Falco Builders Letter

July 25, 1994. Dave McMurray lands after first flight.

First Flight 155BJ

By Dave McMurray

Exciting things have occurred here on the north coast of California over the last few weeks, starting with the realization that Falco 155BJ was ready to move to the airport. Due to the good working conditions we had at our shop at home, we decided to put the Falco together, including the control surfaces, and have everything rigged and ready to go. Since we have a 15-ton crane at our disposal, we figured we'd sling the Falco once we got it outside, and 'walk' it up the drive through the over-hanging redwood trees. As you can see by the pictures, it turned out to be a tight fit, but worked perfectly.

The plan was to set it down on our street lawn, (our house is 300 feet from the street) on Friday evening, then load it onto our flatbed at 4:30 Saturday morning. Needless to say, it was quite a sight to come around the corner and see the beautiful Falco perched there in all its splendor, and it created quite a stir in the neighborhood.

Everyone wanted to know all about the Falco and how we were going to get it to the airport. After explaining that we would be loading it early the next morning, many promised to be there to give us a hand.

I was glued to the bird and couldn't imagine leaving it up there all by itself, so after a sleepless night in the back of my parked truck, I was up at 3:30 to prepare for the big move. We again used the spreader frame and slings with the crane, and loaded the Falco on the flatbed. The overall width was 20 feet, necessitating a permit. With an entourage of ten or more vehicles, we made the six-mile trek to the airport without a hitch.

In This Issue:

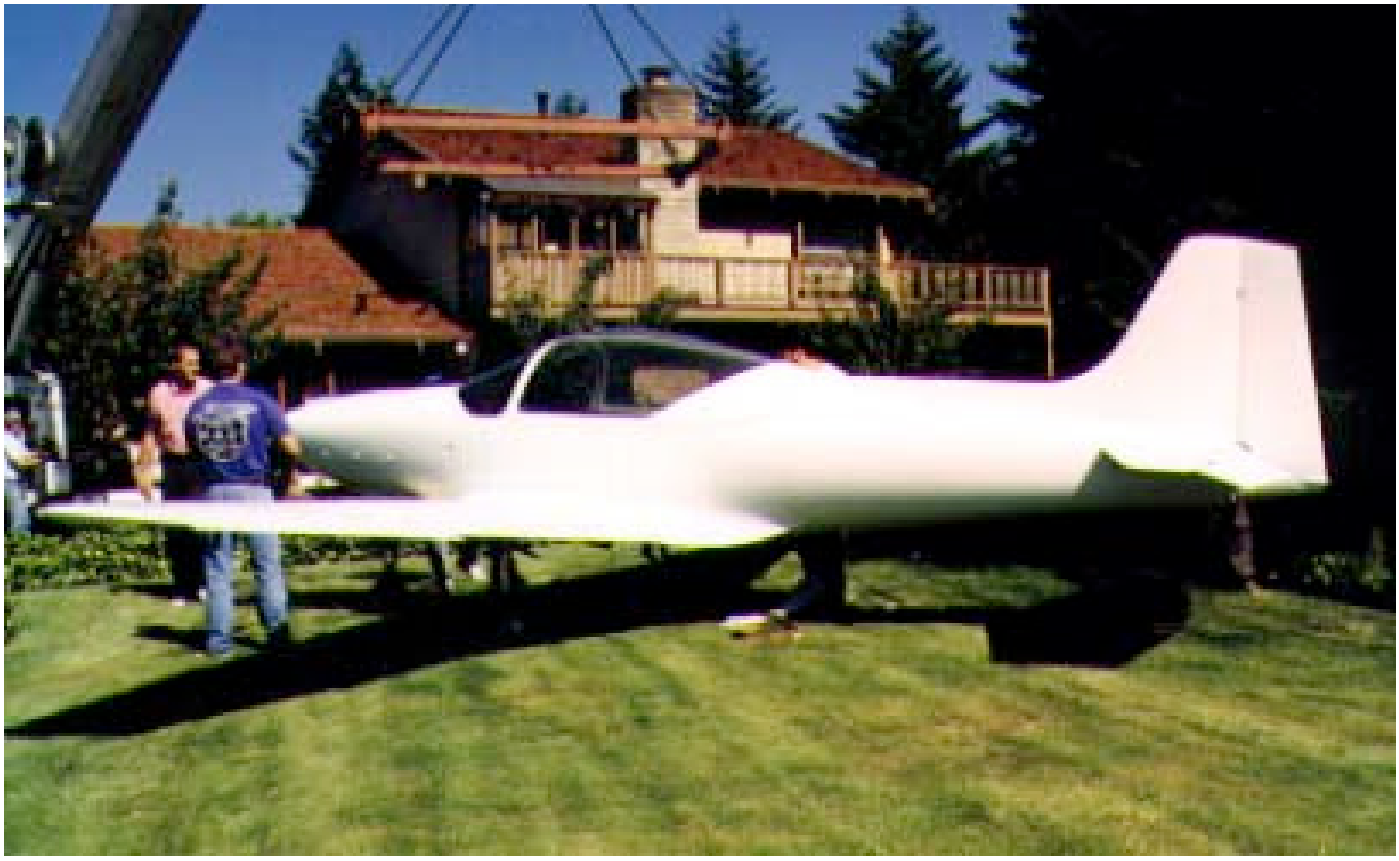
After a breakfast celebration, the propeller was installed, and we prepared to fire the engine for the first time. We filled it to the top of the filler neck with uncompounded oil (19 quarts!) and hand-turned the propeller until we could feel compression, then drained to eight quarts. This engine had been on the floor for eight years after a High Performance Aircraft Engines rebuild. It had been kept in a heated shop, and we'd been told that it would be fine. Why eight years, you ask? Well, nine years ago I planned on building and flying the Falco within twelve to eighteen months. Anyway, it fired right up, ran smooth, and we certainly were pleased.

During the last few months, I had been pondering having a test pilot do the first flight, particularly after reading all the articles. I'd flown with Karl Hansen, Ray Purkiser and John Harns in their Falcos at the fly-ins, had some time at the controls, but realized that their planes had gone through the testing and had been proven.

John graciously volunteered to fly down to allow me some serious flight time in his, and at the same time encouraged me to consider flying it myself. After a few hours in John's beautiful bird, I decided to do the first flight. I really appreciated John's help, and the encouragement and advice that he and Karl Hansen gave me. Both were invaluable.

We waited a week for the FAA to come out, but it gave us time to go over the airframe and engine again and again. I also did the brake run-in and high-speed taxis. (Our strip is 3,000' long at 7' MSL.) The aileron response test went well, then we did the elevator test. I had my mechanic on board to call the airspeeds and off we went. Before he called 50, much to my surprise, we were airborne. This was not in the plans, and I immediately pulled power back and realigned for touchdown. Fortunately, we firmly planted it back on the runway and were pleased at the performance of the trailing link gear. They're tough!

The arrival of the FAA inspector on Monday, July 25th was full of anticipation, as we



planned on the first flight immediately following the certification. With the FAA's blessing, and after another high speed taxi, we were rolling. It was still hard to believe that the task that seemed would never end, had turned into a viable airframe, and it was actually doing what it was designed to do. My first task was to monitor the engine and do the break-in routine. All temperatures and oil pressure were perfect, and the first hour logged was uneventful.

We have done four flights now, the first without gear retraction, and all without gear doors. The next flight will be with the doors and with some airspeed checks. I can honestly say that it handles like the Falcos I've flown in. It's a beautifully smooth plane to fly, and it's worth all the sawdust, sweat and tears of the last nine years.

Above: It helps to have a crane to move your Falco around the yard.
Below: Leaving the womb—walking the Falco through the redwoods up the driveway. Barbara McMurray wouldn't allow any limbs to be cut.

A couple of observations are in order. The high-speed taxis are important for control surface response checks, but getting airborne is not a good idea. We found our airspeed indicator in error, and we should have verified its accuracy before doing the tests. I don't think the chances of bending the bird are worth the few seconds of flight. The fact is, this plane will come off quickly under full power with the elevator in the full-up position, and the nose does come up almost immediately. My few seconds' delay in reducing power was all it took and the distraction of getting airborne could have caused serious problems. Alfred, you've got it right in your guide. I read

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and re-read it before testing, but it happened so quickly.

I know the recommendation is to let a test pilot do the first flight, and it may be the right way in most instances. Time spent flying a Falco before the decision is made is important. An evaluation by one of the more skilled Falco jocks, (in my case, John Harns and Karl Hansen) should be imperative before the first flight.

Barbara McMurray reports: "The final coat of paint on the Falco will be all white body with teal and raspberry striping… mmmmm." And after seeing this Falco at the West Coast Falco Fly-In, Cecil Rives reports that the airplane is the equivalent of Bjoern Eriksen's.

Saga of the Unsinkable Miss Fitt

by Allan Hall

Once upon a time... I wanted to build an airplane. The airplane is now built, and has flown. I'll try to spare you all of the sordid details, and try to hit the salient points of getting from there to here.

Decision No. 1: Which airplane? After looking at a few, and talking to John Shipler on the phone, it had to be a Falco. I've never met John, who lives a few miles north of here, but his project was near completion. He is an experienced builder, and I valued his advice. He didn't try to sell me, but he *did*!

Decision No. 2: This wasn't much of a problem—whether to buy or build components. It was apparent that I could buy things better and cheaper than I could hack them out myself.

I probably hold the record for "slowest builder". The plans arrived in the summer of '84. A certificate of airworthiness was issued in March 1993. When anyone asks how long it took me to build the airplane, I try to change the subject. However, my excuses for this snail's pace are (1) that I'm old (80 in November '94), and (2) that there were distractions such as terminal cancer in my immediate family—when the airplane went on the back burner.

Building the thing was probably the most satisfying experience of my life. The detailed drawings, and Alfred's instructions made everything fall into place like magic. The entire airplane was constructed, strictly 'by the book' in my three-car garage. You may still observe the outline by the glue drippings on the garage floor!

Speaking of glues, I used them all, Aerolite, Penacolite and T-88. T-88 was my choice for most major joints since it seemed the strongest (and the most forgiving). Of course, I had to paint Miss Fitt white, because of the epoxy (T-88) glue.

When everthing was assembled (except the engine), it was time to move to a hangar. The closest hangar for rent was in Ramona, California, about an hour's drive from here (Vista, CA). A mover was willing to move the plane, providing I would take care of the wide load permits needed to go through every town and highway to be traversed. This turned out to be a formidable job, so I found a mover who "didn't know" that wide load permits were required. He moved the thing over there in about an hour without a scratch or other incident.

Cousin Bob after Miss Fitt's first flight. Notice the crash helmet and the heat barrier gloves—remnants of his days at the Air Force Test Pilot School.

After final assembly, I took Alfred's advice and hired a mechanic at $42/hour to inspect my masterpiece. It turned out to be a good investment. He could find more wrong in an hour than I could correct in a day. One stupid example: he found terminal nuts on the ground bus that were barely finger tight.

Now for the big inspection, I called the FAA inspector in San Diego, and arranged a date. During our phone conversation, he stressed the importance of the emergency locator transmitter installation. I called Aircraft Spruce, and they rushed one each ELT down to me. The FAA inspector arrived bright and early one morning, OK'd the airplane for an airworthiness certificate, and went on his way. He never mentioned the ELT, which is still in its carton in a back corner of the hangar.

For a test pilot, I chose my cousin, Bob, mostly because he *wanted* to do it! He's a retired Air Force colonel, has flown everything in the Air Force and has just short of 38,000 hours in the air. Finally he managed to get up here in June '94 (he resides in San Antonio). Bob read the Falco Flight Test Guide, and proclaimed it very good. Then after two mornings of taxi tests, he was ready to fly.

The third morning we strapped him in, and he and Miss Fitt took off as routinely as though they had been doing it for years. Bob wore his crash helmet, which was incompatible with the radio, so I did the radio work for him from the ground with a walkie-talkie. At the same time, I was trying to operate a camcorder, and consequently didn't do a very good job at anything.

After a beautiful approach and landing, his first words were, "*Anybody* can fly *this* airplane!" I wanted to know which wing was heavy, and I had a piece of aluminum cut for an aileron tab—because I was *sure* that one wing would be heavy. However, he said it flew perfectly.

He also said I was right—Miss Fitt is a little nose-heavy. The only trouble that he mentioned was "A little trouble with the flair". I suspect that was due to his belly interfering with the stick. He is short and pudgy, and he had to have the seat all the way forward plus an extra cushion for his back. Bob had to leave right away for an appointment in Bakersfield—so I didn't get a chance to ride in Miss Fitt so far, darn it!

Now that I have an airplane that will fly, where do we go from here? My medical had run out, so last week I took the physical and—surprisingly enough—passed! Now if I'm lucky, I'll find someone who can check me out in Miss Fitt, then get a CFI to give me a BFR, and I'll be ready to *enjoy*.

In conclusion, I wish to thank Alfred and the rest of them at Sequoia Aircraft for their patience and understanding with this old man through the several years of this project. And it *did* keep me off the streets for a while!

The Glider

Part 8 of a Series

by Dr. Ing. Stelio Frati
translated by Maurizio Branzanti

Chapter 4
Flight Stability

Centering. After obtaining the moment curves analytically or by experiment, we can proceed to the study of longitudinal stability.

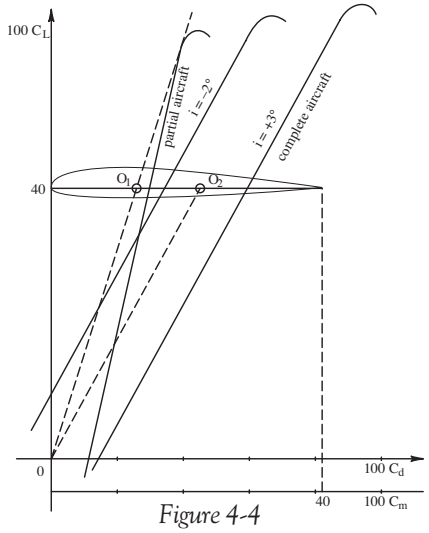


Figure 4-4

As you can see in Figure 4-4, we can establish that the position of the aircraft center of gravity cannot exceed the limits set by the points O_1 and O_2, where the center of gravity lines drawn are respectively tangent to the moment curve for the partial aircraft and parallel to the moment curve for the complete aircraft.

In fact, in the case where the center of gravity would be ahead of the point O_1, the center of pressure will result in a farther aft position since its maximum forward position cannot be past O_1 as we have seen when determined graphically. In this condition, we would have a case of auto-equilibrium only for an aircraft design without a tail, while under normal flight conditions the equilibrium would be lost—hence the requirement of a stabilizer anyway. Thus, in all flight attitudes, the tail section will not create lift.

It follows then that the airplane's efficiency will be reduced due to the lower total lift and the increase in tail drag. From what we have seen, we deduce then that, as the center of gravity moves forward, the aircraft will become more stable, even with a small tail section. Its forwardmost position is however limited by the aerodynamic considerations just explained.

In the opposite case, where the center of gravity is aft of point O_2, we will have instability even with larger tail section surfaces and length, and an attitude of equilibrium will not exist.

The range of the center of gravity will have to remain therefore between these two extremes which may vary between 25% to 45% respectively forward and aft.

Cecil Rives at Oshkosh. He flew there in formation with a bunch of RV-6A builders. All airplanes had 180 hp engines, and they flew at 150 knots indicated. The RVs were pulling 65% power, while Cecil was back to 16-17" manifold pressure and 2200/2300 rpm. At a fuel stop, they took on 30 gallons to Cecil's 20. Cecil said they were not too happy about it.

In reality, however, it is always best to have the center of gravity to the front, between 25-30% of the wing chord.

Angle and Location of the Horizontal Tail Section. To locate and orient the horizontal tail, after determining the center of gravity position, you must determine the attitude of equilibrium without the intervention of any control surfaces, in other words, the normal flight attitude. As in the case of the wing alone, this attitude is the one corresponding to the intersection between the center of gravity line and the moment curve.

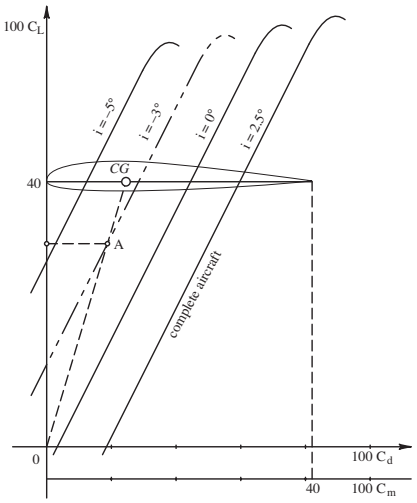


Figure 4-5

Having established this attitude of equilibrium, for example with C_L = 30, we draw a horizontal line through this point on the ordinate axis until it intercepts the center of gravity line at point A. This is the point through which the moment curve of the complete aircraft design will have to pass. This curve will give us the angle of the horizontal tail for equilibrium at that particular attitude.

Since high lift is always part of the normal flight attitude of gliders, the angle of the horizontal tail is always negative. At an average equilibrium attitude, we may consider C_L to be varying between 30 and 40.

These procedures are only possible when the moment curves are derived by wind tunnel experiments. Without these, we would have to accept results with a lesser degree of accuracy.

With a glider, you may use a horizontal tail angle between –3° and –4° with a good chance of success.

First Flight, Bob Bready

There's one happy Falco owner flying around the New England skies these days. Bob Bready flew his Falco for the first time on July 21, 1994, and he's been burning up the air over Westfield, Massa-chucetts, ever since.

Bob started the Falco in 1982, so his 12-year build time is close to Larry Black's. Like Larry, Bob made most of the parts in the plane and purchased kits for cowling, canopy, seats and some other things. When he started the Falco, Bob had two daughters in college which gave him plenty of time but no money.

Some builders finish their airplanes and then lose interest after flying for a while, but it's been obvious from the beginning that this will never be the case with Bob. He's owned a long string of airplanes, beginning with a Luscombe T8F Observer, a tandem-seat taildragger with a bubble canopy in the back. This was followed by a Skylane, Aztec, Geronino Apache, a push-pull Cessna twin ("Suck and Blow") and a Baron.

Bob has over 3,500 hours and has spent a lot of time flying Jim DeAngelo's Falco. I asked him how he liked his Falco and how it compared to other Falcos he has flown. "It flies better than it looks!" he said, using Karl Hansen's famous line. His Falco feels the same as the others he's flown. "You're not flying. You're just thinking about it. It's an extension of your fingers."

Compared to the other airplanes he's owned, the Falco is "probably the easiest to fly and probably the most fun to fly. It has the best visibility, the best handling, and will be economical enough to put a lot of time on it."

Bob's Falco has a 180 hp engine, weighs 1,303 empty, and so far it has proved to have almost identical performance to Jonas Dovydenas's Falco, although Bob has yet to install the nose gear door, wheel well doors or control hinge fairings—he's looking forward to eating Jonas' lunch once those are installed. Down low, he gets 155-160 knots indicated at 23"/2300, while at 9,500' a typical cruise setting of 21.5"/2400 gets 180 knots groundspeed on the GPS.

Bob is the first to install a King GPS with the moving map display. He had a KLN88 loran, but it worked for 5 minutes and then blew up. Bob swapped it for a KLN90A GPS, essentially the same unit but GPS instead of loran.

The moving map display is something to see operate on a cross-country flight. You can watch as VORs and airports slide by. There are a dozen or so 'pages' in the display, and you can look at your entire flight plan from a zoomed-way-out view, or watch the runway of the airport you're approaching come into view when you enter the pattern. "The Northstar is so easy to use it's not funny, but with this thing you're into computer systems. The joke around here is that if I wreck the Falco, they're going to find the GPS embedded in my face. When you're learning it, you have to sit and think with each step, but it's the cat's meow."

Easily qualified to do so, Bob did his own first flight. Unfortunately, when he did his high-speed taxi tests, he was assigned the cross-wind runway. "There was an 18-knot cross wind, and I looked like a drunken Bob Hoover weaving down the runway."

On his first flight, the engine oil temperatures ran up much higher than they should have, so he retracted the landing gear to get more air flowing over the engine. The problem turned out to be a sticking thermal valve in the oil cooler circuit, which he has since replaced. He put the Falco through the usual feel-it-out process, encountered no other problems and came back and landed. It was fine.

"On the first flight, I was more tuned into how I was going to fly the airplane rather than any emotional thing. The emotional thing, it's just not there. It was a great flight in a different airplane where everything went fine. It was just a mechanic and me. My plans were not to raise the gear, but it was the easiest way to get air over

the engine. I put a fire extinguisher in the right seat, mainly so I could use it to break the canopy if I had to get out. It wasn't a chest-beating, whoopee kind of thing, and I think looking to the first flight for an 'experience' is the wrong way to approach it."

Since then, Bob has been burning up the skies. He now has 65 hours on the Falco. "When I was flying off the first 25 hours, I put 16 hours on it in three days. That put a new meaning to being a pain in the ass."

I asked Bob to compare his 180 hp engine with the 160 hp Falcos he's flown. "There really isn't that much difference in the speed. Where you're seeing it is in the climb-out and acrobatics where the extra 20 horses make a difference."

"I have the inverted fuel system but not an inverted oil system. I'm not into hard acrobatics. I like to make long sweeping 'Mustang maneuvers'. It's what you want to do. I like the airplane because of the way it flies. The first time I did a loop, I stalled it and it got into an inverted spin. It's a bit scary, but you let go of it, chop the power and it grins at you and flies itself out of it."

The stall warning is quite good. "You'd have to be dumber than a rock to not know that the airplane is going to stall. It really rocks and rolls."

I asked Bob if the larger engine contributed to any nose-heaviness. He said it did not. He has a light-weight starter and alternator and this means his 180 hp engine is probably a little lighter than a factory-stock 160 hp engine—so in terms of balance, it is invisible.

On the controls, Bob says that Jonas's are a little smoother, but his are breaking in. The autopilot adds some friction to the system, and you can tell if it is connected or not. He has flutter-tested the Falco at 240 mph, and then took it up to 265 mph but didn't test for flutter at that speed. He says it has a 'Mustang buzz' to it at high speeds, which he thinks may be something in the engine baffling.

The Falco is currently painted in white, but Bob plans to put some decoration on it. It'll have black on top of the cowling and some stars-and-bars for an airforce trainer scheme.

"People always ask me what it is like. I equate it to having a third child. You're happy it's born, but you don't know what it is going to be like. Every day new and wonderous things take place. I'm in a hangar with eight other airplanes, and I'm the only one here who built his own plane. What a learning experience to put one of these up into the air! About 25% of my life has been with the Falco, and it's been a very large part of my life. It's kept me away from bad women and bar rooms too long." Knowing Bob, I couldn't resist asking him to compare the Falco to women. "You can catch a disease from it, and that disease is not curable with a shot of penicillin either!"

Bob asked me to say that he appreciated all of the support from all of the builders and from us here at Sequoia, for our help and for keeping the design good and clean.

And his advice to other builders working on their Falcos? "Don't build an airplane. Build a piece at a time. And don't be discouraged about how long it takes to build because the end product is worth it. It's like that baby."

Congratulations to our new proud papa.

—Alfred Scott

First Flight:
George Barrett

I wish every homebuilder in the U.S. could watch, as I did the other day, as Al Aitken takes an airplane through the flight testing process. For homebuilders who often see the first flight as a victory celebration *cum* wedding night, it's instructive to watch a real professional at work. You learn, first off, that the most professional test pilots are the most meticulously careful people in the world. They have no illusions of the risks involved, and the entire flight test methodology is intended to minimize the risk by testing each aspect of the airplane's handling in the safest possible manner.

Few people have had as much effect on the attitudes of homebuilders toward flight testing as Al Aitken. As many of you know, he's a graduate of the Navy's Patuxent River Test Pilot School, flew F.18s in the Marine Corps and was one of those who bombed Libya for President Reagan. Our *F.8L Falco Flight Test Guide* is really Al Aitken's work—all I did was write down what Al told me. This document has been widely circulated far beyond our circle of Falco builders, and it's been widely praised and religiously followed.

I was at the Gordonsville (Virginia) airport to witness the first flight of George Barrett's Falco. Al Aitken had arrived at 7:00 AM and when I got there at 10:30, he was still checking the aircraft over. After another half-hour of this, he started the engine, taxied over to the fuel pumps and then began the first of a long series of high-speed taxi tests.

First there was the directional control tests, to prove that the airplane would steer down the runway under takeoff power and then stop when brakes are applied. These were followed by the aileron control effectiveness test, to prove that each aileron worked, that both wings began to lift at roughly equal speeds. This also reveals any grossly out-of-rig condition in the wing.

(A friend of mine once built a two-place Quickie with wings so badly twisted that the airplane could maintain wings-level flight only with full right stick. The test pilot—supposedly qualified to do such testing—discovered this *after* breaking ground. He was lucky and was able to complete the pattern to the left, and landed safely. However, if the twist had been any worse, the airplane would have spiraled in after liftoff. This is a risk you avoid with the controls effectiveness tests. You discover the problem before leaving ground.)

Above center: One of the many flight test cards. Above: George Barrett's 1969 Plymouth Satellite (nice catchy aviation name) and his Falco.

George Barrett's engine was a freshly majored 160 hp IO-320-B1A with Cermi-chrome cylinders, and the break-in requirements were that the engine not be allowed to get very hot prior to the first flight. As a result, after each series of high-speed taxi tests, the engine was allowed to cool until you could put your hand on the rocker arm covers. The final taxi test checked the elevator effectiveness, and then we broke for lunch. The results of each test were carefully recorded on a series of flight test cards that Al had prepared for the flight.

Al carefully filled the Falco with the fuel required for the planned one-hour flight, plus a reserve, and then taxied out for takeoff. The engine runup was rough. The rpm drop on the left mag was excessive, so Al brought the plane back in. The bottom plug on the No. 2 cylinder was not firing, so it was removed and cleaned.

Top: George Barrett watches as his Falco takes off for the first time. Above: George Barrett and Al Aitken.

Once again Al taxied out to the end of the runway. This time the engine runup was fine, and he lined up at the end of the runway, applied full power and accelerated down the runway. He quickly chopped power and braked to a stop. The engine had stumbled briefly on the initial application of power. After much discussion, we decided this was probably due to a slightly over-rich condition coupled with other spark plugs slightly coated with oil.

We concluded that it made sense to lean the mixture slightly and try again. A freight train rolled by, and Al decided to let the train clear the area before taking off—it would, after all, be an unhappy experience to put the plane down on the tracks and then be run over by a train. After a few minutes, the train disappeared from sight and hearing, and Al began the takeoff. This time, the takeoff roll went normally, the Falco charged down the runway, rotated and flew off. We stood and watched as the Falco climbed straight out at a shallow angle, on and on until finally, after reaching perhaps 1500 feet, it banked gently to the left and circled back over the field.

"How does it feel", I asked George Barrett, a retired lawyer (trusts and estates; he can't stand litigation and fights) and builder of the white airplane that droned over our heads. "I don't feel anything," said George, who was far more concerned about Al Aitken's well-being and safety than the fate of his own airplane. As he spoke, I noticed that he was shifting his weight from left to right foot in a rapid, nearly running, frequency.

For the next hour, we watched as the plane circled overhead. With each passing minute, we all felt a sense of relaxation. George had a hand-held radio, and we could hear the reports from Al Aitken in the plane. The airplane handled well. The engine was running fine, and Al read off the temperatures, pressures and other numbers on the engine.

After perhaps 15 minutes, Al began a series of shallow turns each way, timid 20-degree banks at a time when some homebuilders have already rolled their creations. Later he took the plane through a series of slow-flight maneuvers and nibbled at the stall. It all looked good. Then, after nearly an hour in the air, he lined the Falco up with the end of the runway, descended, flared and landed.

It was a moment best remembered for the sheer ordinariness of it all, a spectacular time mainly because nothing had gone wrong, and we were all overwhelmed more by a sense of relief than victory. No trumpets, heroic music or setting suns. Just Al Aitken taxiing over to the gas pumps once again before they put the plane away for the day.

Watching it all were George and Joy Barrett, their son David, Joel and Carolyn Shankle, Tom Prasec (a local mechanic who helped George) and me. There were smiles and handshakes all around. Joy and Carolyn were bursting with pride. We put the plane away and all headed home after a long day.

There was one other man there watching it all. A friendly, blond man who hovered on the periphery of our tiny group. I later learned that in addition to being a pilot, he was also the local funeral director.

—Alfred Scott

Construction Notes

One part of the Falco design that's always been a bother is the down-limit switch arrangement. Frati's original design worked well on the production aircraft, but it's been very touchy on our Falcos. The reason is that the production machines all used a motor that would continue to turn after it was shut off. In other words, the motor would coast.

This permitted the down-limit switch to cut the motor off before the gear was fully down, and then the motor could continue to turn so that the screwjack would be driven into the spring. With our system, however, we use a permanent-magnet motor which has almost no coast at all. Builders report that the adjustment is very touchy, you have to hit it perfectly to get it right. Even then, most Falco owners give the crank an extra turn or two just to make sure.

We all owe Joel Shankle a word of thanks on this, for getting on my case, in his normal friendly way, about how touchy this is. Watching George Barrett getting his plane set up for the first flight caused Joel to start worrying about this down-limit switch thing and asked me to look into a redesign.

I remembered that Charles Gutzman had come up with an alternate way of mounting the down-limit switch, so I called him. His arrangement has turned out to be the best solution, and it's what a number of Falco builders have already done at my suggestion. Pure and simple, it's a far better way of handling things.

In this design, the down-limit switch is mounted on the aft face of frame No. 1, in the nose wheel bay so that the lever arm of the switch is directly below the screwjack. On the screwjack, you mount a clip. The clip is attached with one or two worm-type hose clamps, and at the bottom forward end, it has an arm that goes out from the screwjack by about 20mm.

George Barrett made the clip with a piece of tubing welded to a strip of steel. Joel Shankle machined a part out of aluminum. We will be makine a steel part that's stamped and formed to the tube. All of these designs are light and easy to make.

The beauty of this design is that it allows the gear to go completely down, start compressing the spring, and *then* it cuts off the motor. I worried that there might be so much coast to the motor that the coasting of the screwjack might damage the microswitch by exceeding its overtravel limits. Everyone says the motor stops "instantly" and that there is essentially no coast to the screwjack.

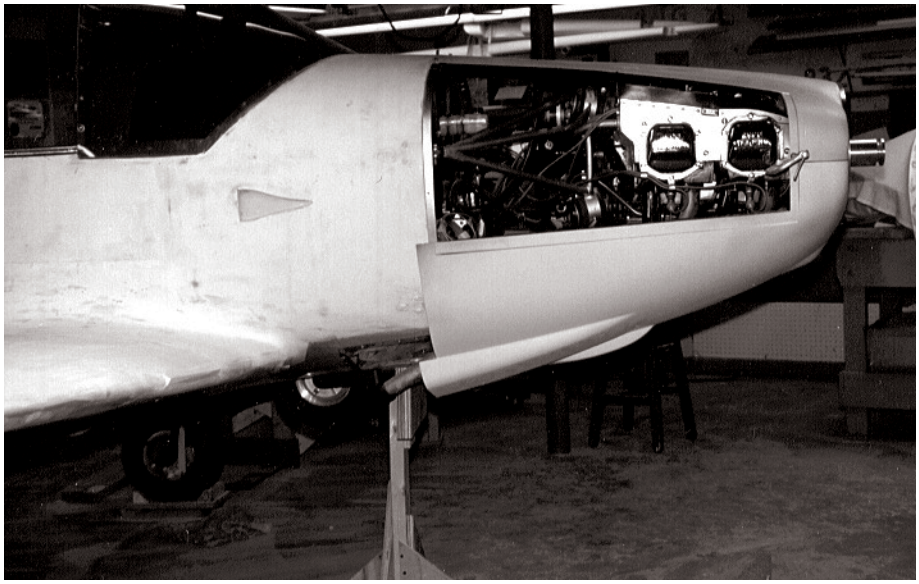
Top: Down-limit switch on George Barrett's Falco.
Above: Battery door on Cecil Rives's Falco uses European-style cabinet hinges.

I mentioned this to Mr. Frati, who is using the same motor and gearbox design as we use on the Falco for his Penguino/Sprint aircraft, and they are going to do the same thing. (Don'cha love it, the great Frati building an airplane with a gearbox designed by the infamous Dr. Ing. Alfredo Scoti—a speech-and-drama major from drunken U.Va!)

From everything I can see, this design is a dramatic improvement over the previous design. At this time, we're working on new drawings for the parts and should have new parts available within a month or so. For those of you who want to make your own parts, go right ahead. If you can build an airplane, you're resourceful enough to make up something that will work.

Steve Wilkinson writes, "While reinstalling the engine in the Falco yesterday and today, I noticed some more-than-minor damage to the engine-mount structure, caused by vibration of the exhaust system. The damage was caused by the circular flange that forms the right end of the cabin-heat muff, and it consists of a shallow-C-shaped indentation in the engine mount at the point where the flange is in closest proximity to the mount, on the vertical tubing that comprises part of the nosewheel support structure.

"Apparently, there's literally no clearance at all at that point when the engine is running and the flange has worn its way into the steel tubing over an expanse of about an inch and a half in length, and I'd guess the indentation is about 1/16" deep at its worst point. There's no question which is the harder steel—the mount tubing or the heater-flange stainless—because there's ab-



Rex Hume: "After considerable discussion at the West Coast Falco Fly-In that cut-outs and access doors are not necessary on the top of the wing—keep it clean."

solutely no damage to the heater flange.

"I wouldn't be surprised if an IA who saw it on a production airplane wouldn't ground the thing, but right now, I've got enough work to do on the damn airplane that it's the least of my worries. I brought the exhaust system home with me yesterday and filed about a quarter-inch off the aft part of that right-hand header muff flange, and there now seems to be adequate clearance. But because several builders have called me over the last couple of years and said, "How did you get the exhaust system to fit? I can't seem to get enough clearance for the heater muff..." I wouldn't be surprised if this situation exists elsewhere. Nor would I be surprised if, in another 100 or 200 hours of flight, the vibration wouldn't wear its way clean through the tubing wall. It's something I think everybody ought to check next time they take the cowling off to change the oil."

Another thing to check are the metal tags that come on the oil cooler hose assemblies. Irving Jones, who recently bought Tim Baker's Falco, reported that both of the tags were loose and had vibrated so much that they had cut completely through the woven steel braid of the hose assemblies.

If you ever need to replace the valve cores for the Schrader valves for the nose gear or main gear, John Devoe notes that the proper part is the 2300HV valve core listed in the Aircraft Spruce catalogue. My literature from Schrader calls it a P/N 2300TV, so one of these may be a typo.

Jerry Walker reports that he bought a Slick harness for the Bendix magnetos, and with this harness, you don't need blisters on the cowling. Jerry has an IO-320-B1A engine, and is in the process of finishing the plane.

Whenever anyone gets started on the

Left: From John Devoe, "Bob Bready advises not to cut the nose gear opening in the cowling before fitting it. With the cut, the cowling is loose as a goose and could result in a poor fit. With a weight on the tail and a tail stand, the gear can, of course, be retracted. With my low ceiling and thus no tail cone, my solution was the stand shown here. The top rest of 1/4" plywood is carpeted, formed to fit four inches aft of station No. 1, slotted to accept the gear leg and rests on the sides of the nose gear well. It worked well."

Falco, they go through a period of adjustment to the realities of building. I think everyone starts out with the mental picture of that perfect airplane they are going to build, and somehow they get it in their head that every piece will be as immaculate, polished and perfect as the painted, polished and waxed airplane. And in that first couple of months, we frequently get calls from builders who are upset about something that looms very large in their mind. Dean Malstrom, for example, didn't care for the set of rudder pedal mounts. All of them were structurally fine and he recognized that, but they were from different machining batches and there were some slight differences in the appearance. No problem, we switched the parts with some we had on the shelf so he could have a cosmetically matched set.

There's also a typical period of adjustment while you come to understand what is important and what is not. The other day, for example, I got a call from a new builder who didn't like the appearance of some of the tail group ribs. In his case, he didn't like the appearance of the staples used in the construction of the ribs.

When we first made the tail group ribs, we used a ridiculously inefficient clamping method that allowed us to make exactly one rib a day. When we got into the wing ribs, we started using the staple-and-glue method that is used at the Pitts factory. It's a far superior way to make certain types of parts, and we use this method on many of the fuselage frames as well. And we're now making ribs for the tail group that way, using a laser-cut stapling template. I'll admit that staples detract from the appearance, but the parts are fine. You'd be amazed how many cosmetically perfect Falcos are flying with staples within them. All I'm saying here is that when that lump-in-the-throat feeling hits you in the early stages of construction, that it's something everyone has gone through.—*Alfred Scott*

Sawdust

• Yes! Three cheers for the EAA, which has just announced the EAA Flight Advisor program. Flight Advisors are a corps of volunteers who will assist aircraft builders and restorers in conducting adequate self evaluation of their piloting skills and to develop an appropriate flight test program. This answers a crying need and addresses a long-time problem where builders of aircraft feel compelled to fly their own creations, despite a lack of understanding of the principals of flight testing and the dangers involved. The accident rate for pilots with less than ten hours in type is simply gross, and this is a very good way to address the problem. Fantastic stuff.

• Two years ago, the Italian gummint instituted a ludicrous tax on aircraft. The airplanes are taxed by weight alone—age or value has nothing to do with it. The result is that the annual tax on an old Cessna 320 is $35,000 a year, the same as the value of the plane. How's general aviation doing in Italy, in a country where avgas goes for $8.00 a gallon? Well, two years ago there were 352 corporate jets in Italy. Today there are 27.

• OSHA wants you to know. Our own Department of Labor Occupational Safety and Health Administration has determined that there is a sufficient workplace safety issue raised by the presence of certain amounts and types of wood dust that our plywood suppliers have been required to issue a Material Safety Data Sheet and a caution label on wood dust. It says, "Sawing, sanding or machining wood products can produce wood dust which can cause a flammable or explosive hazard. Wood dust may cause lung, upper respiratory tract, eye and skin irritation. Some wood species may cause dermatitis and/or respiratory allergic effects."

• Friends of ours adopted a girl at the age of two months. Now in the second grade, the girl is just learning that she's adopted. Riding along a back road with her mother, she was taking it all in. "So, I was never in your tummy." "That's right," said her mother. "Okay, now let me see if I've got this straight", the little girl said, very carefully and deliberately, "somebody else had me... but they couldn't afford to keep me... so they gave me to us."

• Jim Baugh's Sequoia 300 was badly damaged in August after a precautionary landing on a gravel road near Gillete, Wyoming. Jim reports that he got caught in a squall line and was unable to find any clear air over the hills to the Sheridan airport. He landed safely on the gravel road, but a 40-knot crosswind pushed him into the ditch. The left gear collapsed and then the airplane spun around, shearing the nose gear axle off and damaging the right gear, engine mount, propeller and buckling the left wing. Jim is not sure if the aircraft is repairable or even if he wants to try.

Top: Jim Baugh's Sequoia 300 in happier days before the rough landing. Above: Cecil Rives's highly modified removable flightline pass.

• Larry Black's engine was one of those affected by the Chevron contaminated fuel incident of this summer. The engine is now back at Lycoming for a complete rebuild. The incident, which reportedly will cost Chevron $40 million, is bizarre in that Chevron has, if anything, gone overboard to take responsibility, meanwhile Melvin Belli—to Larry Black's disgust—is filing a class action lawsuit against Chevron.

• The Bracelet Menace. Once again the dark, storm clouds of controversy hang over the EAA. Angry voices are heard, suspicions abound, and members threaten to quit. Some say they'll never come back to Oshkosh again. Petitions are circulated and signed by scowling men and then marched into EAA offices and presented in fierce defiance.

And the cause of all this concern and anger? Why it's the bracelet, the most horrible and awful of things to descend on Oshkosh in years. In years past, the flight line pass was a paper luggage-tag on a string. This year they went to a bracelet worn on the wrist. The daily pass was a colored paper band. The weekly pass was a plastic, hospital arm band affair firmly held on your wrist with a rivet. When the show was over you cut it off.

What caterwauling there was about this plastic band! People were threatening to go home and never come back. Members were threatening to quit the EAA over it. Someone had a petition that they were circulating, protesting this thing. One couple reported that they scratched themselves while making love. Always the clever me-

Top: Xavier Beck's Falco (see the cover story of the June '94 FBL) crashed on takeoff recently after the engine quit—something about a problem with the induction system filter. No one was hurt, and Mr. Beck is thinking about rebuilding the plane. Above: The things Falco builders will fool with instead of building a Falco—Vern Raburn's Super Connie at Oshkosh.

chanic, Cecil Rives devised a little bracelet modification with a ring terminal so he could take it off at night. *Kitplanes* editor Dave Martin said he still had the bracelet on when he got back to California, and the receptionist at his office said, "My Lord, Dave, what happened to you!" when she first saw the 'hospital' bracelet.

One woman said the band gave her a rash. This led to the Bracelet Riots on Friday evening, when a beleaguered Tom Poberezny was pinned against a wall by the irate crowd and was heard to say, "Unfortunately we didn't have the luxury of testing the new bracelet before we put it on the market. We had to stay in business. We had to keep selling tickets." Just kidding on that last one, but you actually had grown men with huge astronaut watches on one arm crying like babies about the agony of wearing a nearly weightless band on the other arm.

The problem with the tag-on-a-string is that you can pass it over the fence, something you can't do with a bracelet. The result is that more people buy tickets and the numbers are significant. Tom Poberezny says it's hard to pin down exactly what the bracelets did, but he guesses that the additional revenue is somewhere in the range of $100,000 to $125,000. Any way you cut it, that's a significant amount. Tom said that most of the complaints were in the first few days and all were about the plastic weekly band that you couldn't take off, (next year, they're going to issue a series of paper bands) and since Oshkosh he has received 15-20 letters about the bracelets. "Some people really lay it on, and it's no fun to stand there and listen to the complaints, but they deserve to be heard. When people said that they were going to quit the EAA over this, all I could think was: Where had we failed them that such a little thing would push them over the edge?"

• Why general aviation is not going to hell. 1993 was an awful year for everyone in general aviation and kitplanes as well, but from everything I can see, it all hit bottom back in October or November. Since then, there's been a significant increase in plans and kit orders here, and everyone else I've talked to says the same thing. The EAA's revenues at Oshkosh were up $700,000 over the previous year, and everyone reports increased interest in aviation. Product liability and litigation—a problem for society and not simply aviation—is now seen by a majority of people as a gross excess, and I think the tide will turn because of this attitude. The first good news is the Statute of Repose, just signed into law and which limits liability for aircraft manufacturers to 18 years. Cessna's president, Russ Meyer, says it's the most significant thing for aviation since the Wright Brothers's flight. He knows the cost of litigation better than anyone else, and is easily the smartest man in aviation today. Cessna will put piston singles back into production, and this will spill over to everyone. We now have lightweight starters. Unison just introduced a certified electronic ignition system. Aircraft batteries are better. New and better oil filters are being introduced. Falcos and many other high performance kitplanes offer superior performance, looks and handling over anything we've had before, and you can work on them yourself. We now have *two* magazines devoted to the care and maintenance of aircraft by the owners. Tom Poberezny is doing a phenomenal job of transforming the EAA into a mainstream organization. By a huge margin, our navigation systems of today are better than anything we've ever had—today you can buy a hand-held GPS with a moving-map display for around $1200!—and the next ten years will see phenomenal advances in avionics and flight controls. Yes, things are still expensive and the economy is not yet booming, but I think we've hit a long-term bottom in general aviation and things will improve slowly from here on out.

• Put down November 5 on your calendar for the 14th annual World's Only Oyster Fly-In and Gathering of Stelio Frati Aircraft at Rosegill Farm, Urbanna, Virginia. This year's special invited guest of honor is none other than Libya's Col. Mu'ammar Qadhafi, whose air force owns 190 SIAI Marchetti SF.260's. Look for Col. Qadhafi's tent compound to the side of the runway. Following dinner on Saturday night, Col. Qadhafi and Al Aitken (who once bombed Libya—President Reagan made him do it) will have a big hug and make up.

Airworthiness Directives

by Ben Owen
EAA Information Services

There has been some discussion on airworthiness directives on Experimental (Amateur-Built) aircraft. Part 39 os the FARs covers airworthiness directives, and it is one of the few FARs that is direct and to the point. 39.3 states "No person may operate a product to which an airworthiness directive applies except in accordance with the requirements of that airworthiness directive." Local FAA personnel may act as the "Administrator" and request that you apply ADs to your Experimental (Amateur-Built) aircraft. So far, we have avoided ADs on experimental aircraft airframes by a quick response of the designer, and sending updates to those we know to own the aircraft. If a continuing problem develops that could normally be an AD on a standard aircraft, we work with all concerned to get the problem resolved quickly. The FAA is aware of this process and has been very supportive of the EAA on airframe problems.

Another question that arises is "are ADs applicable to a type-certified product, such as an engine or propeller installed on an Experimental (Amateur-Built)?" The historical way that this has been handled is that the engine and propeller are considered experimental as long as they are on experimental aircraft. If the engine and propeller are taken off an amateur-built in order to be put on a standard type-certified aircraft, they need to be overhauled and all ADs applied to them before this is done. This is one reason that EAA Headquarters recommends that separate logs be kept on airframe, engine and propellers. If the engine or propeller is removed, the logbook can go with it. However, it is quite legal to keep one logbook on airframe, engine and propeller combined; it's just not very convenient if you sell the engine or propeller.

We have found some new inspectors who are insisting that ADs be applied to engines and propellers when the aircraft is inspected. So far, this is the only occasion we have heard of this type, as the FAA only looks at the aircraft one time, the final inspection before flight. Some owners have acquiesced to these requests, others have worked with the FAA. In one region, you can stamp an "X" behind the serial number of the engine on the dataplate and make it an "experimental" engine. Other regions have requested that engine dataplates be removed and that a new dataplate indicating this is a "Smith Special" or whomever the builder is. However, there is a fairly complex process in the removal of the dataplates, and they must be passed to the local FAA who then usually passes them on to the manufacturer.

All of this is complicated by the fact that we can use automobile engines, Volkswagens, Chevy V-8's, etc., and we can also modify our aircraft engines with helicopter pistons and other items. Usually, indicating this to the FAA inspector may cause him to change his mind about insisting upon ADs. However, the bottom line is that if the inspector cannot be convinced otherwise and still insists on ADs being placed on an engine or propeller, then it must be done.

Susan's Corner

Hello again from Susan's Corner. I'm continuing to learn about this business and don't feel nearly as "kit plane ignorant" as I did in the beginning. And as some of you know, I can even talk somewhat intelligently about parts, etc. when you call.

I tend to be a very organized person and have re-vamped the entire operating system here to suit my style. Of course, in the beginning Alfred had no idea where to find legal pads—or anything else for that matter—but he seems to have learned to ask "where is..." before going off on a fruitless search. Actually, from a business standpoint, it's been quite helpful, for me anyway, to make the changes I have. I've re-done the filing system and ledger cards, and this has allowed me the opportunity to glance through each of the builder files and become familiar with a lot of your names as well as the status of your Falco projects.

We have finished the fuselage frames 3, 5 and 6, and I've been sanding off all the edges so you don't get a handful of splinters when you uncrate them. In fact, I was doing just that the other day when we were having a wonderful steady rain, and I think it was the most peaceful thing I've done in a long time. I had the big door open in the back and worked nearly all day with nothing but the sound of the rain.

A note about Oshkosh '95 and the big Fortieth Birthday Party for the Falco. We are going to do the entire Oshkosh/builder-dinner thing quite differently. If you're going to bring your Falco, plan to arrive on Wednesday, July 26. We will have a block of parking spaces reserved at the convention, but we need to know how many of you are coming, and you must get there early or the reserved spaces will be released.

Since most Falco builders like to avoid the weekend crowds, our activities will be principally on Thursday and Friday. And rather than one single builder dinner, we'll have a gathering of the hard core at the infamous Road Kill Inn on Wednesday night and a builder dinner on Thursday *and* Friday night.

We need to start making plans on all of this—now! If you need a hotel room, I need to hear from you soon. I've already started a file for next year and have heard from 2 or 3 people that want rooms. We only have 20 rooms at the Paper Valley Hotel in Appleton, and I think they're going to go fast. I also need to know how many Falcos are coming and your arrival/departure dates so we can get the parking lined up. (We'd hate to have you fly in and not have a place to park—you'd have to circle overhead for 3 days and miss all the festivities!) I'm a true believer in planning ahead. I think events such as this run much smoother and with fewer surprises when everyone knows what to expect.

Brochure and kit sales have been quite brisk here lately. Brochure packages are going out at the rate of about 4-6 a day, and while I may go 2 or 3 days and not ship out any kit packages, all of a sudden I'll have 8-12 boxes waiting for the UPS man!

And a reminder—as soon as you get your kits, please be sure to check them carefully for any missing parts. As you all know, it only takes a phone call, and we'll have any missing parts on their way to you. But in fairness to everyone, please don't wait a year or more to check your kit. After that much time we assume the kit was complete and will have to charge for additional parts.

That's all for now, and if the rain don't hurt the rhubarb, I'll see you in the December builder letter.—*Susan Rogers*

Calendar of Events

The Great Oyster Fly-In and Gathering of Stelio Frati Airplanes. November 5 at Rosegill Airstrip, Urbanna. Contact: Dr. Ing. Alfredo Scoti at Sequoia Aircraft.

Oshkosh '95. Plan now to attend the Fortieth Birthday Party for the Falco. All Falco owners are ordered to attend. Expect a massive turnout—Marcello Bellodi is going to bring his Falco from Brazil.

Mailbox

The wing is about complete. I am making up the inspection covers at the moment. I was careless enough to crack the left navigation lamp cover, and will require a new one.

The plywood bending was a complete non-event. The 1.5mm plywood bent around the leading edge before I even had time to begin to persuade it. The heavier ply was a little slower but presented no difficulty. The key action seems to be to boil the plywood. I made a small wooden trough just wide enough for an immersion heater and the leading edge of two sheets of plywood. The internal dimensions were 3.5" wide, 8" deep and 4' 6" long.

The bending was done by heavy office-type rubber bands attached to wire hooks through holes in the leading edge of the plywood and to a board clamped to the spar. It is important to have as long a distance as possible between the hooks and the pegs in the board so that the bands don't run out of steam as the plywood bends down. Talking of steam, the process was assisted with a steamer made out of a 20-litre drum. This last may have helped, but was not the most important part of the process—that was the boiling. I am sure the unremitting pressure of the rubber bands was also very useful.

Ian Ferguson
Dookie, Australia

I presently have 214 hours on my Falco after five years of flying. I don't fly just to bore holes, but still go to lots of fly-ins and airshows. The Falco is well received and very populer with the fans. I get in arguments with people who won't believe it is made of wood instead of plastic. I call the plane "The Italian Tri-Pacer" on my prop placard.

I can't seem to keep the nose gear oleo gland nut tight. I discovered the problem a year ago, when I lost all air pressure and some oil. It had gradually unscrewed to that point. I flew the plane home with the gear extended. There were only one or two threads engaged with the nut. Have you heard of other problems?

Rex Hume
Williams, Oregon

We've never had a report of this problem before, but it's easily fixed. A simple way to 'safety' a nut like this is to take a dull chisel and deform the threads slightly. Our machine shop has used this method for years, and it will cause enough interference so that it won't spin off.
—Alfred Scott

Andrea Tremolada writes, "Last year when I went to Oshkosh, I saw Bjoern Eriksen's Falco, and it was really the best I've ever seen. In Italy, I've only seen production Falcos and none are as refined as the Sequoia Falcos. My Falco is one of the last ones built by Laverda and has only 362 total hours (200 flown by us), so when we bought it, it was almost new."

I enjoy reading your newletter and, quite frankly, it is one of the best newsletters of many of the type clubs. The following are some minor comments:

In the June '94 issue, page 3, figure 4-1: Between *L'* and *L*, *b* should be inserted. It is a beautiful explanation, though!

On page 4 of the same issue regarding the Piaggio P.c.7: Steve Wilkinson is correct in that the original never flew, but quite recently, giant scale modelers have become interested in re-creating the Schneider Cup era, and they have races annually at Lake Havasu, AZ. One of the modelers has built a flying model of that particular airplane that flew quite well. In fact, due to its lack of floats it was, I believe, the winner of the last event. Unfortunately, I am not into modeling much anymore, but it was interesting to see that it actually could fly. I remember seeing a model of that particular aircraft along with all of the other Supermarine Racers at the Museum of Science and Industry in Chicago in my youth, and that is quite a few years back!

Ben Owen
EAA
Oshkosh, Wisconsin

1400 hours now logged! I'm now float sanding both flap/aileron assemblies in preparation for skinning. The empenage is complete as well as all fuselage frames.

Garry Wilburn
Clarksville, Virginia

I am finally back where I started, since the earthquake damage on the Falco has been repaired. I am moving along, and I have a question on the plywood thickness on the control surfaces. I am building fabric covered control surfaces, and I am unable to locate 1mm plywood. Should I substitute .08mm or 1.5mm? Do I go for weight reduction or added strength.

Rich Fitzwater,
Van Nuys, California

You'll never catch me, in this age of litigating lawyers, recommending a thinner skin than is called out on the plans, so you'll have to go for 1.5mm, however we are able to get 1mm GLII plywood without any trouble.—Scoti

An interesting note that popped up while I was discussing transponder installations with a Glasair owner friend which may add a bit more information to the transponder issue that was mentioned in the March 1992 FBL. Particularly with Bjoern Eriksen's installation which is using King equipment.

My friend had been discussing antenna types with a radio engineer that specializes in King gear. The rod-type antenna was mentioned as my friend had noticed the type used in the Falco and was interested in something similar. The engineer advised that due to the 'cavity-type oscillator' in the King KT76A and 78A, that a rod-type antenna could not be used as it 'pulls' the transponder off frequency. This certainly would explain why Bjoern's King transponder will only work properly on a King antenna.

George Richards
Auckland
New Zealand

Dear Col. Qadhafi

Col. Mu'ammar Qadhafi
Chairman of the Revolutionary
Command Council
Socialist People's Libyan Arab Jamahiriya
Tripoli
Libya

September 7, 1994

Dear Col. Qadhafi:

Since you are the world's leading Frati enthusiast, we'd like to invite you to attend, as our guest of honor, the 14th Annual Frati Enthusiast's Fly-In, held in conjunction with the Urbanna Oyster Festival—said to be the biggest small-town event in the United States—on the weekend of November 5-6 at our private airstrip on the Rappahannock River, Rosegill Farm, Virginia. (For your GPS, crank in the coordinates N37° 37.93, W076° 33.28.)

As you of all people know, Stelio Frati is the designer of the SIAI-Marchetti SF-260, of which you are easily the world's leading owner, operator, collector and enthusiast. There isn't an American Frati lover who owns more than two, or perhaps three, of his designs—the Nibbio, the Picchio, the SF.260, our beloved little Falco and others—yet you alone own a staggering *one hundred and ninety* examples of the revered marque! What a guy!

And well-armed examples they are, we must say. There are those among us who pack a survival rifle now and again, and perhaps even a few who quietly but routinely fly with Smith & Wesson insurance policies in their pockets, but we all marvel at your superb collection of Frati-designed, rocket-equipped sportplanes that quite literally can be called an air force. The Libyan Air Force, in fact.

So be our guest, bring one of your splendid SF.260s, if you wish, and join us for a weekend of oysters, airplane talk, music, beer and Southern hospitality. Hey, if Sinn Fein is throwing in the towel, the Hutus and the Tutsis are making up, the Palestinians and the Israelis are going to the mall together, it's about time we let bygones be bygones, right?

Alfred P. Scott

PS. Oh, by the way, bring your tent. The motels in the area are full for the weekend, and we all camp by the side of the grass runway.

Top: Bob Bready's swing-wing modification has 38° of sweep.
Above center: The original swing-wing Falco in re-entry pattern after several earth orbits to test the effect of weightlessness on frog eggs.
Above: Oshkosh ain't no Woodstock. All highs are drug free.