Falco Builders Letter

Ben Burgoyne and his Falco, the 25th Sequoia Falco to fly.

First Flight: Ben Burgoyne

My Falco first flew September 19th. John Harns came over from St. Maries and took it up. Only a few minor things like the light for the gear transit did not light up. Also, he said the gear horn did not sound, but I found out later it was because we had jumpered the terminals to cycle the gear on the ground before takeoff. When I removed that by-pass for the pitot switch, the gear horn sounded okay, etc.

John flew my plane about 20 minutes, then took me up and checked me out in his Falco. I did well with landings and stalls, etc, so when we landed he said, "Now, go fly your own." So I did.

It flies beautifully. At speeds of 140 to 160 knots, I need a little right rudder (just the weight of my toe) to keep a heading. Up to 180 knots, I need a little added pressure on the right rudder.

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First Flight: Perry Burholm

The 26th Sequoia Falco flew on November 14. The Falco was built by Perry Burholm, who lives in La Jolla, California. Perry started the plane in December 1982. He built all the the wood parts himself, made many of the simpler metal parts, but used kits for everything else.

Perry had previously built a Monerai sailplane and had spent most of his fly-

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In This Issue:

Around the Falco Patch

For the first time in several years, the Great Oyster Fly-In was blessed with good weather and those who came had a great time, not to mention the tastiest oysters you ever had. We also had the first homebuilt Falco—Terry and Mae Smith arrived in the early afternoon, and I got my first ride in a 180 hp Falco.

Actually, it's a 192 hp Falco after all the things High Performance Engines did to the engine. Terry has the Nustrini canopy, and I have a standard canopy neck. Even after removing the seat cushion, I was still not comfortable in the plane, but I scrunched myself down, and we went for a ride.

I have spent years of flying off this grass strip in the Corporate Disgrace. My Falco is a hundred pounds heavier than it should be and there's a tired 150 hp engine driving a fixed pitch propeller. Any doubt that you may have about the need for a constant-speed propeller is quickly erased when you attempt to take off from a grass strip in the Corporate Disgrace.

You push the throttle in full and the tachometer advances to 2200 rpm, where it sits for the entire takeoff. That gives you 115-125 hp, and the acceleration is glacial. You slowly start to move through the grass, and you pull back on the stick to get the nose up. Any lift from the wing greatly reduces the drag of the tires in the grass, and the plane starts to pick up just the tiniest additional amount of speed.

Finally, the plane starts to get light on the gear and starts to skip along the grass. This moment always comes just as you are about to chop the throttle and stand on the brakes, but *finally* the old lady skips a couple of times and staggers into the air. And as you finally clear the fence with a modest amount of altitude, you realize you actually broke ground about halfway down the grass strip. It could have been much worse, and you still would have made it.

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Ben Burgoyne

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I had some delays in getting my registration numbers. I sent my application in on May 9, and after two months I had received no reply. I phoned Oklahoma and they said—after a long wait on the phone—"Your application is incomplete. There is no notarized form saying you built it."

So I sent them this form and a week later, I called again. They said, "Okay, now we can start your application, but you will have to go to the end of the line. We can't put you ahead of those whose application was complete."

In my instruction sent from the FAA, they said this form was necessary at the final inspection. Then I had another month's delay getting the FAA examiner for the airworthiness certificate. Then another week for John Harns. So it went.

Now I have six hours on the plane and no problems except for the transponder and marker beacon lights (sounds okay though). I was up to 16,100 feet and still climbing when I decided that was enough without oxygen. I have to get 25 hours within 25 miles of home base before departing to parts unknown.

I have the main gear doors ready to put on and the hardware ready. The upholstery was done by a local airplane upholsterer. Also it was painted by a local professional painter. N-7B looks beautiful!

—Ben Burgoyne

I called Ben Burgoyne the other day to see how things were going with the Falco. He now has 22 hours on the plane and is enjoying the plane. Most people find that the Falco's light, powerful controls take a bit of getting-used-to, and I was a bit worried about how well Ben would do in the plane.

Ben says, "It's very easy to fly. I haven't had any trouble. It is very stable and easy to do instrument approaches. It's easier to fly than a Cessna 182, but of course the stick is much more sensitive. I learned to fly in tail-draggers—Luscombes are harder to fly that this. It lands beautifully; I haven't made a bad landing yet. It flies like a dream. I'm just very happy."

(This is very unusual, and it's rare to see someone with mostly Beech/Piper/Cessna time fall into the Falco with such ease. Please approach your Falco with caution and get someone to check you out first.)

Ben Burgoyne hails from Arlington, Washington, and he built all of the wood parts but used kits for the rest. Ben is a doctor and was just in the process of retiring when he started the Falco in March 1985. Ben is a cheerful man who addressed most of his early letters to me as "Dear Walter"—as in Sir Walter, I suppose, but I was never sure if Ben was joking or confused.

There were numerous problems with understanding the drawings and some of Ben's questions made no sense until I realized he was using both the newest drawings and also the outdated drawings that had been replaced. I kept begging Ben to have a bonfire with the old drawings, but for the longest time he used both sets.

This laid-back practice coupled with his doctor-prescription handwriting conjured images of being a patient of his—"Lemme see now, I know I had it somewhere in this bag—nurse, have you seen that whatchacallit medicine? Wait a minute, this looks like it. I'm sure this is it—yeah, this is probably it. Okay, now if you'll just roll up your sleeve there...."

Except for the standard canopy, Ben Burgoyne's Falco is identical to Jim DeAngelo's. Same paint scheme. Same colors. The Falco has a factory rebuilt IO-320-B1A engine and weighed in at 1,285 lbs empty with radios.

Right now he is just flying off the required hours and tinkering with the plane to get rid of the inevitable problems. The alternator analyser doesn't work at all. He is installing a new loran antenna and the marker beacon lights still don't work. And he still needs to install a trim tab on the rudder, but otherwise the plane is well balanced and flies with the trim tab in the middle.

Ben says his Falco is not particularly fast, producing 160 to 165 mph at 23/2300 and with no wheel well doors, but "it's a delight to fly."

—Alfred Scott

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Perry Burholm

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ing time in gliders. He owned a standard Libelle 201, one of the first fiberglass competition sailplanes.

In the first part of the construction, Perry made remarkable progress with the construction. He knocked out the wood parts for the plane in a surprisingly short time, which was doubly remarkable when you realize that he was working in a one-car garage. As time went by and as the plane took form, the space constraints slowed things down so that Perry eventually had to move the plane to the airport to finish it.

N772SF came in at 1141.6 lbs empty with the CG at 63.26", with a 160 hp IO-320-B1A and all painted in white, with black and red stripes.

With most of his flying in gliders and without much recent time, Perry wisely got Jim Slaton to do the first flight. Jim flew it on November 14 and put in about 45 minutes in the plane. The entire flight was done with the gear down, and Jim just took it through the routine stability checks of a first flight. With the gear down, you can't tell too much about a plane, but it needed a little right rudder, otherwise it flew nicely.

There was, however, just a tiny little problem with the engine, which kept trying to cut out. The first time this happened was at 800 to 1000 feet, right in the airport pattern, and it was an unsettling experience for Jim. The engine cut out for 3 seconds and then started running again normally.

Then 4 to 5 minutes later, the engine did the same thing, and it continued to do this for the rest of the flight. With more altitude and as he saw the regular pattern form, Jim became less concerned. It's not really clear to me what happened. Jim said that it was "just like you turned the key off" and thought all four cylinders were not firing. From the ground, Perry and a mechanic said they could hear the engine sputtering but thought the engine had not completely stopped running.

After Jim landed, the mechanic has given the engine a thorough going-over. The ignition switch was a suspect, but it checked out all right when they removed it. The mechanic did find that the injector nozzle on the No. 4 cylinder was clogged, and the plugs were fouled. Since that first flight, the plane has not

flown again, but they have run the engine extensively on the ground without a problem. Perry hopes to get the plane back in air shortly, but he's the manager of a photographic lab and this is their busy season.

Over the years, we have had occasional problems with the main gear oleo shock absorbers. Sometimes there is a tiny pinhole leak in the weld at the top of the piston. The hole is normally so small that you can't even see it with your naked eye, but once you put pressure on the thing, the air finds its way out. Whenever we have this problem, we just replace the cylinder and put the defective cylinder on the shelf to be remanufactured next time we make those parts.

The other problem is with leaking under the valve. This normally shows up as a slow leak that lets the strut down over a one-to-three-day period. The cure for this is to use a little tool with some valve grinding compound to polish the face that the strut valve seats upon. This cure has worked for everyone except Perry Burholm who was jinxed. I've lost track of how many cylinders we had to send to poor Perry, and frankly I don't even want to think about it.

It was like a bad joke. Perry would polish the strut valve base, pump the cylinder up and come back the next day to find the struts bottomed out. He would pump the cylinders back up and spray them all over with Leak Check. Not a single indication of air leaking out, but the next day the cylinders would be flat. Then he submerged them in water, and later in a bath of oil, and never could see a single bubble come out. But when he put them back on the plane, the struts would go flat overnight. This type of thing can give you paranoia. Finally, the jinx ended and the struts held. Lordy, I hope we never have to go through *that* again.

—Alfred Scott

Around the Falco Patch

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There's no such suspense in a 180 hp Falco. From the moment you advance the throttle, there is no question that you are going to jump off the ground in very short order. The only thing that is at all in doubt is the direction of the takeoff. You don't have the steering authority that you get on pavement, and when you pull the nose up this gets even worse. The result is that with all that torque, the Falco skitters off to the left something terrible. I think the only way to do it right is to attempt to take off on a line about 5° to the right of the runway.

With 192 ponies up front, Terry's Falco has almost as much power per pound of airframe as the SF.260, but the wing loading is much less. It all adds up to a short, authoritative insertion into the air. I'd guess that we broke ground in something short of half the distance it took the Corporate Disgrace, right about the place that the old lady started to exhibit the first, hopeful lightening on the tires.

Then Terry selected gear-up, and the landing gear wound up as I watched the load-reading ammeter. Terry has the full set of gear doors and all this adds up to a big load on the retraction motor. The gear came up relatively quickly, but about half-way up, the ammeter needle started a steady swing to the right, and at the last few seconds before the circuit breaker tripped, it was pegged at 80 amps. Terry then cranked the gear the last four turns, and he had to exert a surprising amount of muscle to do this.

Funny, without the wheel well doors, the motor will bring the gear up in 7 seconds and will pull only about 5 amps. Put Terry's Falco on jacks, and the gear will zip up without any difficulty, but it appears that the air loads on the main gear wheel well doors coupled with the force required to close the nose gear wheel well doors are almost too much for the motor. The motor starts to slow down, the amps go up, and Ohm's Law takes over. You are in a downward spiral of increasing amps and decreasing voltage. Once you get voltage drop, you get it bad.

Jim Slaton solves this by selecting gear-up very early and gets the gear up completely before he reaches 80 knots. Do it like this, he says, and the gear will come up smartly without popping the circuit breaker. Let the speed build up, and you are in trouble. I'm beginning to wonder if maybe we ought to have two gear boxes for the Falco, the present one for the standard set of doors and a low-geared version for the full wheel well doors. I designed such a gearbox for Karl Hansen a few years ago. It has twice the gear ratio, and it takes twice as long to bring the gear up, but it has no lack of power.

Except for the gear-motor problem and the lack of headroom, Terry Smith's Falco is a delight in the air. The upholstery is attractive and just makes the plane feel good to be in. We throttled back and trucked around at 160 knots indicated while I felt out the plane. Terry had never rolled the Falco. I quickly put an end to that, and before the flight was over, Terry was doing acceptable barrel rolls.

The Falco flew like all Falcos do, light on the stick and with a high rate of roll. But also like all of the homebuilt Falcos I've flown, the breakaway force on the stick is noticeably higher than on the Corporate Disgrace and the rate of roll is slightly lower. At full aileron, the forces

are probably the same, but there's a fluid, loose-as-a-goose lightness to the controls of my Falco that I don't find in these other Falcos. That first minute movement of the stick is so easy in my plane that it feels effortlessly greasy. With the others, the stick is still light, but there is the tiniest amount of sticksion in the feel of the thing.

I attribute all of this to the poor workmanship of the wing on my Falco. Just in front of the aileron and as it passes over the aft wing spar, the top skin pulls down slightly so that the ailerons appear to be about 2mm high. I think this causes the air to re-attach and contributes to the lower breakaway forces and to the slightly higher rate of roll. The relationship between protruding control surfaces, controls effectiveness and low breakaway forces is well understood in aerobatic circles. All of the competition planes have 'fat' ailerons.

Earlier that day I had taken up Al Aitken and a fellow Marine Corps aviator, Joe Baez. Joe flew A-6's, and Al wanted him to see how the Falco flew. Once we got into the air, Joe took over the controls, and like any jet jockey he flew the airplane smoothly from the first time he laid his hand on the stick. I sat back, watched him fly the plane, showed him a few rolls and then let him do one.

It was lucky that we were at 3000 feet. Joe did a nice smooth roll to the right, but he didn't pull the nose up enough, didn't give it full ailerons, and he pulled back slightly on the stick. With a beginner, I always watch for this, catch it early and take over the controls. But with a more experienced pilot, I was a little slower to take over. Finally, when Joe had the nose pointed straight at the ground, I chopped the power and pulled back on the stick.

"Did you mean to do that?"

"No!" said a rather embarrassed Joe Baez.

Joe said that he never had any instruction in aerobatics and that he was, in fact, a right-seat, ordinance officer in the A-6. He had, of course, taken the controls of the jet attack bomber and had flown it many hours. He flew the Falco very well, but it was such a surprise to me to see someone of his experience fall into the old trap of scooping a barrel roll.

The Great Oyster Fly-In is certainly an unusual fly-in, and it became weirder still with the official unveiling of a painting by Jack Amos. Jack is an illustrator, graphic designer, free-lance art director and the designer of our Falco brochure. Jack is a veteran of many an Oyster Fly-In, and a vision came to him one evening while he was drinking something very lethal. He started slapping oil on canvas, and the result is the painting "Where Oyster Pigs Gather". The half-pig/half-oyster creature sports a Falco paint scheme. If that doesn't strike you as weird, then come next year and see the unveiling of Jack's next creation, "Big Al's Oyster Bar", which I haven't seen, but which Jack says is worse.

As you might imagine, Tony Bingelis's Falco didn't stay on the market for very long. Although he was well under way with his Falco project, John Kerosotas reflected on the idea that the reason he was building a Falco was to *get* a Falco, and also on the notion that Tony is only one year older than him. John put his checkbook in his pocket, bought a one-way ticket to Austin, and flew the Falco back home.

—Alfred Scott

Goings On at Sequoia Aircraft

The main thing that's going on around here is work on the wood kits. We finally received the spruce for 50 tail spar kits, and I have three of the spars jigged and going together. Once you get the pieces cut, the assembly process is relatively simple. There is not much more than ten minutes work to glue up any of the tail spars, and I normally do one each day.

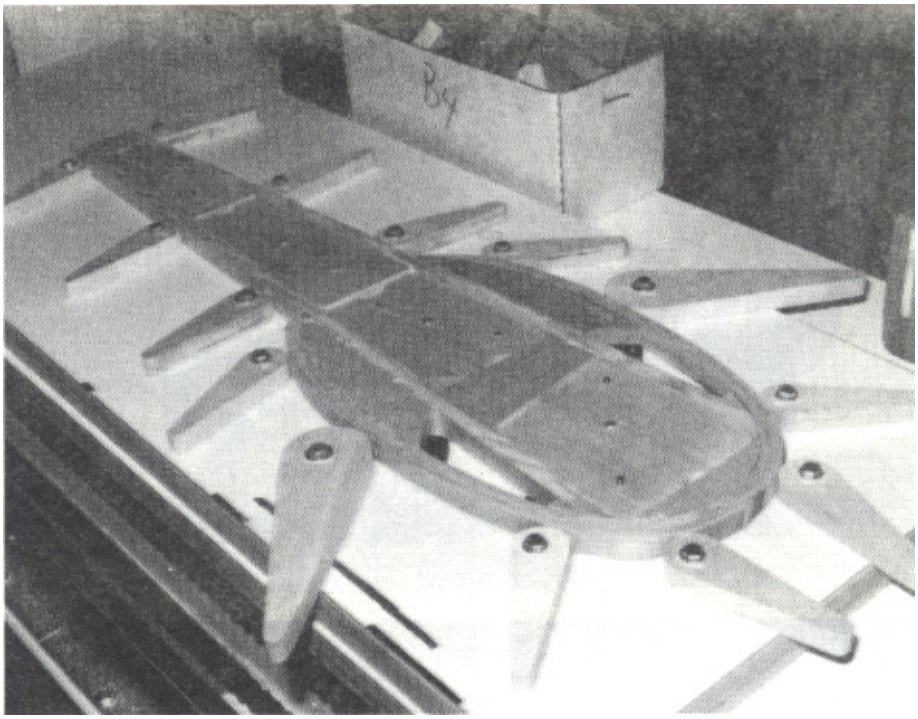
None of this is particularly interesting work. All of the jigs for the tail group spars are "inside" jigs. I make the jigs by carefully drawing with ink on the jig base of 3/4" baltic birch plywood covered with white Formica. Then I cut the blocks that mount on the surface of the jig, mount them with dowel pins and screws, varnish and wax them.

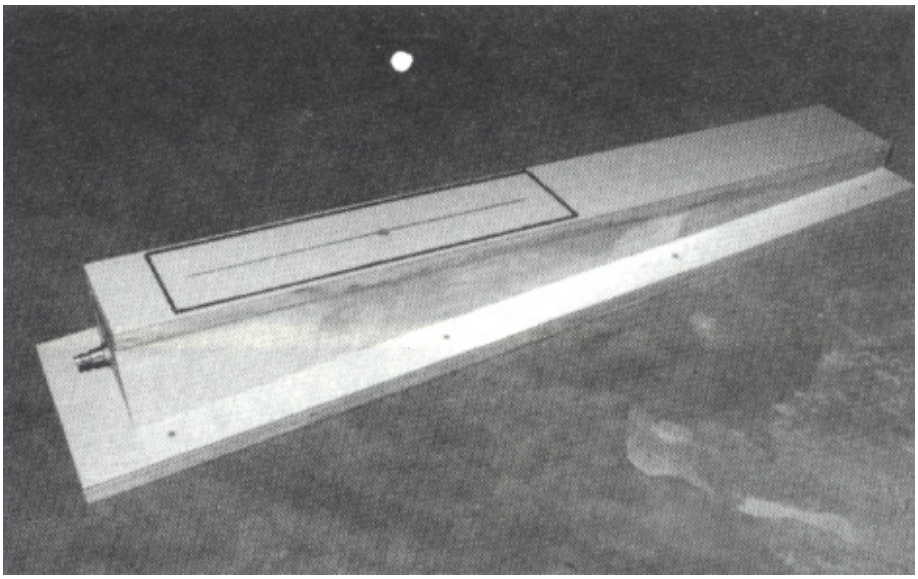
The next step is to cut all of the pieces that go into the glue-up. In each case there is a simple fixture to hold the blocks on the table saw. I've really got the jig-making business down to a science, and it usually doesn't take me more than five minutes to make the cutting fixture for a block, then I knock out 50 ship-sets of those blocks, put them in bags and go on to the next block.

Finally, I mount cam-clamps on the jig to do the clamping. I make the cams of baltic birch plywood and bolt them down with 1/4" bolts and with T-nuts hammered from below.

If you need to make a cam-clamp, it's easy and I always do it with a simple formula that always makes a nice clamp. I draw a circle of diameter D, then I draw a line 5.7D long from the center of the circle. That gives me the length of the handle. Then I locate the pivot bolt hole at .13D at right angles to the centerline of the handle. I make my templates of acrylic. I put the template on the plywood, mark the pivot hole, drill the hole in the plywood, put the template back in place with a bolt dropped in the holes, trace out the outline and then bandsaw and sand to the pencil line.

I've got the forward fin spar, rudder spar and forward stabilizer spar in daily production now. The main stabilizer spar is next to enter the process, and I've just finished all the preparatory work. Next I go on to the elevator spar and main fin spar. I've been doing the assembly work on the tail spars, while Signora Averi is in charge of making ribs, and she is turning





Top: Forward fin spar in the gluing jig. Above: This scarfing jig uses vacuum to hold the spruce in place.

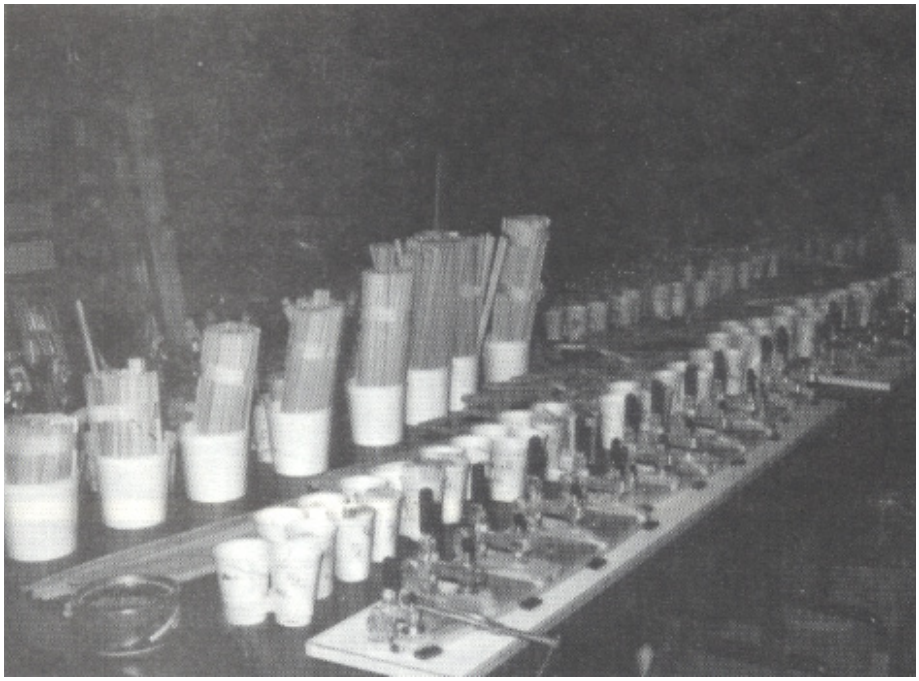
out one set a day. I would expect that we will complete fifty tail kits by the next builder letter.

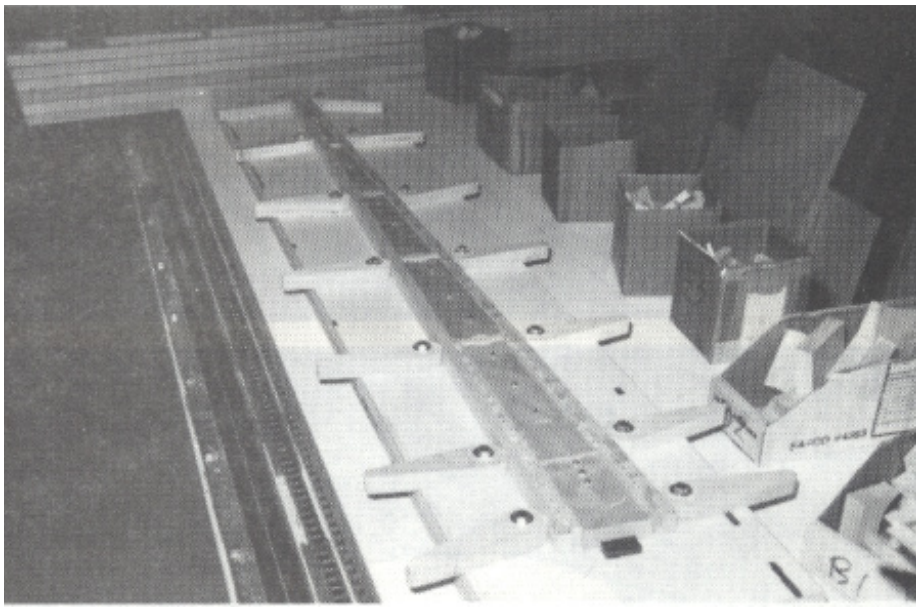
The largest amount of work has been on the main wing spar jigs. The largest of these are the laminating jigs, one each for the upper and lower spar booms. These jigs mount on Gonzales and have built-in Jorgensen clamps mounted on a swinging foot base, thus the clamps are a permanent part of the jig, and you don't have to reach for the clamps.

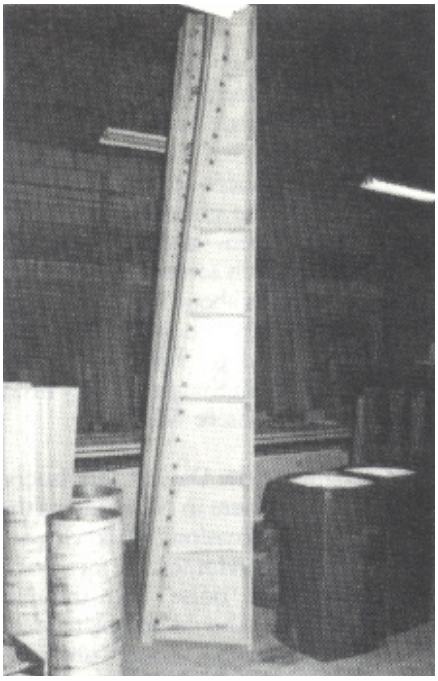
The other jigs are essentially holding fixtures to hold the spar booms at the correct height and angle for milling. The pieces are held in place with vacuum. I also have made a vacuum-fixture for scarfing the spruce. These jigs and fixtures are made to tolerances that would be impossible without the Gonzales machine, and which are quite easy to achieve with it. At this time, we are waiting for the arrival of the spruce for the wing spars, and I will be spending quite a bit of time on that in the coming months.

I've got my fingers crossed, but so far at least, the jigging methods that I have used have worked well, although some of them did not work out exactly as I had envisioned and required some minor modification.

Maurizio Branzanti is hard at work







Top: Brenda's Rib Shoppe. Top right: The main wing spar laminating jigs. Above: The rudder spar in the gluing jig.

translating Stelio Frati's *L'Aliante* (*The Glider*) and has several chapters finished now. Fernando Almeida sent me his copy of the book. *L'Aliante* is an engineering textbook divided into nine chapters covering preliminary considerations, general characteristics, aerodynamics, stability, mechanics of flight, applied aerodynamics, starting the project, design of the aircraft, and structural design.

Many of the chapters have extensive appendices; for example, the chapter on general characteristics has an appendix of nearly 100 pages showing the general layouts and a brief description of currently produced gliders, and another chapter has a lengthy listing of airfoils.

Once you ignore these dated reference sections—as we plan to do—the book is a timeless classic of the engineering involved in aircraft design as it applies to sailplanes. There is a huge amount of similarity to sailplane design, and the design of powered aircraft.

I have, I'll confess, no good idea about what to do with the book once it is translated and illustrated. When I heard that Stelio Frati had written a book, I knew I would have to get it translated—what to do beyond that, I haven't the foggiest. I'll face that when I get to it—one possibility is just to distribute it on computer disk and let people print out their own copies.—*Alfred Scott*

Brenda's Corner

We have a new person working on the ribs—ME! Alfred had been working on the ribs in his shop at home, but he found them boring and decided it made more sense to bring the jigs in to the warehouse and have someone work a few hours a day on them.

Instead of trying to find someone to work on them part time, I decided to give it a try. After a couple of gluing lessons, I have started turning out about a set a day. At first I didn't wear gloves. Alfred said the acid wouldn't hurt you if you washed your hands every 30 minutes or so, but after losing the skin on the tips of two fingers, I decided it was gloves for Brenda.

I have been working on the elevator and stabilizer ribs. I like doing this sort of thing, and it's neat to come in in the morning and go back and take the ribs out of the jigs to see how they turned out and if I got enough glue in the right places. I have had a few rejects, but I'm learning. Don't worry, none of the ribs will be shipped without Alfred's inspection and approval.

If any of you are planning to use a conical engine mount, please remember that is not an engine mount we keep in stock, and it has to be a special order. You should allow for several months lead time.

Best wishes for a joyous holiday season.

—*Brenda Avery*

Construction Notes

If anybody wonders—as I did—where on earth to acquire fine brass screening to use as anti-mud-dauber barriers inside the underwing fuel-vent outlets, go buy a $1.89 kitchen-faucet aerator. Inside the kind my hardware store carries is a fine-mesh brass screen—actually, and propitiously, two such screens, one for each fuel vent—that's about 3/4" in diameter and works just fine when carefully bent, cut and crimped to shape around the shank of a drill-bit that fits loosely inside the vent tube.—*Steve Wilkinson*

The designer of the David Clark Isocom lives and works here in New Hampshire, and I have had occasion to talk with him on the subject of avionics. He says that to insure minimum "noise" both the mike and phone jacks should be isolated from the panel (insulated washers are available) and that they should go to a separate grounding source along with all other avionics grounds. Now all the grounds end up going to "ground" of course, but he says isolate. I believe David Clark put out a flyer on this recommendation as well.—*John Brooks Devoe*

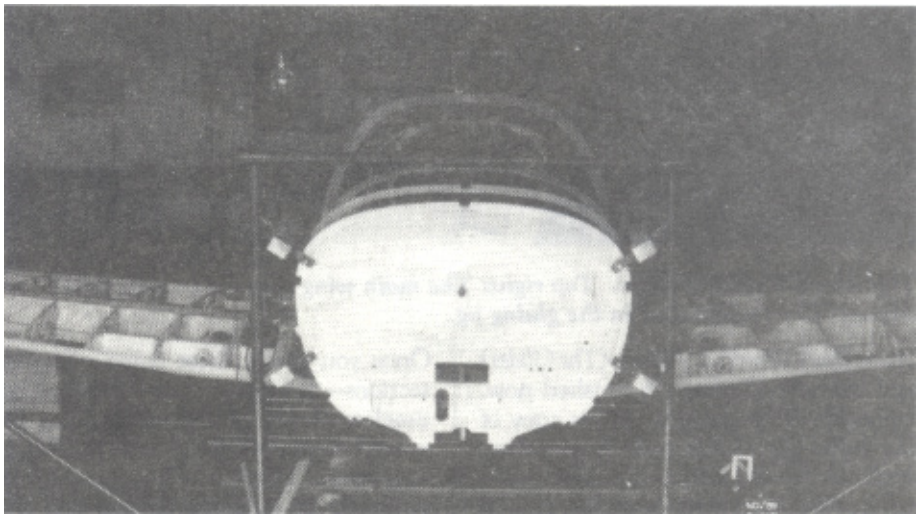
In our electrical system, we use the instrument panel as a grounding bus for avionics, panel lighting and instrumentation. Lighting and instrumentation are not sources of noise, so I think that our system effectively meets this 'specification'.

I'm hearing nothing but rave reviews on West System Microputty. Everyone who has tried it likes the stuff and has been using it in place of the old faithful microballoons. Microballoons come in two variants, glass and phenolic—the brownish phenolic type are most often used. Joel Shankle says that he thinks microballoons are better for shaping, since they give a good hard shape, but that Microputty is a better filler. It is more powdery, is easier to sand and holds a feather edge better.

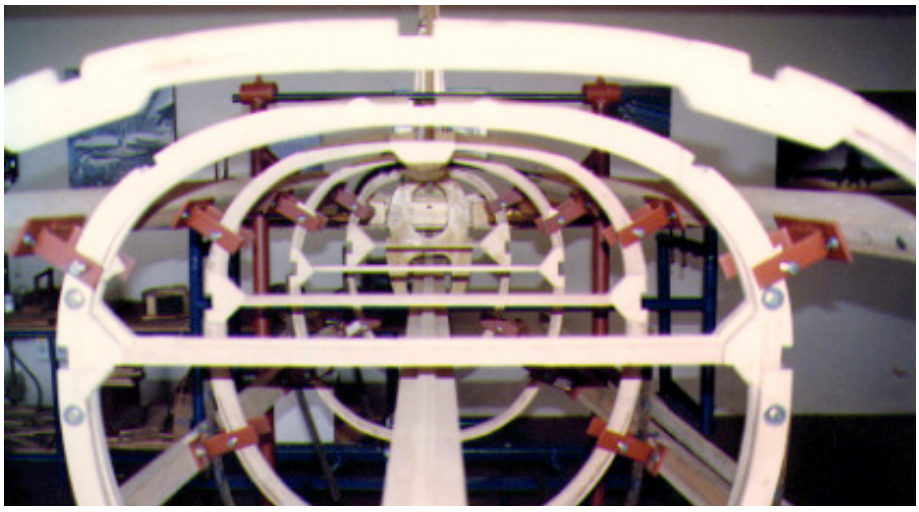
When you open a container of microballoons, you'll find a bag of dusty powder which frequently is lumpy, and when you mix it with epoxy there always is a little problem of breaking up the lumps and getting a consistent mixture. Microputty has a slightly creamy feel to it, and it mixes with epoxy very easily. West System Microputty is neat stuff, and I think it's all most of you ever need to use for filling and smoothing.

I've been using some Weldwood plastic resin glue lately for laminating the rudder and elevator tip bows. I mix a fair amount at each time, and it's always best to read the instructions on the container. These instructions, however, are the worst I've ever seen—or at least that's the way it worked out for me. They say to pour a little water into the powder, mix into a thick paste and then slowly add the rest of the water until the glue is the consistency of thick cream. For small batches and a mixing stick, that method works okay, but it's slow, difficult and the mixture is invariably lumpy.

I use a mixing device—a little propeller on the end of a shaft—that I put in the drill press. I've found that if you start



No one in the entire world has built as elaborate jigs as Brazilian Marcello Bellodi. This is his fuselage jig.



More Marcello Bellodi jigs and Marty Benham.

with water only, turn the mixer on, and then slowly pour the powder in, it mixes beautifully. You get the nicest, creamiest mixture without a single lump.

Howard Benham notes an error in our construction manual: on page 23-30, Figure 48, June 10, 1986, change the number of sheets of 2mm plywood from "two" to "one".

Howard also reports that he has enough stainless steel for two firewalls. The material is 301 half hard .016". Howard can cut these slightly oversize and ship by UPS for $15.00 plus UPS charges. Please contact Howard or Marty Benham at (316) 788-7723.

I haven't yet had the time to work out a list of plywood for the fuselage construction, but Howard Benham came up with this list: 9 sheets of 2mm 50"x50", 3 sheets of 2.5mm 50"x50", and 4 sheets of 1.0mm 50"x50" or 48"x48". Anybody want to comment on that?

Steve Wilkinson encountered a minor problem with the gascolator-to-firewall fuel line. We supply the tubing with a 15° angle and a single flared end. Unfortunately, the little blue sleeve will not slip over the bend. Steve solved the problem by slightly unbending the tubing and then re-bending it. The nut, sleeve and flared-tube system is designed to work with considerable pressure, and the function of the sleeve is to press the flared end of the tube tightly against the flared fitting. There is virtually zero pressure in this line, and I think it would be perfectly acceptable to file a slight clearance radius on the inside of the non-flared end of the sleeve.

Our fax machine has been busy with messages to and from Stuart Gane and Neville Langrick in England concerning an alloy of aluminum extrusions that Doncaster Sailplanes supplied. The alloys supplied have roughly the same strength as 2024-T4 aluminum and are acceptable for use as hinges and many other parts of the airplane. Some of these extrusions do not have the usual fillet radius in the angle; instead, there's a sharp corner. This is *not* a good thing at all, since a short corner creates what engineers call a "stress riser"—a concentration of stress at the sharp corner. While the part may be of roughly the same strength of a part that has the fillet radius, the fatigue life of the part will be dramatically lower.

For many parts, such as the aileron and flap hinges, the extrusions have been used only at the base of the hinge. Because the base of the hinge is so wide, the loads are spread over a large area and these sharp-cornered extrusions do not give us great concern—although a regular inspection for cracks is a good idea. We do have great concern about using such extrusions for the P/N 720 fittings that support the engine mount. These extrusions have a substantial bending load and the fittings are extremely critical to the integrity of the airplane. Please do not use these no-fillet extrusions for the P/N 720 fittings. Neville Langrick has such fittings on his Falco and is in the process of replacing them.

—Alfred Scott

Tool Talk

Craig Bransfield recommends a Skil Model 7131 belt sander with a #97500 "support frame" accessory. Craig says, "This is a readily available sander, however none of the consumer outlets seem to stock the support frame, which is available direct from Skil at about $11.00 COD (allow about 8-10 weeks for delivery). I would not recommend using such a sander without a support frame or depth stop, due to a tendency toward rocking and instability. With the frame, however, the tool is very easy to handle reliably, and can be used for stock removal where the grain is not all unidirectional. Even the internal dust collection system works well. Be sure to clamp down your work piece, since the drag generated by the sliding belt is considerable."

When you use resorcinol glues, you really have to measure the two parts by weight and for most people that means making a proportional balance scale. Pictured here is my contribution to the art form, made in one evening of 3/4" baltic birch and glued together with instant cyanoacrylate glue.

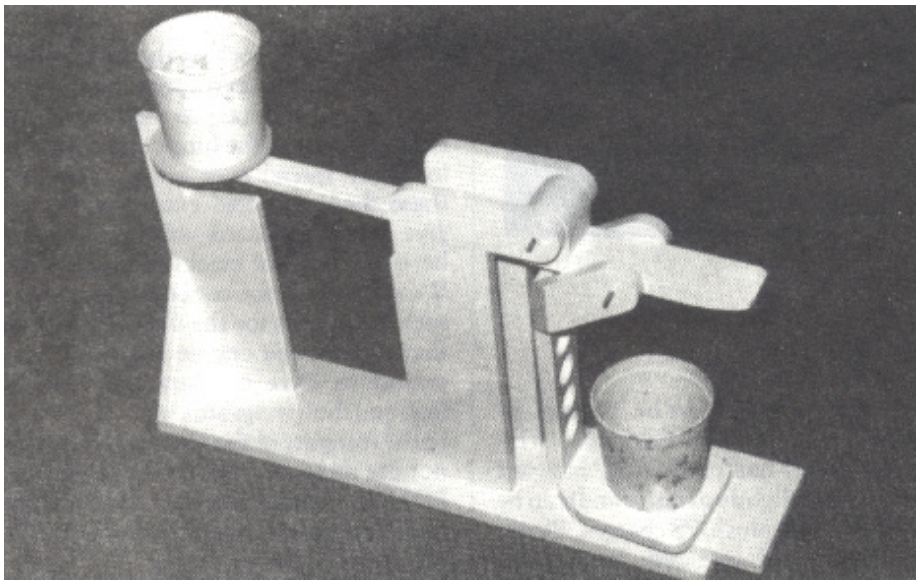
This is actually a dual scale which will balance at either 4:1 or 5:1. The powder is put in the cup on the top of the arm and is located 15" from the pivot point. To locate the cup at this point, there's a round disk with concentric circles drawn on the top face.

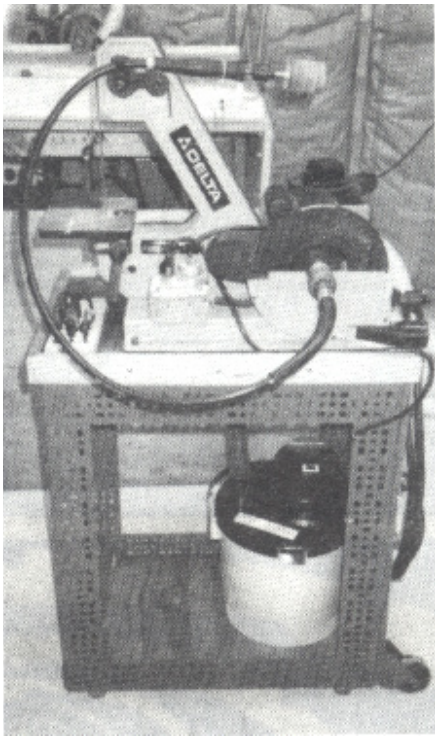
The liquid is put in a cup below the other end and hangs from one of two points, 3.00" or 3.75" from the pivot point. I have it set up so that it balances with empty cups in place and set up for a 4:1 mixture. For a 5:1 mixture, you move the point from which the cup hands and then put a balancing weight—just a piece of plywood—under the cup.

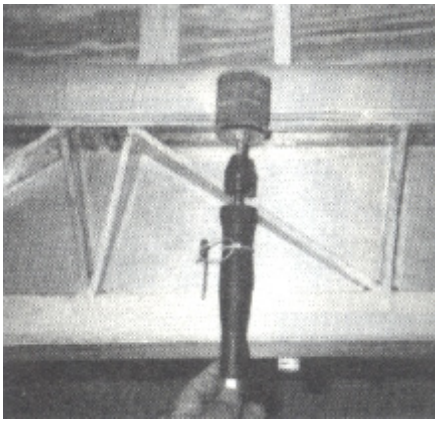
The pivot point is about 1-1/2" above the pivoting arm and the ultra-low-friction bearing system is nothing more that some quarter-inch aluminum tubing pressed into the plywood and with .125" music wire as the "shafts". Brass tubing would probably have been better, but sometimes you just use what you can lay your hands upon.

There is a new and very interesting bar clamp on the market—the makers of Vise-Grip have come out with the Quick-Grip bar clamp. Available in 12, 18, 24 and 36 inch sizes, the clamp is just like any bar clamp except that you only need one hand to use it. There's a pistol grip on one end that you squeeze to tighten the clamp. Very handy for those situations when you need an extra hand.

Is there anyone out there who doesn't know about drywall screws? This is one of the greatest inventions of modern times. These screws are wonderful for making jigs and general carpentry work. You normally install them with a Phillips head bit in an electric drill. The nice thing is that you don't need to drill a hole; you just lean on the drill and pull the trigger. They have a very sharp point and are case-hardened. These screws were originally developed to install drywall over sheet metal studs, but they have become so popular that people use them for everything. The other day, I noticed that my local hardware store is stocking self-drilling drywall screws. These have a tiny drill bit on the tip of the screw and, they drill their own pilot hole in thick metal.







Howard and Marty Benham rigged up their Delta belt/disk sander with a flex cable and chuck in place of the disk and use this for a sanding drum and rotary rasps.

These screws have created a huge market for electric screwdrivers, which in turn have created markets for other tools. The latest to appear is the Black & Decker pilot-point drill. These are ordinary high-speed steel drill bits intended for drilling into metal except that at the tip, rather than a normal vee-point, there's a tiny little drill to start the hole. Some are coated with titanium nitride which makes them gold in color and which makes the drill last longer and cut more easily. All of these things are intended to make the drills work better with slower-turning rechargeable drills. Gary Smith said he picked up one of these drills, spent the entire day drilling 1/8" holes in steel with the same bit, and was amazed to find it still sharp at the end of the day.

—Alfred Scott

Sawdust

• In an article comparing the Piaggio Avanti to the Beech Starship, *Aviation Week* reports, "Starship cruise performance is less than that envisioned when the program was started. The Starship design and part of the performance estimates came from a 85%-scale flying prototype built by Scaled Composites. The optimistic predictions . . . are similar to the canceled Air Force/Fairchild T-46A trainer, for which Scaled also built a subscale prototype. The full-scale T-46A cruise drag turned out to be about 40% higher than predicted." Wouldn't it be cheaper to guess?

• The metric system is now used by all nations except three: the United States, Burma and Liberia.

• "In this age of high-tech composites, no discussion of high-performance kitplanes would be complete without mention of Dr. Stelio Frati's immortal "Falco"—specifically, as kitted by Sequoia Aircraft in Virginia. This design is well over 30 years old—yet it continues to offer performance as good as that of its metal, and even composite, competitors, as well as handling qualities that even its detractors admit are probably among the best of any aircraft, kit or complete, civil or military, anywhere."—Peter Lert, "Fast Company", November 1989 *Air Progress*.

• Karl Hansen's Falco is featured on the cover of the January 1990 *Hot Kits and Homebuilts* magazine. The article is a reprint of and article by Peter Lert than appeared in *Air Progress* several years ago.

• Com' on, Lert, you get to fly all the exotic stuff, so how about a flight report on this baby? The Boeing Condor has a wing span longer than a 747 and two 170 hp Continental liquid-cooled turbocharged engines swinging 16'-diameter, three-bladed propellers. The two-stage turbochargers have a pressure ratio of 19:1, effectively maintaining the engine at sea-level conditions at 65,000'. The plane recently set a new altitude record for piston-engined aircraft, at 66,980' and on another flight stayed up for 29.4 hours—both figures are significantly lower than the plane's ultimate capability.

Dunno where you're going to sit, though, this thing's the world's largest unmanned air vehicle that flies the entire mission, from take-off to landing, according to an internal computer program.

• Jonas Dovydenas is just back from Lithuania where he had a showing of his photographs of Afghanistan war—the first such photographs shown in the USSR. While there, he visited his friends at Litovskaya Aviatsionnaya Konstruktsiya, the only sailplane manufacturer in the USSR. The factory was started in the late 1960s, began production of a simple wood-and-fabric primary training glider and then concentrated on designing competition sailplanes in fiberglass and carbon fiber.

Their earliest design attempts were unfortunate—the wings came off one sailplane in a flight test—but now they produce world-class competition machines. The company's sole computer is a vacuum-tube machine that fills a room and requires two maintenance technicians to keep it running and yet is less powerful than an Apple II. Jonas showed them photos of his Falco project; they shook their heads and said, "All those pieces. All that work."

• Here's an interesting view: "Government is responsible for the lack of single engine aircraft manufacturing today, but ironically, not for the reasons that most postulate. The simple fact is that the Veterans Administration 'subsidized' production for ten years (1968-1977, GI Bill) resulting in ten times the aircraft being put into service that would have satisfied normal demand. While most industry pundits call the current decade a 'depressed pilot period' it is, in reality, a return to normalcy."—Don Harrington, American Flyers, January 1990 *Flying*.

• **in·nu·en·do** \in-ye-wen´-do\ *n* **1** : an oblique allusion. **2** : a parenthetical explanation introduced into the text of a legal document. **3** : suppository [Italian].

• Neville Langrick's Falco won the best homebuilt award at the Popular Flying Association's Cranfield rally this past summer. That's the English equivalent of winning the Grand Champion award at Oshkosh, and as a result there has been much publicity attending the plane.

• Ever want to duke it out in the skies and *shoot* somebody? Now for just $395, you can strap on a SIAI Marchetti SF.260 at Top Gun Aviation in—where else?—southern California. They use electronic "bullets" and when you wax that guy, it turns on the "enemy's" smoke system and informs the poor thing that he has just entered fighter pilot heaven. Top Gun Aviation is at (714) 752-6676.

• Did you ever wonder what possible benefit could come from the money we have spent on the space program? I've heard every imaginable explanation: national pride, manufacturing in space, technological advances ("Why if it weren't for the space program, you wouldn't have that-there hand-held calculator"), exploring the last frontier, and preserving our stake in "the high ground"—lordy, you wouldn't want the Russians to have *that*.

But in these times of remarkable change in eastern Europe, it's worth noting that probably none of this would be happening if it had not been for the space program's communications satellites which bring world-wide television coverage to everyone with a dish antenna, and which makes life for dictators so difficult. So let others talk about growing crystals in space, I'm proud to say that the major accomplishment of the space program is the defeat of communism.

• Just in time for Christmas comes the "World's First Altimeter Watch". Casio has invented this new watch that not only tells the time but also tells you the altitude up to 13,000 feet—or the depth to 98 feet if you are skin-diving. Also good for fantasies of the airline captain coming on the intercom to say, "Ah, ladies and gentlemen, we've got this lil' ol' problem up here. It's hard IFR down below, all our altimeters just crapped out and we're sitting here trying to figure out what to do next...."

• Sad news, Joel Boterro bought Jim Martin's Falco in September, put in about fifteen deliriously happy hours in the Falco and then died of a massive heart attack on the Friday after Thanksgiving. Joel paid $75,000 for the plane and has since added a transponder and KX-155 nav/com at an additional cost of $3,000. The plane is for sale again. For information, please contact Mike Smith at the Bermuda Dunes Airport in southern California at (619) 345-2558.

• Stelio Frati reports that he is developing three additional versions of the Penguino. There's a fixed-gear version with 160 hp and constant-speed propeller that should fly very shortly. Following that will be two retractable gear versions with 160 and 200 hp.

There is also some possibility of the planes being produced in the U.S.—Mooney is said to be looking at the designs.

Mailbox

If Peter Lert is having to turn down a lot of ferries, he must be hanging out with the wrong crowd.

Howard Benham
Wichita, Kansas

I just found out something that I thought might be of interest to the others that are using the IO-320, maybe the IO-360. You know that I have had a recurring problem with an injector becoming restricted and making the engine rough. Actually, the worst plugging was on the first flight in July '85.

I noticed the other day when flying with Steve that the engine was slightly rough at the higher power settings (Steve likes to move out a bit). Anyway, yesterday I decided to check the injectors out and lo and behold the same injector was slightly fouled. My .024" wire slipped through all of the others, but was initially restricted on that one. It occurred to me that it always was the front one on the driver's side. The only difference is that *that* one is exposed to the air blast with no baffling while the others are baffled by the cylinders. I made a 2-1/4" x 2" aluminum plate and mounted it to an existing baffling screw which will effectively shroud this injector like the others. If you look at the baffling, you will see that this injector has no protection from the air blast.

I had previously lowered the oil pressure by inserting a couple of shims in the oil pressure regulator. I removed one of them which gives me a bit higher oil pressure at low rpm and now I can get 1800 rpm at normal cruise if I want it. It takes oil pressure to bring the prop to a higher pitch, during the drip I had wanted to get below 2000 rpm but it wouldn't stay there. Of course, when letting down at higher speeds, for example, 170 KIAS, it seems to be up agains the stops and the rpm will build up somewhat.

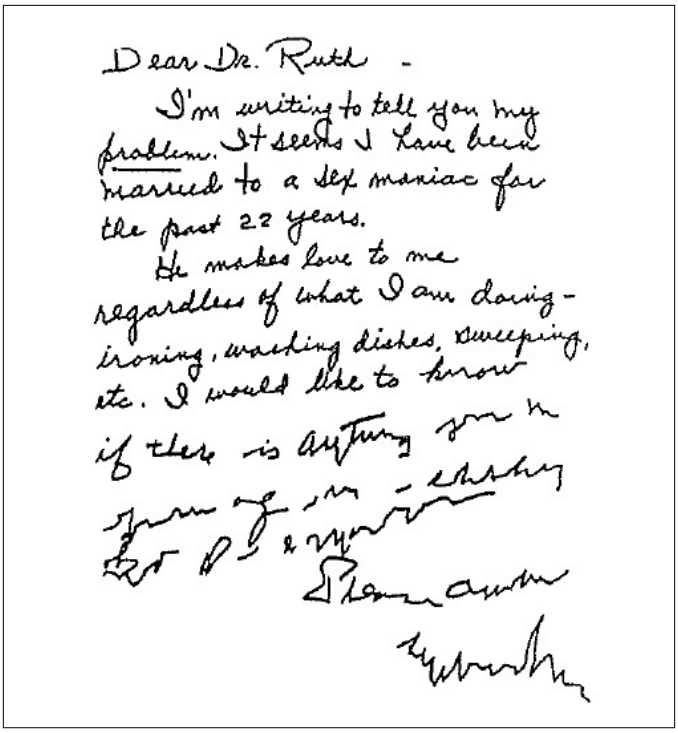
The Falco is flying real good. I'm going to try to make the CAFE 400 this year but it's going to be quite a close schedule. Mexico for a week in April and a reunion in S. Dakota in June, which may make a problem. There are a few things I'll want to do if I fly the CAFE that should give a bit more "mileage".

We are getting enough Falcos out here so that we may want to have a Falco get-together on the West Coast. We can't have a Oyster Fly-In, but maybe something up at Rogue River? I'll have to get ahold of Purkiser.

Karl Hansen
Roseville, California

Grab him by his dorsal fin. Permission granted to have an Abalone Fly-In—just remember these trends start on the east coast and then get ruined by California pre-verts.

I'm interested in Karl's observation on the plug fouling. I imagine that there could be some correlation between the temperature of the injector and the formation of gum deposits in that injector. Kas Thomas is going to run something on this in Light Plane Maintenance *to see if others have noticed the same thing.—Alfred Scott*


Dear Dr. Ruth -
I'm writing to tell you my problem. It seems I have been married to a sex maniac for the past 22 years.
He makes love to me regardless of what I am doing - ironing, washing dishes, sweeping, etc. I would like to know if there is anything you

You will think I've lost my mind. I sold my Falco project (T-88 glue). I am starting over using Aerolite and Penacolite. I love the work so really no problem.

Gary Rene
Edina, Minnesota

I have been slowed down lately because I had my Falco Factory burglerized and lost all my small power tools. This was particularly disturbing to me since I was at home at the time (I love L.A.?). I was insured but collecting from State Farm has been a nightmare. Oh well, I ended up with nice new tools so I'm back at it.

Here's an item for the Shoot Yourself in the Foot Department: I'm a builder on a budget so I don't always have everything I need when I need it (like flap and aileron hinges). I decided to build the flaps and ailerons on the wing rather than try to figure out your jig arrangement. I did not have the hinges yet so I cut wood spacer blocks to simulate hinges and clamped the spars on the wing and proceeded to build a beautiful set of control surfaces. However, when I unclamped them from the wing, I was horrified to find that on one side, I had inadvertantly clamped a twist into the aileron spar, and it sprang back to its relaxed shape. Now I get to do it over again (what a bitch!). I learned my lesson: Do it like Dr. Alfred says to do it!

Rick Fitzwater
Van Nuys, California

Falcoperson, spare that aileron! The situation is salvageable. You should re-clamp the slight twist into the aileron spar and then skin it in that position. Lots of builders have encountered an identical situation using our jig method.

Let's not get into an infallibility thing here. The method that Rick used is not wrong, and plenty of builders have used it successfully. My reason for advocating the construction of the ailerons and flaps first is that you can install the hinges first, and it's also quite easy to jig on a flat table. I've been amused at how many builders who made the ailerons and flaps the 'old' way cannot understand how the new method works, and a number of them have warned new builders that the ailerons-first method won't even work. The ailerons and flaps were always every builder's candidate for the most-difficult-part-of-the-Falco award. Dave Aronson spent 9 months fighting with them. Tim Baker said he agreed that they were the most difficult part—took him 7 days. The ailerons-first method is a slick trick, and everyone that has used it just shakes their heads at the notion of doing it any other way.

And finally, if your ailerons and flaps don't come out rifle-straight at the trailing edge, don't worry about it. Buzz Glade didn't even bother to jig any twist into his ailerons and flaps. He just slapped it all down on a table and glued it together. There's a slight step at every junction of wing, flap and aileron, but you know what? It flies just fine.—Scoti