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Dear Falco Builders:

On June 14, 1982, Larry Wohlers flew his Falco. This was the first flight of a homebuilt Falco, and it happened to be on the eve of the 27th anniversary of the first flight of the Falco. Larry's Falco, N33LW, has a 160 hp IO-320-B engine and the extended prop from a Twin Comanche. This propeller isn't suitable for acrobatics, and Larry has the airplane placarded "no acrobatics", which he isn't interested in doing anyway. The nose bowl of the cowling is from a Twin Comanche and Larry's Falco has a completely different appearance from the firewall forward. It's a very nice airplane, finished in metallic gray Imron and maroon strips. Larry wanted to be the first to fly and to have it at Oshkosh, and the interior was not completed. Even with the 58 lb propeller, his airplane weighed only 1,167 lbs before he put on the final coat of paint. Larry expects the airplane to weigh about 1,200 lbs when he finishes the interior and re-weighs the airplane. He has not yet opened the throttle, but he is indicating 175 mph at altitude with 23" and 2450 rpm. That makes Larry's Falco about 40 mph faster than my Falco, and I suspect that he may be able to true out at between 200 and 210 mph at altitude. He has 45 gallons of fuel on board and calculates that he has about 1,100 miles of range. Larry now has about 60 hours on the airplane. Look for photos of Larry's Falco in the upcoming issues of Sport Aviation.

Now, who will be next? Dave Aronson and Syd Jensen look like the best bets, but they are both being held up by me since I still have some work at the drawing board. I think both Dave and Syd will be flying by next summer.

Since our last builder letter, I have been doing some traveling. In June I flew my Falco to California for the Cafe 400, then Meredith and I went to Europe for ten days in late June, and I was at Oshkosh in late July and early August.

The trip to California was my first flight across the U.S. in a light airplane. I was somewhat awed by the trip, but it proved to be a routine flight -- only longer than most. I knew I had to put in a lot of flying during the day to make the trip so I started early in the morning and carried a cooler of food and drinks. I averaged about 20 minutes per stop; just buying fuel, a quick trip to the facilities and back into the air. I flew three hour legs on each hop and later made a couple of legs of 3 hours and 15 minutes. By keeping careful note of

the fuel put into the aft tank, I was able to know precisely what my fuel burn was and so was able to accurately determine my range. I start up, taxi and take-off on my front tank and shift to the aft tank at precisely 10 minutes into the flight. I stay with the aft tank until I run it dry. I now can predict this time within five minutes or so. When the fuel is all gone, the fuel pressure gauge suddenly drops to zero with rather violent excursions of the needle. By watching the gauge carefully, I am able to switch promptly, and the engine never misses a beat. Sometimes if I am forgetful I won't catch the gauge indication, and the engine stops firing. The prop continues to turn over at about 1,500 rpm, and the engine starts up in about 10 seconds. I make a note of the aft tank fuel burn time and calculate the remaining fuel on board and the flight time remaining. It always comes down to a total endurance of 4:00 to 4:15 with my 33 gallons of fuel on board. Running a tank dry bothers a lot of people, but if you think about it, it is a very good method of getting the greatest range out of your airplane. It allows you to get an accurate reading on your fuel consumption, and when you land you have all of the remaining fuel on the selected tank. On my flight to Oshkosh, I flew from Richmond to Lansing, Michigan, a distance of about 600 miles, in 3:30, and I landed with 42 minutes of fuel on board.

I left Richmond at 7:00 AM and flew to Knoxville (bucking 70 knot headwinds), then to Walnut Creek, Arkansas, Hutchinson, Kansas, Cheyenne, Wyoming, and Big Piney, Wyoming. Bret Miley, a Falco builder, had invited me to spend the night on my way out, but I didn't think I would make it that far, but I surprised myself and arrived there at dusk after 14 hours of flying that day.

I unloaded the airplane and took Bret for a quick ride. Big Piney is about 7,400' above sea level, and we climbed to about 9,000'. We did a few rolls, and then we decided to do a loop. The result was quite embarrassing for me, but I'll recount it in the hopes that you can learn from my mistake. Normal loops are entered in the Falco at 165 knots indicated, and I entered a little slow. With my fixed-pitch propeller, I have to throttle back in the dive-for-speed, but I apply power on entering the loop (not thinking that at 9,000' the engine was not developing the same power that it does at lower altitudes). Across the top of the loop, the engine went rough, so I pulled back slightly on the stick, then added some more as the roughness continued. The result was a series of high speed stalls with the wing dropping first to the left and then to the right. After about three of these, the airplane flew normally, and we did a normal recovery. We landed and went for a beer! It finally occurred to me the next day that the "engine roughness" was actually the stall warning buffet. Chalk up a lesson learned.

Bret had his Falco fuselage in the jig, and he is doing a very nice job on the airplane. The next morning, I found that I had about 6 hours of flying to get to Susanville, California, to meet Hal Engel, and I decided to go the long way, via St. Maries, Idaho (near Spokane) to see John Harns and his Falco project. I left Big Piney early and flew up to Jackson Hole, Wyoming. I took a lot of photographs of the Falco on the ground and also took a number of shots of the mountains up side

down -- during a barrel roll. After breakfast at Jackson Hole, I flew up over the Yellowstone Park, up by Sheridan to Missoula, Montana. This is some very rough terrain, and the clouds were fairly low, so I motored up the valley floors above the highways. Even if the weather were clear, I think I would still follow the roads in this sort of terrain. The valley roads are straight and clear, and the mountains are no place to put an airplane down. Count me as a chicken, but I always have to have my "plan B". From Missoula, it was a short hop to St. Maries, where John Harns was waiting. He had been there a couple of hours -- John was a little anxious to see the Falco! We went for a ride, which included a buzz over his house and a roll for the neighbors. I wasn't able to visit his shop, which was twenty minutes away from the airport, so we had sandwiches by the plane while John, Pat and family poked at and sat in the Falco.

I was only able to stay for an hour or so at St. Maries, and then flew to Klamath Falls, Oregon. Eastern Washington and Oregon is more desolate than I ever imagined, worse in many ways than Nevada and Utah since there seem to be so few landmarks. The VOR's are 125 nm apart, and one was out so I had 250 nm between VOR's. After Klamath Falls, I flew to Susanville and was met by Hal Engel. Hal is now working on his Falco full time, and he was preparing to put all of the frames in the jig. He now has the basic framework finished and is gluing on the fuselage skins.

The next day, Hal and I flew to Santa Rosa for the CAFE 400. Since my Falco is heavy (1,240 lbs empty) and not particularly fast for a Falco (170 to 175 mph cruise speeds) I knew I would not do well in the competition. Some of the contestants were very serious about the race, arriving with stacks of computer printouts. I wasn't so competitive, in fact, I hadn't even studied the formula for the score, but I knew the basic idea. I talked to Roy Lopresti and Peter Garrison about what sort of flying technique to use and ended up flying the whole race at about 65% power and leaned past peak to slight roughness.

The first checkpoint was a drive-in theatre about 4 miles out, and everyone said you "can't miss it" so we spent our time studying the other checkpoints. It turned out that the theatre was about a mile off the end of the runway, and we had flown past it before we started to look for it. We did a neat pylon turn around the drive-in theatre at Petaluma, thereby going about eight miles further than everyone else and being "disqualified". This wasn't as serious as it sounds, since our score was still computed and ranked, and we couldn't have received a trophy -- which we wouldn't have won anyway. We were timed at a speed of 139.7 mph, and we got 18.79 miles per gallon. This would put us at 40th place. Figuring that we went eight miles further than everyone else, I calculated our approximate score based on the extra miles traveled, and we would have moved up one place. We were allowed 200 pounds per seat, but we didn't bother and only carried 367 pounds, and I had ample fuel on board so that I would be landing with about one hour's reserve. Others were cutting it very closely, including one Quickie that didn't actually have the range to complete the race and was hoping to ridge-soar on part of the course to make it. Fortunately the high mountain pylon was engulfed in a thunderstorm, and the race was shortened.

You were allowed to carry 200 pounds per seat for all seats for which seat belts were provided. The rule allowed some "people-stuffing" to happen which was not within the spirit of the competition. Burt Rutan put six people in his four-place Defiant. One of the girls in the back became ill from the heat and lack of ventilation in the luggage compartment and spent the entire race retching into a bag, which she had to keep with her so that her lost lunch would not count as fuel burn. Dick Rutan put three people in his Longeze. Roy Lopresti had five in his Mooney 201 (he won the race), but this was less of a stretch of the rules as he carried a small boy, and the Mooney is now being certified to carry such a passenger in much the same way that the Falco may carry a ninety-pound child.

With decent speed, an injected engine, and with a third seat for the child, a Falco could do very well in this race, and I calculate that Nustrini could have won both last year's CAFE 250 and this year's CAFE 400. Anyway, it's a very good test of an airplane, and I hope we get some Falcos in the next running.

I might as well tell you the funny story about our weigh-in. The day before the race the pilot and passengers were weighed with their ballast, bringing them to 200 lb per seat. We didn't bother with ballast, so Hal and I just stepped on the scales and were weighed. The next morning when we were re-weighed just before the race, we were instructed to "off-load six pounds". We didn't have any ballast to dispose of, so we started to strip ourselves of everything we could think of. Shoes, watches, sweaters, shirts, and belts came off. I had a very baggy set of trousers on, so the lack of a belt meant that I had to hold up my trousers to keep them from falling off. We were weighed again and instructed to off-load some more weight. This time, we got rid of our wallets and change. After another weighing, we were instructed to "off-load 1/10th of a pound". I started to pat my pockets for more disposables and discovered that I still had my pouch of chewing tobacco, so I took it out and threw it in the box with a "so it's come to this!". At the awards banquet that night, the story was told to the entire crowd of 800 people. Everyone out there seems to remember me rather well!

On the day after the competition, I flew Hal back to Susanville, and then flew on to Fort Collins, Colorado, with a stop at Ogden, Utah. The next day I flew to Topeka, Kansas, then to Lexington, Kentucky, and then home to Richmond. On the way into Richmond, I had the FBO call Meredith and told her to get the girls out in the back yard. A few minutes later I was circling over our house with Meredith, two dogs, and two little girls in their white nightgowns standing out on the lush green grass. After 42 hours of flying across the U.S. it was the best sight I had seen on the entire trip.

Five days later we were flying to London in an L-1011, where we had the misfortune to be bumped to first class! (This also happened on the return trip as we were bumped to "business class".) After a couple of hours sleep at our hotel, I managed to get a taxi out to the Elstree Aerodrome for our Falco builders get-together. There were about 60 people there gathered around Peter Hunter's Falco. It was a good

time for many of our builders to see a Falco and to meet each other. All in all, I thought the meeting was a success, and we ended up in a room talking about the construction of the airplane. Brian Fox of Doncaster Sailplane Services was there, and it was a pleasure to meet Brian and many of the builders.

I've got to tell you about Peter Hunter's Falco. Peter has just had the Falco completely restored, and it looks like a brand new airplane, but with a better finish than any aircraft manufacturer puts out. Nearly 1000 hours went into the work, with the majority of that having to do with the new instrument panel and re-wiring the airplane. The Falco is painted "Ferrari red" with a white stripe down the side. The airplane was covered with microballoons over the fabric, sanded smooth and finished in a polyurethane enamel. Peter took me for a short ride in his Falco, and I was really surprised at how quiet the airplane was. His Falco has the same four-pipe exhaust system that my Falco has. I had begun to wonder if Falcos were inherently noisy. I had already determined from my Falco that most of the noise in the cockpit is engine noise. I have eliminated the hiss of the wind noise by sealing the canopy, but the cockpit is still noisy. I get a sound pressure of about 97 dbA at ear level, and about 109 dbA just under the panel. On Peter Hunter's Falco, they had installed fiberglass insulation (about 2" thick with a vinyl backing) on the inside of the firewall frame and back to frame No. 2. The airplane was exceptionally quiet, allowing normal conversation without shouting. It was still noisy enough so that I would want to use a headset, but I left being very impressed with the difference. I am not sure that we have yet seen the ultimate that can be done in noise supression in a Falco. I suspect that some of the foam materials would do a better job and might provide a tighter fit around some of the openings in the insulation (for plumbing and wiring) that were in Peter's Falco.

Later that week, I flew to Milan and was met at the airport by Mr. Frati. Unfortunately, he speaks relatively little English, I speak absolutely no Italian, so we were able to talk only through others. Fortunately, Mrs. Bielli, Conrad Lozinski and Renato Cairo of General Avia were able to translate back and forth.

General Avia is located in an industrial district and is housed in two large adjoining shops with offices in the front. In one shop they were building the second and third prototype Canguro for SIAI Marchetti. A number of little changes have been made and the draftsmen are working on the final production drawings. A Pegaso sat in the front of the shop. Pegaso, Canguro and SF.260 components were to be found stacked around the shops. In the other shop there was a nearly completed Condor, which is a version of the Pegaso that Mr. Frati is now designing. The aircraft has a bubble canopy, twin Allison turboprops, a longer tail cone and two hardpoints on each wing. The canopy arrived as I was there and was fitted to the aircraft. The Condor was undergoing landing gear cycle tests.

There are about 20 people working at General Avia, and a stray cat has taken up residence in Mr. Frati's office, and she spends most of the time sleeping on his desk or walking distainfully over the aircraft

drawings. Around the office were to be found drawings, photographs and models of Mr. Frati's many designs, and there were a lot of other aircraft designs that never came to fruition. There was a model of a twin engine bomber (which bore an exceptional resemblance to the Mosquito but with tandem seating) which Mr. Frati designed in 1943 for his engineering degree. Another early design was a high-wing radial engined transport with two Fiat Topolinos shown as cargo. There was also a business jet, somewhat resembling the Jet Commander. Latest on the drawing board is a tandem seat military trainer with a Lycoming piston engine. There were also a lot of other design studies of various light planes. The whole operation is really very remarkable, particularly when you consider how tough the aircraft business is. It is also interesting to focus on what they have to work with. It is very hard to get things shipped to Italy, and the government ties things up forever. With the exception of a few things like cabin air vents which they buy from Fiat, they make everything that is not carried in the Van Dusen catalogue. Specialty items which we can easily get with one telephone call here after a search for the manufacturer are all items which they make. Gears, bushings, shoulder screws, pulleys, universal joints, knobs and door handles are just a few items I saw that they made themselves. The simple fact is that Mr. Frati can have the part made in their shop quicker than they can find the part by calling to the U.S. or Europe.

I suppose you would like to know something about what Mr. Frati is like. He is a very nice and unfailingly polite man. His aircraft design work is his life. He is single, and he is more likely to be found at his office on a Saturday or Sunday as anywhere else. He is obviously very intelligent -- Luciano Nustrini later told me that he considered Mr. Frati a true genius. You must remember that Mr. Frati was once a professor, and although he hasn't taught for years, the professorial manner endures. The office, the drafting room and the shop continue to be something of a school, with the employees as much students as workers. A question is raised, and Mr. Frati answers with a small lecture. It is clear that everyone understands the point, but the lecture continues to its conclusion. I left thinking of how I would answer people who asked me about Mr. Frati, and I came to the conclusion that the best answer would be to say nothing and to let his work speak for him. On my return home, I read again James Gilbert's piece on Mr. Frati, and I would not change a thing. I can only add that those of you who are building the Falco know him better than you think.

I went to Florence by train to visit Luciano Nustrini. We spent the afternoon at the airport going over his Falco, and later we went for a ride. I went to Europe with two nagging worries. One was that all Falcos were heavier than the weights we have listed in the specifications. My Falco, remember, is about 100 pounds more than it should be, and Peter Hunter's Falco is also heavy. In Milan, Mr. Frati produced the figures of the official weighing of the Falcos for original certification. Typical equipped weights were 1,186 lbs with fixed pitch propellers and 1,223 lbs with constant speed propellers. Nustrini's Falco now weighs 1,129 lbs with constant speed prop and 160 hp engine, although when he first bought it was stripped of the electrical system for racing and weighed only 1,025 lbs. Larry Wohler's Falco also came in at a good light weight.

The other nagging worry was that Nustrini's Falco was not as fast as reported. He had earlier reported that he had been timed at 228 mph and later had won a race at 234 mph. The speed is so incredibly high that I would never believe it if I had not also seen it published in a magazine with the official results. I was still bothered by the formulas also given (it was all in Italian), and I kept wondering if it was an adjusted speed, or something. Nustrini's Falco does not have a top speed of 234 mph. I'll get to this in detail later on.

I made ten pages of notes on my trip to Europe. Most if it is on Nustrini's airplane. His Falco is a Series I Falco which was originally built with the 135 hp engine. The tail surfaces of all of the Series I Falcos are slightly smaller than those of the rest. Nustrini's Falco was actually the second Falco built, and there are a number of things about the airplane that are quite unlike the later Falcos. Nustrini has also made a lot of changes to the airplane. The canopy is the most obvious change, but there is almost nothing that has not been done for increased speed. The jack pads are recessed into the wing (I don't know how this was done), and nice fairings have been installed on all of the hinges. The aileron and flaps did not have fairings on the top (except at the aileron pushrod), and there was no opening. It turns out that the upper leading edge skin of the ailerons and flaps were extended over the hinge to form something of an overhang. From above, there was no hinge opening at all. The ailerons and flaps are reflexed, with the trailing edge of the aileron up 12mm at the tip and the flap up 15mm at the root. This required that the lower leading edges of the flap and aileron be re-built for a smooth contour. Nustrini says that his Falco is optimized for maximum speed at sea level, and that this change hurts his cruising speed at altitude. Also, it increases his landing speed due to the loss of lift on the outer panels. He has also installed aileron and flap gap seals (mylar glued to the wing and leading edge of the surface in the shape of an "S") which helps with speed but really hurts the effectiveness of the flaps. The stall strips on the wing are gone, so he has no stall warning. Also, Nustrini has moved the battery to the engine compartment for rather technical reasons. (In normal cruise, the Falco has slightly down-elevator, and by moving the battery forward, the elevator goes to a zero angle of deflection.) The result is that Nustrini's Falco is very nose-heavy, has no stall warning, lands about 15 mph faster than normal Falcos, and my impression was that it lacked the elevator effectiveness to do a full landing flare in ground effect. It was quite a different airplane to land, and I came away with the clear impression that it would be very dangerous in the hands of anyone not well checked out in the airplane. I have over 100 hours in my Falco now, but if I had been turned loose in that airplane with out a complete briefing or check ride, I would have crashed it on my first landing.

I had earlier reported that Nustrini had wing tanks like the Series II Falcos. This is not so. He has fuselage tanks like normal Falcos, and the aft tank is filled through an access panel in the canopy skirt fairing. The tanks are vented through the cap (which by virtue of being inside the skirt fairing is also within the cockpit) so the cockpit has a continuous scent of gasoline. Since the aircraft is quite nose-heavy, Nustrini can load more weight in the back of the plane. In

addition to his normal aft tank, he also has a larger aft tank of 30.3 gallons (the front holds 18.5) which he uses for longer trips. He also showed me a luggage compartment ferry tank of 52.8 gallons. His range with all this would be about 3000 sm, but Nustrini readily admits that this is all fantasy, and he only uses the tank to bring fuel into Italy and escape local fuel taxes.

Nustrini's Falco was stripped to bare wood and covered with micro-balloons/epoxy and sanded smooth and painted with a polyurethane enamel. The paint is five years old, and with the exception of some flaking around the firewall, the paint looked new. With the exception of the area just aft of the firewall, there is no fabric on the airplane. There are no drain holes on the bottom of the fuselage, wing or tail group. You may remember that there was a flood in Florence in 1966. Nustrini's Falco (and two other Falcos) were completely covered by the rising waters. Nustrini cleaned, dried and flew his Falco two days later. During the testing of the airplane following the flood, Nustrini dived the airplane to the design speed, and the canopy top broke in a "U" shape from one screw hole to another. (It is probable that this is the result of not drilling an overside hole for the screws, or prehaps the holes were ragged-edged. One technique you can use is to get some windshield washer hose and put it in each hole around the screw -- cut the piece off with a razor blade.) You can see the patch for the canopy break on the photo on the back of our Falco brochure -- the shot with all of the kids in the back. I should also mention that there were not six in that Falco, there were actually seven, but you can't see Giovanni who is on your right.

There is no elevator trim on Nustrini's Falco. He took it out to save weight, and now uses a bunch of rubber bands which he hooks to the right control stick once in the air. He also has some other rubber bands which he uses for aileron and rudder trim. There is no wing walk surface on the airplane, and Nustrini has a rubber mat which he puts on the wing and then pulls into the cockpit. Before races, he installs adhesive-backed foam strips between the ailerons and flaps and at other openings. Also he rubs the airplane with talcum powder (?!) saying that the talcum powder fills in the little holes in the paint.

The seats are nearly useless. They are fiberglass seats with no cushions, and they rest on a tubular steel contraption allowing quick seat removal. The seats lean back at an impossible angle, and the seat backs extend up only about 12" which is not enough to give you full support. Once over Florence, I leaned back to put my camera in the back when Nustrini banked the Falco in a high-g turn. The seat provided little support, and I was only able to rescue myself from tumbling into the luggage compartment by grabbing my leg and pulling myself up with that assistance. Nustrini never leans back and only flies the airplane leaning forward, holding the stick with both hands, one at the bottom and the other at the top. The aircraft is painfully noisy, and I made the short flight without the benefit of a headset.

The engine compartment was something of a surprise for me. I thought that Nustrini had done some real magic here, but he had not. He has two oil coolers mounted on each side of the engine, and with the

exception of the new nose bowl and ram air induction, it was all standard Falco. The openings for the cooling air seemed to be of the same size as normal, and since his spinner is rather small, he still has a blunt area between the air intake and the spinner to cover the starter ring. There is no cabin heat system.

In the air, Nustrini's Falco behaved like other Falcos except that the airplane was more stable in pitch (due to the nose-heaviness) and had heavier controls (probably due to the higher speed of the airplane), but the controls were still light by normal standards.

As I mentioned earlier, Nustrini's Falco does not have a top speed of 234 mph. That speed was measured from a standing start and around pylons! During our flight, I saw indicated speeds of 300 km/hr (186 mph) at 2000 feet, 20" and 2300 rpm. This is the top of the green speed for me and a speed I have to dive to attain, as in the entry for a loop. The real mind-numbing experience was when Nustrini opened it up. We were at one thousand feet, and the temperature was 80°F outside. The two window vents were open, and Nustrini shoved the throttle all the way in. The prop pitch was put on full fine, and it indicated 2,800 rpm. The indicated airspeed stabilized at 375 km/hr (232.5 mph) for a true airspeed of about 244 mph. I have found with my Falco that the speed increases as you burn off fuel by about 7 mph, so I would imagine that Nustrini is able to hit some very impressive speeds with little fuel, one on board, windows closed, and with full race preparation.

It was a little much to take in at one time. My experience with airplanes has been that the indicated airspeeds do not increase so rapidly with the increase of power. With Nustrini's airplane, it was a little as if he had suddenly invoked the "force", and we were being towed along by some invisible line. We held this speed for about three minutes and approached a nearby hill which rose about 200 feet above us. Nustrini held it dead level until the absolutely last minute, then pulled it up, and we sailed over the hilltop. Nustrini is crazy about speed, and he gets a broad grin across his face after pulling such a stunt. Recently, in the Tour of Italy race, there was a leg which began with a pylon turn on the beach of one island and ended at a pylon on top of a 4000' mountain at the next island 36 miles away. Nustrini flew the entire leg at 10 feet above the water and did a zoom-climb at the mountain. On this leg, he picked up two minutes on the SF.260s that did a cruise climb.

I should mention that the Falco class is now an FAI registered racing class. The Falco Club in Italy has been racing Falcos for some time, frequently in conjunction with automobile races (last year at Monza the Falco race was on Saturday, and the Formula II car race was on Sunday). The class is neatly designed to accomodate not only Falcos, but also SF.260s and any other aircraft which meet the requirements. This also includes the Rondones, which share the same wing as the Falco (as did the F.5 Trento jet). The aircraft are given a handicap speed based on engine size, propeller type, cut-down canopy, ram air induction, and other factors. Each aircraft is flagged off individually at the start with the effect that if all aircraft flew at exactly their handicapped speeds, all of the aircraft would cross the finish line at

the same time. As we get some Falcos flying in the U.S. we may want to try having such a race.

I was scheduled to fly commercially from Milan to Copenhagen, but Per Bruel, who owns a Falco, gave me a ride up in his King Air. It was a lot of fun to cross the Alps in a private plane. While in Denmark, I got a short ride in Mr. Bruel's Falco. This was a Series IV Falco which has a muffler. It was about as quiet as Peter Hunter's Falco, but Mr. Bruel's airplane did not have any insulation installed. Mr. Bruel said he thought the sound pressure level was about 90 dbA, which is probably accurate since his company is the world's leading manufacturer of sound pressure meters. Some of you may have heard me talk about the control system of the Series III Falcos. These aircraft had a pushrod from the control stick to a bellcrank in the wing and then cables out to the normal bellcrank. I was able to show one of these to Mr. Frati, and it was all news to him. That system just doesn't make any sense. It is heavier, more complex, more expensive, and introduces more play into the system. I had always assumed that the Series IV Falco had the same system, but it does not. The aileron controls system that we have was used in the Series I, II, and IV Falcos. I was able to confirm that the aileron controls were more direct and precise. There is only a little amount of play in the aileron controls in my Falco, but there was none at all in Nustrini's or Per Bruel's Falcos. I did note that in Mr. Bruel's Falco we indicated 165 mph at 1,500', 60°F and 24"/2400.

At Oshkosh, Dave Aronson brought along his photo album of his Falco project. A lot of builders asked that we make copies of the photos available. We promised to do so, but Dave has searched for the negatives and so far he has been unable to locate them. Hopefully, we will have final word on this by the next builder letter.

A few construction notes. A number of builders have questioned the plywood pads under the hinges on the control surfaces. These are not shown consistantly throughout the drawings. In Italy, I asked Mr. Frati about them, and he said that they were provided to protect the plywood web from being crushed if the bolts were over-tightened. He said that they were not absolutely necessary, but that he suggested that they be installed. Also, some have questioned the grain direction of the spruce blocking. Mr. Frati said that the purpose of the grain direction was to have as little end grain as possible at the glue line. Therefore, if the blocking is between two members that meet at an acute angle (less than 90°), the grain direction of the blocking would be best if it bisected the angle. If the angle is oblique (that is more than 90°) then the angle would be at 90° to the bisecting angle. If the angle is 90°, then either method would result in the same amount of end grain. This is not really critical, and some glues (such as epoxies) have good adhesion on end grain, while resorcinol does not. Even so, remember that the purpose of the blocking is to transfer the loads into the plywood skin, which is always present at these corner blocking situations.

On some of my recent drawings (such as Section E-E on Sheet C9) I have shown the wing spar/bottom center longeron junction

incorrectly. While in Italy, I talked to Mr. Frati about this, and he advised that the main wing spar should not be rectangular in cross-section at the center of the airplane. If you look at the drawing for the wing rib at Station 1, you will see that the wing spar is shaped to match the airfoil. This same contour should be maintained on the lower surface of the spar through the fuselage, and if this is done, then the wing spar will sit on the bottom center longeron. If the bottom center longeron has been notched to receive a rectangular wing spar, then Mr. Frati advises that additional wood should be added to compensate for the lost strength. This can be done by adding spruce to each side of the longeron, or (if the bottom skin is already fitted) then a plywood doubler should be added to the outside of the airplane.

Some builders have questioned what was meant by "N. B. this location only" for the rib at station 2 shown on Sheet B3. First "N. B." is a standard abreviation for note bene, Latin for "note well". This note is simply to bring your attention to the construction of the part as shown in the drawing. All of the diagonal braces in the ribs are installed so that the center of the brace is at the "corner" into which it fits. In this location, we want you to install the diagonal brace with the upper aft face of the diagonal brace at the "corner" so that the brace will clear the cable hole. Above this, you will note that the 18mm dimension refers to an additional piece of spruce that is installed to provide a base for the pulley bracket, and there is another similar piece of spruce (20mm wide) for the other pulley bracket.

Due to the confusion caused by the "N. B.", I used the phrase "note well" on sheet C8. Even this has caused some confusion, and "well" is used as an adverb, not a noun. The note simply means to look at the drawing carefully, do what is shown, because it is important. I should also note that the diagonal frame at No. 2 should be installed before the top center longeron. Also, at sides, the diagonal frame should not fit down on the inside of the side longeron as it will interfere with a channel-nut for the instrument panel.

I should offer a word of caution about using Weldwood plastic resin glue. Trimcraft's early wing rib kits used this glue, and there were some problems with the gussets not staying on. Trimcraft has since switched entirely to Aerolite. Herb Andersen of Pitts asked me what we were using with the birch plywood, and he reported that he had to glue on some birch plywood recently. He used Weldwood, and it performed so poorly that he scrapped the part and used Aerolite. Other builders have reported the same thing, that Weldwood does not stick to birch plywood easily.

Some builders have reported that the oleo shock absorber struts do not extend to the full length shown. Take a look at Sheets EE14 and EE11, and I will explain the cause and cure. When the piston is plated, the chrome tends to build up thicker on the high spots, so the 37.9mm diameter ring on the piston is probably a little oversized and will not fit within the 38mm diameter recess in the oleo nut. If this is the case, then you can sand on the ring until it fits in the nut. This is meant to be a close fit, since a small amount of hydraulic fluid is trapped and this provides some cushioning effect when the strut

is fully extended. This prevents a "knocking" of metal to metal on the full extension of the strut.

Larry Wohlers also had some problems with his oleos maintaining pressure. This was an early problem, which has now solved itself without any action, but I believe it was due to the slight machining marks on the face of the piston upper end. The strut valve has an O-ring which must seat on this surface. Apparently, in Larry's case, the O-ring has finally seated on the slightly rough surface. This can be avoided in several ways. One method is to file the surface smooth, but I would not suggest doing this, since the surface is chrome plated, and you will not only dull your file but also break up the chrome plating, which protects against corrosion. Another method would be to sand the area slightly with fine emery paper. A better method would be to paint on a little epoxy and then file and sand it flush with the surface of the metal after it is hard. There may be a better material than epoxy (I suspect that primer might work as well), and I'll have some notes on this in future builder letters if I come across a better method.

Dave Aronson did one thing on his Falco which I think is a super idea. He ran some plastic tubing in the wing and tail cone for the wires for the strobes, nav lights and heated pitot. This allows you to fish the wires through later, and also allows you to easily replace the wires if needed at any time. The tubes also serve to protect the wires from abrasion. I would suggest that you use 3/8" or 1/2" tubing for the strobe and nav lights and 1/4" or 3/8" tubing for the pitot heat. I plan to install the heated pitot on the bottom side of the left wing at the aft wing spar. This will be at about the same position as the aileron pushrod, probably just a little inboard. The reason for this position is that the pitot is located at this location on the SF.260, and since we have the same wing, it would seem to be a prudent course of action to copy their installation. The plastic conduit should have drain holes drilled at all low points.

A lot of our builders have been installing an additional access panel in the fuselage between stations 12 and 13. These builders have found that the installation of the elevator balance weight and working on the rudder cable pulley requires that you get your hands in there. I suspect that it is a good idea. The Series III Falcos had a balance weight of a slightly different shape and this allowed the weight to be installed from the rear. Builders have also questioned whether access doors might be warranted for the aileron pulleys at wing station No. 2. Access panels were not installed at these locations on the Series I, II or IV Falcos, and I am not sure that they are needed. First, these pulleys will receive very little wear. It is hardly likely that you will ever have to replace the cables, since we are using stainless steel. Even so, you could still pull new cables through and install the turnbuckle end with a nicopress fitting without the doors. I think I would not add any access panels here, but suit yourself on this one.

Kit progress. We have the fuel tank kits in stock now and are making deliveries. For the control system, we only made up 5 sets of

control cables since I wanted to check the fit before ordering a lot of these things. We now have all of the bugs worked out, and we should have the cables in here within a few weeks. By the way, we were able to get a better price on the cables than I had earlier anticipated, and you will note that the price of the cables has been reduced, along with the price of the control system kit. The price of the kit is now $1,325.00, down from $1,370.00. Those of you who paid the higher price will be issued a credit. The seat kits should be ready for shipment in about one month. We have been working on an engine mount for the Type II dynafocal IO-320 engines. The injector is mounted on the aft end of the engine on this engine and prevents the installation of the anti-torque tube. We think that the engine mount will be sufficiently rigid is torsion due to the extra triangles we have in the structure. This is a critical part, and we are in the process of testing the engine mount to the ultimate torsional loads. When this testing is complete and successful (which we think it will be) we will be able to ship these engine mounts. We expect this to be complete by the time you get this letter, so we should be able to ship engine mounts within a few weeks. We have changed suppliers for the engine mount, and there may be a price change, but I hope it will be minor.

I have finished the design of the instrument panel, center console and throttle quadrant. Most of these parts are being made now, and I hope to complete the make-up of the cockpit equipment kit within a month. This kit will include the instrument panel, the center console, throttle quadrant, glare shield and center console covers, and assorted other parts. It is sometimes difficult to know where to stop with a particular kit. I am toying with what to do about the fuel lines, fuel selector valve, fuel pumps, pitot-static and vacuum systems. I suspect that I will have an engine controls kit, consisting of the engine control cables and brackets, tachometer cable, cabin heat box, etc.

I had some drawings of the instrument panel at Oshkosh. I made something of a pest of myself in asking builders and others for their opinion. I am happy to report that everyone liked it. The only thing that was ever questioned was the location of the landing gear switch, and once I explained my reasons for putting the switch where it was, everyone said they liked it there.

One thing that I am doing is a little unusual. I have a pet peeve with most airspeed indicators. For one thing, they are usually cluttered with more numbers and information than you need. The one we will have will be very "clean" and uncluttered. The speeds will be shown in knots only. The flap arc is stepped, since you have one speed for 20° of flaps and another for full flaps. We have small ticks marked "G, MA, MU" for the gear, maneuvering aerobatic, and maneuvering utility speeds. My major beef with the standard airspeed indicators is that they don't read in a natural manner. Zero is usually at 12:00 with the result that the needle goes down for faster, up for slower. This is crazy, even though you can get used to it. In my Messerschmitt Monsun, zero was at 9:00, with the result that the needle moved to the right for faster. This is what you are used to in a car, and it results in having the needle at the top of the instrument during approach. I have about

800 hours of flying behind one of these instruments, and I can assure you that approaches can be made much more easily and precisely with this presentation. I talked to a number of experienced pilots, like Dick Collins, Ed Tripp, and Harry Shepard, and they all agreed with my point.

I have only made a few very minor changes to the instrument panel layout -- so small most of you who saw it will not notice the changes. One is the marker beacon receiver. The more I looked at the panel, the less I liked the appearance of the thing. All of the marker beacon receivers look awkward, and I decided to just install three lights and a switch on the panel and to install the receiver remotely. This is a very simple thing to do, eliminates the need for an antenna connection, and results in a more professional looking panel. Also, for those of you who want to use an carbureted engine, you should consider installing a carburetor ice detector. Unfortunately there is no room on the panel for the usual box, but I have worked it out with the manufacturer of the instrument that we can remote the box, and we will have a carburetor ice light on our annunciator panel and a pot and switch mounted on the panel.

On the instrument panel, I have decided to drill all of the holes for the instruments, with the exception of the DME, Davtron OAT, and Silver Fuelgard. These holes are easy to cut. A number of the round instrument panels will require that you ream up and file out the bottom left screw hole if you plan to use an instrument with a knob in the bottom left, as in the case of a four-cylinder EGT, volt-ammeter, or G-meter. My reason for not doing this for you is that the panel will have greater flexibility for those of you who might have plans for other instruments, and it is so simple to make the required changes. I have decided to cut the radio stack full depth, since I think the best thing to do with the extra depth is to make a glove compartment. This could be something that could be easily removed as more radios are added. By the way, there are 284 holes in the instrument panel!

I have heard a lot of builders talking about covering their instrument panels with wood. On the surface, this sounds like a good idea, but wood instrument panels on airplanes are rarely attractive. The only example that I can think of that looks good is the late model Beechcraft aircraft, which use a wood-grained Formica in the center and far right of the panel. I looked at a lot of instrument panels at Oshkosh, and all of the wood ones looked bad. Even when the wood grain was attractive, the overall appearance was still poor. The thing you have to remember is that instrument panels have a lot in them, and the wood grain makes them look busy. I think that the best instrument panels being made today are on the Cessna twins and jets. These panels are just plain metal painted a dark flat gray. They look very good. My preference is for a panel that is all business and nothing else. Bellanca used a special type of paint on their last series Vikings which gave something of a suade leather look. Made by 3M, you use Nextel 411-P4 or 415-P4 primer (you have to alodine the aluminum for a successful finish), and then a final coat of Nextel Suade-Coat 3101-B28 (gray), 3101-B21 (black) or 3101-J70 (tan).

I have only mentioned the glare shield briefly. This will be similar to the one on the Aerostar, but plain and without their annunciator panel. The glare shield will serve several functions. At night, it prevents the lighting of the instrument panel from reflecting from the instrument panel, which is a problem with the Falco. There will be four utility lights mounted in the glare shield which will be shining on the panel. This will be hidden for view and will be on a separate dimmer and circuit from the panel lights, so that you will have two lighting systems, an important safety feature in the event of a short in one of the circuits. The glare shield will also help keep your radios cool during the day. It will also greatly add to the appearance of the panel, both in dressing it up and in hiding the attachment bolts from view. It will be elliptical in shape to match the other lines of the aircraft and will be rounded off on the rear edge. I will probably have this made of fiberglass, with the idea that you will cover it will some padding and cloth or naugahyde. I mention all this now, since you should be giving some thought to your interior and the installation. The glare shield will be held in place by screws, but I think you might also want to consider making a "lip" of plywood to retain the front of the glare shield. This would make for a neat installation, and would allow for a more easy installation and removal. It would also keep it from rattling around. This lip should be done before the windshield is installed. Also, I would suggest you cover the wood under the windshield with any cloth or naugahyde before the installation of the windshield. I would suggest that you put a layer of foam padding under the naugahyde to keep the radios cool. Because of the reflections from the windshield, you have to use black for the glareshield and the area just in front of it. I know my radios got very hot on my trip to California, and I ended up taping some white paper over the radios to keep them cool.

During this trip, I also made a mental note to tell all of you to be thinking of using light colored interiors. With that bubble canopy, you are flying in something of a solar collector. My Falco has a dark blue interior, and it really soaked up the heat flying out west. It was quite comfortable when you were flying under cloud cover, but the rise in temperature was very noticable when you broke out into direct sunlight. My Messerschmitt Monsun had a light gray interior, and it was never like that. Padding under the black naugahyde should reduce the heating effect of the sun in those areas.

Speaking of interiors, I have spoken to Ramshead Exclusive, the manufacturer of sheepskin seat covers. They will be willing to offer seat covers for our Falco seats if you are interested. It is less trouble for them than it sounds, since every seat cover is made to order from a cardboard pattern. I will only have to send them a seat with cushions and they will make the pattern. Their seat covers are very attractive and come in a variety of colors. Peter Hunter plans to get one for his Falco and to use our seats, so we should have something to report by the next builder letter on this. Ramshead advertises in a number of aviation publications as well as in all of the car magazines, so if you are not familiar with them, look for their ads.

AOPA Pilot should have an article on the Falco in the October issue if all goes according to schedule. I met Ed Tripp and Art Davis down at my farm just after returning from California. Ed only had about 20 minutes in the airplane, so it won't be a full report, but we did do some air-to-air photography.

While at Oshkosh, I talked to a number of builders who said they had trouble maintaining the alignment of the ailerons and flaps. I don't think anyone has had an easy time of it. You will want to build the ailerons and flaps on the wing, but when it comes time to skin them, you will need to support them in a simple jig to keep them from moving. The lower front skin in glued on first, stopping at the leading edge cap strip. At this point the aileron (or flap) is still flexible in torsion. You have to soak and bend the leading edge upper skin over a pipe, and it is preferable to over-bend the plywood slightly for an easier job of gluing on the skin. When you glue on this skin, you need to hold the aileron firmly in position, or if you do not, your trailing edges will not line up precisely, as a number of builders can tell you: Aronson, Bingelis, Harns, Wohlers, Reilly.... Bill Forbes has been building wood airplane for a long time, and he said that the only thing you need is a simple jig. This is a "box", and I've made a sketch at the end of this letter. The ends of the box take the shape of the bottom of the root and tip ribs, and the front and back of the box support the spar and the trailing edge. You can also use the same sort of jig for the rudder and elevator, but these have not proved to be the problem that the ailerons and flaps have.

I have been interested in knowing if the four-pipe exhaust system was more efficient than the cross-over system. I will be working with Dean Cochran on the design of a system to fit the Falco. Dean makes the cross-over exhaust systems for Pitts. A number of the companies who make cross-over systems have bad reputations for quality and refusal to refund when the system-that-wouldn't-fit was returned (a word to the wise, if in doubt, charge it on your credit card, and you'll get your refund automatically from the credit card company). Dean Cochran makes the best system on the market, and he has an excellent reputation for quality workmanship. If that wasn't enough to recommend him, his systems are also the cheapest. Dean recently sold one of his systems to Kent Paser, who had a four pipe exhaust system in his very fast (236 mph) Mustang II. I talked to Kent at Oshkosh, and he reported that he picked up about 6 mph from the cross-over system. I think we can now consider the question answered. I will be working on the exhaust system at some point in the future, and once I get the problems worked out, I'll let you know in a builders letter. Dean will be supplying the systems direct, but we will list the system in our price list. In the meantime, please don't send Dean letters, since he doesn't have anything to tell you at this point.

When I was in Italy, Mr. Frati said he has wanted to come to Oshkosh for many years. At our last dinner together, we got in a fight over the check, and I only let go once Mr. Frati said he would come to Oshkosh next year and let me buy him dinner. I am going to keep after him to come, and I think next year is as good as any year, particularly if we have some more Falcos flying.

There is an organization of engineers in Italy that gives an award, the Compass d'Oro, each year for the best piece of design by an Italian designer. Ferrari has won a number of times, and in 1961 Mr. Frati received the award for the Falco. In Milan, he gave me ten decals of the award, each signed by Mr. Frati, to give to the first ten builders to finish their Falcos. Larry Wohlers now has the first. We have nine left.

Summer is now over. Excuses are no good any more. Back to work on your airplane!

Sincerely,
SEQUOIA AIRCRAFT CORPORATION

Alfred P. Scott
President

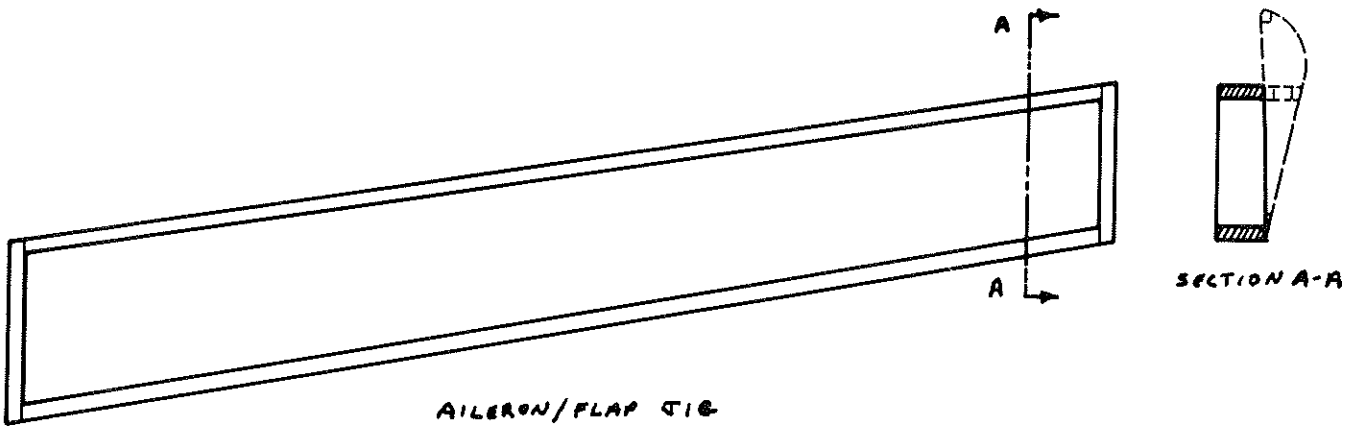
ROLL CALL
Please send in your progress report on a separate piece of paper and not as part of a letter as these entries go into a separate file. Please give your name and builder number.

660. Rex Hume. Fuselage frames complete and on jig. Rudder complete and plywood skin on one side of vertical fin. Horizontal stabilizer ready for plywood skin. All wing ribs complete. Presently working on elevator, wing front spar and aileron/flap spars.

686. Ron Rios. All wing ribs done. Stabilizer complete except for cover. Elevator, rudder and vertical fin complete. All aluminum parts machined. Aileron and flap spars complete. Have ordered main spar, rear spar and front spar wing materials kit.

683. R. E. Edwards. Tail group compete (not covered), flaps and ailerons ready for hardware (ordered with this letter), fuselage rings covered and ready for jig. Main spar covered and ready for ribs (on hand). All work inspected and signed off.

725. J. W. Hofler. All vertical, horizontal ribs complete, and all but four wing ribs complete. Plan to start on frames in about 3 weeks.



AILERON/FLAP JIG