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Dave Aronson's Falco

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Dear Falco Builders:

O Oshkosh! How you ruin my summer! In the three months before Oshkosh, I only had about 5 days that I did not work every day and night. I told Meredith and the girls that they could forget about seeing much of me until Dave Aronson was flying.

And fly he did. Dave flew his Falco on July 20, and we got the Falco to Oshkosh. It is a spectacular airplane... all that we have been striving to make it. There are some problems, and I will take these in turn.

The first problem that surfaced was with the landing gear doors. Dave had installed the full wheel well doors, and due to the wider tire, the geometry changed slightly. I would suspect that this also changed the loads on the linkage. The fitting for the linkage is mounted on the bottom of the wing skin, just under the seats, and it is mounted about halfway between the two seat track supports. Dave had installed a 10mm block of spruce on the lower surface per the plans, and he had also installed two 20x15 running fore-and-aft bridging the main wing spar and frame No. 5. The entire fitting pulled out of the airplane and left the door hanging. All of the wood broke, and it pulled a patch of plywood out big enough for your head to fit in.

I had never given much thought to the wheel well doors. I am not aware of any additional bracing that was installed on the production Falcos that had this door, and Mr. Frati reports that he has never heard of a problem. Still, it is obvious that in Dave's case the wood structure was not adequate. I suggested that Dave rebuild the thing exactly as before and then laminate several layers of Kevlar over the 20x15 spruce pieces. This he did, and it has given no further problems.

I have not had time to study the matter yet, but I think that a better solution will be to extend the block so that it mates with the seat track supports, and install a similar block on the upper side, with corner blocks at all intersections. The seat track supports are quite strong, and I would like to see the loads carried into them. I will do a drawing of this at some time and present it to Mr. Frati for his opinion.

After this was fixed, Dave and John Holm continued to fly the Falco. It was a good thing there were two of them in the airplane since on the Tuesday before Oshkosh they were extending the landing gear and the crank came off! A matter of some embarrassment for all concerned, but John Holm managed to get the gear down by jamming the broken piece down and doing a quarter of a turn at a time. In the process, John got a large blister on his hand which he wore as a badge of a true builder throughout Oshkosh.

My plan had been to fly to Oshkosh on Thursday, but I flew out to Minneapolis on Wednesday instead, taking with me replacement parts for Dave's Falco. Dave's hangar was swarming with people polishing the airplane -- I think there were 15 people in there. It was really something to see the airplane for the first time. It was sitting on jacks, with its nose up high, and in the hangar it looked like something out of the future. Later when I wheeled my Falco into the hangar, it looked really sad next to Dave's. In fact, the airplanes did not look like they were the same design.

I had asked Dave and John to remove the P/N 520 gearbox so that we could install the new shaft on the bench. They didn't like the idea and thought we could do it in the airplane. Oh, dear! That was a mistake. We started to work on the thing about midnight. We used blocks of wood to make sure nothing shifted while we drilled the holes with an angle drill. But shift they did, and by 2:30 AM we had ruined the shaft. We packed off to bed to try again early in the morning. Up early (with just a couple hours of sleep) John and I managed to screw up my second shaft.

As it happens, the company that does all of our stampings is located in Minneapolis and run by a good friend of mine. I called him and asked him to have two new shafts made by their tool shop. John set to removing the gearbox from the airplane while I drove off to retrieve the new shafts. This time we did it all on the bench, and things worked out well.

Why did it fail? The shafts were originally solid in the production Falco, and I have always been interested in getting as much

weight out of the airplane as possible. When we designed the vertical shaft, Dave Thurston and I only considered the torque of the motor. The .049" wall shaft can easily handle the torque of normal retraction and extension of a properly adjusted retraction system. Dave's system was not set up correctly, and they were cranking very hard on the last few turns to jam the gear down. (I will discuss later all that was wrong with the retraction system and wheel well doors.) In any event, it is obvious that this sort of thing can happen again, so we are changing the shaft design to a heavier wall tubing and will be sending out replacement parts. (More about this later.)

With this installed, we were able to fly the Falcos to Appleton on Thursday night. The next day we flew both to Oshkosh, but not before I got a chance to fly Dave's Falco. (For those of you that are wondering how in the devil Dave flew off all of the required 25 hours before Oshkosh and still have time to do all of the repairs, we can only say that we have absolutely no comment on the "Black and Decker Time" rumors some Falco builders are circulating!)

Now for some comments on flying Dave's Falco. I'm 6'2", and headroom was not particularly comfortable. Once I released the shoulder belts I was able to move about more easily. Other than that, the Falco is exceedingly comfortable. I liked the panel as much as I thought I would. The airplane is very quiet. Certainly it is the quietest Falco I have flown in, but it is not as quiet as a Bonanza. Dave has not yet gone to work on sealing up noise leaks, so I suspect it will be quieter before long. With the headsets on there was no background noise on the intercom although you could just hear the sing of the propeller as you changed the pitch. The noise that is there is a low-pitched hollow sound characteristic of a Falco. The low pitch comes from the fact that most of the noise is engine noise (there was no wind noise), and the hollowness from the bubble canopy which echoes the noise. The other thing was the freedom of airframe vibration, you just don't notice any. The electrical system, too, is completely quiet -- no alternator noise, no flap motor noise, no nothing!

The P-factor on take-off is quite something. Dave said that it was much more than in his A36 Bonanza. We fed in the power quite slowly, and I had no problem. Once I broke ground I bobbled the airplane around a bit to my embarrassment. Only later did I remember that a large four engine turbo-prop had just landed... so it was wake turbulence. Dave had done nothing more than shallow turns by the time I flew it, so I did some stalls and quite a few rolls, both ways, until Dave said he wasn't feeling too swift. Not wanting to foul his own airplane, we came back and landed.

The handling in the air including stalls, rolls, and all control inputs is unchanged -- it's a Falco. There are some differences. One is in the slop of the controls. My Falco has all of the bearings worn a bit, and it has a lot of slop, though you don't notice it in the air. Dave's Falco has no play at all. Dave's Falco does have more friction than my Falco, which is as loose as a goose. If you flew Dave's Falco you would probably come to the opinion that it is the nicest airplane you ever flew, but I tell you that it is not the

jewel that it can be. Several things are causing this friction, all of which are curable. First, the bushings on the control hinges have paint on the ends, so you have paint rubbing against paint. The control hinge bolts should be lubricated with light weight (30 weight will do) engine oil. Dave had only sprayed them with WD40, which doesn't provide much lubrication. On one aileron, the fairing is installed with truss head screws, and they rub the wing. Dave had intended to use flat head screws and has probably replaced them by now. But most important is the boots around the control sticks. Dave had some very stylish naugahyde boots around the bottom of the control sticks. They look very nice, but they restrict the movement of the control stick. This is most noticable at full deflection. We released the Velcro zipper in the front, and they worked much more smoothly. One of Dave's projects is to get the friction out of the controls. I don't mean to be critical; most of you would have been ecstatic over the controls. Only someone who has flown a Falco for a long time would notice the difference.

Dave's Falco also was slightly out of trim. The left wing was a little heavy. To cure that he adjusted the flaps. Folks, this doesn't work! Dave has since installed a trim tab on the right aileron, and it flies hands-off now. Don't worry about installing trim tabs now, these should be done after you fly the airplane. They are simply a plate of aluminum screwed to the bottom of one aileron and bent down. You won't know until you fly the airplane if you need them and which wing to put them on. Also, you do not want to have to bend the aluminun on the airplane, so this is one reason not to put one on now.

The Century 1 autopilot does a beautiful job of flying the Falco. The flight to Appleton was at night, and Dave let the autopilot do most of the flying. It worked the way an autopilot is supposed to, you just set the airplane on a heading, and it holds it. We had worried about whether the autopilot might be a little sensitive with the Falcos controls, but it is very smooth.

I did notice that the airplane needed much less rudder in the air than my Falco. James Gilbert had commented on that before, and I was pleased to actually see it. Except for take-off, we ignored the rudder.

The elevator trim was just right, giving you immediate response. This is certainly an improvement over the production Falcos, whose elevator trim had a lot of slop. Dave somehow managed to install the angle drive wrong, and it worked backwards as a result. He has now switched it around to the way shown on the print. If you want to check yours: if you roll the top of the trim wheel aft, the top of the output shaft should rotate to the left, pulling the cable forward.

Dave found that the autopilot installation was a little too tight with the fuel tank, and he moved the instrument panel aft about 20mm. Surprisingly, this is not noticable when you sit in the airplane. I have not had time to check all of this out. The engine controls were very smooth before the relocation of the panel, but they tightened up after the move. This can all be cured, and Dave plans to adjust things. I found I really liked the left hand throttle.

One thing that really impressed my about Dave's Falco was the feeling of riding in it. This is a hard thing to describe, but when you see a Falco fly you are taken with a feeling of what it must be like to fly in such a lovely thing. Yet, when you actually fly in my old Falco, the cockpit is old and dusty, and it doesn't feel like the beautiful thing you thought it would be. With Dave's, though, you have the feeling that you are flying in the stylish, elegant airplane that you see when you approach it.

Performance? It looks like Dave is now cruising at about 190 mph. He has had it up to 162 kts indicated with full throttle and 2600 rpm, before they finally got the prop governor set. The other day Dave flew on a trip and had 145 knots indicated at 7,500 feet and 23.5/2400, but that was without the wheel well doors installed. On the same trip, he saw 202 knots (232 mph) groundspeed on his DME -- good for the ego.

Dave's Falco has the full acrobatic paint scheme on the wings, and there are noticable ridges at the edges of the stripes. I don't think there was anyone at Oshkosh that did not notice or comment on them. Dave's plan was to leave the ridges on the airplane and fly it. Only when he had time was he going to buff them down (something he has begun to do now) and see how much speed he gains. I kept a mental note of the predictions of speed gains that spectators offered. They ranged from 3 mph to 20 mph. Personally, I think they are costing him about 8 to 10 mph. Also, Dave did not have nose gear bay doors installed. With these installed and with the wings buffed down, I think Dave may end up cruising at 210 mph.

The two things that I was most pleased about were the cowling and the baffling. I knew that the cowling was going to be good looking, and I had seen photographs of the plug. Still, I was shocked by the appearance, it was better looking than I had imagined.

My goal on the baffling has always been to get the temperatures between the various cylinders closer together and to lower the cooling drag. On my Falco, there is a 75°F difference between the hottest cylinder and the coldest. We don't have an exact reading, but it looks like the greatest difference on Dave's is about 5° to 10°. The inlet area and the outlet area about the exhaust is unchanged. There are a number of subtle changes to the cooling. The spinner is larger, and the theory is that the "dead area" around the spinner is lost cooling air (although I always had trouble believing this). Also, we take the air for the oil cooler and cabin heat from the inlets. The outlets have a little less blockage from the single exhaust pipe per side versus the two pipes per side of the old system. Dave Thurston and I had our fingers crossed that we would not be pushing the temperature too high. The surprise is that we are 100°F cooler than on my Falco. It didn't take very long to realize what was happening. Without the nose gear door, the nose gear fairing in the cowling was acting as a giant extractor, pulling more air through the engine than is needed. I expect that once we get a nose gear door installed, the temperatures will go back up to where they really should be. We are presently flying in the green, but Lycoming would like to see us up around 325° to 350°F on the CHT. Don't forget that all of that excess suction is also drag.

There was one very good thing about the failure of the shaft in the retraction system. A very nasty thing was happening to Dave's plane, and he was not aware of it. For the fuel tank vents, he had run two nylon lines out of the wing. These passed through the aft wing spar on the right side, and they "daylight" between the flap hinges. Dave had installed a screen over these and glued it in place with silicon RTV compound. I stuck my head under the panel to see what all of that looked like and emerged asking Dave and John why they had bashed in the bottom of the tank. The culprit turned out to be a little piece of silicon RTV in the end of the vent line. This is something you should all keep in mind to check before you fly your Falco for the first time. The tanks are strong, but the fuel pump is perfectly capable of collapsing the tanks.

Dave has had a problem with the fuel line from the aft tank loosening in the fuel selector valve. Because of the two battery wires, things are very tight and cramped. He has used an aluminum tube, which loosened. A replacement aluminum tube did the same thing. As it happens, the fuel line from the aft tank to the fuel selector is an extremely difficult thing to get in the airplane. We think that vibration is probably the culprit. We are going to switch to nylon tubing, which will be very easy to install. Dave has already used nylon tubing for the vent and brake lines. I think it is also the thing to use for the manifold pressure and fuel pressure lines aft of the firewall. Certainly, you cannot beat it on weight or ease of installation. Remember, we are talking about nylon, not polyethylene tube.

One of the other things that I checked was the landing gear retraction system. The first thing I noticed was that the side load struts for the main landing gear were not behaving as they should. When the landing gear is extended, the screwjacks should push the landing gear fully down, and once the side load struts are fully-down, then the screwjack should begin to push on the spring. In Dave's case, the side load struts were not completely straight (they were like a slightly bent knee), and the wheel well doors were bottoming the springs before the gear was fully down. This meant that to have the gear fully down, they had to crank on the handle until the gear was "down and jammed" rather than down and pushing-on-the-springs.

I suppose I assume that builders know the same things that I know, so I was surprised to see some little things out of kilter. The lower drag struts are machined without any radiuses to fit within the upper drag strut. Secondly, YOU MUST CHECK TO MAKE SURE THAT THE UPPER DRAG STRUT IS DIRECTLY IN LINE WITH THE LOWER DRAG STRUT, OR SLIGHTLY OVER-CENTER. You cannot sight down the struts, as we did, and assume because they look lined up, that they are.

All through the construction process, Dave has been one of those lead builders who has learned all of the hard lessons that have been passed on to the rest of you. This particular lesson of checking the side load struts and the nose gear drag struts is one that you should not forget. Following Oshkosh and with recurring problems with the wheel well doors, he removed the doors and adjusted the screwjacks

so that they worked properly. He was not aware, nor was I, that his side load struts were not straight. Like a slightly-bent knee, they had little strength. Last Saturday, his right gear folded on the landing roll. Once Dave got his wounded bird back to his hangar, they checked the other gear and found that they could easily push on the gear leg with their hand and cause it to start to retract. The nose gear did not do this. Bear in mind that these side load struts appear to be completely straight to the naked eye. Only by putting a straight edge on the bolts could they detect that it was not aligned correctly.

To align the side load struts, you have to file on the lower side load strut. Remember that these are symmetrical parts, and you should not adjust one for the left side and then use it on the right. When the lower side load struts are machined, they are machined around each end radius and along one side only. The other side is as received from the mill, and the stock is placed in a fixture which has stops which hold the aluminum in place. A piece of grit can cause some change from one part to another. Accordingly, you will find that one side of the lower side load strut may be slightly wider than the other. Use your file and get the things perfectly aligned or slightly over-center (probably the safer alternative). To check, install the bolt and push from each end. As a final check, install in the airplane, leave the screwjack off and KICK the landing gear. If the side load struts and drag struts are properly adjusted, the gear will remain down and locked with just the weight of the struts holding them in place.

The damage to Dave's Falco was less than you might have imagined. The bottom of the wing tip was scuffed. The flap was fully down, and it took all of the weight. Amazingly, the flap held up very well. At the inboard end, the spar was cracked slightly, and the trailing edge was scuffed, but there was no other damage. If nothing else, Dave has a new respect for the strength of his flaps.

One other thing, I noticed that the rate of roll to the left was not as good as in my Falco. With the prop rotation that we have, and with the left wing heavy, his Falco should have rolled better to the left, but it did not. This confirms a suspicion that I have had for a long time about the Falco ailerons.

You all know how a slotted flap works -- we have one on the Falco. When the flap goes down, it opens up a slot between the wing and the leading edge of the flap. This allows air to pass through and gives the flap greater lift. The Falco's aileron is of the same design, so the gap is important. I know that everyone is into gap seals these days. Gap seals are good for speed but in some cases they detract from the handling. I remember several years ago when I flew with Harry Shepard in his SF.260, he was ripping some aileron gap seals off this airplane. He said they ruined the rate of roll. On Dave's Falco, I noticed that the gap between the wing and the flap was larger on the left side than it was on the right, and I think this is the reason for the difference. On the plans you may see the 8mm dimension given on the wing rib drawings. Dave Thurston also thought that the ridges of the paint strips were hurting the rate of roll.

Back to the wheel well doors. These things are an accident waiting to happen, and they must be changed. They are wrong. The problem is that the door overpowers the spring in the end of the screwjack sleeve. The spring exerts something like 40 pounds of push on the side load strut to hold the gear down. In the case of Dave's Falco, the doors completely overpowered the springs, so they were prevented from working. Only by jamming the gear fully down was he able to get things to work.

When I was in Italy a few years ago, I noticed that the gear door mechanism on I-CIRE and I-ERNA was different from what we show on the drawings. The linkage was attached to a stud mounted on the screwjack sleeve. This is really the way it should be. I have a drawing of what should be done and those of you who are installing full wheel well doors should contact me for a preliminary copy. Also, the original arrangement caused the bolt to hit the landing gear leg and scratched the paint. The new design will eliminate this problem.

During a photo session on the final day of Oshkosh, the end fitting of P/N 860 broke. Dave attributed this to the fact that it will not swivel like a rod end bearing. He was able to get a rod end bearing in the "Fly Market", and it has subsequently failed as well. We don't really understand why, but for now Dave has the doors off the airplane pending the installation of the new linkage.

The main landing gear doors on Dave's Falco rub the tire when the airplane is heavily loaded. I have not yet had the time to work this out, but you will need to make some changes to the geometry of the linkage so that the door will clear the gear with the shock absorber strut fully collapsed.

Another small picky thing, Dave installed the lens for the engine instrument cluster on the aft face of the panel. If never occurred to me that any one would do this, so there is no note on the drawing, but the lens should be between the cluster and the panel... on the forward side.

Dave had built the wing tip before we came out with the new design for the wing tip light. He was able to install the strobe light in the original opening by placing it on the aft wall of the opening. This places the strobe outboard of the position light and too close to the plexiglass lens. Even after a few hours of operation with the plexiglass nearly touching the strobe, the wing tip lens is starting to craze.

The cowling installation for Dave was rather tough since the cowling was a prototype. In order to get Dave the cowling in time, the fabricator of the cowling skipped some of the normal steps of construction. The joggles did not fit well, and there were other problems that you will not encounter. The cowling installation jig worked like a charm and Dave's friend, John Holm, said that he thought the cowling installation should be an 8 hour job for the average builder.

We also had some problems with the baffling, all of which were occasioned by the cowling. To date we have only found one dimensional error in the cowling or baffling drawings, and that was a minor one. I forgot to allow for the manufacturing tolerance of the width of the oil cooler. This requires race-track shaped holes, which we have now taken care of. There is apparently more variation in the engine crankcase castings than I had thought, and Dave had to do some trimming on the baffling, but I guess this sort of thing is to be expected. We do cover these edges with a rubber chafe-seal.

There is also a minor problem with the nose gear down limit switch. John Harns had earlier mentioned that with the gear fully up, the leaf actuator on the switch hit the upper drag strut. Dave Aronson had this problem too, and it caused him to have a "gear down" light when the gear was fully up. The cure for this is to grind out a little cup for the leaf. Most of you will not know what I am talking about here since the details of this installation have only been sent to a few advanced builders.

Dave's Falco came in at 1,293 pounds empty. With the changes that we have made, the basic airframe is about 20 to 30 pounds lighter. Dave has a lot of equipment in his Falco. Compared to the equipment on the original production Falcos, it adds up like this:

Inverted oil system	6.25
Autopilot	2.50
Avionics	28.15
Inverted header tank	4.00
Strobes	6.00
ELT	4.00
Landing gear doors	15.00
Jack pads	3.00
Left hand throttle mod	2.00
Canopy skirt fairing	5.00
Prototype cowling (heavier than production)	5.00

This totals to 80.90 lbs, which when subtracted from his empty weight of 1,293 leaves 1,212.10. This is very close to the original specs for the Falco. The difference is in the paint job. You can add a lot of weight with paint. When he was painting his Falco, Dave was more interested in getting the kind of finish and appearance that he was after than in going for the minimum weight.

Larry Wohlers Falco was also at Oshkosh this year. Larry has put a fair amount of time on his Falco, as I recall it is something like 150 hours. Larry's Falco is surprisingly light -- I seem to remember that he said it was 1,146 pounds. He has a basic panel without a lot of avoinics. Larry has a few things in his Falco which are heavier than ours. The landing gear motor is probably a pound or two heavier. The nose gear may be slightly heavier. The extended propeller is about 6 pounds heavier, and the Hartzell governor is a couple of pounds heavier. Also, Larry has about 6 pounds of lead in the leading edges of his ailerons. Still, it shows that you can build a light Falco if you put your mind to it. I doubt that there is any substantial difference in

the basic structure of either airplane. I know that Dave followed the drawings very closely and only added a few little blocks of wood that were not shown on the drawings.

When Dave built his Falco, he was not building a show plane, and we did not expect him to have a chance for Grand Champion Homebuilt. This year was not a great year for show planes, so by the middle of the week, many people were talking about Dave winning the award. It was, in the minds of many, the nicest aircraft on the field. In the end, he did not win any awards. You have to remember that the scoring is done according to some strict rules. There were a number of things on Dave's Falco which were mandantory mark-downs, and these took him out of the competition, even though all of the judges really liked the Falco. John Holm was one of the judges, but he had to disqualify himself on Dave's Falco. John said that if the minor imperfections were cleaned up, Dave would have probably won the award.

The annual Falco Builders Dinner was much better attended than previous years. We had a number of SF.260 owners there, and Giancarlo Monti from SIAI Marchetti was there, as was Dave Thurston. I think we had about 70 people in all. Next year, when Mr. Frati comes -- and he will! -- we should have many more. Fortunately, the restaurant has a separate room which will accomodate 200.

You may remember that when I was in Italy a couple of years ago, Mr. Frati gave me ten autographed Compasso d'Oro decals. The Italian equivalent of our Society of Automotive Engineers gives out this annual award for the best piece of Italian design of the year. Ferrari has won the award, and Mr. Frati won the award for the Falco. I gave the first of these decals to Larry Wohlers two years ago, but due to an early departure he was not able to come to the builders dinner. This year we gave him a long awaited, and deserved, standing ovation. We presented Dave Aronson with the second decal. Who will get the remaining eight?

Normally I try to get our Falco washed up for Oshkosh, but due to the sudden departure to take the parts to Dave Aronson, I didn't have the chance. This year, the "Corporate Disgrace" lived up to her name. In fact, on the final day I found an award hanging from her propeller, "The New Delhi Spirit of the Great Unwashed, Compasso d'Oro". This was complete with the most horrible delapidated peacock that had once "adorned" a ladies hat. This was the sneaky work of Dave Aronson and friend, and it now hangs in our front hall! Thoreau once said that if someone calls you a name, you should wear it with pride like a badge. So, our airplane is dirty, and we're damned proud of it!

Before leaving the subject of Oshkosh, I'd like to make a few additional points. Most of what I have had to say about Dave Aronson's Falco has been in pointing out faults. Most of what you see published on homebuilt aircraft is all "good news". I have taken it that all of you would be better served if all of these things were laid out for you to see. This way, each of you will be in a position to avoid such problems. Dave's Falco was, in my opinion, the nicest and most desirable airplane at the show. Many of you who were there had the same

opinion, and I found that even our competitors quietly recognize the Falco as the most advanced and desirable airplane offered as a homebuilt aircraft. Dave's Falco is the best aircraft I have ever flown. The best description is still James Gilbert's "you feel a fool for not knowing that light airplanes could be like this".

In the months ahead, you will be reading the coverage of Oshkosh. Aviation journalists are always drawn to the newest thing. You might be interested in a few behind-the-scenes things that reach my ears. The Swearingen SX-300 was there, and it is a fast, high class airplane. I admire the design, although it is certainly not for the average pilot. Just so that you know that we are not the only one with small problems, at speed their ailerons are floating up 5/8", due to "stretching" cables. For whatever the cause, this will surely lead to a fatigue problem and could be very serious. They are aware of the problem and will certainly find a fix. Also, the baffling "dog house" had a weld that had completely come un-zipped. This was along the left rear.

The Glassair's sales have been plummeting lately, largely due to the fact that the word is now out that it is not the instant airplane that it appears. Average building times seem to be in the 2,300 to 2,500 hour range, with some airplanes taking up to 7,000 hours. They have work that should be done on the engine cooling, but apparently this is not being done. I was told by an insider that at certain speeds, the flow of air through the oil cooler actually reverses. One of our builders got his hands on some of the fiberglass material they use (a normal fiberglass cloth with a polyvinyl resin) and found that it burns about like kerosene after a match has been held to it for about 3 seconds. I am told that one unfortunate builder actually had one of these catch on fire in the air, and by the time of the crash very little remained.

The most publicity will go to the Voyager, which it now appears will not be able to fly around the world. In many ways this is a shame, but there were many people who thought that the pilots were literally risking their lives in the venture. There seem to be three problems. First, from the cabin side windows, the horizon is completely obscured by the tanks, wing and canard. This means that the flight must be made on instruments. The structure is necessarily flimsy, and there was some concern that the weight of the fuel might tear the skins from the spar. This was tested with a 2 foot hydraulic head, and the wing passed the test. Unfortunately, no one had considered the fact that when the airplane flies in turbulence, the wings bend up as much as 14 feet. This, combined with g-loads during a gust or with shock loads from sloshing fuel, could create quite a problem. But the most serious problem is the unforseen action of the airframe in turbulence. During Oshkosh, the plan was to establish a world distance record by flying from Mojave to Oshkosh and back for three circuits. The first flight had to be terminated since in light turbulence the weight of the fuel in the outboard tanks acts as a fulcrum, levering the center section up and down. The poor girl on board was being slammed from floor to ceiling. It's a real shame, because the airplane is clearly capable of flying some incredible distances, and it's an effort everyone would like to see succeed.

Enough of Oshkosh. I have recently finished the installation drawings for the baffling and the cowling. We will be sending advanced copies to those of you who need them, otherwise we will hold on to these drawings until we have enough new drawings to make up a reasonable package to send out.

During the rest of the year, I will be working on finalizing a lot of the details for the Falco. Many of the things that Dave and I worked out on the phone have to be put down on paper. I am also beginning to revise the construction manual. I will be starting with the tail group and will work my way through the assembly of the airplane. I have found that it is necessary for me to rework some of the drawings, particularly the tail group. I hope to work my way along and re-do the drawings in the order in which the parts are assembled. There aren't really any changes in the drawings so much as additional details and more logical sequential presentation of the drawings. To this end, I have been spending some time taking to various builders about how they tackled various parts of the project. In anticipation of this manual, you may be interested in the methods most used for the tail group.

Builders seem to be evenly divided between two jigging methods for the tail group. Some use a flat table and use wood blocks (of all the same length) to hold the centerline a certain distance above the table. The advantage of this method is that the "jig" is a minimum effort, and you can skin the surfaces with the hinge bolts installed. The other method is a vertical jig, usually based on a flat table, with pieces of wood extending out, on which the spars in placed. A plywood plate is usually used at each end, aligned with a plumb bob, and strings are used to line up the rib centerlines. The reason for having the pieces of wood extending out from the table is to allow you to flip the elevator or rudder over and work on either the trailing edge or leading edge on the top.

John Oliver came up with a series of neat home-made clamps for gluing on the ribs and leading edge skins of the rudder, elevator, flap and aileron. I have shown these in the Tool Talk section.

All builders have built the horizontal tail on a separate vertical jig or on a flat table. Some builders have built the vertical tail "on the airplane"; that is, they did not use a jig at all, but just put the vertical spars in the fuselage jig and fitted in the ribs. While this has worked, I am not sure that this is really the best way.

The problem is that the spars of the vertical fin must be glued to the spars of the horizontal stabilizer. Joel Shankle solved this problem by building his vertical tail section. When he built the horizontal tail, he used a block of wood as a spacer, to make sure that the two spars were the correct distance apart. The vertical tail was mated to the horizontal tail on the fuselage jig, and the forward fin spar is flexible enough to spring open for gluing.

For the installation of the flap torque tube, see John Oliver's suggestions in his letter in the Mailbox.

I have received a lot of letters about the balancing of the control surfaces. I have had the balancing information for some time, but I was waiting to release it until I had these weights confirmed from a Series II Falco in England. I have not yet had this confirmation, so we will have to proceed without it. These balancing conditions are supplied by Mr. Frati. Dave Thurston reviewed them and found that they agreed with his experience. The degree of balancing happens to be the same as Dave Thurston advised be done on the 300 mph Bellanca Skyrocket II.

The balancing instruction are covered in the revisions. Please note that all of the control surfaces will end up being "tail heavy", and it is not necessary nor desirable to achieve "100%" balance. With some of the early builders, I have kept track of the weights of the various control surfaces. It appears that in the case of the elevator and rudder, the weights will come out right if built from the plans. In the case of the ailerons, this is also true, but you will find that the ailerons will be very close to the aft limit of balancing. I have had a couple of early builders change the 15x15 beech nose capstrip for the ailerons to 20x20 beech, walnut or oak (all are about the same weight). In these cases, the balance of the ailerons came out in the middle of the balancing range. I think this is a good idea, as it will eliminate the need for additional weight if you re-paint the control surfaces later. If you have the 15x15 beech installed, don't worry about it. The flaps do not require any balancing.

We are also showing the flush jack pad installation in the revisions. This installation came about as a result of an interchange between John Rawlings and myself. John is an aeronautical engineer with MacDonald Douglas. I designed the thing, and John checked my calculations. The installation turned out to be surprisingly light and simple. I had earlier thought that a hardwood block would be necessary, but spruce turned out to be the best solution. This installation has a surprisingly high margin of safety. Each fitting will easily support the entire weight of the airplane. The weakest part of the design is that under very heavy jacking loads (way over gross weight) the poplar core layers of the lower wing skin could crush. Also, we were worried about the side loads from a snatch tie-down load splitting the spruce. John Rawlings tested the block for these side loads. He faced the bottom of the spruce block with a piece of 1/4" birch plywood (all plys of birch, obtained at a model airplane store). He did not glue on the normal 2mm birch plywood for the lower wing skin. The sample failed at 88 ft/lbs. The tie-down ring is an eyebolt, whose eye is .75" from the flange of the bolt. This translates into a failure at 1,408 lbs. In other words, an empty Falco could hang from one of these fittings alone. The failure mode was with the block peeling off the spar. John had earlier tested a piece of end grain spruce and found that it failed at 12 ft/lbs, unacceptable low.

I felt that the use of the solid birch plywood was not necessary and enlisted John Oliver to run a test on the design as I had drawn it. I felt that you builders would find my design easier to install as you would find the birch plywood difficult to sand in preparation for skinning. John Oliver tested this design up to 82

ft/lbs. This translates to a strength of 1,313 lbs at .75". The failure was in the 9-3/4" long steel rod used in the test. It took a 3-3/32" bend, and the wood showed no sign of failure. As this was very close to the results of John Rawlings test, John Oliver did not pursue the test any further.

Dave Aronson installed a similar fitting in the tail of his Falco. This is not a bad idea, but an alternative method is to install a combination tailskid/tie down ring made from a T-section aluminum extrusion. I will be working on such a design and will be incorporating these sorts of parts into the fuselage and wing equipment kits.

I would also caution you against installing the jack pad up next to the wing rib. First, this is not necessary for strength. Secondly, you will find that there is such a thing as getting the jack pad too close to the landing gear. Dave Aronson has this problem. In order to jack up his Falco, he has to disconnect the landing gear doors.

Another construction detail. One fuselage frame No. 1, there are two triangular openings. On the production Falcos, these were used for a variety of plumbing lines as well as wiring. We have managed to get all of the plumbing and engine control cables through the center rectangular hole. We use the triangular openings only for wiring. On the right side of the airplane, we have a single hole with a rubber grommet on the firewall. On the left side of the airplane, we have three holes and grommets. Two of these are for the large battery cables to the engine and starter. There is always the possibility that these wires could wear on the grommet and cause the grommet to be cut by the firewall. Also, the triangular openings will be a source of engine noise. I have come to the opinion that the best way to do all of this is to fill in the triangular openings with spruce. It is not important whether you have plywood on the faces. When you install the wires, you will drill a hole through the spruce. This will hole the wires in place and will keep them from pushing on the grommets, and this will make for a quieter installation.

I had an interesting conversation with Budd Davisson at Oshkosh. Budd is an aeronautical engineer by training, a marketing manager with Butler Aviation by vocation, and you all know him for his articles and photography in Air Progress and other magazines. Budd and a friend are building a replica of a Wedell Williams racer, the first airplane to top 300 mph. It has a wooden wing. Several years ago, Budd cornered me for some advice on their wing. The skin was wavy, and when they raised the humidity of the shop the waviness disappeared. He was hoping I could put him on a coating which would lock in the humidity and keep the skin smooth. I told him about the moisture-protection characteristics of various coatings that the Forest Products Laboratory had tested (this was covered in a recent builder letter). Once he understood that there was no hope of a completely effective coating, they resigned themselves to removing the skin and doing it over again.

Budd and his friend have gone to extremes to obtain a smooth wing skin and have made something of a science of it. He said that what they ended up doing was to use a moisture meter. He said he found that

wood in his area stabilized at 12% moisture content. (In the process of finding this out, he went around sticking the moisture meter's pins in furniture, houses and friends' airplanes -- with their permission.) He found that plywood as received had a moisture content of about 7%. He also found that the plywood took "forever" to stabilize to local conditions. He finally settled on spraying the plywood with a mist of water and sealing it in a plastic sheet. At intervals, he would scarf the plywood and test the inner plys. He said that to get a perfectly smooth wing skin, he found that it was best to put the plywood on with a moisture content of 1.25% to 1.5% greater than that of the spruce. This way, when the plywood dried out, it had a slight tendency to pull tight. I doubt that any of you will want to go to this extreme, but I thought you might be interested in his observations.

As I mentioned earlier, we will be replacing P/N 520-6 vertical drive shaft with one made with a thicker wall. We are using .120" wall 4130N steel. In fact, I think .095" would probably work. We specify .095" wall for the horizontal shaft, but this was not available from our supplier and the actual parts are made from .120" wall. We will be sending the new shafts to everyone who has purchased our retraction kit. There is no harm in using the same gears by cross-drilling them. If you do not care for this, you may return all of the parts which are installed on P/N 5206 for replacement with new parts. For purchasers of the full kits, this will be an option that is available at no cost to you. We do insist that the old gears be returned. For those of you looking for a bargain, we will be offering these gears (if anyone returns any) at a reduced price -- first come, first serve.

We have also completed the design of the landing gear retraction motor and its gearbox. Dave Aronson has the prototype installed in his Falco, and it is doing a good job of running the gear up and down. On the ground (i.e. at 12 volts, the retraction time is 10 sections and extension is 8 seconds). We do not have an actual cycle time of the gear in the air, but I think this will come down by about 2 seconds (i.e. at 14 volts). Dave has had a number of little electrical system bugs to trace out, and at this time he is able to retract the gear electrically, but some mystery problem is causing a problem on extension in the air. We have since located the culprits and should have things working well when Dave gets back in the air in a few weeks.

The landing gear motor and gearbox assembly is substantially simpler than the one installed on the original production Falco. The big reduction is in the disconnect apparatus, which allows you to disengage the motor for manual retraction. When I was in Italy a couple of years ago, I noticed that Mr. Frati had a new design on the F.20 Condor. He supplied me with drawings, and we have a scaled down version. Even with this parts count reduction, the thing is frightfully expensive. I don't have a complete count of all of the damages, but it is apparent that my earlier estimate of the cost of the thing was low.

What I am going to do is this. Everyone who has already purchased the landing gear retraction system will receive the motor and gearbox as part of the kit at the estimated price of $2,200.00. We are

raising the price of the kit to $2,400.00 effective October 10, 1984, so any of you who want to get the package at the old price may do so by then. With each new price list, we will be raising the price by $200.00 until we reach the full cost of the thing. As I said, I don't know the full damages, but the kit price looks like it will end up at around $2,800.00. Each price increase will be effective on the normal publishing date of the builder letter (Dec. 10, March 10, etc.).

Painful as this all is, you may be interested to know that even so, you are buying the entire landing gear system (nose gear, main gear, retraction system and motor) for less than the supposedly "cheap kit" Glassair gear system.

We are also enclosing some new kit brochure pages. Please note that we have combined two kits that we had earlier proposed. Kit No. 817-1 includes all parts previously included in 817-1 and 817-2. I had hoped to have final prices on the cowling and baffling kits, but we do not have all of that worked out yet, even though we are only a few weeks from delivering both.

We had hoped to use a production prototype baffling kit on Dave Aronson's Falco, to check out not only the design (which has now been done) but to also check out that all parts being dimensionally correct to fit together. We are producing 5 baffling kits for the 150/160 hp engines and 5 for the 180 hp engine. All of the interference problems that we had with Dave Aronson's Falco were a result of glitches in the prototype cowling. It now looks like Jim DeAngelo and Syd Jensen will be the proof installations. Once these are done, we will run the parts in quantity and only then will we be able to come up with the final prices, unless of course anyone wants to pay the exorbitant costs of the first items!

Also, we had earlier planned to have separate cowlings for the 180 hp engines. It appears from my drawings that the 150/160 hp cowlings will need a small blister for the baffling at the right front cylinder. We attempted to do such a blister for Dave Aronson. The blister was too big, and as it turned out the door had to be replaced. The replacement did not have a blister and even though Dave has less clearance between the baffling and cowling, he has been able to get along without a blister. For all of the initial cowlings, we will not be installing blisters in the doors, and we will leave this to builders to do. The 180 hp engine will require small blisters on both of the front cylinders.

I should also mention that we have the exhaust pipes rather close to the inside of the cowling. The clearance is about 1/2 to 5/8". To provide additional clearance, we would have to undertake an expensive rework of the cowling tooling, and the cowling would not be nearly as pretty as it currently is. I have made the decision to live with the problem in the interest of appearance and solve the problem other ways. The exhaust pipe was scorching the inside of the cowling (which is made of fireproof resin), so Dave installed some ceramic insulation. Apparently, during start-up or shut-down, the engine shakes around enough so that the exhaust pipes just rub this insulation. It was

enough to wear through the insulation. I think that all is necessary is to bond on a small piece of stainless steel. If possible, we will try to get the exhaust system up a little higher. Don't get too concerned about this, it is not a major problem by any stretch of the imagination.

It is also obvious from our cooling situation that the inlets can be reduced in size. I think that our cooling will be just right once we get nose gear doors installed. We have to accomodate a wide range of builders. Some builders want to install 180 hp engines, and many builders plan to use their Falcos for acrobatics, which required additional cooling due to the high power settings and varying speeds. For those of you who don't plan to do acrobatics and who want to optimize for speed, there is the possibility of reducing the inlet size. We do not plan to make this change, and will leave it to you to change things. We will be open to offering suggestions on how to do all of this. I expect, though, that most of the tweaking should take place on the air exits, and not the inlets. Also, bear in mind that if we changed the shape of the inlets, the appearance would be changed substantially, and if the profile of the bottom of the inlet was changed the baffling would no longer match.

My annual "World's Only Oyster Fly-In and Gathering of Stelio Frati Aircraft" will take place on November 3. The Oyster Festival parade starts at 1:00 PM, so it would be best to arrive by 11:30 or 12:00. I will be sending out the usual invitation to our little list, but you are all welcome to come. Bad weather kept alot of people away last year, but I expect that we will have a few SF.260s there. I hope that Dave Aronson will be able to make it. There are a number of magazines which plan to do a report on his Falco, and we are thinking of killing two birds with one stone by combining the great oyster thing with meeting up with the various writers.

So, who will fly next. I have made a list of builders who have the potential of flying by next year's Oshkosh. This list includes Syd Jensen, John Harns, Jim DeAngelo, the Chilean Air Force, Tony Bingelis, Jim Shaw, George Neuman, Karl Hansen and Ray Purkiser. It's possible that a few more builders may make it as well and these include John Shipler, Joel Shankle, Jim Petty, Herbert Mueller, Mike Pepper/Peter Grist and Barry Mowforth. There is a list of 15 or 20 builders who should be dead on their heels, and I would expect that we will see the completion stage of the Falco becoming shorter as time progresses. In fact, I would not be surprised to see among the first 20 Falcos completed one builder who has not started construction yet -- but then, I know something that you don't!

Sincerely,
SEQUOIA AIRCRAFT CORPORATION

Alfred P. Scott
President

TOOL TALK

John Oliver came up with some clamps which have served him well. These are shown on page 23. Figure 1 shows the clamp used to glue on the elevator leading edge skin. A similar clamp is used for the rudder, and both may be used for pre-bending the skin. The clamp consists of a strap of aluminum (.020" to .032"), two blocks of wood and a jack-screw. The aluminum strap is screwed to one of the blocks. The jack-screw is a 3/16" or 1/4"dia machine screw. A nut is epoxied to the face of the wood block. The jack-screw pushs against another wood block, which has been partially drilled for the jack-screw. During final assembly, the leading edge skins were positioned with alignment nails at the front. In addition to the clamps shown, the skin was also clamped along the spar.

A similar design is used for the aileron and flaps. This is shown in Figure 2. In this case the strap of aluminum is secured to the top with two small nails. It would probably be better to put the nails into the trailing edge rib. The jack-screw is mounted in a 3/4"dia hardwood dowel. John used the aileron and flap jig shown in an earlier builder letter. In figure 2, the dowel is inserted into a hole in the jig. John actually used a piece of aluminum angle which hooked over the lower spar cap, and it had a hole in it for the dowel.

Figure 3 shows a type of clamp that John used for gluing on ribs. He has a series of these clamps, which are very simple to make, and he uses these for the wing ribs as well. A block of wood is inserted into the rib so that the clamp bears on it, and not on the gusset. He uses C clamps to apply the clamping pressure, and a block of wood on the other side of the spar.

Also note the advertisement for the Webair jackset. I believe that either the W2235A or W2539A will work. As these are mechanical jacks, you do not have to worry about them settling overnight -- a problem with hydraulic jacks. I failed to mention earlier that one of Dave Aronson's homemade jacks failed two weeks before Oshkosh, and it poked a hole in the bottom of the wing.

ROLL CALL

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

627. Jim Petty. I have just finished gluing the main and forward spars to the fuselage, and am beginning to assemble the wing. I hope to have the airframe structure finished this summer.

632. Jimmy Shaw. Just covered the bottom of the aircraft with 3/4 oz. fibreglass cloth using L-26 epoxy sheathing resin. Found it was somewhat difficult to sand but once complete the finish seemed very smooth. Just coated the bottom with duPont 70S primer. I was cautioned by a local paint distributor to ensure that I kept the thickness of the primer to a minimum due to the softness of 70S (a thick coat could result in some chipping of the paint under impact stress). I've found that the primer sands nicely; however, care should be taken so that an

even wet coat should be applied to fill those imperfections. I am presently installing the fuel tanks, all structural work is done, and am preparing to start on the pitot/static and electrical system. The Falco will be set up on the main gear as soon as I can get a half dozen hardy souls to help me flip it over. Ah, heck, I might even let them sit in it and dream a little!

I found the control surfaces to the among the most difficult portions of the aircraft to build and will probably remake the rudder and elevators due to rather curvy trailing edge -- good in women -- bad in airplanes!

Those of you cussing over those compound parts take heart! Liquid foam! Many composite builders utilize this neat liquid 2 part polyurethane foam that you mix up, pour in and it fills the cavity to whatever shape you desire -- just trim off the excess. Works well on rudder top and bottom, wing tips, and probably the wing fairings.

Well gotta go, the engine mount just got here. With my shop and spare bedroom full of canopies and airplanes -- or parts thereof -- it becomes a major operation trying to find a place to store things! Well I suppose I could put it on the firewall today -- Nah! -- Oh why not!

651. Russel J. Woods & Bruce Fraser. Progress on the Falco has been slow but interesting. At this stage the fuselage is in the jig ready for ply. We have purchased a Hoffman constant speed propellor, which is a lot lighter and reputed to be more efficient than the Hartzell equivalent. Bruce has purchased a new lathe and a milling machine so soon the Falco parts will begin to flow. How about some weight and balance figures of plans built Falcos -- if we have to shift the battery of something it would be nice to know now. We look forward to getting the newsletters. Keep up the good work.

(Thanks for the kind words and report from New Zealand. The Hoffman prop is lighter but not as efficient as the thinner-bladed Hartzell. As for weight and balance, Larry Wohler's had to move his battery aft, one bay as I recall, but remember he has a heavier prop. Dave Aronson required no adjustment, and I would expect that you would certainly not require any change with your medium weight prop. -- Alfred Scott)

737. Chris Barnes. I have not been able to do any construction for the past year, but now my new workshop is coming along nicely and this winter I hope to begin purchasing your kits. I have secured an end-use relief number from Her Majesty's Customs, and I expect that you will be receiving my first order very shortly. Best wishes and keep up the good work.

MAILBOX

As mentioned during your visit, the flap torque tube and operator installation was most difficult. After much trial and error, I found the following approach to be practical:

1. Measure the distance between the bearing supports at ribs No. 2.

2. Check distance between end bearings on the torque tube with the 30mm gap for the operator fixed. Make adjustments if necessary to assure a good fit.

3. With a line stretched between the center line of the bearing supports at ribs No. 2, determine height of the torque tube center support. If necessary adjust height.

4. Install the left half of the torque tube, center support and operator with supports.

5. Bring the right half of the torque tube into position.

6. Drill for (or mark to drill for) the 3/16" positioning bolts through the two halves of the torque tube.

Rework of the flap torque tube center support (P/N 726) was satisfactory. Centerline height is 57mm instead of 65.

Enjoyed your visits and your helpful comments. Hope you will stop by again whenever you travel to the crowded Northeast.

John Oliver

(For reasons that I do not understand, John Oliver found that the 65mm dimension of P/N 726 too high and modified the part to 57mm so that he could keep the wood support 20mm thick. The original production Falcos used the same 65mm dimension. I would appreciate comments from other builders who have encountered this same difficulty. -- Alfred Scott)

I'm not too happy with Instrument and Flight Research, Inc. I ordered my instruments in April and am still lacking the accelerometer. Also, just received my turn and bank P/N 145-13, and it has a three pin (unlabelled) connection cannon plug without the plug? I've written them but have poor response.

John Harns

(Our specifications for P/N 145-13 specifies white ball, 12 volt and standard terminals. The part you received is not to our specification and should be returned for replacement -- as we did once ourselves. The connector, even if supplied, would do you little good as it would interfere with the fuel tank. I have been constantly on the back of IFR to speed up deliveries with little success. They are nice people who eventually get the work out, and they have been willing to make up the special dials for the Falco, but I wish they would turn orders around faster. Until they do, my advice to builders is to order 6 months in advance. -- Alfred Scott)

I have read some criticism to the effect that the Falco plans are too extensive and there are too many sheets. "Bunk or B.S." (which ever term suits you best). Craftsman ALWAYS work from a plan even if they draw it themselves or have it printed in their mind. I do not have a vast background in aircraft design; therefore, it is much quicker and more efficient for me to look up the proper plan sheets than to locate necessary books, manuals and pamphlets, then try to sort and assemble information required to figure out how it should be. I have found that one drawing can tell more than a whole chapter in some "enlightened" publication. Falco plans are simply great, and I encourage you to expand rather than reduce them.

Don Stark

(Thank you very much for your kind works. It seems to be generally accepted that the Falco plans are the best ever offered to a homebuilder, but I have to agree with Tony Bingelis on most points. We

will be working on improving the plans. We will be increasing the details shown, showing the details in a more logical order for the builder -- and not for the designer -- and we will phase out drawings for things like metal control surfaces, springs, seat cushions, and other things few builders make. -- Alfred Scott)

QUESTIONS & ANSWERS

Q: How are the engine mount lug anchor plates (P/Ns 856A & 839) attached to the fuselage stringers? Countersunk bolts, or what? It appears that nothing is visible externally, so I'm somewhat puzzled.

A: See drawing No. 114 (Sheet A14) for the installation of the AN525 washer head screws. Even Nustrini's Falco has these screw heads on the outside of the airplane, so you needn't worry about the appearance of these structurally important screws.

Q: I've read everything you have to say about glue but I am still confused. Which glue to you suggest we use?

A: Our point has always been to emphasize that all glues have their advantages and disadvantages. The best glue is Penacolite resorcinol, but if you can't make consistantly sound joints with it, then you should use Aerolite or Epoxy. We would suggest that you try to use Penacolite wherever you know you can get a good sound joint. Second choice would be Aerolite, which is the easiest glue to use if you can put up with the short working time. Epoxy, for all of its heat limitations, is the most forgiving of poor workmanship.

Q: P/N 755 hinge is not 90°. Is this defective and should I return it?

A: Aluminum extrusions are manufactured to angular tolerances of ±1.5°. This is our first complaint of such a part, but all of the hinges of a given part number are made from the same material, so any replacement would be the same. You have two choices to make it work: install a tapered plywood pad under the part or sand the hinge base to 90 degrees.

Q: I realize your resistance to modifications, but as a military pilot in the beginning, I too have mixed feelings about your panel, neat as it is. Can it be 1" lower at the bottom and still permit control adjustment for such an extension? It is a pretty panel, but if God had intended us to use gauges that are not round, He never would have given us the round ones. Further, at my age I cannot read those LED things in bright light!

A: First off, we do not use any LED (light emitting diodes) in our instrument panel or electrical system, only incandescent. You are correct that LEDs are hard to read in sunlight. The only LED that you will have would be for the transmit light in the David Clark Isocom, but I have found that I am able to read that -- although the need for the indicator still escapes me. The meter movements in our engine instrument clusters are the same movements that are used in round gauge cases. The primary reason for using them is that the case is substantially lighter, not to mention cheaper and more compact. This allows us to get a lot of instrumentation in a small area, as you have clearly revealed in your desire to add 80 square inches to the panel. I fail to see the need or reason, and the other ex-military pilots who

objected have since traded their olive drab for something a little more practical and appealing -- and have installed our panel, and they are very happy with it. I have a couple of suggestions. As you are in the early stages of construction, I would forget all about the panel and concentrate on the work at hand. In time you will have a chance to see or ride in a Falco with this panel, and I think your view will change. Lastly, as you progress further into the construction of the Falco, you will become increasingly aware of the degree to which things are integrated in the Falco. This "Swiss watch syndrome" is something you will come to understand, but I can absolutely assure you that until you have all of the parts in place and are ready to fly, you will not really understand just how complex and intertwined things really are. I am reminded of the man who opened a box labeled "cat", and out jumped a tiger. There is no such thing as a little change -- one change makes a million. The area that you have selected for a potential change is the worst place in the entire airplane, but this is a lesson I hope you do not learn from your own experience.

Q: At Oshkosh, Dave Aronson said that if he had to do it all over again, he would not use fabric and just varnish with epoxy. What do you think about that?

A: In a recent builder letter, I had a section about the moisture protection of wood. The established and tested technique is to use fabric, and I am reluctant to endorse anything else. But I should point out that this technique is based on the use of dopes, varnishes, and coatings which are inferior to those available today. I think everyone who is aware of the materials available is doing some re-thinking of the way we finish wood aircraft. I know of relatively few aircraft that have been finished without fabric. Nustrini's Falco has fabric for the first two frames of the fuselage. His aircraft has been rather babied, and has not really be exposed to the test of the elements. Tony Bingelis is omitting fabric on much of his Falco, but I doubt that it will be flown in lots of bad weather. I am rather of the opinion that this technique may be the accepted procedure in ten years and that it can be done with success. I would still be tempted to use fabric along the leading edges and around the firewall on the fuselage. Hoffman does not use a fabric on their wooden propellers, but they do use a metal leading edge strip, bonded to a bronze mesh which extends aft of the solid strip. Then they cover with propeller with a huge number of coats of polyurethane enamel. Wooden boats are also finished with epoxy and then painted, but the weight of the epoxy is not important. With your Falco, how do you know that you have an even coating, and that you have not sanded nearly through the coating? At least with a light weight fabric, fabric gives you some control over the thickness of the coating.

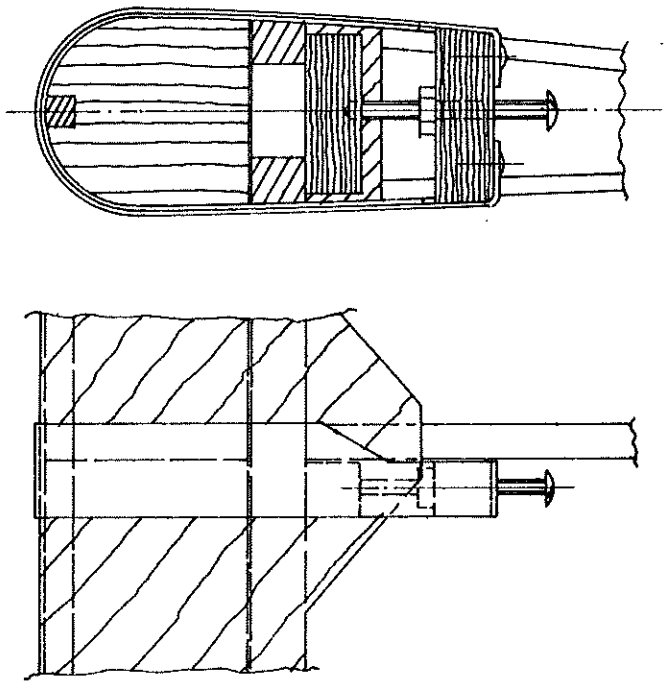

FIG. 1

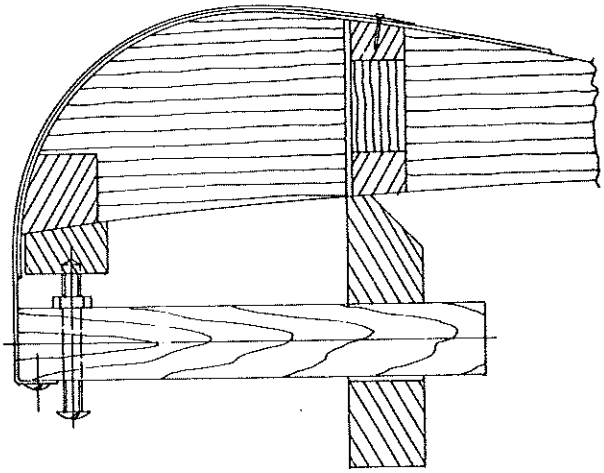

FIG. 2

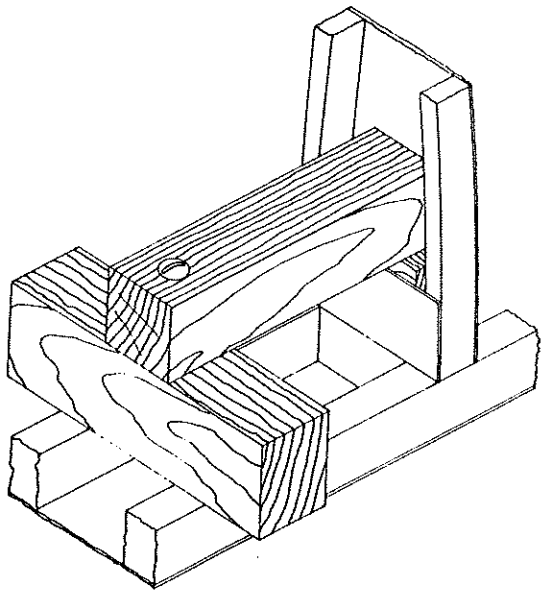

FIG. 3