The tail went in on the diagonal and I used the same eight frame bolts to tie it to a plywood frame which was screwed to the floor.

I think the Falco went via Hong Kong to Port Chalmers, Dunedin from Galveston. At any rate it took about six weeks. It actually arrived in February.

After putting it back together in the Alpine hangar I had “Southair” do the New Zealand airworthiness requirements as well as giving the engine a 100 hour check. Some of the important CAA requirements were changing the “altimeter” subscale to millibars from inches and correcting the compass for “southern hemisphere dip”. As I was not in the country for much time between February and now things got a bit drawn out but finally the only outstanding matter was the instrument and radio checks which were completed yesterday. That completed I flew “JPG” for about 45 minutes and again today for 55 minutes.

# The Glider

## Part 22 of a Series

by Dr. Ing. Stelio Frati  
translated by Maurizio Branzanti

### Chapter 9 Applied Loads and Structural Design

#### 53. Flight Loads

The design of the airframe is carried out in three distinct phases: (1) analysis of all the flight loads to which an aircraft may be subjected, and the analysis of the stresses caused by these conditions, (2) determination of all the strains on the various structures under different conditions, and (3) testing the strength of the various elements.

The first phase is the most difficult analysis due to the number of flight conditions and atmospheric conditions. These stresses are very difficult to foresee.

Today, based on years of experience we can accurately establish the loads that are applied to the various elements of an airplane in various flight conditions. The results of these experiences are common to the majority of aircraft with appropriate adjustments for individual type.

Every country has adopted regulatory engineering standards for the design of the structures, and which establish the loads that affect the components of every aircraft. These standards have been established to help the designer in his work, and also to establish a discipline and regulate the aeronautical design so as to not leave the structural strength and safety of the aircraft at the sole judgment of the designer.

In their standards, each country considers all of the possible flight conditions, and among these have determined and examined the ones that calculations and experience have shown to be the most dangerous ones. In the beginning these standards were very simple, but various countries had a considerable difference of opinions.

Today however while improving they also have become complicated, since not only the weight of the plane and its dimensions are considered and examined but also the aerodynamics. Countries have therefore reached a standardization, especially in the civil sector of aviation.

From tests performed on aircraft under various atmospheric conditions the following conclusions were established: (a)



**Oshkosh Builder Dinner: Bill Nutt, Al Dubiak, Bill Roerig, Charlie Nutt, Cecil Rives, Dave Nason, Bob Bready, Mike Schuler and Bob Trumbley.**

the greatest flight loads occur in sudden pull-ups, (b) the flight loads in rough air generally do not exceed the value of 2.5 g and (c) maximum acceleration withstood by men is roughly 7-8 g for short durations, and 3.5-5.4 g if continuous. With gliders it has been established that the maximum acceleration does not exceed 3.5 g.

From these conclusions the regulatory standards have established a load factor for various categories of aircraft, a value that is equal to the ratio of the maximum load applied to a specific structure and the airplane's maximum weight. In a steady horizontal flight, the lift is the applied load and equal to the weight, and the load factor is equal to one.

In Italy there are two authorities that regulate aeronautical production: one for civilian aircraft and one for military aircraft. The military airworthiness standards are more complete and complex than the civilian standards, however we will discuss only the civilian regulations.

In these regulations there are three load factors used: gliders: 3.5 g, normal category aircraft: 3.5 g and acrobatic category aircraft: 4.5 g. The civilian standards use these load factors to calculate the loads applied to the components of the airframe. To make sure that the structures are not subjected to loads that exceed the elastic limits of the construction materials, the airframe components are designed to a greater load.

In mechanical or civil engineering, structures are designed for loads that are 3 to 5 times greater than the anticipated loads. This is the same as saying that the factor of safety is 3 to 5. These safety factors are fairly high, and they are adopted to insure

against all possible dangers, including the deterioration of the materials over time, the possibility of errors in the calculation of the loads, and also for unforeseen accidental causes. Adopting a safety factor this high results in a heavy structure. Generally this is not very important in terms of cost or the quantity of material used.

In aircraft construction, however, weight is very important and extra material cannot be used. For this reason, the factor of safety in aircraft construction is relatively low, and a safety factor of 2 is required by civilian airworthiness standards for all types of aircraft, with some exceptions, thus the structures are designed for a load factor of twice the flight loads. [Today, the standard factor of safety is 1.50.]

#### 54. Static Tests

Because aircraft use a lower factor of safety, the calculations of the strength of the aircraft structure must be done with a greater degree of rigor than for civil and mechanical engineering. We must also verify the airframe's strength with static tests. Civilian and military airworthiness standards require that every aircraft prototype has to undergo a static test. Once the aircraft passes this test, it is allowed to continue with flight tests and normal flight.

These static tests check the strength of the most important components, such as the wings, fuselage, control surfaces, landing gears, controls, etc. During these tests, the components are attached to a test rig to duplicate the flight loads and conditions. The test rig should be quite strong so that the internal deflection may be ignored or at least measured. This allows controlled forces to be applied to the structure and the failures documented.

The static tests consist of a limit load test and an ultimate load test. The limit load test is performed with limit loads which are imposed for an indefinite period of time, and it should result in no permanent set. The ultimate load test is carried out following a successful limit load test. In this test, ultimate loads are applied for a short duration and failure may not occur. After this, the loads are increased until failure occurs, and the designer may collect data in order to study any divergence of the calculation from the results of the test.

In gliders, since they are manufactured in limited numbers and at times are based only on the prototype, static tests to ultimate loads or failure are never conducted, since an airframe loaded to such extremes, even if it never shows signs of failure, is no longer suited for flight since the structure has gone beyond the limits of elasticity and would be over-stressed.

Static tests to limit loads are used for the main structural components, however tests to ultimate loads and failure may be performed on individual components and assemblies where appropriate and practical.

### 55. Flight Conditions

Let us see then how to determine the loads affecting an aircraft during various flight conditions. With gliders we consider four fundamental flight conditions for the wing: (1) maximum lift, (2) maximum speed, (3) zero lift, and (4) hard landing.

**Maximum Lift.** The condition at maximum lift occurs during a sudden pull-up or when a strong vertical gust is encountered during high-lift conditions. The limit load factor is 3.5 g for gliders and normal category aircraft, and 4.5 g for acrobatic category aircraft. Under these conditions, we have the maximum bending of the wing.

The forces that are acting in this case are: aerodynamic forces (lift, drag, moment), aircraft weight, centrifugal reactions, and the reaction of all the linkages that transmit the forces of the rest of the aircraft to the wing.

The load applied on the wing is:

$$L = 2 \cdot N \cdot (W_{total} - W_{wing})$$

where

- 2 = factor of safety [today, 1.50 is used]
- N = load factor (3.5, 4.5, ...)
- $W_{total}$  = aircraft total weight
- $W_{wing}$  = wing weight.

As we see in the formula, the load applied to the wing is reduced by the weight of the wing itself.

This weight, being distributed with the same laws of aerodynamic loads, is in opposite direction of to the aerodynamic forces, therefore the wing supports itself without generating bending loads due to its own weight.

The load  $L$  is averaged along the wing span proportionate to the wing chord. The distribution on the chord is assumed triangular with center of lift at 1/3 from the leading edge.

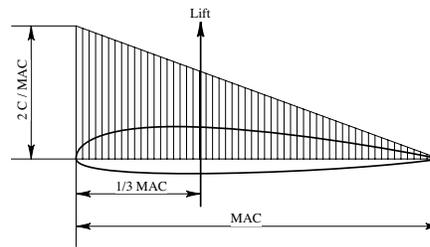


Figure 9-1

The wing including the wing fillet is considered a lifting surface only.

**Maximum Speed.** The coefficient of lift at maximum speed in gliders is one where:

$$C_L = 0.25 \cdot C_{L_{MAX}}$$

at the same altitude.

In this condition the center of lift is always aft, thus there is a heavy load on the aft spar, its attachments and on the aft structure of the wing.

The load factor is set at 0.75 of the one used for the calculation of the maximum lift condition. The load on the wing therefore will be:

$$L = 2 \cdot (0.75 \cdot N) \cdot (W_{total} - W_{wing})$$

This is divided among the ribs with the distribution shown in Figure 9-2 with a center of lift at 50% of the chord.

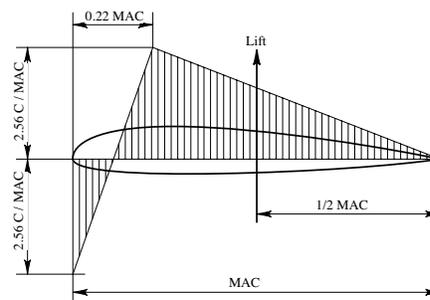


Figure 9-2

**Zero Lift.** The zero-lift condition is the equivalent of a straight-down nose dive at maximum velocity in acrobatic category aircraft and at a lesser velocity in normal and utility category aircraft.

This produces the maximum torsion on the wing, therefore you must analyze the resistance of the wing and its attachment to the fuselage to this load. The minimum value of torsion is given by:

$$Torsion_{min} = 0.20 \cdot N \cdot W_{total} \cdot MAC$$

where

- N = load factor (3.5, 4.5, ...)
- $W_{total}$  = total weight
- MAC = mean aerodynamic chord

The regulations also dictate that under a maximum load of 1.25 N the twist at the wing tips may not be over 4 degrees. In gliders, due to the length of the wings, this last condition is more critical than the resistance to twist itself, therefore special attention is given to the design in order to keep the elastic deformation within 4 degrees.

**Hard Landing.** In a hard landing the wing and its linkages are subjected to downwards forces of inertia when the aircraft touches ground. These forces are considered to be at 15 degrees forward of the perpendicular plane of the wing.

The landing load in a glider is calculated by multiplying the combined weight of the all the wing elements complete with the accessories attached to the wing by a factor of 4, no matter what category of glider.

In this condition, as in the maximum lift condition, the wing is subjected to forces that are in a forward direction in the first case and a backward direction in the second case.

Due to scarcity of aerodynamic data, regulations dictates that in gliders, the maximum load in the wing plane in the forward direction be equal to:

$$1/8 \cdot N \cdot W_{total}$$

where  $N$  and  $W_{total}$  are already established.

Following the civilian regulations we have briefly looked at the loads on the wing in various flight conditions.

Later, we will study the load conditions for the fuselage, the empennage and other elements.

## Sawdust

- **PC Nose Art.** A doctor customer for a new Citation Bravo was also the owner of an original 'Vargas Girl' painting of the kind that inspired nose-art on USAAF bombers in WW2. He asked Cessna for the picture to be reproduced alongside the cabin door on his Bravo. This prompted a walk-out by female staff on the production line, who claimed sexual harassment, and it was only resolved when management agreed to erect a 'modesty tent' around the Bravo's nose until handover.

- **Down Under Falcos to Auckland.** If you're planning a trip to New Zealand, be there on March 13-14, 2004 at Auckland for the Down Under Falco Fly-In. George Richards is the host, and hopes to have his Falco flying by then, but these things have a way of not exactly working out. Ask Dan Dorr, who finished his Falco months ago and only had to get it painted in time for the West Coast Falco Fly-In that he and Alyson were hosting, but a friend promised to paint it in a month. Now four months later, Dan is still waiting. But you can still have a good time anyway.

- **Farwell to a Friend.** As most of you already know, the Brazilian aviation writer Fernando Almeida died as a result of an aircraft accident on July 5, 2003. The aircraft is reported as a Europa PULAN.

Fernando was as passionate about the Falco and Stelio Frati designs as any man on this planet. In 1987 he flew Karl Hansen's Falco at Oshkosh and wrote an article entitled "The Best Airplane in the World", and earlier this year he flew Marcelo Bellodi's Falco and wrote "Bravissimo".

It's also difficult to imagine a more colorful man than Fernando. He has entertained Falco Builder Dinner guests with his stories of flying a very unstable Mitchell Wing at 5000 feet when he flew into a swarm of tiny bees which packed into his helmet and started stinging him, and later flying in Europe, circling a large building only to find that it was the central military command of NATO and the panic that caused. At one of these dinners, he mentioned "Frati's book" and this was the first I had heard of Stelio Frati's *L'Aliante (The Glider)*, a 1946 engineering textbook on the design of a glider.

The world of the Falco lost a great friend in Fernando Almeida.

- Falco N33LW, originally built by Larry Wohlers, crashed shortly after takeoff



**Top and Center:** Mike Wiebe checks out Nancy Aitken in his Falco, then takes off from the Great Oyster Fly-In. **Above:** Engine and cowling installed on Doug Henson's Falco.

about 1/2 mile off the end of the runway in Ashland, Ohio. The pilot suffered serious injuries. Initial accident reports indicate the internal wire spring in the Aeroduct tubing of the engine induction system collapsed.

- A year ago in England, James Gilbert was raving about a book that had just been published in the UK. It was by a man who flew Spitfires in the Battle of Britain, and

then waited until he was over 80 to write about it. The most stunning thing was how well it was written, among the best aviation writing he had ever read. Now, when you consider that James Gilbert is often regarded as one of the best aviation writers ever, that's strong praise.

*First Light* by Geoffrey Wellum is a best seller in the UK and is now published in the US by John Wiley & Sons.

## Mailbox

Thanks for the latest FBL. I especially enjoyed Fernando Almeida's article, and John King's piece on Syd Jensen. I hope you will permit me one nit-pick. Fernando repeats the oft-quoted myth that Italian series production of the Falco totaled 101 airplanes. In fact, it was 76, thus Prototype F.8 I, Aviamilano: F.8L Series I 10, F.8L Series II 10, Aeromere: F.8L Series III Falco America 35, Laverda: F.8L Series IV Super Falco 20.

I think the confusion arises because Aeromere planned a batch of 60 Series IIIs but completed only 35, one of which was a rebuilt Series II. So it looks like you've already been responsible for doubling the Falco population, with many more to come!

*Mike Jerram  
Spalding, Lincolnshire, UK*

I flew in Dr. Fanie Hendrick's plane on Saturday, and can only describe the handling qualities as unbelievable.

*Alan Evan-Hanes  
Weltevreden Park, South Africa*

G-OCAD is undergoing its annual at the moment, so we've taken the opportunity to remove the screwjacks from the aircraft. They have been thoroughly cleaned and we've done some measurements on them. All are well within your suggested limits.

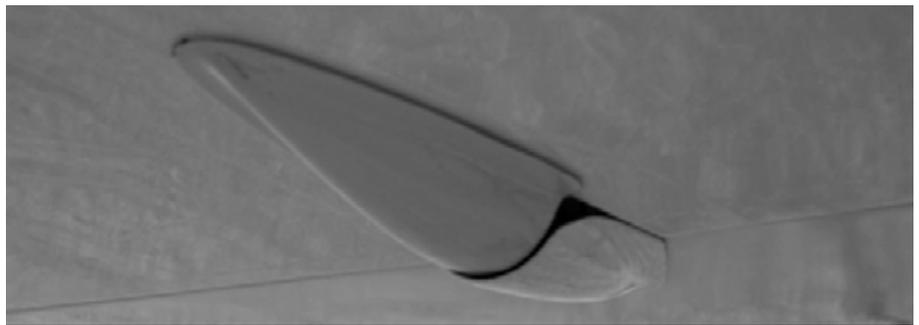
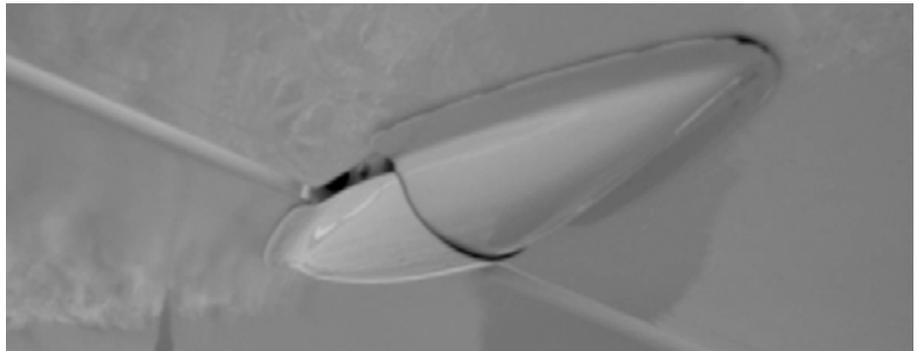
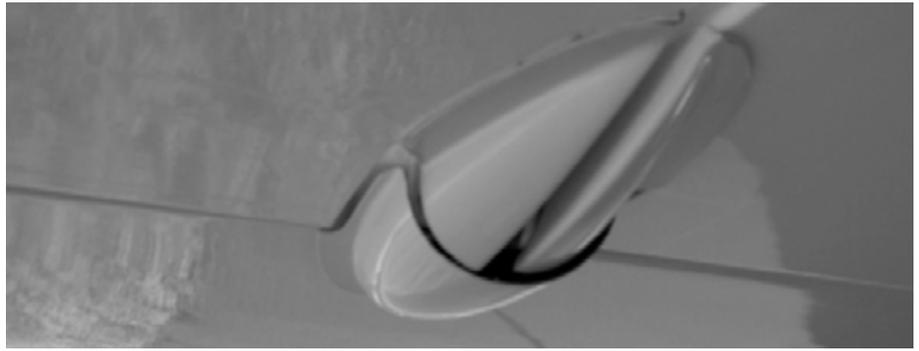
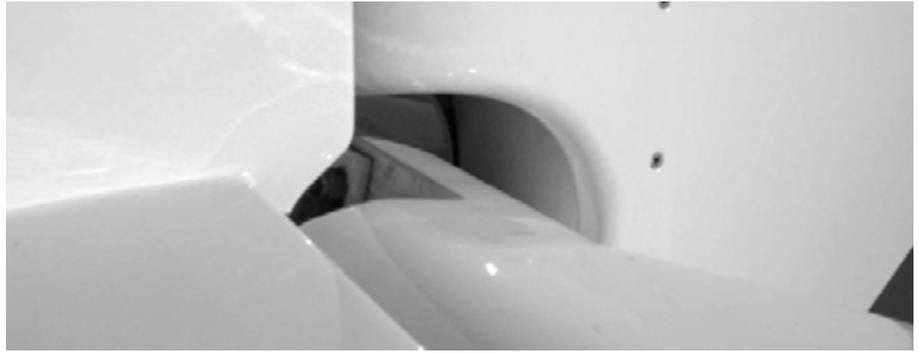
The aircraft continues to give excellent service, flies beautifully and still attracts lots of positive comments—one from an RAF Tornado GR3 driver!

*Clive Garrard  
Leicestershire, UK*

Just a letter of thanks for the Falco Builders Letter. To build my homebuilt, I started in 1979 by building a shop to work in. In 1982-3 with that ready I was going to build a floatplane with the motor up on top (Coot Amphibian) and so my shop had a 10 ft ceiling. I got the plans and then had a chance to fly in one. It was so noisy, you could not hear a thing.

Next I had a ride in a Glasair. The way you had to get in it, I was sure my 160 pound wife would have to be let down by an overhead crane.

Now it is 1984 and nearing retirement, I flew our club Bellanca to Arizona to see Hanson's garage Falco project. Frames were fastened, no wings, etc, but I was hooked and started my construction in June 1985. It first flew September 19, 1989, made by John Harns of Idaho, for a test flight.



**Larry Black put a radius on the rudder fairing, removed an external bent-wire com antenna, installed flush screws on the cowling and these trailing fairings on his ailerons and flaps. All these gave him a speed increase of about 12 kts, which sounds far-fetched but he can now outrun John Harns and Dave McMurray, who used to be faster than him. In formation, Larry pulled 2400 19" to John and Dave's 2400 23".**

I am 86 now and passed my physical last summer. When do I quit? Only 275 hours on the factory rebuilt engine installed in 1986, Lycoming IO-320. I do not fly enough, eh? I have taken people up and always gave a big brag about my 200 mph 'Porsche' (Falco).

*Ben Burgoyne  
Lake Stevens, WA*

I have spent the last month clearing my

parents house and in doing so, I have found so much material and trophies of Dad's flying that I was not even aware of! This one here is one of the most representative of the amazing capabilities of the Falco. Dad won two trophies during the same race, the International Tour of Italy in 1982, which was also the "First World Cup for Rally Pilots." You might ask, so what.

One trophy is for the "1<sup>st</sup> classified abso-

lute speed”, which means that he was the fastest aircraft around the course (not on handicap). The other trophy is for the “Aircraft that has used the least amount of gas.”

Now put these two together and ponder. Truly amazing! We Falco pilots are so lucky to be able to fly these incredible machines!

*Giovanni Nustrini  
Papakura, New Zealand*

I’ve been out of touch lately because I’m trying to acquire a flight school here in Omaha. It’s a lot of work, but that’s what I want to do for the rest of my useful life.

I can proudly tell you that I now have about 5 hours of PIC Falco time. This past weekend, I flew (airline) to Milwaukee and on Saturday and Sunday I was expertly taught by Pawel how to fly the Falco. He’s a good teacher, and I’m not a bad student. I now have seven Falco landings, several of them very smooth. We worked on takeoffs and landings, straight and level, different power settings and configurations and slow flight.

*Sylvester Chavez  
Omaha, Nebraska*

*Sylvester Chavez translated Fernando Almeida’s “Bravissimo” article for us in March and he has now purchased Pawel Kwiecinski’s Falco. He’s a happy man.—Alfred Scott*

I got the final sign off from CASA this afternoon (July 9). I finally have an Australian C of A, with no restrictions. I am now legal to fly the Falco again. I will write up a detailed version of my ‘trials’ later for the newsletter.

*Bob Hendry  
Melbourne, Australia*

On 8 August, I completed the transfer of my Falco to [son] David. He was delayed in flying it to Texas by poor weather conditions but he made it okay with a stopover in Jackson, Tennessee. I will always remember the day Al Aitken flew it for the first time and your presence to observe the operation. I believe you told me that it was the first “First Flight” you had witnessed. Your article about it was the best also—short and to the point.

Joy and I have enjoyed the times we were with all the wonderful people in the Falco Family. It has been a memorable experience but the time came for me to pass the airplane on to the younger generation. Thank you and Brenda and Susan for the outstanding support you always gave.



**Dan Dorr and a piece of tail. His airplane was supposed to be painted by a friend in time of the West Coast Falco Fly-In, but it didn’t happen in time.**

Please give my best to Meredith for her unflinching support to the fly-ins.

*George Barrett  
Charlottesville, Virginia*

Well, at last my Falco has flown, on October 19, 2003. 21 years after buying the plans! All is going well with 3.5 hours and 6 flights so far. The only slight problem is upgear limit switch opens under high g, this energises the motor which will not power against the extra load and then pops the breaker. I am using a Hoffmann composite c/s prop. The early performance results look good.

*Tim Painter  
Suffolk, UK*

I hope to have my Falco flying next year. I

will try to get pictures out to you and some info for the newsletter.

*Kyle Brumfield  
Massillon, Ohio*

I have built a number of aircraft and so appreciate better than most that while the building takes time, it’s the thinking and the planning that really stretches a project out. Something that became clear as soon as I got into this project was that the two Ing’s have done all the thinking for the builder. Every last little bit of it.

Awesome is a greatly overused word these days, but I am truly in awe of the work you have done.

*Steve Beaver  
Columbus, Ohio*