Falco Builders Letter

Above: Richard Brown's Falco took 16 months to build.

First Flight:

Richard Brown

Another Falco has flown the nest. Richard Brown's Falco flew for the first time on Saturday, November 29, 1986, in Portsmouth, Ohio.

The story begins many years ago. When he was born, Richard Brown must have hit the ground running, since you're not likely to find a more active man of his age of 67. As a boy of seven, Richard Brown started helping his father build houses, and he has been in construction ever since. He built his first house when he was 17, and by 20 was into heavy construction. He learned to fly on the GI bill forty-two years ago, but didn't stay with it since flying was too expensive. He built houses for a while and then thirty years ago switched to commercial and industrial construction. In addition to his construction company, now run by his son, Richard Brown owns East End Building Supply—"Your Leader in Kitchen Cabinets, Tools and Hardware."

Mr. Brown's son bought a Piper Archer, and Mr. Brown started taking lessons

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Around the Falco Patch

You *really* missed it. This year's Great Oyster Fly-In was the best ever. It was one of those magical warm autumn days with the leaves at their peak. It wasn't a large crowd since too many people listened to the forecast, which by some accounts had us as marginal VFR.

For the first time ever, I did not get into town to watch the parade, instead I gave rides in the Corporate Disgrace between sessions around the oyster barrel. Jonas Dovydenas flew in from Massachucetts. Joel Shankle flew his Stinson in from nearby Culpeper. John and Midge

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First Flight:

Buzz Glade

On November 1, the eleventh homebuilt Falco flew. Built by Buzz Glade of Jacksonville, Florida, it is by several measures a most remarkable Falco. Tony Bingelis saw it and reports, "The wing was slick as molded glass. I was going to go home and burn mine." Tony calls it the "best finished Falco" he has seen. "Outside it is gorgeous, just like glass."

Aha! But what does it weigh? Would you believe 1,065 lbs? Apparently even Buzz wasn't sure since he has weighed the plane twice.

The Falco has a 150 hp 0-320-A2C engine with a fixed pitch wooden prop, a Prince "almost-constant-speed" scimitar-bladed prop with curled-over tips. Hartzell calls them Q-tips, but on this prop they're called P-tips—same thing. At 68"/74" the prop has too much pitch, and Buzz can only get 2,000 RPM at full power on the ground. In the air, full power gets him 2,400 RPM and 165 knots indicated. (The production Falcos used two wood Hoffman props, the cruise HO-23-175-178 and climb HO-23-175-170—for 175cm diameter and 178 or 170cm pitch.) The Falco stalls at 50 knots dirty and 63 knots clean.

Buzz had not flown much in the seven years he took to build the Falco, so he had an instructor do the first flight. After the airplane flew, Buzz rushed out, got his biennial flight review and flew the Falco. It has also been flown by Carl Pascorell, who flies an SF.260 in the Redhawks aerobatic team. Carl reported that it flies "just like the Marchetti, only lighter and better."

The Falco, N85ZZ, is painted in a bright white, with a dark red and metallic stripes down the side. The interior is painted and no upholstery is planned. I was curious about the noise level, and Buzz said that it is surprisingly quiet.

I asked Buzz about the finish on the plane.

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Richard Brown

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again. One day Mrs. Brown gave him a copy of *Flying*, and it was there that he saw one of our advertisements. From the first time he saw it, Mr. Brown admits to being caught up by the Falco. "Boy, it took my eye," he says. Although the thought of building an airplane had never crossed his mind, he sent for our brochure and soon purchased a set of drawings. His son did his best to talk him out of it, even suggested that he buy a local Glasair that was for sale, but Mr. Brown would have none of it.

Just as he was preparing to start construction, Mr. Brown read about Bret Miley's Falco project being for sale in Wyoming. (As you may recall, Bret and his brother were killed in a plane crash at the end of a tragic 13-month period in which Mrs. Miley lost three sons and a husband.) Within a week, Mr. Brown built a trailer, and then spent five days bringing the Falco back to Ohio. The Falco was moved to a loft over East End Building Supply, and for the next year order clerks climbing the ladder to get something from the top shelf could see Mr. Brown at work on the plane.

From the beginning, it was clear that Richard Brown was a fast worker who lost no time getting a job done, and he admits to it, "I've always been fast, even at slow work." Bret had the fuselage in the jig and the tail feathers were skinned. In the next 12 months, Mr. Brown finished the airplane and delivered it to the paint shop, but he lost three months to a broken thumb. The upholstery was farmed out, and John Jewett took care of all of the electrical and instrumentation and stayed on to help with the engine hookup. John is an electronics technician who normally works on large computers, but he has also wired airplanes.

The Falco was painted in a local auto paint shop, and everyone pitched in to get a perfect finish. When they first sprayed the beige-tinted white Imron, Mr. Brown said it looks "just like a refigerator." Then after the burgundy stripes went on, he called to say that it was "slicker than a minnow's tail." The interior is burgundy and gray, with gray carpeting.

While he was building the Falco, Richard Brown continued with his flying lessons in the Warrior, but as he had not

yet soloed, it was clear that he was going to need someone else to fly the plane at first. I think Mr. Brown had some secret thoughts about possibly doing the first flight, but I kept after him to get an expert, and he gradually came to see the wisdom of that plan.

I had already begun work on a flight test guide, and this grew in importance as Mr. Brown's Falco neared completion. I had planned to get my friend Parke Smith to do the first flight, but then Al Aitken came on the scene. Al is a Marine Corps F-18 pilot and a graduate of the Patuxent River Test Pilot School. Al was among those F-18 pilots who paid a late night visit to Libya last spring delivering some Reagan Easter Eggs to Colonel Khadafy. Now assigned to Marine Corps Headquarters, Nancy and Al Aitken moved to Manassas, Virginia, and Al was finally in a position to build a Falco—something he had planned to do for several years. For his birthday Nancy gave him a set of Falco plans, which Al calls "The nicest birthday present I ever got."

Al offered to do the first test flights of Mr. Brown's Falco, and he helped me with the flight test guide. We carefully planned the entire test procedure. As the date for the first flight drew closer, there were numerous delays. On the Monday before Thanksgiving, the FAA completed the inspection, and N894RB was signed off to fly. It weighed 1,299 lbs empty with engine oil, so let's call it

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1,284 empty. The airplane has a Christen inverted oil system, inverted header tank, a complete IFR panel, including an Apollo II 612B "Fly-brary" loran and Shadin fuel totalizer. With all of the avionics, the instrument panel weighed 51-3/4 lbs.

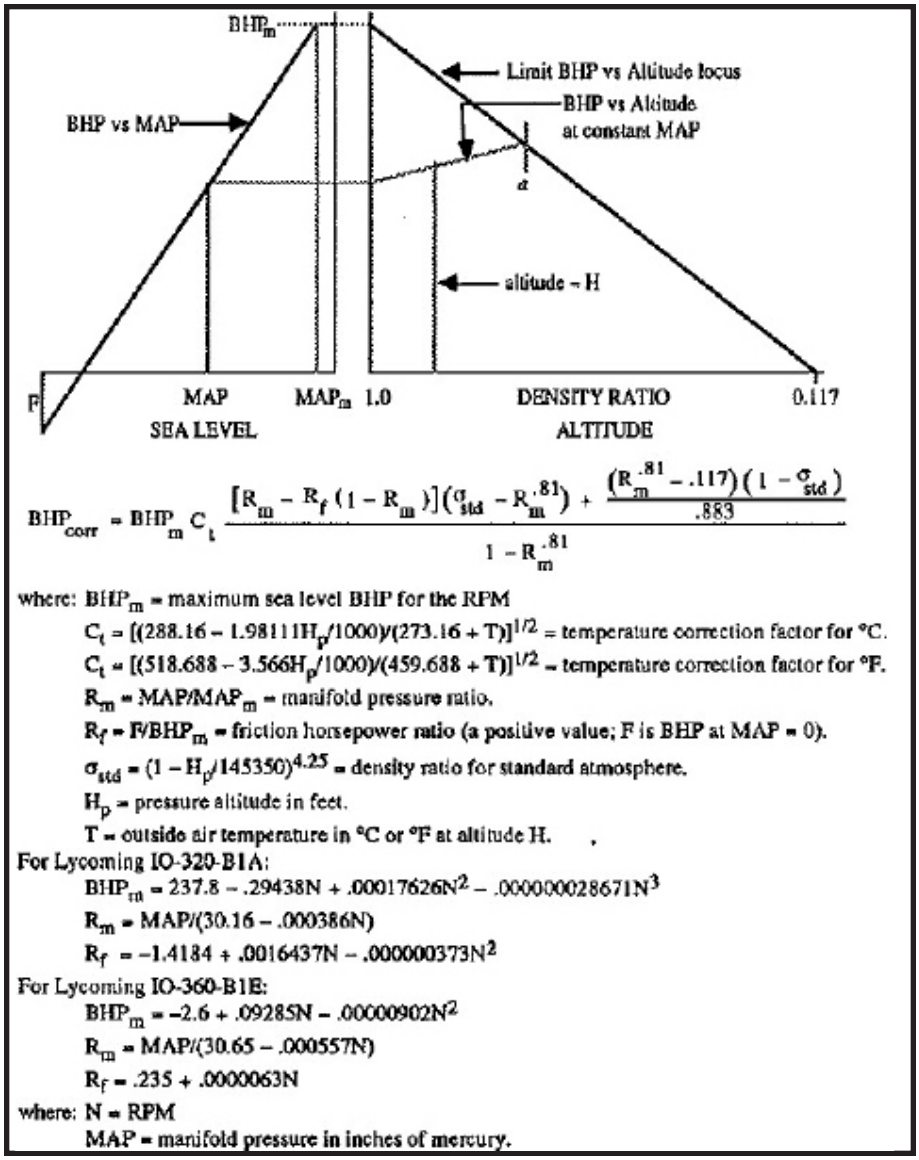
The day after Thanksgiving was to be the big day. I rose early, picked up Al Aitken in Manassas, and we flew to Ohio. The weather was perfect—except for Portsmouth, Ohio. There was ground fog and a 2,000 foot overcast that showed no sign of moving. Al and I hung around a nearby airport for a while, ate lunch and then took off to take another look at Portsmouth. It was clear that there was no way to land there that day, and even if we could sneak in, it was no weather for a test flight. So we went back to Virginia.

The weather in Virginia deterioriated the next day, and Mr. Brown could not stand it any longer. As a backup to Al Aitken, he had his eye on a local pilot, Connie Scott. An engineer with a local stone company, Connie doubles as the corporate pilot for the company plane. He built a Citabria from two wrecked ones, and flies air shows in the airplane.

So on Saturday, Connie Scott flew the Falco for the first time. He made four flights that day for a total of 1-1/2 hours. The first flight was made stiff legged, and then he retracted the gear on the second flight. Connie spent quite a bit of time checking the plane out and came to the conclusion that it was a wonderful airplane and that everything worked nicely. At the end of the day, he took Mr. Brown for a short ride. From the beginning, the airplane flew well, with the right wing just a little heavy, and it needed just a touch of rudder trim.

The next day Connie flew the Falco again, and by the time the day had ended, he had done most acrobatic maneuvers. He brought the Falco down the runway at about 175 mph and looped it on the deck. "I thought my heart was going to bust open!" says Mr. Brown. By the end of its second day, the Falco had five hours on it, and Mr. Brown got his second ride.

If you haven't figured it out by now, Richard Brown is in seventh heaven. He had visited with Tony Bingelis and saw his Falco. Tony admits that his "Flea Market Falco" is the best one he's seen. To which Richard Brown says "If he's got the best one, I've got him beat!" His



$$BHP_{corr} = BHP_m C_t \frac{[R_m - R_f(1 - R_m)](\sigma_{std} - R_m^{.81}) + \frac{(R_m^{.81} - .117)(1 - \sigma_{std})}{.883}}{1 - R_m^{.81}}$$

where: BHP_m = maximum sea level BHP for the RPM

$C_t = [(288.16 - 1.9811H_p/1000)/(273.16 + T)]^{1/2}$ = temperature correction factor for °C.

$C_t = [(518.688 - 3.566H_p/1000)/(459.688 + T)]^{1/2}$ = temperature correction factor for °F.

$R_m = MAP/MAP_m$ = manifold pressure ratio.

$R_f = F/BHP_m$ = friction horsepower ratio (a positive value; F is BHP at MAP = 0).

$\sigma_{std} = (1 - H_p/145350)^{4.25}$ = density ratio for standard atmosphere.

H_p = pressure altitude in feet.

T = outside air temperature in °C or °F at altitude H.

For Lycoming IO-320-B1A:

$BHP_m = 237.8 - .29438N + .00017626N^2 - .000000028671N^3$

$R_m = MAP/(30.16 - .000386N)$

$R_f = -1.4184 + .0016437N - .000000373N^2$

For Lycoming IO-360-B1E:

$BHP_m = -2.6 + .09285N - .00000902N^2$

$R_m = MAP/(30.65 - .000557N)$

$R_f = .235 + .0000063N$

where: N = RPM

MAP = manifold pressure in inches of mercury.

Top: Jim Petty's engine performance formula. Above: Karl Hansen's gear doors.

Falco also has a name, "Tenacity", which was suggested by friends who watched Mr. Brown build the Falco.

And Connie Scott seems to be having as much fun as Mr. Brown. "Man, he's got one critical little airplane," he told some friends, and now they are talking about Connie doing air shows in the Falco. It sounds like there's going to be one lonesome Citabria in Portsmouth, Ohio. After the hours are flown off, Mr. Brown plans to continue his instruction in the Falco and start putting some hours on the plane.

Meanwhile back at Manassas, Al Aitken is going through withdrawals from the idea of flying a Falco for the first time, and he says if anyone needs a test pilot to call "Easy Al!"—*Alfred Scott*

Buzz Glade

Continued from First Page

He used the West System with no fabric. When the wood was ready to finish, he went over the plywood with a wet sponge to raise the grain and to close up the staple holes. After a day or so, he put on the first coat of West System epoxy with a roller. Previously he had found that—apparently because of high humidity—the epoxy would sometimes be gummy and difficult to sand. He called Gougeon Brothers, and they suggested using a heat gun right after application. Buzz said he worked with a roller in one hand and a heat gun in the other. Apparently just an initial heating to start the reaction was all it took, and he had good results whenever he used the heat gun.

When the first coat of West System was dry, Buzz sanded the airplane and then applied a second layer and sanded that. He then used microballoons—"dry micro"—right on the epoxy wherever there was a low spot. He said the micro sanded easily, but he always used the heat gun when he first applied it. When the sanding was complete, he touched up any spots where the epoxy might have been sanded too thin, and then sprayed a coat of Dupont Korlar primer. He filled in any pinholes with acrylic spotting putty and then sprayed two coats of Dupont Centari enamel. The first coat was a "tack" coat, and it was followed with a final spray. He used a gloss additive in the Centari on the airframe but shot straight, unblended Centari on the fabric-covered control surfaces.

Buzz said he did exactly the same thing to the wing and the fuselage. On the wing, you can't see any ripples at the ribs, but on the fuselage you can see the fuselage frames if you catch the light just right. Buzz has no idea why that's so. At this time, he says the plane is not much to look at since the cowling is not painted, nor is the canopy trim. He has a Lexan windshield—the third or fourth one he's had on the plane. He found that paint thinners do not agree with the Lexan.

At 1,065 lbs, Buzz Glade's Falco is the lightest yet. Buzz followed the plans and did not change any of the structure. Wherever possible, he shaved a few ounces off; for example, the battery access door does not have a piano hinge—it is installed with screws only. Buzz calls the Falco a "deluxe day VFR" machine. There is only a single, tiny 720 channel glider com radio.

(Don't laugh, the "French Connection" CAP-10 aerobatic team appears at about 40 air shows a year and has never missed an appearance in ten years because of weather. They don't have any nav radios, either. They navigate with sectionals and Texaco road maps and bring a new meaning to "low level scud-running.")

The instrument panel has a single electric turn coordinator, a vertical card compass, but there are no vacuum gyros. There is a basic electrical system with a 35 amp Japanese alternator and Gell/Cell battery. The gear and flaps are electric, but there are no navigation or strobe lights. Buzz installed the complete internal antenna system. The seats are upholstered, but the rest of the interior received a single coat of West System epoxy and one coat of paint.

The wooden propeller saves a lot of weight, but it also guarantees lethargic takeoff performance. The prop probably weighs about 15 lbs, and you also save the weight of the governor and prop controls. There is a mechanical and electric fuel pump, but no vacuum system. The conical engine mount is lighter than the dynafocal mount. There is no air filter installed yet. Buzz made his own cowling and reports that it is rather flimsy when you pick up each part, but it stiffens up when installed on the airplane. The windshield is 1/8" Lexan. That's half the thickness of our windshield, and Buzz reports that the windshield has pushed in slightly in flight. I doubt the windshield would stand up in a test flight to design speed.

Buzz Glade flew C-130's in the Air Force. He has been around homebuilding for a long time and has helped with the contruction of various biplanes. Buzz and Susan Glade live in Jacksonville, Florida, where they operate a general contracting company. Buzz bought his plans in December 1979 and began work on the Falco shortly thereafter. Buzz made almost everything for the airplane, thus his Falco is a true plans-built Falco and took just under seven years of nights and weekends.

Buzz keeps the plane at the St. Augustine airport and had flown it only about 4 hours when I spoke to him. Because the propeller is not an approved installation, he must fly the airplane 40 hours before restrictions are lifted, and he plans to put in some hard flying to get the time flown off. Look for this Falco at Lakeland!
—*Alfred Scott*

Around the Falco Patch

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Oliver arrived from Delaware, followed shortly by crazy José V. Martin in his Bücker Jungmann. Terry Smith Pipered in from Pennsylvania. Al and Nancy Aitken arrived by land, as did Steve Wieczorek.

The Wilkinsons didn't make it this year since Brook came down with an untimely virus, and Jim DeAngelo put pastry business before flying pleasure. But we had a good crowd and the sky over our runway buzzed with airplanes. There were even a few vague, unverified reports that a small, blue and yellow airplane was observed flying under the Rappahannock River bridge, but no one recognized the aircraft type or got a good look at the pilot. Parke Smith put on a wonderful display with his CAP-10, which inspired some departing Cessna driver to do a low level wingover reverse. And on departure, Joel Shankle bombed down the runway in a "high speed pass" in his Stinson, and the shock wave actually knocked down a bystander—a wonderful day and a great time for Falco builders to gather, eat oysters, play with airplanes and compare notes on building their favorite Eisenhower-era wood airplane.

It was also my first opportunity to fly a Bücker Jungmann, the famous German biplane. I've heard the handling of the Jungmann/ Jungmeister described in almost-reverent tones and with the same phrases—"beautifully harmonized", "silky smooth"—that are used to describe the Falco. I was interested to compare the two planes.

When I take someone for a ride in my Falco, I jump in the plane, fire up the engine and taxi down the runway checking to make sure the seat belts are fastened. It isn't so informal in a Jungmann, you strap yourself in with a procedure designed by the Federal Reserve Bank, and somewhere— knotted between the airplane and me—was a parachute. Fat lot of good... I was going need *help* to get out of the airplane.

But to hell with such thoughts. We fired it up and stumbled into the air in a tenuous transition from an absurdly nose-high stance until suddenly the airplane was in its element. Everything that I had heard about the plane was true. The handling *is* silky smooth and

beautifully harmonized—in some ways almost identical to the Falco and yet it is a completely different airplane. You can't see much from the front seat of the Jungmann, so you fly with the fervent hope that you're the only blind pilot in the area. The other thing is that—no matter what you do—biplanes always seem to fly at the same speed. With the Falco there is a sense of acceleration, speed, and slowing down as you paint your way through the sky, but I didn't feel that in the Jungmann.

But it *was* fun! We rolled, looped, and spun; strafed innocent wheat fields; breached the defenses of a sleeping duck marsh; and we returned home so power-crazed with our conquests that we actually parked the Jungmann in the front yard right next to the swing. You had to be there.

On the week before the Great Oyster Thing, Steve Wilkinson flew Jim DeAngelo's Falco for a flight report and he reported two things that rather surprised me. Steve timed the rate of roll and came up with 70° per second. I had always thought that the Falco was faster than that. The sales brochure on the F.14 Nibbio put its rate of roll at 140 degrees a second, so I thought the shorter-winged Falco was probably about 160° a second. I've had lots of acrobatic pilots in the Falco, and they would nod knowingly and agree with me that "Yeah, that's about 160 degrees a second", but I had never actually timed it. I took my stopwatch to the Oyster Fly-In.

My first attempt was on the way out of Richmond, and it didn't work. I had to time it myself as Sara was laughing too hard and Kakee was covering her eyes in the rolls—we were three-across. I took Jeff Miller, from *AOPA Pilot*, for a hop in the Falco and we timed it, and then Al Aitken and I timed it on a later flight. We did about 5 rolls each way. There was some variation in the times, but most of the rolls to the left were slightly under 3 seconds, and most were slightly over 3 seconds to the right. The fastest time was 2.84 seconds to the left and the slowest was 3.28 seconds to the right. That works out to 127° and 109°.

This was measured from the start of the roll until the wings were level again, so it doesn't measure the highest rate of roll, so if you want bragging rights on the rate of roll, you could probably increase it a little. You'll also find that it will roll a

little faster with only one on board.

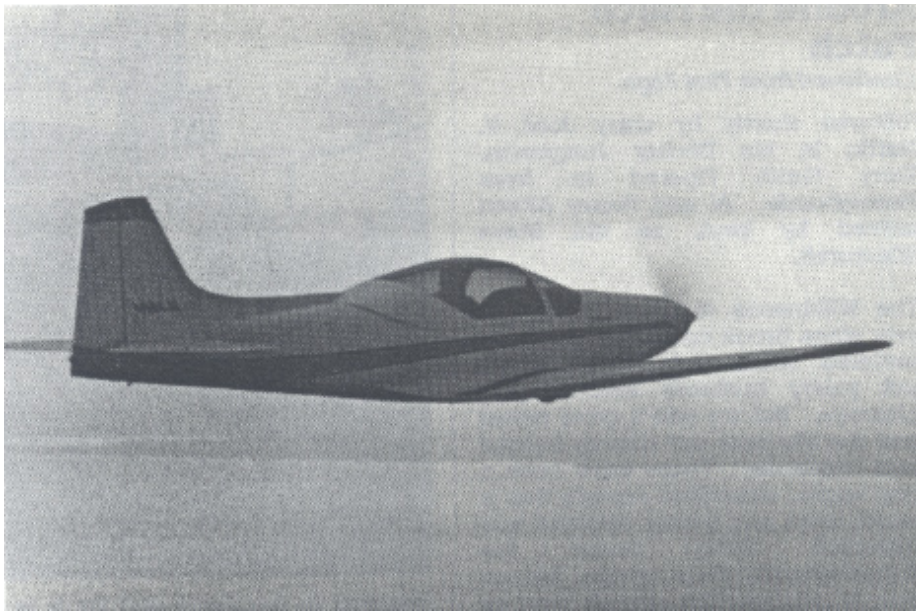
But who cares? I've always been delighted with the rate of roll and so has everyone else, even if the actual number is lower than we all thought. (I got a call from Harry Shepard the following week, and he admitted that he has never timed the rate of roll on his SF.260.) When I flew Dave Aronson's and John Harns's Falcos, I thought both had a slightly slower rate of roll than my Falco, so Steve's measurements may still be right. The only way to actually know is to have more builders time the rate of roll.

The other surprise from Steve was the cruise speed of Jim's Falco. I had been under the impression that Jim's Falco was capable of 190 mph or more at cruise, but Steve nailed it with a stop watch. His report:

"The predicted wind aloft along our route was 12 knots from 330 degrees at 6,000, 15 knots at 9,000. We chose as our most convenient and wind-aligned VOR-to-VOR route Madison to/from Kingston: 55 nautical miles each way on a course of 305°/125°, throw in an extra mile each way for minor deviations from course for a total of 112 nm. Our position overhead each VOR was confirmed visually and by strong loran and CDI indications. Time en route by stopwatch was exactly 23 minutes 30 seconds northwest-bound, 20 minutes flat back down wind. That works out to 143 knots groundspeed upwind and 168 knots downwind, confirming a headwind/tailwind component of 12.5 knots. Averaged speed for the distance thus works out to 155.5 knots, make it 156 (180 mph).

"Indicated altitude both ways was 7,000 feet, pressure altitude was 6,680 feet. OAT was +6° and +7° C at the two extremes of the route. Indicated airspeed was 142-143 knots, near as I could read it, which works out to a TAS of 158 knots (182 mph), showing an airspeed indicator that reads two knots too high in cruise. Power setting was 23 inches at 2,400 rpm on an engine that admittedly has 1,900 TT. We were 120 pounds under gross weight. Zero turbulence.

"DeAngelo has a 155-knot/180-mph airplane, in round numbers, though he says he's seen 190. Maybe solo, light on gas, cold day, slight ASI error. What it does at full throttle at treetop level or cruising at 2,700 rpm is as far as I'm concerned immaterial."



Oh, I agree completely. Karl Hansen and I have been using a benchmark of balls-to-the-wall at 6,000 feet density altitude. Because it elimin-ates instrument error of the tacho-meter or manifold pressure, it's a reliable indicator of speed improvements. It also gives us bragging rights on a nice fat number, even though nobody actually cruises at such a power setting.

With Karl consistently getting 180 knots at that benchmark, that puts his maximum speed at about 228 mph. That's close to a 50-mph difference, more than I would expect, and it's difficult to understand. I told Karl Hansen about Steve's times and pressed him on whether he thought his figures were accurate. Karl says he thinks there may be a 5 mph error, but no more. He has flown in formation with a number of other airplanes and reports that the indicated airspeeds have always been within a knot or two. On his cross-country trips, he says the groundspeed agrees with his indicated speeds. He has flown the CAFE 400 course twice—one for practice and one in the race itself.

Steve makes the point that Jim DeAngelo's Falco is a representative airplane: "competently built but not compulsively over-detailed." I think that is exactly right, and if the numbers calculate out to be 180 mph cruise, so be it. I wish the numbers were a little higher, but speed is a function of time and distance, not wishes.

I think it is also fair to say that Karl Hansen's Falco is representative of the ultimate performance attainable by one of our kit-built Falcos. Karl has put a considerable amount of effort into cleaning up his airplane, and every speed mod has produced some results. If Karl's performance numbers have dominated these pages, it's because he has sent in more news. We have published everything we've received.

Karl has continued to work on his speed and in the last few months he has picked up some more speed. He has sealed up for cooling air loss in the engine compartment and has installed microballoons on the cowling to reduce the gap behind the spinner to about 1/16". This worries me—I have images of the spinner tearing the cowling off—but Karl says that George Pereira has not had any problem with his similarly-tight cowling, and that the spinner quickly grinds down the frangible microballoons. Karl has also covered up three tubes of the oil cooler bringing the temperature up to the "T" of OIL TEMP. Karl thinks he has picked up 5 mph or so. After Oshkosh he used to indicate 165 knots at 25/2500 and 1000 feet, and he is now up to 170-172 KIAS at the same conditions. He now indicates 140 knots at 20/2000 and low altitude.

There is something very strange going on. At our benchmark of balls-to-the-wall at 6000 feet density altitude, Karl got 180 KIAS (228 mph TAS). Before Oshkosh, Karl installed the exhaust port horns and the nose gear bay doors. We were sure this would give us another 5 mph. While the cruise speeds were generally up 5 to 7 mph, the best he could get was 181 KIAS at the benchmark test. Then after picking up an additional 5 mph or so (from the smaller spinner/

cowl gap, less cooling air loss and oil cooler flow) Karl tried another run and the ASI needle would not get above 180 knots. Attributing this to a clogged injector and dirty airplane, Karl fixed both squawks and tried again a week later. Again, 180 knots indicated!

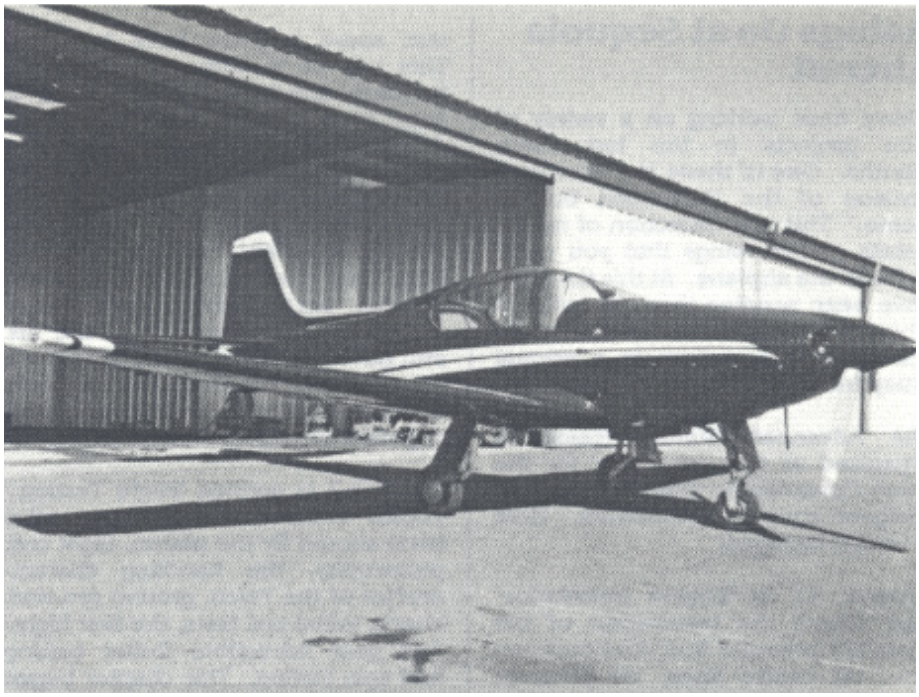
By all indications at cruise, the maximum benchmark speed should have been close to 240 mph, but it has not changed one bit. Karl tried a low level run and got 190 KIAS at 1000' pressure altitude and 25°C (2400' density altitude) at full throttle (30" MAP?) and 2,700 RPM. The only explanation I can offer is that the gear doors must be pulling open at high speed and increasing the drag above a certain speed.

The Falco has received a lot of press coverage this year. First, there was Nigel Moll's article in the February *Flying*. Then *Kitplanes* had the Falco on the cover of the March issue. (Red airplanes do wonders for the newsstand sales. *Kitplanes* sells its surplus issues at Oshkosh, and—while there were ample supplies of other issues for sale—the March issue was completely sold out before the show.) The June issue of *Aviation Consumer* carried a feature on three kit planes, and the Falco received high praise from their intrepid reporter in the trenches: S. Wilkinson. The August issue of *AOPA Pilot* covered kit planes in general and featured photographs of Karl Hansen's and Jim DeAngelo's Falcos.

And now there is more. The second October '86 issue of *Western Flyer* had a feature article on Ray Purkiser and his Falco. Karl Hansen's Falco made the cover of the November *Air Progress*. Peter Lert called it a "combination of performance and handling that is as close to perfect as anything I've ever flown."

More from Peter Lert: "In a way, it's hard to describe the controls or handling of the Falco, because like those of the SF.260, they're almost 'not there.' By this, I mean that everything is so nicely balanced and harmonized that you don't really recognize the presence of the controls at all; you fly the airplane 'through them.' It's almost as if you can direct your flight path without conscious thought; I suppose the most concise definition of the controls would simply be 'just right.'"

There are more articles to come. Fernando Almeida sends word from Brazil that his flight report on Karl's Falco is at the printers but since there is an election all of the paper has been diverted to political uses so the magazines are on hold. He promises a copy when it's printed. Anyone out there want to translate the article from Portugese for the next builder letter? There are more articles in the works: I count at least three cover stories on the Falco coming shortly—two of them should be red.



Above: Karl Hansen's cowling now has a tigher fit with the spinner.

John Harns has done a number of spin tests at my request. I was curious if the Müller and Beggs spin recovery techniques work with the Falco, and John reports that they both do work. It is difficult to quantify the improvement, and old dog John admits to a learning disability with new tricks. John now has about 240 hours on the plane and just completed his third trip to Florida.

Tony Bingelis has now passed the 50 hour mark on his Falco. He says his Falco "flies like a homesick angel when all the mechanical systems are working right." On inspecting his nose gear, he found that the nose wheel was loose on the bearings, and it would vibrate side-to-side. Apparently he did not have the axle nut fully tightened, although he thought he had checked that before the first flight. He thinks that the sides of the nose gear fork may have been pulled slightly out of parallel and that while the spacers contacted at the bottom, there was still some space at the top. The axle was slightly embossed and he is going to replace it. While it was nothing dangerous, Tony suggests other builders check their nose wheels.

Tony has also had a problem with the circuit breaker popping before the landing gear is all the way up. This is the same problem that we have had with our electrical kits, and we have gone to a 20 amp circuit breaker for the landing gear actuation circuit, increased the wire to a 12 gauge wire and moved the gear actuation relays for a shorter wire run. With the longer 16 gauge wires, we are getting one heck of a voltage drop. Tony has the same problem since his gear wire runs out to a squat switch on the landing gear. (Richard Brown has the latest change to our electrical kit installed and reports that the landing gear retracts very quickly—5-3/4 seconds by his recollection.)

I asked Tony about the performance of his Falco. Tony doesn't yet want to make any real speed claims since he wants to calibrate his tachometer, but he did tell me about timing the Falco from one airport to another. He got an average groundspeed of 183 mph, flying at 5,500 and 4,500 feet. He did not touch the power during the flight. He can't remember the exact power setting, but he does remember that it was an economy cruise setting of either 55% or 65%. His Falco will indicate 160 mph burning 7 gph at 21.5/2200 at 2,000-3,000'. He has measured his fuel and has 27.5 gallons in the aft tank, 21 gallons in the front tank for 45.7 gallons total usable.

Tony is now in the process of making a new instrument panel for his Falco. He has removed the Compu-Cruise computer which was draining his battery when he wasn't flying it.

—Alfred Scott

Goings On at Sequoia Aircraft

I have been working on a variety of little projects in the last three months. One of these is a complete revision of the "Advanced Builder Memo." This is a collection of notes, details and drawings that you need to finish the airplane. At this time, we have been sending them to builders who need them. All of these details will eventually end up in a normal blueprint.

The Advanced Builder Memo is organized as four "chapters" for the Falco Construction Manual. I simply assigned each a high number. Here is what is included:

Chapter 41 is "Engine Installation" and covers the installation of the manifold pressure line, fuel pressure line, oil cooler lines, oil pressure transducer line, engine breather hose, fuel pump vent line, engine controls, smoke system provisions, induction system for the IO-320-B1A and IO-360-B1E, cabin heat system, windshield defrost system and inverted oil system installation. This chapter is 7 pages and includes 8 drawings showing how to make the various hose assemblies and the windshield defrost valve assembly.

Chapter 42 is "Cowling, Baffling and Nose Gear Door Installation". This is normally sent out with the cowling kit.

Chapter 43 is "Fuel and Brake System Installation." The chapter is 7 pages and has 19 drawings. This covers the installation of the various fuel lines and fittings. Some of these drawings are sketches that can use additional detailing.

Chapter 44 "Access Doors" is a little four-page chapter which describes making the access door for the front fuel tank. When I get time to redraw the fuselage, this will just be a little detail.

I have also finished some drawings for the cabin fresh air inlets. These are on three small sheets. The cabin air inlets are installed on the sides of the fuselage between frames 2 and 3. I have also designed a cabin air valve. One of the objectives was to design a valve which would not interfere with the left hand throttle. The damper valve is as compact as you can get, and it can be installed over upholstery. It is not the prettiest thing, but if you paint it black, you'll probably never notice it. The valve does get away from the bulky vents that some builders have installed. This will be a little detail on new fuselage drawings. If you need a copy of the cabin fresh air inlets, drop us a note.

I have also been working on the F.8L Falco Flight Test Guide. Chapter 1 "Final Inspection" consists of a 20-page final check list of the airplane. So far, both Richard Brown and George Neuman have used the list and have not found anything that we have left off. The check list follows a systems approach and gives some organization to your final checking.

Chapter 2 is entitled "Flight Testing." Topics covered are the test pilot (who should fly the plane), flight test philosophy, the handling charact-eristics of the Falco, ground pre-start check, initial taxi tests, the first flight, first gear retraction, flutter testing and spin testing. This chapter began with some initial comments by John Harns. We are fortunate to have among our Falco builders a graduate of the Patuxent River Test Pilot School, Al Aitken. Al has been very helpful in making suggestions.

At this time, we have printed a limited number of the first two chapters and have sent them out to a selected group of Falco builders and a few others for their comments. I am beginning to get some of the feedback. The initial take has been that the test guide is excellent, but there are suggestions that I am in the process of incorporating.

Even after I get all of the comments, I do not plan to print and ship the Flight Test Guide to all builders. It will be available on request to builders who are ready to fly. Despite all the good reviews, I would like to have twenty or so Falco builders use the document before I consider it ready to print. I plan to revise the Flight Test Guide after each Falco has flown, since I expect that each builder will have some comments that should be incorporated. I would like to be spared the chore of revising the document after each new builder finds a new way to get into trouble!

Chapter 3 of the Flight Test Guide is entitled "Performance Testing" and is still in the early stages—and a long way from final publication. I am working on the document when I have the time. The mathematics is so horrible that literally no one but a "mathochist" would attempt the calculations. As a result, we are working on divorcing you from the math. Two of the most difficult problems have been that you must use a propeller efficiency chart and calculate the horsepower of the engine from the engine manufact-urer's engine performance chart. Neither is easy to do, and it would be infinitely easier if these were automatically calculated by a computer.

Jim Petty has once again come to the rescue. You may remember that Jim developed the formula for the curve of the fuselage frames. Jim has developed a formula which duplicates the engine performance chart. The method used to construct these charts has been published and is based on physics and aerodynamics, but to my knowledge no one has ever developed an equation that could be used to duplicate the chart. Jim Petty's formula is a big, nasty equation but, since a computer can calculate the result in an instant, who cares? For those of you who would like to use it, the engine performance equation is shown on page 3. And for those of you who find formulas like this imposing, don't worry—you'll be able to accomplish the entire performance testing procedure without having to do a single calculation.

Jim has also managed to turn the propeller efficiency chart into a series of six polynomial equations to duplicate the three-dimensional chart. They are absolutely monstrous things; one of them stretches to the length of a long paragraph and has thirty-six terms. I'll spare you that one for now.

The other project I am working on is Chapter 26 "Fuselage Assembly" for the construction manual. I hope to have the chapter finished so that it can be sent out with the next builder letter. If you are in the process of building your fuselage now, let me know, and I can keep you supplied with my latest version of the chapter. Unlike the wing, there aren't any great lessons to be learned. The fuselage is so straight-forward that anyone can put it together without the manual. The only thing the manual will do is to speed up the process and insure that you do things in the most logical order.

Karl Hansen's feat of building a Falco in 23 months has now been eclipsed by Richard Brown's 16 months. (Yeah, I know... our ads say 13 months. The type was set this summer when it looked like he would fly at the end of August.) Richard Brown's completion time is in extreme danger at this very moment.

Top: Adam Slobowy. Above: Pawel Kweicinski.

We have a Falco being built in Chicago which will set a new record if all goes according to plan.

The Falco is being built by two Chicago-area doctors, Pawel Kweicinski and John Slobowy. Pawel and John moved to the United States from Poland about six years ago. John's father, Adam Slobowy, is doing almost all of the construction of the Falco.

Adam Slobowy is a genuine master craftsman. Back in the 1950's, Adam built a couple of automobiles —not as a hobby but out of necessity. In postwar Poland, buying an automobile was impossible, so Adam built his own using a motorcycle engine and transmission. For 15 years, Adam had a show on Polish television called "Do It Yourself," which was directed toward young people and showed how to make and fix things, and how to use tools. In addition to working on scenery design for Polish TV, Adam is also the author of three books for teenagers on building models and working with tools. Adam is now retired from his television job, and his hobby is making silver jewelry. At the age of 62, he is in great shape, and Pawel says he looks and acts like a man of 50.

So what happens when you put such a master craftsman to work on a Falco project? They began construction on September 18, working on the tail group. That took three weeks, since they were also setting up shop, buying tools and building work tables. Adam is working 10 to 12 hours a day, and Pawel works a couple of hours each night. Adam is doing the woodwork, while Pawel prepares the metal parts and is wiring the plane.

After the tail group was done, Adam built the ailerons and flaps. That took 17 days. At this time, he is working on the wing. All of the ribs are in place, and Adam is float-sanding the wing. They expect to have the wing skinned in the next couple of weeks.

It is far too early to say when this Falco will fly—Pawel is shooting for the end of March—but it is apparent that Adam is building the airplane in record time. In addition to the skill and speed of Adam Slobowy, there are two things—Aerolite glue and a Senco staple gun—without which they could never have built at this speed.

This is the first Falco that has been built right under Francis Dahlman's nose, so Francis has been stopping in to see the project take shape. Francis reports that Adam is doing beautiful work and is a tough taskmaster. Pawel says that Adam measures everything ten times, and everything must be perfect. One thing they have found is that Francis Dahlman makes the wing ribs exactly to the drawings, and because of the angle on the front face of the main wing spar, they have had to add little shims, and this has taken some additional time.

So who knows when this Falco will fly? Not me, but it's going to be fast. Much depends on Adam, who is scheduled to go back to Poland in February for a month. If they can keep Adam on the plane full-time until completion, we should see the fastest completion yet.

Jan Waldahl stopped by our office on his way to Florida for a week's escape from "winter wonderland" and to pick up an electrical kit which he planned to take back in a suitcase—some suitcase. "I hate snow!" he says—which is unfort-unate for someone who lives in Norway. Jan is a seaplane pilot, flying a Cessna 185 on floats from the fjord at Sandane, carrying fish in the winter and tourists in the summer. Despite temperatures that can get as low as forty below, they fly on floats year-round since the fjord doesn't freeze.

Jan is building his Falco in a partitioned-off area of the seaplane hangar. He spends four hours a day working on the Falco and doesn't remember what he did before he started building the Falco! It has become a way of life for him. He has spent about six years building the Falco and has made many of his parts. Although birch plywood is easy to get in Norway, Jan gets all of his spruce from the United States. A typical order from Aircraft Spruce takes three months to arrive.

If you build a Falco in Norway, you must make all of the wood parts for some silly reason, since a rigorous series of inspec-

Above: Jan Waldahl

tions must be done at various stages in the construction. There are only four welders in Norway who are certified to weld aircraft parts, and your parts must be welded by them (or inspected by them in the case of our kit parts).

Jan is now in the final stages of construction and hopes to fly his Falco this coming summer. Next project is going to be a wooden boat—no government inspections on that!

It seems like everyone has a VCR these days, and I am often asked about the possibility of a series of tapes on the Falco. (From time to time, some dodo who has just sunk a fortune in cameras calls me with the proposal that they will build a Falco, make an instructional how-to-build-a-Falco tape—if I will supply him with a free kit.) To do a proper how-to tape, you really need to write a script, plan the shots and then shoot the thing over the course of building the airplane. Big job.

It seems that the most any of us could hope for on a cooperative effort is a collection of tapes of various Falco builders' projects. These would be little television visits to another builder, narrated by that builder, perhaps showing and explaining things that once confused them. Or it may simply be a look at another Falco project. There are also the finished Falcos that could be photographed in flight, taking off, doing acrobatics, etc.

I can see the attraction of all of this. I tend to think that drawings are still the best way to show how something is done and that photographs should be used to supplement the drawings. I can see that there could be some promotional value in having a tape of Falcos being built and flown, but I also think it would be very expensive and would require more time than I have. And I have no idea how to work all this equipment—I can barely get a rented movie to run.

But if there are a lot of you who think all this is a good idea, I would encourage you to shoot footage of your Falco and send it in. If we get enough material, then I'll try to figure out how to put the pieces together.

We've had mixed reviews on the "photography" in this newletter. Everyone agrees that the quality is poor, but most would rather have poor pictures than none at all. With this issue we are experimenting with direct half-tone position prints. We'll see how it works.

Next year looks like a good year for more Falcos to fly the nest. George Neuman is ready to fly now but Canadian aircraft insurance is sold in six-month blocks starting January and July—like Chinese birthdays; there is nothing in between. George decided to hold off until the new year, so he should break ground on the first day of good weather in 1987.

—Alfred Scott

Construction Notes

Let's talk scarfing techniques. After all, the scarf joint is the most common joint in the airplane, and I'm interested in the variety of methods our builders use.

Steve Bachnak uses a sanding drum which he has mounted on an old table saw. The sanding drum is installed on a shaft which is mounted on the table top with two pillow block bearings, which have been shimmed to the slight incline needed. Steve used the motor from the table saw, driving the shaft with a belt and pulleys on the shaft and motor. Steve scarfs almost all of the plywood ahead of time. If he must glue the plywood on first, he uses a block plane and a sanding block to make the scarf joint.

Steve Bachnak also mentioned that he prefers to cut all of his plywood using a straight edge and a Stanley utility knife. He simply marks the plywood, holds the straight edge in position and makes a couple of passes with the knife. The edge is smooth and straight—better than he can do on a saw and also easier than firing up the bandsaw or table saw.

Jim Slaton scarfs all of his plywood by hand using a pneumatic die grinder and a Sears 2-1/4"Ø x 1" x 1/4" shaft sanding drum. Jim started out using a hand electric drill but found it was too slow, and he likes the adjustable speed of the pneumatic tool. Jim works with the plywood on the edge of the work table. He marks the start of the scarf with a pencil and then carefully sands the scarf with the die grinder—one disadvantage is that he gets a lot of sanding dust in his eyes—and then he finishes off the scarf with a sanding block. Jim started to make a scarfing jig on the radial arm saw, but ended up using the die grinder method and found it so easy he never completed the scarfing jig, although he's thinking about finishing it before working on the wing.

Dave MacMurray uses a Milwaukee electric die grinder, but he admits to ruining a couple of sheets of plywood. One of the problems with an electric die grinder is that you can't adjust the speed of the thing—it either spins at 30,000 RPMs or not at all.

In our last builder letter, I mentioned how Jerry Walker drilled the holes for the nose gear screwjack support. I had figured that it would take a 14" drill so that the drill chuck would clear the fu-

selage frame, but Jerry was off murdering geese in Canada so I couldn't check with him. Jerry later reported that he used a 12" drill but used a small-chuck Black & Decker electric angle drill which he borrowed from a friend. The drill is an expensive ($280.00?) industrial tool, so you don't want to spend that kind of money to drill four holes. If you don't have a drill that will clear, you can get a drill extension which will work. Jerry bought 12" drills in 1/8", 3/16" and 1/4" and he has used all of them.

Because of space constraints, both Jim Slaton and Richard Clements have built the fuselage before the wing. Jim Slaton had planned to build a shop for his Falco but there were a number of delays. Without the space to build his wing, he built the fuselage but left the bottom longeron loose from frame 6 forward so that he could get the main wing spar in place.

Jim skinned the tail cone and the fuselage sides up to frame 5 or 6. After separating the tail section, Jim set up the fuselage in the vertical position and built the wing as described in the construction manual. In essence, the fuselage becomes part of the wing jig, replacing the centerboard. Jim has had no real problems with this approach and asked me to pass the word on to any of you who might be considering this method.

There is certainly nothing wrong about this approach. Each method has its advantages, and I continue to think that the wing-first method has the advantage of getting the pieces of the airplane glued together in the most logical order. But this is not a huge advantage, so if space constraints force you to build the fuselage first, have at it!

A number of Falco builders have made the bottom of the wing fillet of plywood. This is the section of the fillet from fuselage frame No. 6 aft. I've always viewed this with suspicion since I know what curves the skin takes. The original production Falcos used plywood, but I wasn't sure if the bottom was the same cold-molded plywood that was used on the top of the wing.

Joel Shankle is one of those builders who has built this part of the wing fillet in plywood, and since he is only a 20 minute Falco flight from Richmond, I stop in to see him often. All I can tell you is that the plywood method works, and you just have to take it on faith that a piece of plywood will take the shape. With the fuselage upside down, Joel marked the outline of the fillet on the fuselage bottom. Then he installed a piece of wood between the trailing edge of the wing and the fuselage (when viewed from the bottom, it looks like the wing trailing edge strip extends straight in to the inboard edge of the wing fillet). This strip of wood takes a bend as it arches into the fuselage.

Joel then cut the skin to fit everything but did not cut the trailing edge of the wing fillet. Then with the wing fillet bottom skin clamped in place, he drew the curve of the trailing edge and cut it. The remarkable thing is that a flat sheet of plywood will actually take the shape. I can't explain to you why this works, or why the concave bottom of the flaps extends into the wing fillet and then transitions into what *looks* like a compound convex shape at the aft end. But it does! And it looks perfect and is easy to install. Count me as a born-again believer in the plywood bottom wing fillet cult.

Jan Waldahl mentioned that he had used the same method and used foam and fiberglass for the upper wing fairing. "It was easy!" he said, and I can tell you that there is nothing about the appearance of his fillet that you can fault.

From Allan Hall: "The way to get the proper clearance between the gear teeth in the landing gear retraction gear box assembly is to use a single thickness of kraft paper, like the paper used for grocery bags. Jam this paper between the teeth, then fix the gears to their shafts. When the paper is removed, the clearance is just about right. Several vice-grip pliers hold everything secure during the drilling process. I've use the kraft paper method for years in changing gears in my metal lathe. The manual that came with my lathe (some 30 years ago) says one place to use writing paper, while on another page it says to use any 'thick wrapping paper'. I've always used the heavy grocery bag paper, because it's better to have a few thousanths of an inch too much clearance that to have too little. As the Indy Race car mechanics say, when they're tuning up a car, 'Too much is just about right'."

Allan Hall also offers "Those who want to can use talcum powder when installing tires, but you'll notice in the shops that they use a liquid lubricant. Cheap old dishwashing detergent works just as well (and a whole lot better than the talcum). The tube gets so slippery that you almost can't pinch it if you try."

And on the subject of tires, Allan Hall mentioned that the tubes for his 5.30x6 tires came with straight valves. I have the 1980 part numbers: the tire is Tire Product Code 210045015, and the tube is 1999154700-01415, which has a right angle valve and is listed as a G 450 X 6 industrial. I would appreciate it if anyone can offer any correction or confirmation on these part numbers.

Mr. Hall was also confused by the spacing of the forward wing spar with the main wing spar. In redrawing the wing, I eliminated the wing draft, which showed that the primary thing that you are after is a dimension of 340mm from the aft face of the main wing spar to the forward face of the front wing spar. A slightly fat main wing spar made Mr. Hall think that his landing gear was the wrong length, the fuselage frames out of kilter... or something.

I've been getting some questions about the main gear doors. Some builders have asked if we can't have the gear door overlap the wheel well door so that it will help hold the door closed. This will not work, since the wheel well door opens first and closes last. There is no way to change that.

Others have mentioned the possibility of installing gear doors like those on Nustrini's Falco. If you look in our Falco brochure, you'll see these doors. Nustrini's Falco was the fourth Falco built and—from what I can tell—each of the first Falcos were slightly different. The first couple of Falcos had a manual gear retraction system with a big lever that you pulled like the old Mooneys, but it worked so poorly it was quickly replaced with screwjacks. These first Falcos also had the gear doors you see on Nustrini's Falco, but that design was quickly improved upon to the one we now show in our drawings. Nustrini has long since abandoned the old design and has installed the type of gear doors that we use. The new design is better—forget about the old gear door design.

Builders making their own fuselage frames have used a variety of methods to get the frames to an even thickness. The best method is to use a thickness sander, but they are quite expensive, so the best you can hope for is to rent time on one—as Francis Dahlman does. A thickness

sander attachment is now available for radial arm saws (see "Tool Talk").

Ben Burgoyne has used a jointer to rapidly finish his fuselage frames, supporting the frame with a homemade adjustable-height "dumb robot" roller. With this arrangement, he leveled the roller with the jointer and worked the frames around until the reached the proper thickness.

Bob Cordray used a Sears rotary plane mounted, as I recall, in either a drill press or on a radial arm saw. By simply passing the frame around under the device, the whole frame was planed to the exact thickness.

Because of the close proximity of the fuselage access door to the right stabilizer, it is best to install the access panel very early in the game. Once you have installed the inboard stabilizer rib on the fuselage you have seriously compromised your clearance for a router. Even then, an ordinary router may be too big, and you may have to use a router attachment on a Dremel Moto-tool.

Until this past year, only one loran, the Apollo II, was compact enough to fit in our instrument panel and still provide room for lots of other radios. There are now several; both Foster and Arnav have compact and desirable lorans on the market, and each new model has features you could previously only imagine.

Arnav now has three new models, the R-15, R-15B and R-30, all of which are variations on the same receiver. In addition to providing loran navigation, they can tie into a fuel computer so that you can know not only when you are going to run out of fuel but *where*. And if you crash in the boonies, the optional ELS gives your airplane's exact coordinates, ID number, and time since the crash in spoken English—in addition to transmitting a digitally coded signal to search and rescue satellites. Lord knows what features they'll add next year.

Arnav has put out a brochure for installing loran antennas in homebuilt aircraft. Some of you have had questions about their antennas, so I wrote Walter Dean, the author of the paper, for his recommendations on the Falco. He suggests installing the antenna coupler as shown in our plans and making the antenna of the "monopole" design, that is, of a single piece of RG-62/U coax. The antenna wire should run up the forward or aft face of the main fin spar as high as possible. The antenna should be as long as possible, and the last half of the coax wire should be stripped, thus if the overall length is 56", the last 28" should have the outer braid removed.

Although this antenna appears to be a monopole, it is electrically equivalent to a dipole since the lower half of the antenna is merely a coax cable and the shielding of the cable acts as the lower half of a dipole while the extended center conductor acts as the upper half. If the length of the shielded (unstripped) part of the antenna is two feet or less, use RG-58/U coax cable. If the antenna is longer than that, use RG-62/U cable. (There are some conflicting statements in his brochure, and Walter Dean confirms that the previous sentence is correct.)

From the antenna preamp—or "coupler"—to the loran you may use either RG-58/U or RG-62/U cable. It really doesn't matter, and RG-58/U is cheaper, lighter and more flexible.

As for the need to ground hinges and other small metal parts, Walter Dean says that he doesn't have enough experience with wood and plastic airplanes to say.

Which antenna do I recommend? I can't say, since I know so little about antennas. It seems to me that Jim Weir's antenna and Walter Dean's antenna are essentially the same thing. Jim Weir's antenna is also a dipole with a longer center conductor and with other parts of the airplane acting as the lower half of the dipole. Walter Dean's antenna has equal length of shielding and center conductor, and he specifies the impedance of the wire. My guess is that either will work. Following the same twisted logic that it's a good idea to use the same brand thinner as paint, even though all thinners are about the same, if you are going to use an Arnav loran, you should probably use Walter Dean's antenna.

John Oliver asked about whether to install a scupper drain for the fuel tank. I don't have such a thing on my Falco, and I don't recommend it. I always do my own refueling and even then I overflow the fuel from time to time, since the production Falco has such small fuel openings—one of the reasons I went to the larger opening for the front tank.

What I have on my Falco and what I recommend is making a ring-shaped bowl to fit around the tank opening. My Falco has an aluminum bowl that is sealed in place with silicone rubber RTV compound. When I spill fuel, I just flip it out with my finger. While this may sound crude, it happens so infrequently and the finger-flip works so well that I can't see any reason to do anything else. Further, the front tank has a recess around the filler neck, which will make it impossible to drain with a tube, so your finger is going to get into the act anyway!

For the front tank, I think you should have a ring of wood extending almost down to the tank and then seal between the tank and the wood with silicone rubber compound or another suitable sealant such as polysulfide rubber. For the aft tank, you might think about adapting a wooden salad bowl, cutting a hole to fit around the filler neck and gluing the bowl in place under the skin. Jan Waldahl went to the ultimate solution, turning a Sitka spruce bowl on a lathe. The opening even has a groove for an O-ring to seal against the filler neck.

Francis Dahlman has been keeping an eye on Adam Slobowy and the Falco he is building in Chicago. He was intrigued to see that one of the first things that Adam did was to build a work table, cut a hole in the middle of it and mount a belt sander upside down. The belt is just a tad higher than the work table, and Adam uses this to sand spars to contour.

When we were designing the cast aluminum nose gear trunnion, I knew that builders were going to want a nose gear door. Nustrini has such a door, and I just put a lug on the trunnion and reasoned that we would figure out how to attach the door later. When I drew up the cowling, I eliminated the carburetor air scoop and replaced it with the smallest possible fairing over the nose gear. When I worked on the nose gear door, I concluded it was impossible to hinge the door on the cowling. When the gear was up, the door would be too close to the trunnion to install a pushrod that would have any mechanical advantage. In short, even if you could install a pushrod, it would have little power to hold the door closed.

I concluded the only way to install the door would be to attach it to the nose gear trunnion. I have shown this on the preliminary drawings. Jim DeAngelo installed the door according to the drawings—with three wood blocks epoxied to the door and with screws installed through the web of the trunnion.

It was a neat installation in which no fasteners showed, but it had two distinct disadvantages. First, the nose gear door blocked the removal of the cowling. Secondly, we were relying on epoxy to hold, and it didn't! Jim's nose gear door departed the plane somewhere over Connecticut.

I changed the drawings to show the door and trunnion through-bolted. Jim first tried to install the door by hinging it on the cowling and concluded it was impossible. His new door is now installed on the trunnion and since the spacers are bonded to the trunnion—and not the door—the door and cowling are easy to remove.

This said, both Karl Hansen and John Harns have installed their nose gear doors with a hinge and a pushrod. I don't understand this at all. Karl recently sent me an inflight photo (see page 3) of the bottom of his plane, and the nose gear doors are clearly being pulled open. The way I see it, Karl's nose gear door is being pulled open by 1 to 1-1/2 inches at the aft end. I suppose the air-to-air shot was taken at a normal cruise setting. The clamshell nose gear bay doors are about an inch apart, and the main gear wheel well doors appear to be pulled out by a half-inch or so at the outboard trailing edge. It looks to me like Karl's nose gear door needs to be attached to the trunnion and that the doors may be doing nothing for his speed as they are presently installed.

In our last builders letter, I quoted a Sikorsky engineer on composites. Now a Falco builder, Steve Wieczorek is planning to run a series of temperature performance tests on the various epoxies our builders have been using: T-88, FPL-16A, West System, etc. Because of the exceptional test facilities at Sikorsky, we should be able to plot the shear strength of each epoxy against the temperature. It's my guess that the results will not differ greatly with what we already know of the room temperature epoxies and that the West System epoxy will be slightly better than T-88. We'll see.

After publishing Steve's comments about the concerns at Sikorsky about field repairs using room-temperature-cure epoxies and hand layups, I learned about a recent accident of a Q2 in Maryland. The airplane was owned by the Q2 dealer there. The canard had been broken—from a landing accident, as I recall—and repaired. On a demonstration flight, the canard broke off at the repair, the plane crashed, and the pilot and his passenger were killed.

Joel Shankle has been making his wing hinge fairings and gear doors. This is his first experience using fiberglass and his first attempt resulted in more sticky fingers than anything else. The result of this first, unpleasant experience put Joel to thinking that there had to be a better way.

Joel had already made the fairing shapes of styrofoam, so he put a piece of Saran wrap down on the work table, laid up three layers of fiberglass and West System epoxy, and then covered this with another layer of Saran wrap. He was then able to pick this up and drape it over his styrofoam shape. To hold it in place he stapled through the fiberglass into the work table. This cinched the fiberglass around the shape. (An alternative method is to make a little horse-collar of plywood and clamp this over the fiberglass.)

When the epoxy had hardened, Joel removed the staples and Saran wrap. The surface was a little rough, but he was able to quickly sand it to shape.

Jim DeAngelo had made his fairings by making the shapes in paraffin and laying up the fiberglass over the wax—epoxy will not stick to wax. Steve Wilkinson did something similar. He melted some paraffin in a pan and then used a melon-ball cutter to scoop out the shape. He laid up the fiberglass and after the part was finished, Steve melted the wax again for the next part.

We have not yet made a kit of the landing gear doors, so until we do you'll have to make your own doors. I am rather worried about the main gear wheel well doors. I'm not sure how successful we will be in making a door that will fit everyone's Falco. This is a part of the airplane where there is bound to be some variation in the shape, and a door that doesn't fit your airplane is not worth much.

So let me describe the method that Joel Shankle used to make his doors. It's a method that many of you may have used anyway, and I suspect that there are many improvements that can be made to it. I'd appreciate hearing of any better ways of doing this.

When he began working on the doors, the entire bottom of the wing was skinned with plywood, and Joel had already routered the little recess in the plywood for the wheel well door. The airplane was upside down, and Joel removed the landing gear from the airplane.

Joel cut a piece of plywood to the shape of the wheel well, so that it would just fit down in the hole with very little room to spare. He set this piece of plywood down in the wheel well about an inch from the surface of the skin and installed blocks to support the plywood in that position. The blocks were stapled or clamped in position. The plywood makes a "floor" to support the foam.

Joel then cut a piece of foam to the shape of the hole and glued it to the plywood floor with hot melt glue. The foam was thick enough so that the top of the foam stood up above the skin. Joel used styrofoam, but any foam that sands easily will do—polyurethane or Clark foam will work as well. As the foam will later be cut from the plywood, you should only put glue around the edges.

Joel then sanded the foam to shape, sanding it smooth with the bottom wing skin around the edges and using a template to match the patterns shown on the drawings. Joel laid up three layers of fiberglass sandwiched between two layers of Saran wrap and put this over the foam and the bottom wing skin. This made the outer skin of the wheel well door.

When the epoxy was set, Joel removed the plywood/foam piece and trimmed the fiberglass for an exact fit to the wing, thus the edges fit exactly in the routered recess. Joel replaced the main landing gear and cut a hole in the plywood and foam so that it cleared the tire by about 1/4" all the way around.

(So far, so good, but at this point Joel goes in a direction that I think could be improved. Let's first follow through with Joel's method, which we'll call Option 1, and then I'll describe what I think is a better way as Option 2.)

[Option 1] Joel did not remove the plywood from the foam since he was working with a thin piece of foam, but if you have a thicker piece of foam, you should separate the plywood from the foam at this time. Joel beveled the foam to make the shape of the inner skin of the wheel well door. Once this was done, he

placed it on a work table and pinned it down with a couple of headless nails. He sanded the foam to the shape required to make the inner skin.

Joel placed pieces of plywood around and under the edges of the foam to pick up the shape of the outer door. At the inboard face—where the hinge would go—he held the plywood straight so that the hinge mounting surface would be flat. (Because of the shape of his fuselage bottom, the outer skin of the wheel well door had a slight contour at the hinge.) He then did a second layup of three layers of fiberglass sandwiched between two layers of Saran wrap and laid this over the foam. This made the inner skin of the wheel well door.

Note that the inner skin was not bonded to the foam. Joel now had three pieces, the outer skin, the inner skin and the foam form. He trimmed the inner skin to fit the bottom of the wing, so that it was an exact fit into the routered recess around the edge. This inner skin had a large hole in the middle as it did not include the innermost reinforcement, which he made later as a separate piece.

Joel placed the inner skin in the airplane, and then put the foam form into it. He marked the outline of the phenolic block and cut out the foam to its outline. (Since he didn't have any phenolic, Joel used end-grain hardwood—which is fine.) Joel then fitted a piece of hardwood to fit the inner skin, and then sanded it to match to upper surface of the foam so that it would match the outer skin. Joel then glued the hardwood block in place.

In preparation for gluing the whole assembly together, Joel jury-rigged a straight piece of wood to support the inner skin of the wheel well door. This would keep the inner door from sagging under the gluing and clamping pressure. He also made a couple of slightly curved sticks, which he used to clamp the two door skins together at the unsupported outboard end where the wheel well door will mate with the gear leg door.

With all preparations for the final assembly finished, Joel put Saran wrap about the wheel well opening so he would not glue the wheel well door to the airplane. He put the inner door in place. The inboard end of the inner door skin was flat, as required by the hinge. As he made it, the inboard end of the outer door skin was curved, so some "adjustment" had to be made. Joel added strips of fiberglass cloth and epoxy resin to the inner door skin to build it up to the contour of the outer door skin. This done, he put epoxy at all of the mating surfaces and glued the outer door skin to the inner door skin. To hold the pieces firmly together, he used strips of plywood which he stapled to the bottom of the airplane, and the overhang of the plywood strips pressed on the wheel well door.

Because the two door skins were glued together on the airplane, they are a precise fit. When you drop the door in place, it gives out a reassuring "thud" as all points contact at the same time. You would go crazy trying to fit the airplane to a door.

This is a good, logical method, but the thing that bothers me is that when you are making the inner door skin, it is difficult to duplicate the shape of the outer door skin by placing pieces of plywood around and under the foam. Joel had this problem and had to cut off some of the outer flanges of the inner skin and repair it after the door was assembled. Picking up where we were at the beginning of Option 1, I will now describe the method I think might work better.

[Option 2] Place the outer door skin, concave side up, on the work table and support it so that it will not become twisted or distorted as you work on the foam to make the inner door skin. Shape the foam as required for the inner door skin.

Place a piece of Saran wrap over the outer door skin and set the foam in place. Lay up three layers of fiberglass and epoxy over the foam.

(The reason that Joel did not do this is that he used staples to hold the fiberglass down in place. Remember, in his method he first laid up the three layers of fiberglass on a piece of Saran wrap and then placed this over the foam form. These layers did not push into place easily and required staples. My experience is that if you use a number of pieces of fiberglass cloth, orient the weave properly and lay them in place one at a time, the fiberglass cloth will take this kind of a shape without pressure.)

This makes the inner door skin complete with the foam in place. Trim the inner door skin to fit the gear door opening. Locate the phenolic or end-grain hardwood block and cut out the foam down to the inner door skin. Shape this block to fit and glue it in place. Then assemble the wheel well door as described in Option 1.

With either method, you have made the inner door skin and outer door skin as separate pieces. Each is reasonably flexible and will distort slightly to fit the airplane. Since the door is assembled by gluing the two pieces together on the airplane, they are a perfect fit for your airplane. And since it is fiberglass, it's supposed to be Eze!—*Alfred Scott*

Tool Talk

Builders making their own fuselage frames may be interested in the Performax S/T, a drum/thickness sander attachment for radial arm saws. To set it up, you take off the saw blade, and replace it with a pulley that belt-drives the sanding unit at 1200 rpm. The sanding unit attaches to the column tube of the saw with a quick-action clamp, then you put on the drive belt and tension it by rotating the saw motor carriage. Boards are fed from the right side of the saw, against the drum rotation.

The sanding drum is a 5" diameter by 22" wide drum which rolls on one-inch self-aligning ball bearings. The three-inch-wide sandpaper strips are supplied in a roll and wound around the drum in a

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Go West, Young Man!

Let us now praise the Gougeon Brothers. They sell epoxy—"West System Epoxy." What's nice about buying epoxy from them is that not only is it the most respected epoxy on the market for our purposes, and the most professionally merchan-dised, but they are a one-source supplier for everything you need epoxy-wise. And everything is matched, tested, compatible. I don't know if that matters, but a compulsive like me is made more confident by the look of same-labeled cans and bottles on the shelves when dealing with something as mysterious as epoxy.

The Gougeon Brothers are big in the boat field, and their West System has been used to make a tremendous variety of competition and pleasure yachts of considerable size, strength and success. Not fiberglass boats, God help us, but wooden boats: God's own "composite"—tree stuff encapsulated, bonded and strengthened and smoothed with epoxy. The Gougeon Brothers believe in strength through wood, bonding and moisture protection through epoxy, and West System Epoxy is formulated with wood in mind.

The stuff is wonderful and makes one wish that its high-temperature performance were as assured as is that of Aerolite or resorcinol. (Boats don't live in the heat-absorbing situations that can be commonplace for airplanes.) Alfred Scott tells me that Falco-builder Steve Wieczorek, who works at Sikorsky, probably the leading user of composites in the aircraft industry, will soon be testing several leading epoxies with the help of Sikorsky's sophisticated facilities. Perhaps we'll have some positive evidence of the strength of West System epoxy—or another brand—in dark-colored airplanes sitting out on the ramp at Phoenix Sky Harbor for a midsummer week.

I'd love it, because I'd give anything to not have to add yet another refrigerator-white flying mailbox to the skies. Fuschia, cobalt blue straight out of the Patagonia catalogue, Hertz yellow, that orgasmic red you see in Porsche ads... anything but alabaster. Epoxy is so wonderfully easy to use (assuming you wear gloves and a mask), and I'd be happy to be free of the fears of making dry, catalyst-free joints when gluing large skins using Aerolite. For small, maneuverable components of limited gluing area, Aerolite seems unapproachable for ease of use, safety, working time, pot life, clamping demands and everything else. But I'm sure that when I start swabbing the formic-acid catalyst on 50-inch-square sheets of skinning plywood, I'll be wondering if too much of the stuff has evaporated to be useful by the time I get the last staples and clamps snugged down.

"System" is the meaningful word in Gougeon's trademark. You get resin and hardener, pumps to dispense the precisely right amounts for mixing, gray or white pigment-pastes to add to the final coat to highlight surface faults for further filling, microballoons, microspheres, microfibers and other thickening agents. Stirring sticks, mixing cups, squeegees, brushes, proctologist's gloves, cleaner/solvent, the precisely right epoxy roller-applicators, a special roller handle that takes both full-length and half-length rollers (for applying epoxy to nooks and crannies). Even protective skin cream and hand-cleaner paste. One-stop shopping from a company that'll have the stuff on your doorstep in three or four days, UPS, packed complete with a picture of the boss and a note asking you to give him a jingle if you have any questions or problems. (The resin and hardener are also available through Aircraft Spruce, as of this year, but that's a waste of time: Aircraft Spruce's prices are from 15 to 30 percent higher, they offer none of the other "System" components, and though their mail-order service is improving, it's nowhere near as good as Gougeon's.)

The first thing to buy from the Brothers Gougeon is their West System Technical Manual ($2). It's a combined marketing brochure, how-to manual and description of the components of the West System, and you'll get the product catalogue and ordering information with it. The hardener comes in "slow" (30/40-minute pot life) and "fast" (10/15 minutes) flavors, but you've got to be in a lot bigger hurry than I am to opt for the fast hardener, which Gougeon considers to be the "standard" hardener. (They deal largely with professionals, I think.)

The resin-and-hardener kits come in four sizes: roughly a quart (too small to bother with, a gallon (perfect for starting out), five gallons (the ideal size for the committed builder) and a 60-gallon drum (exactly how many Falcos are you planning to build?). I'd recommend getting the gallon kit (about $50) and an assortment of West System application tools to try it out and get familiar with it, then go for the five-gallon pop (about 30 percent cheaper per gallon) when you're ready to do some serious skinning, fiberglassing and encapsulating.

West System epoxy is, in its primary form, a coating-and-finishing sealant, encapsulator and moisture barrier, not an adhesive. You turn it into glue by mixing in fillers such as microspheres or microfibers, and you convert it to aircraft-quality Bondo by stirring in microballoons (it's infinitely easier to use for that purpose than Stits Microputty, I find.) But to finish the exterior of the aircraft—or to lay up fiberglass fairings and subassemblies such as gear doors and hatches—you use it straight out of the can, as dispensed by the special West System pumps. I've been covering my control surfaces with lightweight fiberglass "deck cloth" squeegeed down into a bed of West System epoxy (after applying one base coat of epoxy), and it works beautifully, simply, neatly, easily... and I've never even *seen* fiberglass before. I wasted a lot of time filling staple holes and minute cracks and faults in these structures before discovering the miracle of plastic, but this stuff and a layer of 'glass, plus a third coat of epoxy wet-sanded to absolute smoothness, give you a finish that brings to mind metaphors that would be quite out of place in a family magazine such as this.

If you're going to use epoxy anywhere on your Falco, the little squeeze bottles of Chem-Tech's T-88 are nice to have if you need to glue one tiny piece in a place where you inadvertently put varnish or need a dollop of epoxy for any reason; you can eyeball the proper measures of resin and hardener for the smallest mixture you need. But for serious layups, coatings, gluing and finishing, West System is the way to go. Gougeon Brothers Inc. is at 706 Martin Street, Bay City, Michigan 48706. Once you have the Technical Manual and Product Catalogue, you can order by phone against a credit card. They also distribute regular builders' letters to their customers, as well as a list of on-going customer projects and contact numbers for each, in case you want to jaw with somebody else using West System. At last count, there were already two Falcos listed. But one of them's mine, and you already know everything I know about epoxy....

—*Steve Wilkinson*

Tool Talk

Continued from Page 14

spiral. Because of its open-sided design, you can sand surfaces up to 44" wide and up to 3" to 4" thick depending on your saw model. The sandpaper is available in 30' rolls for ($12.50) in 36, 80, 120, 180 and 240 grit. The Performax S/T is available for $179.95 plus shipping. For more details or to order, contact Performax Specialty Products Co., 17065 Judicial Road, Lakeville, MN 55044.

Falco builder and surgeon Dave Gauger writes "I've found that a six inch Mayo Hegar Diamond-Jaw 32-0120-1 needle holder works well for grasping and pulling staples. The needle holder is what we use in the operating room to sew with. It looks like a big hemostat with shorter, stouter jaws, lined with diamond-shaped teeth that are designed to hold a needle firmly without twisting. They cost about twenty dollars for a good cheap pair."

I have recently discovered a sprayable contact cement that is useful for installing upholstery and carpeting. A 3M product, General Trim Adhesive comes in two versions: 08080 is the regular blend and 08090 is the stronger adhesive, and you should be able to get either one at your local auto paint store.

Maintenance snippets from *Light Plane Maintenance*. First choice for cleaning plexiglass is Pledge with Job Squad paper towels. Pledge also works to remove bugs from the propeller and wing leading edges, although you should sometimes precede the Pledge with Fantastik and water.—*Alfred Scott*

Brenda's Corner

We are continuing to have a few problems with back-ordered items. When you receive an order from us, please open it as soon as you receive it even if you are going to store it away for awhile. Check each item against the shipping ticket. If anything is missing, please notify me immediately. If anything is shown as being backordered, make a note of it and if you don't receive the part within a few weeks, check with me about the status of the part. In most cases, I try to make a note on the shipping ticket saying when we expect to receive the backordered item.

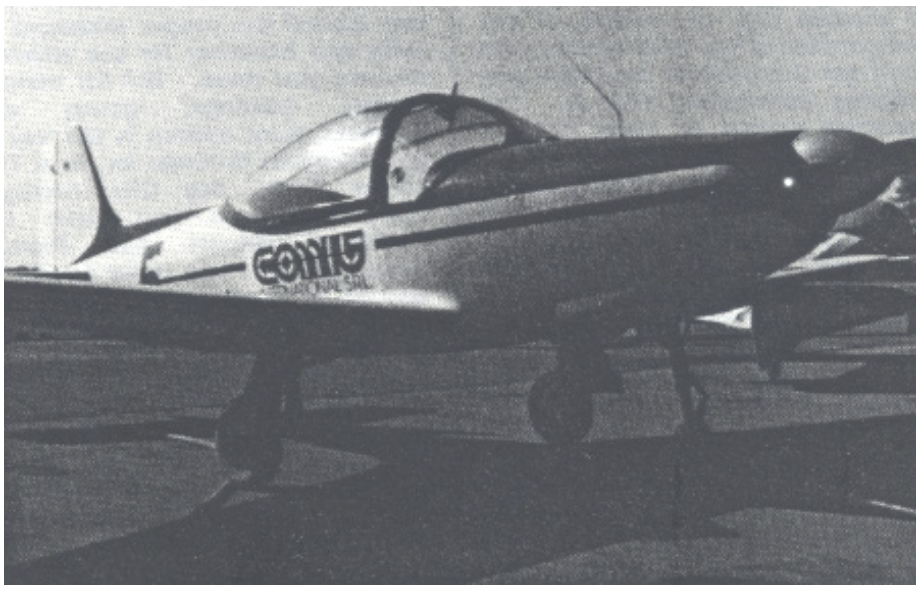
We still have some of the 1987 homebuilt aircraft calendars for you last minute Christmas shoppers. The price is $9.00 which includes shipping. It is a beautiful calendar with Karl Hansen's red Falco being the *pièce de résistance*.

During the week between Christmas and New Year's we do not keep our regular office hours. Also, I plan to take a week's vacation the first week of January, so if you think you're going to need anything during those two weeks, please let me know before Christmas, so we can get it out to you right away.

A reminder to builders who live in Virginia—effective January 1, 1987, the sales tax rate goes up to 4-1/2%. If any of you are considering a big purchase the first part of 1987, you might want to purchase it before the end of the year to save a few dollars.

Best wishes for a wonderful holiday season.—*Brenda Avery*

Below: Guisseppe Demarie's Series 2 Falco.



Sawdust

• One of the first responses to our "Go from Kits to Falco in 13 months" ad in *Flying* came from an inmate at Leavenworth prison, who—we assume—has more that 13 months available.

• While Syd Jensen is waiting for the New Zealand authorities to allow him to fly his Falco over the remote northern part of New Zealand, the U.S. FAA flight surgeon is pursuing an enlightened approach, based mainly on a treadmill test. There are now over 1,000 pilots flying who have had heart bypass operations, and the airline pilot with a heart transplant has just received his first-class medical.

• Calling fuel outage accidents a "general aviation disgrace," the October issue of *Aviation Safety* reported that of 169 fuel exhaustion accidents in 1982, 50.4% crashed within one mile of the destination. Others statistics: 16.5%—2 to 5 miles, and 9.0%—6 to 10 miles, 8.3 %—11 to 20 miles, 7.5%—21 to 50 miles, 4.5—51 to 100 miles, and 3.8% over 101 miles.

• Homer Woodard has now installed a "300 hp" Lycoming in his SF.260, but since it's received the full treatment from High Performance Engines the actual power output is something like 330 hp. Early indications are that the engine has added about 20 knots—Homer has seen 193 KIAS on a hot, humid day. The next mod is to install doors for the nose gear bay, using the Nustrini-Falco door design. High Performance Engines now has a 4-5 month lead time on their overhauls.

• Need an engine for your Falco? John Libby (6221 Camino Padre Isadoro, Tuscon, Arizona 85718, telephone: 602 299-2741) is parting out a 1964 Twin Comanche since the parts are worth more than the plane. He has two IO-320-B1A engines with 2,000 hours. Both are running and the compression is good.

• The Squalus program was set back by about two months by preparations for the Farnborough air show. Current plans are to fly the plane in January or February.

• Falco for sale. 1959 Aviamilano F.8L Falco Series 2 with 150 hp engine and constant speed prop. Engine and airframe recently overhauled. Price: $55,000.00. Contact Mr. Giuseppe Demarie, Via Fosso Dragoncello 32, 00124 Rome, Italy. Telephone: Rome 565-1572.

Mailbox

Though their technical bulletin describes the unmixed shelf life of Koppers Penacolite as two years, when you get the can the instructions and the lettered notation limits it to one year. I bought some in '84, thus I have about $45.00 worth of adhesive which can be used for temporary, non-structural gluing only. Perhaps builders should be made aware of this. To my knowledge Koppers does not sell less than a gallon. That is a lot of glue; plan ahead.

I agree with Steve Wilkinson's "emotion over intellect" comment on the Nustrini canopy, my additional objection being aesthetic. With the Nustrini canopy, the Falco is not as much Frati's signature; a glance at the SF.260 says "Frati" as does the original Falco. I do not know what percentage of builders are going to use the standard canopy, but your color schemes have obviously been designed for the Nustrini. Any thought on that?

John Brooks Devoe
Stratham, New Hampshire

Koppers does sell Penacolite G-1131 in one-gallon cans. I have been after Koppers to set up Wicks and Aircraft Spruce as distributors. If you builders start putting the pressure on them, we might get some results.

The choice of canopy is a matter of personal choice, pilot height and willingness to perform corrective surgery to one's neck. The prototype F.250's canopy was right off a Falco, and Mr. Frati changed it to the aft-slanted windshield bow. Nustrini just did the same. As James Gilbert said, "All of Frati's designs are variations on a single theme...."

The paint schemes were all designed in 1/20 scale for the standard canopy. I did the blueprints in 1/10 scale with the Nustrini canopy since we wanted to know what it would look like. The paint schemes are equally appropriate for either canopy, and I think too many builders attribute the strong eye appeal the Falcos of Hansen, DeAngelo, Aronson, etc. to the canopy when it's really the paint scheme that makes the airplane. Karl Hansen's Falco with a standard canopy would be just as spectacular.—Alfred Scott

Still find myself unable to begin construction at this time but am not giving up hope. Refinements in the plans, kits and construction manual are excellent. News letter is great.

Murph Ivey
Anderson, South Carolina

So you don't like the Nustrini canopy, Meester Devoe! The gentleman on the right would like to talk to you.

I have just been informed that you reported in your newsletter that certain allusions in an article of mine were to the Polliwagen and [name withheld].

I had allowed myself to be gradually dissuaded, mainly by Stephan Wilkinson, from my first impression of you as an unprincipled person or, more colloquially, an asshole. I am sorry now that I was not more loyal to my original opinion.

Please do not communicate with me again, either through intermediaries or directly, even, or especially, to apologize for this act, by which, I suppose in order to make yourself appear to be one in the know, you have embarrassed me and probably deprived me of the confidence and friendship of [name withheld].

Peter Garrison
Los Angeles, California

It's only fair to Falco builders to pass on this warning from Peter Garrison—who must be right since I can't figure out what I did that was unprincipled! I didn't mention the name of Peter's "anonymous" source, but all of his references were so specific they seem completely obvious to me. In one of his books, Peter wrote eloquently about the failure of the aviation press to warn the public of the shortcomings of the BD-5. I thought Peter's intent was to broadcast all identities, and I still do. Maybe Peter was just off his fiber and should plead the Twinkie Defense. And as for Peter's colloquial description of me… heck, everyone already knew <u>that</u>!
—Alfred Scott

Just finished all the wing ribs. I should have bought them—$825.00 was cheap for wing ribs but I am finished with all ribs now.

Ben R. Burgoyne
Arlington, Washington

Let me say again how impressed I am with your prompt response to all letters. I don't know how you do it with your work load—I know, you just don't sleep. I hate to further expand your hat band, but I must say that the effort and product of such items as the construction manual, builders letter, flight manual, revisions, and specifically the flight test guide more than favorably reflect on Sequoia as a company dedicated to producing the finest homebuilt. Only wish I'd have started a little later.

I recently got back from the Reno Air Races (didn't enter). Lots of fun, but on the way home I was under flight following—with so much traffic leaving Reno I couldn't pre-file. Anyhow ATC called traffic at eleven o'clock with no altitude. After a few minutes my passenger picked up a Bonanza about 300' low. I told Center I had traffic and was going to pass close but had him visually. I went by him about 10-20 mph faster and close enough to wave. On a chance I called him on 122.9, and he answered. As an excuse I told him Center was a little concerned about him since we had head-on traffic at 12,000' (we were at 11,500'), and they didn't have any altitude on him. Fully expected him to ask what was that white thing that just went slipping by. When he didn't rise to the bait, I even asked what he was indicating for airspeed. 142 knots period. Ruined my whole day, but it's nice to know you can outrun a Bonanza at cruise.

Above: John and Pat Harns after the first flight.

Still don't have the data for performance charts. I was hoping to get the doors installed first. I feel much better looking at Karl's data you sent. We really aren't *that* far off and me with *no* doors.

John H. Harns
St. Maries, Idaho

I have finished the tail section, fuselage frames, wing spars and ribs, many wing and fuselage fittings. A new builder, Andy Loncarevik and I stay in contact. We will probably finish about the same time—his buying more kits speeds up his project. Your new construction manual gives new enthusiasm to build as everything is more complete and finalized than previous versions. I always rationalized "I'll wait till *they* get things figured out before proceeding further." The new manual all but spoon-feeds us first time builders. It's a complex design but *not* unmanagable for beginners.

David J. Kritzer
Jacksonville, Florida

After reading magazines and talking with other people I find it hard to find anyone who can say anything bad about the Falco. People always use the Falco as an example of how things should be built and designed. Keep up the good work, and I hope I'll be able to get a Falco built soon.

Jim Nickolaou
Hughes Aircraft Company
Los Angeles
California

I am just about to finish the main wing spar. That is the last separate part before starting assembly of the aircraft. I do have all parts ready by now, including the engine, propeller, etc. All control surfaces, flaps, stabilizer and fin are finished. I expect to start the assembly of the fuselage in October, and I think my estimate for first flight in '88 is within reach.

Bjørn Eriksen
Bodø, Norway

Progress nil!! Still recovering from 18 months unemployment! Your new, refined building instructions are a masterpiece.

Peter Jago
Fayence, France

I was reading about the White Lightning landing on a freeway divider and messing it up a bit. Fuel mismanagement. That reminds me again of what I was telling you about the Falco fuel management. If you empty the rear tank, then refill the rear tank you have an air bubble from the low spot in the line to the selector. If you select the rear tank then the bubble comes, and it takes a while to clear it out. If you're at 1000' you may have a squeeker to keep from landing especially if you get excited and make a few missteps. The White Lightning went off the end of the runway at the CAFE 400, again someplace else off the end, and now on the freeway. We sure don't want this for one of our Falcos.

When you fill an empty tank you expect to be able to switch to that tank and go. The front tank *yes*, the rear tank *no*. Knowing where the lines went I expected a delay on the rear tank so I switched at high altitude. Glad I did. I will only empty the rear tank and inverted tank in an emergency. Run it down but not out.

I was complaining about not getting an increase in speed on the cleanups. I remember telling you I never thought I'd see over 165 KIAS on the level. So when I see 190 KIAS, I've gained 25 knots somewhere, and I think there's a bit more yet. I blocked about a fourth of the oil cooler so it's running about two-thirds up in climb and in the middle on cruise. The CHT is still about the same: climb about 380°, cruise about the middle or slightly below. Certainly not a problem but possibly some more air and drag can be blocked off on the outlets or leaks.

On the Friday after Thanksgiving, I flew a photo session with Joel Riemeo for *Flieger Magazine* in Germany. I think we got some good pictures. I had him take some underside for me with my camera as I still haven't done the final swinging and adjusting on the gear and doors. By the pictures the nose gear door is about 1/4" from full closed. When I get it closed I will have a bit less air coming out of the cowl.

After the flight session, I flew back to Lincoln. I was flying at 23/2100 at 6,500' (density altitude about 8,000) indicating 152 knots at 6.8 gph and a true of about 200 mph. The DME read 186 knots at one point. Even though I haven't done the calibrations yet, I feel the gauges are pretty close. The 200 true is a reasonable figure. If your friend Stevie comes out, I'll give him a cruise. The speed is there.

When we did the familiarization flight, Joel and I pulled about 3 g's and not a mark on the cowl from the spinner. I am happy with the close fit, and I like the looks, too. I swear the Falco is flying better than ever. Joel was properly amazed with the way the Falco flew. We took off with zero trim. He was amazed also that we still had zero trim when we landed.

Karl M. Hansen
Roseville
California

The spruce kit is on order from Western Aircraft Supply. It should be here by Christmas. I made the tail group fittings, using your 821 kit. The use of off-the-shelf extrusions and sheet was a stroke of genius on Albert's part. I closed off an 8'x20' corner of my hangar so that I can heat and air condition it. I should be able to build all subassemblies except the main spar here. I couldn't spare any more room at present as I have a Luscombe and Waco Vela in the hangar, and Judy wouldn't allow me to seal off her kitchen door which opens into the hangar.

Ralph Braswell
Ocala
Florida

Next time I see Albert, I'm going to give him a bonus!

—Alfred Scott