Falco Builders Letter

Lynette Zuccoli, Tony Chamberlin and Wayne Milburn pose with her Ferrari-red Falco.

First Flight: Guido Zuccoli

The new world record for inverted flight during the maiden flight of an airplane has been set by Guido Zuccoli in his Falco. He logged about two hours inverted; indeed, he even took off and landed inverted. That would be difficult for any of us normal folks, but not for Guido. He lives in Australia, where everyone's upside down all the time.

I first met Guido Zuccoli at Oshkosh '88, when my friend, Dean Hall, dropped by the Falco booth and introduced him. Guido was an Italian-born Australian who was a friend of Frank Sanders. Both men had a passion for warbirds.

Frank Sanders was famous for his airshows flying his Hawker Sea Fury, and he later formed a formation aerobatic team of SF.260s called Team America. Frank and Ruth Sanders had a shop in Chino, California, where with their sons, Brian and Dennis, they restored and maintained a fleet of warbirds for themselves and others.

Guido had a similar collection of toys, a Pitts, Laser, T-6, and at one time *three* Sea Furies, though he's down to one now. He later bought four ex-USAF T.28s from Vietnam, three of which he restored and sold to other collectors. At Oshkosh '88, the Sanders shop had just finished restoring a Fiat G-59, an Italian fighter that originally flew with a Daimler engine and which had only 90 gallons of fuel. The Sanders had fitted a Merlin engine into the plane and had added a couple of underwing drop tanks.

Guido was thinking of adding a Falco to his stable. He knew Mr. Frati, the Falco and SF.260 from Italy. He took a Falco brochure and went out and sat in the shade of the Fiat's wing and read it all. Then he came back to the booth and asked if we could get all of the kits to Chino, California, by Tuesday so he could ship it back in the same container as the Fiat. That was on Sunday, and we were at Oshkosh. You gotta be kidding, Guido.

We soon figured out that Guido meant the *following* Tuesday. I was going to be in New Hampshire, but Brenda Avery said she could do it. After getting back from Oshkosh, she spent the entire weekend packaging Guido's kits and got them out on Monday by air freight. The kits arrived in Chino the next day where the Sanders stuffed them in around the Fiat.

I told Guido that it would be no problem to get all of the wood kits to Chino, and after he left Oshkosh I was finally able to get in touch with Francis Dahlman, who said there was no way he could ship the main wing spar in time. Craig Bransfield graciously came to the rescue and shipped his spar kit off to Chino.

There was also the minor problem of payment. The Sanders were going to wire us the money and after a couple of days of trying to get things straight with bank numbers and the like, I finally just told them to mail us a check. There aren't many people that we would ship $50,000 of parts to on a promise to pay, but Frank Sanders was one. A finer man would be hard to find, and aviation lost one of its best when he died a couple of years ago in his T-33.

A few weeks later, the Fiat and Falco were nearly lost in a bizarre incident in the Singapore harbor. The dockworkers had loaded almost all of the containers (many of which were filled with cyanide) on Friday afternoon on a ship bound for Australia. When they returned on Monday morning, the ship had listed nearly 90 degrees to one side and was prevented from sinking by the ship's cranes, which hit the dock. The container with the Fiat and Falco were next to be loaded, so they rode out the weekend on level ground.

They arrived safely in Australia a week later, and Tony Chamberlin and Wayne

In This Issue:

Milburn, who work for Guido's Aerotec company in Toowoomba, set to work on getting the Fiat back into the air and approved by the Australian authorities. Once that was finished, they began on the Falco working steadily at times, but there were other times where they had to pull off the Falco to work on Guido's other planes.

Wayne Milburn built most of the airframe and did all of the installations. Tony Chamberlin did the painting, all electrical work, instrumentation, and the cockpit in addition to helping Wayne. As they built the Falco, back in Chino, Dennis Sanders was restoring a Boomerang fighter for Guido. This was a 1200-hp, radial-engined Australian fighter of the WWII era, that's slightly smaller than a T-6. Guido bought a wrecked airplane, and Dennis and two helpers rebuilt it in 6300 hours. The Boomerang was shipped over last spring with a Falco spar kit for Ian Ferguson tucked under its wing in the container.

Tony reports on the first flight: "After what seemed to be an eternity, the first Australian-built Falco broke ground on the afternoon of the third of December, 1992, at the hands of Guido Zuccoli. It was a big moment for Wayne Milburn and myself—seeing something that we built actually fly. Those of you who have done it know what we mean."

"The first flight went well, no problems except for some left wing heaviness. We decided not to fit a trim tab, but instead to use a 1/4" wooden dowel taped under the right aileron trailing edge at the inboard end. The length is found by trial and error; ours will end up about 12" long for wings-level in the cruise. Of course, the stickload will vary from low speed to high, but the amount of effort required to keep the wings level is an absolute minimum. I've used this method of trimming on Guido's Pitts S1S, and it works well. The best thing about it is that you don't have an unsightly sharp-edged tab sticking out to run into. You really have to look for the dowel to find it."

"Guido, Wayne and myself are sharing the test flying program, and so far we have about 6-7 hours total on the aircraft.

There is yet a lot to learn about it, but we all agree that the Falco was worth every minute in the making. Wayne and I also fly Guido's collection—from the Sea Fury, through the Boomerang, Fiat, T-6, Laser to the Pitts; so the high performance of the Falco wasn't even given a second thought when it came to our turn to fly it. But we have to admit it goes well. On the first flight, which lasted almost 2 hours, Guido ran it at 25"/2500, and it showed 179 knots on the GPS at 5000 feet."

"We have the full gear doors (nose and mains), and the Nustrini canopy (which, by the way, is for very short people only). We have done almost everything possible to gain some headroom short of doctoring the seats themselves, which will have been done before you read this. Guido would have gone with the standard canopy right from the beginning if only we had known. We now have the 13-second gear motor in, and it pulls all the doors up much better. Everything closes tightly going up, and when the gear goes out, we give the crank a 1/2 turn just to pull the inner doors closed for the last 1/2", when the gear is locked down."

"I am tidying up a couple of things at the moment, such as replacing the leaking crankshaft oil seal on the Firewall Forward IO-360-B1E (which runs like a Swiss watch, and is *so* smooth), modifying the exhaust where it rubs on the lower cowling, and the seats."

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Articles, news items and tips are welcome and should be submitted at least 10 days prior to publication date.

The Air Defense Squadron of the Zuccoli Air Force over Toowoomba, Australia. Tony Chamberlin is in the Fiat in the foreground, Guido Zuccoli is flying the round-engined Boomerang fighter, and Wayne Milburn leads in the Falco. They are actually flying a Vee formation, but the smaller size of the Falco throws the proportions off.

"A good test of the performance of the Falco (and the engine/prop combination) and a method which Guido uses often, is to dive the aircraft to Vne, level out for a couple of seconds to stabilize, read off the altitude and pull vertical. Read your altitude again at the top when you torque off and note your height gain. For interest's sake, the Pitts gains 1800' (200 hp/fixed pitch Hoffman), the Laser/Stephens Akro — 2300' (200 hp, M.T. constant speed), and the Falco — an amazing 2800' gain, and that is loaded up with a full panel of avionics, too! A word of warning: recovery from an incipient rolling tailslide is not in everyone's capabilities!"

"I think Guido summed it all up when he said, 'You can do everything that the heavy metal does at a fraction of the cost.' We can't get over not having to refuel the Falco after each time it's flown. The other fighters (the *big* ones) are very thirsty."

The 34th Sequoia Falco is built for Lynette Zuccoli, Guido's wife, which explains the registration of VH-LZF. The airplane has an I0-360-B1E built up by Dick Demars's Firewall Forward. It is a 180 hp engine in name only, and it has been ported and polished for additional power. Guido reports a true airspeed of 165 kts at 21"/2400 at 5000 feet, and a stall speed in landing configuration of 58 kts indicated.

"It's a delightful aircraft to fly," says Guido, "It reminds me of a good combination of my Pitts S1S and the Laser 230. I have flown two stock SF.260's and the Sanders SF.260 with the 300+ hp engine. The performance of our Falco in the vertical plane is similar, as I remember it, to the performance available from the Sanders aircraft."

Guido Zuccoli has a construction business, Steelcon, in Darwin which specializes in steel and concrete bridges and water towers. Some years ago, a hurricane swept through Darwin and leveled huge parts of the city, including his house and business. He built the business back, but the Zuccolis now live in Toowoomba, near Brisbane on the east coast.

How did an Italian end up in Australia? Thereby hangs a tale. The Italians often have strong family rivalries, and like the Montague/Capulet feud that made things so difficult for Romeo and Juliet, Guido Zuccoli is the product of a romance between two members of the more famous Broccoli and Zuchini families.

(Um, make that *tall* tale.)

As I write this, Guido reports that the flight test program is completed and he has sent the required 22-page questionaire back to the CAA for the 'first of type' certification. "It should be okay," says Guido, "as everything concerning the flight characteristics of the Falco was just about perfect."

I'll give the last word to Tony Chamberlin: "It is a wonderful machine, and we can only encourage those of you who are working away on your Falcos to keep at it. We did appreciate the overnight responses to our faxed questions, and the many helpful suggestions put forward to remedy our selection of problems. The flying is wonderful, and so is telling all of the admirers that the Falco is made of timber, then watching their mouths drop in disbelief! We love it!"

—Alfred Scott

The Glider

Part 1 of a Series

by Dr. Ing. Stelio Frati
translated by Maurizio Branzanti

In 1946, Stelio Frati, then a 27-year-old professor at the Milan Polytechnic, published L'Aliante *(The Glider). Beginning with this issue, we will be printing the book in serial form. The original book was illustrated with many photographs of period gliders and illustrations, which, for the most part, we will be omitting. Our thanks to Fernando Almeida for lending us his copy of this rare book. Steve Wilkinson and I have edited Maurizio Branzanti's literal translation.—Alfred Scott*

Introduction

Among the many types of flying machines that helped conquer our airways, from the most modest and delicate to the huge, rugged Flying Fortress with thousands of horsepower, there is one category of aircraft that does entirely without engines: the gliders.

The glider was developed in Germany after the first world war, and it found particular acceptance among younger pilots. Even though many used it as a new form of sport and excitement, others employed experimental gliders to advance their studies in aerodynamics and to develop new methods of construction.

Today, aviation owes a great tribute to these last individuals. In fact, the glider has taught a great deal to designers, builders and pilots. To realize how much, we need only look at how many ways our armed forces have used these vehicles in the recent conflict.

To build a glider, one needs no huge industrial facilities, complex technical equipment or large financial backing—just pure creativity, a clear understanding of aerodynamic phenomena, and a patient pursuit of perfection in design and construction. So even our country, thanks to the efforts and merits of the "Centro Studi ed Esperienze per il Volo a Vela" at the Milan Polytechnic, was able to compete vigorously in this field.

The author of this book is, in fact, a young graduate of our Polytechnic who has already tested his theories and practical notions by building several successful gliders.

In this volume, you will find in simple terminology all the necessary advice and information you'll need to begin the project, complete the construction and fly your glider.

Don't be frightened if this book seems rather large for such a simple subject. It also includes the specifications of a variety of gliders, so in addition to being a textbook, it is also a reference manual.

To the new student generation, may this book be the incentive to further cultivate the passion of flight.

Prof. Ing. Silvio Bassi
Milan, Italy
March 1946

Chapter 1
Preliminary Considerations

1. Soaring

Soaring is the complex of activities that results in the flight of a glider. To be exact: (a) to design and construct a glider, (b) to study a specialized aspect of meteorology, (c) to study the techniques of flying, and (d) to organize proper ground support.

In this book, we will discuss mainly the design of pure sailplanes, and only passing reference will be made to low-performance gliders used for dual instruction.

2. Gliders: Training and Soaring

Official Italian regulations define gliders as aircraft that are heavier than air and have no means of self-propulsion. The use of gliders varies: for dual instruction; for more specialized training in soaring; for aerobatic flight; and for distance, endurance, and altitude flights. A strict subdivision according to the particular use is difficult to make. In fact, from the training vehicle to the record-setting vehicle, there is a complete gamut of medium-performance but still important gliders.

As a convention, we will consider two major classes: gliders and sailplanes. Gliders are defined as those unpowered aircraft that due to their basic construction and flight characteristics are used only for free gliding. In this category, we'll find those gliders used for training. We consider sailplanes to be unpowered aircraft that due to their superior aerodynamics and construction have improved performance and can be used for true soaring.

To give an idea of the difference in performance, gliders generally have a minimum still-air sink rate of more than 2 m/sec, with a maximum glide ratio of approximately 10:1. Sailplanes, however, have a minimum sink rate less than 1 m/sec, and a glide ratio above 20:1. Under certain atmospheric conditions, admittedly, a glider can be made to soar, when the speed of the rising air is greater than the minimum sink rate of the glider. By the same token, even a high-performance sailplane can do no more than glide when rising air is absent.

In truth, even the most sophisticated sailplane is actually gliding—descending—in relation to the air mass within which it is operating. It will be soaring—gaining altitude—in reference to the earth's surface, but the altitude reached will depend on the relationship between glider and surrounding air, and the relationship between the air and the earth's surface.

Because of this anomaly, a glider "rises while descending."

3. Aerodynamic Characteristics

The aerodynamic characteristics already mentioned are: efficiency, or glide ratio; and sink rate. Glide ratio is the ratio between the horizontal travel D and loss of altitude H in a given time. The value of this ratio,

$$E = D/H$$

is an indication of the quality of the glider, since at an equal altitude loss H, the distance D reached is proportional to the efficiency E, which can be expressed an efficiency value, say *20*, or more commonly as a glide ratio, typically stated as *20:1*.

The sink rate is the amount of altitude lost by the glider in the unit of time in relation to the surrounding air. This value is expressed in m/sec. Thus, from an altitude of 100 meters, a glider that has a minimum sink rate of 1 m/sec and a glide ratio of 20:1 will take 100 seconds to reach the ground after traveling a horizontal distance of 2000 meters. Modern competition sailplanes have achieved glide ratios of over 30:1, with minimum sink rates of .5 m/sec.

It is evident that the lower the sink rate, the longer the duration of any flight from a given altitude, and the higher the chance of being kept aloft by very light ascending air movements. At first glance, it would seem that obtaining the minimum possible sink rate would be of great importance for soaring. However there are two other factors of equal importance: the handling and the horizontal speed of the craft. To better understand this, let's briefly explain how soaring is achieved.

4. Practicality of Soaring

We can consider two types of soaring: thermal soaring; and ridge, or wave, soaring.

Thermal soaring takes advantage of the vertical movement of air masses caused by temperature differences. The rise of an air mass occurs when a so-called "thermal bubble" detaches from unevenly heated ground formations. These thermal currents are generally of small dimension. Larger masses of ascending air occur under cumulus clouds, and air movements caused by storm fronts are of particularly high intensity.

In ridge soaring, pilots take advantage of the vertical component that results from a horizontal air movement encountering a mountain, hill or slope.

In thermal soaring, either for endurance or distance, we try to gain altitude by flying tight spirals in a favorable site while the conditions are good. When conditions deteriorate and we cease to gain altitude, we move in search of a new area. It is obvious than that when we are trying to gain altitude, the handling of sailplane is of great importance. The tighter the spiral flight, the greater the likelihood that we can stay within even the smallest thermals.

But during the straight-and-level flight from one rising mass to another, it is obviously important to do so as rapidly as possible to minimize the loss of altitude. In this case, it is important for the sailplane to be capable of the maximum possible horizontal speed and low vertical speed—i.e. high efficiency. Unfortunately, it is not possible to combine both pure speed and ultimate maneuverability, so a certain compromise between the two is necessary. Which preference is given to one over the other depends greatly on the intended use of the glider.

5. Launching Methods

Even though it is not directly related to a sailplane design project, it is important to know the launching methods used so we can study the airframe structure and the placement of the necessary hardware required for launching. Since the glider does not have an engine, it obviously needs some kind of external energy to get airborne. The launching methods most commonly used are: elastic cord, ground winch, automobile tow, and airplane tow.

Launch by Elastic Cord. This type of launching is the simplest and most economical, and it has been employed for several years by training schools in various countries.

An elastic cord is attached to the glider's nose while its tail is securely anchored to the ground. The cord is then stretched like a slingshot by two groups of people spread out at an angle of aproximately 50-60°—so they won't be run over by the glider at the time of release. When the cord has reached the proper tension, the glider is freed. The slingshot action then catapults the glider into flight with an altitude gain proportional to the cord tensioning.

This system presents one major inconvenience: acceleration so high at the instant of launch that it can stun the pilot, with possible serious consequences. However, if the tension of the cord is reduced to diminish the acceleration effect, the glider will fail to gain sufficient altitude. For this reason, elastic-cord launching has been abandoned, except for launching from atop hills, where the acceleration can be reduced since only horizontal flight has to be sustained.

Launch by Ground Winch. This system has seen many modifications and improvements throughout the years. It is now the most practical and safest means of launching.

The system consists of a large rotating drum driven by a powerful motor. The glider is pulled by a steel cable, of approximately 1000 meters in length, that winds onto the drum. With this system, the speed of launching can be controlled, making a gradual and safe transition from ground to altitudes of 200-250 meters possible.

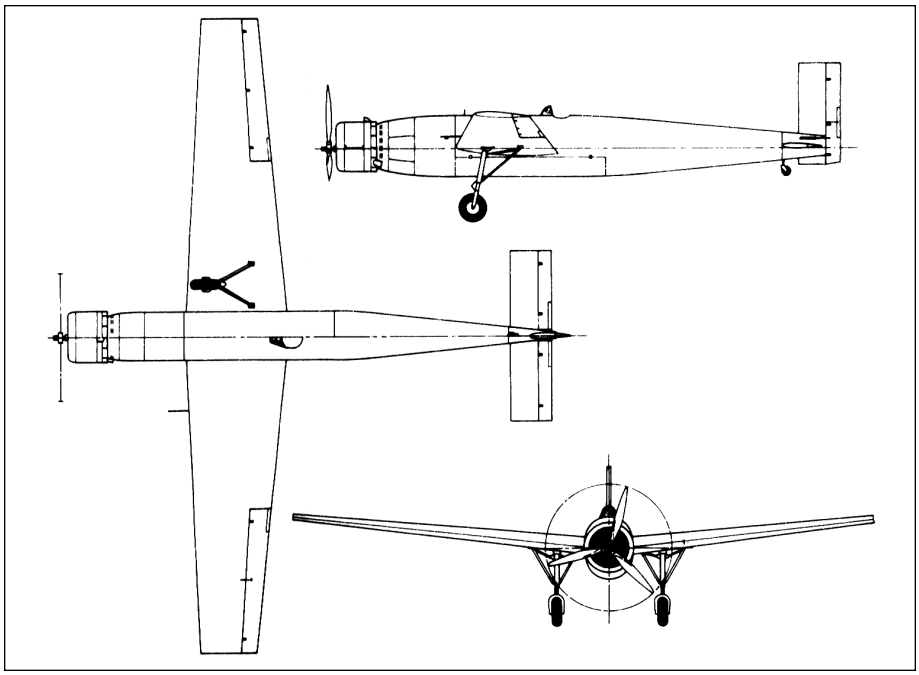
Launch by Automobile Tow. In the United States, it is common practice to tow a glider with an automobile. A cable of 1000 to 3000 meters in length is stretched between the automobile and the glider. This requires a paved runway or a well-maintained grass strip long enough so the automobile is able to reach the speed needed for the glider to fly.

Economically speaking, this system, is less efficient than a ground winch launch, which requires only enough power to pull the glider, while auto-tows need the extra power to run the automobile. As a bonus, however, altitude gain is far greater.

Launch by Airplane Tow. All the systems previously described are mainly used for launching of training gliders. For true sailplanes, it is essential to reach launch altitudes of between 500 and 1200 meters. The most practical way to accomplish this is a tow to altitude behind an airplane. A cable of 60 to 100 meters in length is stretched between the aircraft. When the desired altitude and conditions are reached, the cable is released by the sailplane.

This system has the advantage of not requiring a complex ground organization. The tow plane should be able to fly slowly, just over the cruising speed of the glider to avoid overstressing the glider and to allow it to maintain an altitude not too far above the towplane. □

In 1943, Stelio Frati and Ermenegildo Preti designed the Assalto Radioguidato, a radio-controlled flying bomb intended for use against Allied shipping. Powered by a 1,000 hp Fiat A.80 radial and of all-wood construction, it had a gross weight of 13,200 lbs. Five were built, two were test flown. It was never used in action—thankfully sparing the Allies from being hit by an ugly stick.



Lite Engineering and The Myth of Simplified Certification

The sport aviation nest is all a-flutter these days with talk of the wonders of simplified certification and how airplanes are suddenly going to become affordable again. Not only that, but there will be a whole new genre of modern, composite machines the likes of which we've never seen. When I see an airplane like the Lancair ES knocked out in 53 days from the time Lance Neibauer emerged from his shower with a vision, and then presented to the world by aviation magazines as tomorrow's airplane, I find my head spinning and asking myself why it's so easy. Pardon me, in this Christmas season of warmth and festivities, but I've got a bucket of cold water I'd like to dump on this notion.

The two engineers that I know best are Dave Thurston and Stelio Frati. By any measure, they are masters of their craft, with enormous intelligence and experience. I've watched as Dave Thurston did his sums on the Sequoia 300, calculating the loads, designing the components and cranking out the drawings. It's a long agonizing process that requires thousands of hours for a single airplane. Even Frati, with his shop of twenty-some metal workers and engineers, takes well over a year to crank out a simple design.

Are Frati and Thurston old fools that the world has passed by? Can unschooled designers crank out airplanes of equal quality to those laid out by a great master? Is simplified certification a chimera? And are we in the kitplane business delivering designs of high quality, roughly equal to production airplanes?

Perhaps the easiest question to answer is the one about unschooled designers. The fatalities among hang gliders and ultralights have been very high, and poor design has played a big role in all of this. There was a famous ultralight years ago that suffered the indignity of a structural failure in *level* flight, right over a shopping center parking lot where it was being demonstrated for the local television station, whose cameras recorded the entire absurd, and fatal, spectacle.

There was the Adventure Mustang, a sexy Chevy-powered scaled-down P-51 that suffered an engine failure, crashed and killed the test pilot. There were a couple of other auto-powered scale fighters being marketed

Jonas Dovydenas's Love Ya Special at the Great Oyster Fly-In.

out of Tucson. Two of these designs suffered engine failures, crashed and killed the test pilots. This year at Oshkosh, an amphibian came apart in the air and killed the pilot and prospective purchaser. The infamous Poliwagen—perhaps the worst single design ever flogged as a kit—had a terrible accident record.

Yet it's also true that many acceptable designs have been executed by an amateur with little or no engineering training—the Steen Skybolt and Wittman Tailwind come to mind. I asked Ed Swearingen about this, and he refused to condemn non-engineer designers. For an airplane in the Cessna 150/Piper Cub class, he had seen many wonderful planes built with very little engineering in them. "The most important thing is how well they were tested." Many successful production airplanes, he said with a sardonic chuckle, were "just built" but then people who knew what they were doing tested and tweaked the planes, and they turned out fine. Another observer said that as far as he was concerned, "lite engineering done well is still better than heavy engineering done poorly."

A question I hear asked often these days by aviation insiders is, "What do you think of the Lancair IV?" It's an intriguing machine, viewed with a mixture of admiration and unease by the engineers I know. One man put it this way, "I have a jaundiced view of all composite airplanes" that went back to some time he spent with the Glasair folks in the early days. "I asked to see some drawings, and there were only a few sketches. At that time, there was no engineering in the airplane, and there were

Mark Reichen, Jonas Dovydenas and Fred Scott a-pondering.

major structural deficiencies which have since been corrected."

Wander among the composite designs at Oshkosh and the signs of poor design are everywhere to be seen. One long-dormant design actually had a Hersey-bar wing, while another populer composite kitplane has sharp corners on the fuselage that its designer insists is a sensible design decision, and also has the landing gear forks held on with four quarter-inch fillister-head screws with threads in tension -- a practice guaranteed to get a snort from any engineer. Many of the designs are short-coupled machines, whose designers seem to have little comprehension of the fundamentals of longitudinal stability.

Yet when I walk around the Lancair IV, I see no such obvious flaws; indeed once you accept the idea of a high wing loading, it appears in many ways to be an extremely elegant design. If, over time, the airplane proves to have no serious structural or maintenance problems, I think it will turn out to be a pinnacle airplane of this era, not unlike the Falco in the late fifties. Certainly it shares an elegance of form, and when you look at the performance you have to wonder why anyone is still fooling with pusher designs.

But the things that unsettle my engineer friends are the unknowns. "What is going to happen to the resins if it sits out on the ramp for 6 years in Phoenix? Do we know? I don't think we do", mused one. This is a complex airplane, with oven-cured carbon-fiber parts, but I worry about the ability of a proctologist in Dayton, perhaps with a few ideas of his own, to assemble these components in the uncontrolled conditions of his garage and then go out and operate this turbocharged 350-hp soon-to-be-pressurized machine in the frigid climes of 25,000 feet. Once you go over 200 mph, the margin for error goes down sharply, and this baby trundles along at 300-something.

And when I read the cheery articles in *Sport Aviation* by Lance Neibauer about his planes—hey, man, it's great up here at eighteen thou where we're cooking along at 300, and we haven't even opened it up yet—I reflect that this is not a man with years of experience with high-speed, turbocharged airplanes. Where is the engineer's caution, and the manner of talking that I've come to associate with all the really good engineers I've known? Is it really so easy, when it was so difficult for Beech?

Herb Andersen, chief engineer for Aviat (formerly Christen Industries) shares the concern, and like me hopes the work has been done and that they'll never have a problem. "I myself would never dream of buying a Lancair, Wheeler Express, or any of the other composite kits, build it in my garage, and then go out and fly it unless I had a parachute."

I asked Herb what he thought of the quality of design among kitplanes. He said he had noticed that "things bubble to the surface", like the Varieze with its stall problems and the effect of rain on the canard. "We had some very tragic things with ultralights and hang gliders" and he talked about the sad spectacle of the fatal accident of the ultralight on Hugh Down's "20-20" television show where the pilot was struggling with what was obviously a serious handling problem. Herb said he was "under the impression that some of the planes are well engineered—the Glasair comes to mind. An airplane like the Steen Skybolt lends itself to shop engineering, but I worry about the cantilever-wing composites. The thing that amazes me is that there haven't been the structural failures."

My own conclusion is based simply on what I have observed over the years: the inflight-breakups of the RV-3s; the grounding of Lancair 320s in Australia for stability problems; the Glasair IIS's longitudinal stability problems; the early Kitfox's directional stability problems; and even our own screwups with fuel tanks and screwjacks. I'm astonished at the Lancair's low accident rate compared to all other high performance kitplanes. There's no question that the kitplanes of today are infinitely better than those of ten years ago, and the

naive what'll-she-do purchaser is rapidly becoming a thing of the past—people now ask about engineering, component quality, drawing quality and builder support. My conclusion is that kitplanes are delivering airplanes that are in some respects superior to production aircraft, and our overall level of engineering and design is fairly good but not up to certification standards.

The simplified certification proposal began about ten years ago, when Paul Poberezny approached Frank Christensen to write a proposal to be submitted to the FAA. Frank says that he sees little wrong with FAR Part 23. It is simply a minimum engineering standard, and a very good one at that. If you are going to design something, you must have some engineering standards. The principal flaw is that the FAA keeps adding amendments to cover special situations.

So Frank proposed to take out the lightning-strike requirements, the need for redundant trim tab controls, and such, and then create an honor system whereby the company did the work in-house and was subject to audits by the FAA. This would eliminate waiting for FAA approvals in the process.

Christensen is a stickler on engineering. The Christen Eagle was designed by Herb Andersen, and when it was finished, Christensen hired another engineer to do a complete Part 23 analysis. "People said I was crazy to do this, since I wasn't going to produce the plane, but I wanted all the engineering data in my file in the event of a lawsuit." We have done the same sort of thing here with the changes with the Falco, and we've spent over $25,000 with Dave Thurston on various changes to the Falco.

Even as he wrote the original proposal, Christensen was adamant that certification costs had almost nothing to do with the cost of airplanes. The entire concept, he insists, is based on a false premise. The Husky, for example, was designed by 4 men over 16 months, and cost about $180,000. Much of that work was simply engineering work they would have to do in any case, certificated or not. So if you take the entire cost of design, testing and certification of the Christen Husky and amortise it over 500 airplanes, it comes to about $400—approximately the same as an artificial horizon or a set of Falco plans.

Herb Andersen agrees, and says he was asked to be on the EAA/SAMA team because he was the only guy in the U.S. who had recently certified an airplane to FAR Part 23. Herb says he doesn't understand how changing the engineering standard will substantially reduce the cost of an airplane. He's read the simplified certification document, and from his perspective it is simply FAR Part 23, through amendment 32 with two changes: simplified lightning-strike criteria and the elimination of dynamic testing of seats. Both are very welcome and significant changes. The dual control path for elevator tabs is still in there.

He described a lot of nice people with good intentions caught up in a libertarian's tulipmania.

The honor system that Christensen proposed is not in there either, but Andersen says that's really not an important issue. The FAA only approves the basic loads report and only spot-checks the other things like wing and fuselage analysis. As a practical matter, any company that's going to produce an airplane will have FAA Designated Engineering Representatives on their engineering staffs who can sign off on things.

Andersen said that he thinks the entire sport aviation industry has talked to itself and convinced itself that the cost of certification is The Big Problem. He went to one of the EAA/SAMA meetings, and he described a lot of nice people with good intentions caught up in a libertarian's tulipmania. "At some point in the meeting, I was asked to describe the stack of paper I had to submit to the FAA," he said. "I told them it was about three inches high. There was the longest silence around the table. I think they were all envisioning a stack of paper a foot high. They have it in their mind that it is a bigger task than it is, and they don't really have an understanding of what is involved."

"The whole experience has led me to the conclusion that there are two worlds: the fantasy world and the real world. Everyone is just fooling themselves if they think any of this will affect the cost of airplanes, and I'm tired of hearing aviation writers rhapsodizing about composite structures. The composite work being turned out by kitbuilders today won't even begin to meet FAA minimum standards."

I asked him to compare the difficulty of designing, certifying and manufacturing two airplanes, a 180-hp four-seater built of composites and the same plane in aluminum. "Compared to conventional aircraft construction techniques, more expertise is needed to create a composite airplane—by a substantial margin." As I talked to Andersen, he was flipping through the pages of the regulations. "The quality control requirements are mind-boggling. You have to test every part to a limit load," and he began to read the sections about the damage-tolerance criteria developed for the Starship that are now part of the regulations.

When he looks at these requirements and then sees what kitbuilders are doing, he says he's mystified why it's "all so easy for them—either they know something the FAA doesn't know, or the FAA requirements are too stringent. Something's wrong." But then, he said, "To the simple, all things are simple."

The image that sticks in my mind is the photo of the Oshkosh announcement of the simplified certification program, with a dozen or so scruffy-looking kitbuilders, some squatting on the ground like goatherders from the mountains, waiting to pick up their applications so they can certify and produce America's airplanes of tomorrow—and all of this is in the name of aviation's perennial runny nose, The Affordable Airplane. Gimme a break.

—Alfred Scott

Goings On at Sequoia Aircraft

The Great Oyster Fly-In in November was a great time. There was some weather up north, but Steve Wilkinson and Jonas Dovydenas both arrived in their Falcos. Jonas's Falco is painted in a scheme that's vaguely like Steve's. It's a pretend military job done by the same painter, and it has a Perot sticker on one side of the fin and an elaborate "Love Ya Special" logo on the other side.

This year only 65,000 people showed up at the Urbanna Oyster Festival, down from 80,000 the year before. All this in a town of 500 people with its parade of Shriners, local celebrities, and fire engines. As one wagonload of potbellied hillbillies crooning country tunes drifted by, a friend noted, "It was for people like this that God invented beer."

We taxied Steve's Falco into the front yard, and that was too much for Jonas, who brought his in, too. I settled down shucking oysters for the guests while Steve and Jonas were over pimping for the Falco among the crowd that gathered around them. People would ask about the planes, and Jonas would say, "Aw, it's great" while Steve, ever the banal-retentive writer, would try to think of something original to say in answer to each question.

As the evening approached, we had three Falcos up giving rides—I mean that's assuming you count the Corporate Disgrace as a Falco. At one point, Mark Reichen was giving rides in Steve's Falco, and I made the mistake of pointing out to Steve's wife, Susan Crandell, that at that very moment my attorney was getting a ride in their Falco. This puckered her up something awful, but they landed safely and the counselor enjoyed himself immensely.

In the last newsletter, I discussed the problem with the nose gear control arm sometimes spinning in the upper drag strut, the big 'A-frame' casting in the nose gear retraction system, and the need to keep the nut tight. Mr. Frati advises that this problem also occurred on the F.15 Picchio, and it was solved by installing a pin to prevent the P/N 605 nose gear adjustment screw from turning by friction with the screw-jack. After the entire system was set up and all rigging had been completed, they drilled completely through the casting and through the shaft of P/N 605 and installed a roll pin.

A 1/8"Ø x 1.125" roll pin is perfect for this, and according to my calculations it should be located about 40mm above the base of the casting. We will be adding this to the retraction kit, and we'll get a revision or new drawing out at some time. In the meantime, those of you flying, and with the system all set up, can go ahead and install one of these roll pins to safety the part in position.

After some delay, we are finally going ahead with our own 'clone' design of the vacuum regulator. Airborne's regulator had a worrisome 'patent pending' warning on it, so I wrote the general counsel of Parker-Hannifin and told them that we were reluctantly reverse-engineering their design, and asked them to please disclose what patents they owned so we could design around them. Their patent counsel called to say that all of their patents had expired several years ago! So we are free to do an *exact* copy, and Rapco has agreed to produce this design as a PMA component. Thus it appears that the net result of Airborne's policy is to give birth to a competitor. It doesn't make much sense to me, but there you have it.

At this time, we are finishing up the remainder of the wing ribs, and I expect to start on the fuselage frames shortly. Because of the number of builders waiting on them, we will be making frames 3, 4, 5 and 6 first so that they can be installed in the wing. We've just shipped out our 15th wing spar kit and will be starting a batch of five more shortly.

Jim Slaton called the other day to report a problem with a fuel line hose. A couple of years ago there were some AD's on a bad batch of Aeroquip hose. Jim said he had been smelling fuel for a month and couldn't find it. With the help of a mechanic, he finally traced it to a leaking hose from the injector throttle body to the fuel flow transducer. The hose was leaking through the wire covering.

This particular hose was a rubber hose that Jim had bought locally, and not the Teflon-lined hose that we supply as part of our kits. But Jim thought we should warn others who might have bought hose at the same time.

I am sorry to report that Falco builder Tim Baker died in July in an accident in a Champ. He was taking off and the airplane pitched up sharply and then stalled into the ground. His father, Bud Baker, watched the whole thing and says they don't yet know what caused it, although there is some possibility that there was a wind change over the tops of the trees at the end of the runway. Tim Baker was a 747 pilot for Federal Express, and he was a very colorful personality. Tim and Bud built a Falco several years ago, and Bud has the airplane in Dover, Delaware, now. Our condolences to Bud and Margeret Baker.—*Alfred Scott*

Steve Wilkinson is incapable of flying his Falco without his Italian bicycle racing hat.

Sawdust

• An oil-additive scorned. Aviation's best brouhaha of the year is the Dick Rutan/Jeana Yeager Microlon political tussle. If you enjoy a good fight, this one is vintage supermarket-checkout quality stuff. The problem began this summer, when Voyager pilot Dick Rutan announced he was running for Congress. About the same time, his twelve-percent-of-the-time Voyager copilot and ex-girlfriend, Jeana Yeager, married Bill Williams, manufacturer and promoter of the (in?)famous Microlon engine oil treatment. Williams has gained notoriety for excessive claims of the oil additive, and *The Aviation Consumer* once ran a story where an angry Microlon user demanded his money back and who reported that Williams had threatened to burn his house down. Williams once told me he rubbed the stuff on the wing of his plane, and it flew faster.

This summer, Microlon ran an advertisement with a testimonial from Yeager, where the Microlon ad suggested that as they crossed the coast of Africa they lost all of the oil in the aft engine, but that after two hours without oil, the engine "was still purring" and if it hadn't been for Microlon, the two of them would have been "down in the Atlantic Ocean off the coast of Africa, trying to tread water." Microlon also claimed it was a sponsor for the Voyager flight—news to everyone.

Contacted by *The Aviation Consumer*, Rutan denied ever putting Microlon in the airplane and whatever minor oil-pressure fluctuations that did occur at that time didn't involved any lost oil. Rutan's lawyers fired off a letter to the Federal Trade Commission. A war of letters erupted with Williams telling Rutan, "If you hurt me now, as you have in the past, you leave me no option but to attack you. Interesting thing is that I will destroy your hopes with the truth about you." Then Yeager, who initially signed statements urging voters to support Rutan, came out in support of his opponent and called Rutan "not fit to hold any public office."

There's more, but read about the rest in Dick Weeghman's account in the December 1992 *Aviation Consumer* piece, "The Microlon Fracas". Rutan lost the election by a narrow margin.

• Heading back to Washington. He may be balding and getting-up-there, but former astronaut John Glenn still has the Right Stuff for some. My reporter friend, Ken Ringle, was out in Ohio covering Senator Glenn's re-election campaign for a week, and found that many people barely remember that Glenn was an astronaut. Ever the dogged, anything-for-a-story reporter, and ignoring his own health and safety, the brave Ringle continued to work late into the night gathering material—at a local bar. Twas there he interviewed a hooker with a brown leather mini-skirt. Her voice was very raspy. "I'm sorry about the way my voice sounds," she said, "but my husband came home last night and tried to strangle me. I had to throw him out." Ringle asked her what she thought of Glenn. "Well," she said, "he's kind of cute. I'd give him a head, but I wouldn't vote for him."

Top: Santa gets a break from wind-in-the-face sleigh riding.
Above: Christmas decorations as the Loncarevic house.

• Nibbio for sale. This 1960 Aviamilano four-seat version of the Falco proves that even Stelio Frati is capable of parts-bin engineering. Ten originally built in a plane that has 80 percent of its parts from a Falco. 700 hours total time, 1700 hours on engine. $80,000. Contact John Wynn, 27 High Street, Willingham, Cambridge, England CB4 5EU or call 0954-6080.

• Stanford University researches say their flight tests show a single GPS receiver could replace the functions of more than 50% of the current cockpit instruments, since it can track attitude, heading, altitude and speed. In a surprising side benefit, they found that GPS is so accurate that it can be used to sense wing deflections in *millimeters*, and angular accuracy was better than 0.1 degrees. Sales of GPS receivers of all sorts are virtually exploding, growing between 50 and 100 percent a year.

• Getting close. Marcelo Bellodi called the other day to say that he's within a few days of getting his Falco in the air. He's done the high-speed taxi tests and only has a few minor problems to clear up. Also close to flying are John Shipler and Alan Hall, both in Southern California.

Why I Fly a Phony Warbird

by Steve Wilkinson

As I stood on the ramp flicking motes off my Falco's brand-new Italian Air Force paint job, a dour-looking airport hanger-on paced slowly around the airplane. "That's terrible," he said. "Terrible."

"Huh?" I stopped flicking.

"The roundels. They're *all* out of proportion." He shook his head grimly.

"They're the insignia of the Republic of Kiribati, and they're correct," I growled.

"Nah, my parents were Italian," he said, "I know what they are, and I take these things seriously."

I *hate* people who take things seriously. Life's too short, and then you die. Though he was correct in identifying the pizza-shop symbols, I had never intended the Falco's mock-Italian paint job to be an accurate replication of anything. (Besides, the otherwise-faultless painter has misunderstood my instructions and made the diameter of the roundel's green central disk what I'd intended to be its radius. Someday I'll fix it.)

No Falco ever served with an "Aeronautica Militaire" of any sort, though its big metal brother, the SIAI-Marchetti SF.260, was inducted into a number of air forces as a trainer and even an occasional counter-insurgency weapon. But I'd tired of seeing Falcos in various shades of civilian red and white with zoomy stripes. (I hate stripes on airplanes almost as much as I do humorless people. Stripes are intended to fool the eye into thinking a shape is something it isn't, which may be necessary on a Cessna but doesn't flatter a Falco.)

I think I started to make the decision the day I jokingly asked the FAA inspector if I could put the mandatory 'experimental' labels in Italian, since the Falco was an Italian design. "Absolutely not," he said coldly. "They have to be in English." Well excuuuuuse me.

Then, one day my wife, a pilot too, regarded the airplane in its grim khaki primer and industrial-gray fiberglass cowl and said, "I know it isn't painted yet, but it looks neat the way it is—sort of arrogant." That did it. I got out some monographs I'd collected during a visit to the Piaggio factory in Genoa, studied some photos of ungainly P.166s and marginally more attactive P.148/149s, and set to sketching.

The result was a Porsche Guards red and national fleet gray paint scheme the *machismo* content of which I rationalize by telling people, "The Italian air forces never hurt anybody, it's not a warbird thing." Haile Selassie would disagree, but over here, we continue to tell jokes about how it's impossible to buy a used Italian army rifle. And one of the funniest Italian airplanes ever depicted was cartoonist Bruce McCall's Caproni-Moroni C2 Scud, a double-ended fighter with a radial engine at each end and a central cockpit with a swivel seat and dual controls, so the airplane could instantly reverse direction with each change in the country's allegiance. "A remarkable feature of the plane, considering its fighter designation," the accompanying text read, "was its total lack of armament. The designers successfully resisted all attempts to ruin its unbroken lines with ugly guns." Which is why you'll see no phony gunports or hardpoints on my phony fighter.

I admire builders who paint their own airplanes, but the small amount of spray-painting I did myself on the Falco—landing gear, internal metal parts, the initial priming—made it clear that my skill was moderate and that I'd need far more practice before achieving an outstanding final finish. And nothing so alters the superficial quality of an airplane, for better or worse, than the paint job. A superb finish can turn an ordinary building job (like mine) into a jaw-dropper on any ramp, while the Earl Scheib technique will make the most compulsive wood craftsmanship look... well, homebuilt.

So I took the Falco to a painter I can highly recommend, as can a number of far more knowledgeable airplane owners who have carefully examined the Falco's finish. His name is Gary Montpelier, he's an A&P and a pilot, he runs an auto body shop way up in Plattsburgh, New York, with an 1,800-fool dirt strip out back, and now that he's practiced on N747SW, he'd love to paint more Falcos. (If you're interested, call him at 518 563-2149.)

To find Gary's shop, fly directly overhead the Clinton County Airport—watch out for FB-111s wailing out of Plattsburgh AFB, just to the southeast—follow the one main road that leads north from the airport parking lot for about five miles, take a right when you get to a road that leads east from that main road, and you'll spot his strip about a mile to the east. It's wide though relatively short, and strongly uphill if you land to the west. In fact, though you normally take off the the east—downhill—I wouldn't recommend landing to the east unless there's a considerable wind down the runway from that direction. Jonas Dovydenas and I have both been in and out of Gary's strip, and it's no problem for a Falco. If you want to take a look first, Gary and his dog will pick you up at Clinton County.

One nice thing about Montpelier is that he's intelligent. He's *not* just a body-shop guy with a Binks and a bunch of color books. If he thinks you're making a poor color choice or have a misguided decorative scheme, he'll tell you, and tell you how he thinks it should be done. (He made several suggestions on my Falco's design and colors, and they were all absolutely right.) Another is that he's honest. Gary quoted me a price of $3,500 for a polyurethane finish that ultimately involved five different colors, and he did enough work preparing the airframe that he would have been justified in billing me for extra hours beyond the agreed-on job but didn't.

The only down side of Montpelier's work it that, like any opportunistic North Country hustler, he might put your airplane aside for a few weeks if a couple of pickup-truck wrecks come in. My Falco was in his shop for a good three weeks before he put a hand to it, and we consequently missed a deadline that meant Susan and I had to cancel a long-planned flight to visit friends in North Carolina and Alabama.

Another problem is that his strip is strongly subject to weather. If you need to get your airplane out during a particularly wet time, or during mud season—which is what they call spring up north—you won't. It'll stay parked until the runway dries. But if you want a craftsmanlike paint job done in an evacuated booth by a guy who now knows Falcos, call Big Gary. "We'll do your airplane for $2,500, but we won't put our name on it," he laughs. "Those are the ones we paint outside. And we'll do it for $5,500, if you want a museum-quality job." I think you'll be happy with the one he does for three and a half large, though.

Brenda's Corner

Gosh, there's not much room left for me—this *is* a corner down here. Good thing though, because I didn't have much to say anyway. I'll make up for it in the next issue, and in the meantime, Merry Christmas and Happy New Year to all of you.

—Brenda Avery

Mailbox

For anyone in Europe who'd like to experience Frati handling, the Marchetti Sports Flying Club at Dublin's Weston airfield have three SF260D's for hire with instruction. These planes were part of the recent American Enhanced Flight Screening program, and now earn their living during the week with the Irish Air Corps but are available at the weekends. The cost is approximately £250/hr (Irish). Contact Patrick Byrne, Skylane Flight Management Ltd., Dublin, Ireland, Tel: 353-1-269-7444. I had a whale of a time. The 15-meter wide runway keeps your attention on takeoff and landing. The instructors are regular military types and accomplished formation flyers. The canopies leak with it rains. Patrick Byrne will sell you a 260 if you insist.

Robin Rother
Edinburgh
Scotland

In our June builders letter, we published a note from Karren Melhuish in Australia which dealt in part with the license plate thing that Brenda Avery started. Cecil Rives sent us a copy of the following note to Karren:

Dear Miss Melhuish,
Enclosed you will find one of Alfred's old license plates. I was persuaded by Brenda to take it in order to spare Alfred from possible embarrassment. (I think she paid someone to take the other one.) I am sending this one on to you, not because I don't cherish it, but because I was touched by your letter in the Falco Builder's Letter. Perhaps, it will be an inspiration to you or you might wish to use it as target practice during those periods of darkest despair that await you in the building process. In looking at the plate one last time, I can't resist thinking "Yes, Virginia, there is a Falco" or "Yes, Falco, there is a Virginia." But let me assure you of one thing—Alfred Scott is not Santa Claus!

Cecil Rives
Houston
Texas

I am looking for a kitplane that will do the following: 1. Fly two adults, say 6'5" and 250 lbs, 2. Use the CAM100 powerplant, 3. Folding wings, 4. Can floats be used?, 5. Please forward any performance information or anything that might be useful. What I am looking for is a kit that is not going to bankrupt me.

Patrick Conroy
(age unknown)
Edgewater
Florida

Marcelo Bellodi's Falco is painted and now in high speed taxi tests.

Bill Nattress died on the 14th of October, and I should be most grateful if you would publish this in the next Builders Letter. He was a modest character, but I feel that he would have been pleased to know that this acknowledgement was reaching individuals of like mind in different parts of the world.

He was the backbone of our Falco project, and the registration G-BYLL was the nearest we could get at the time to his name, and as a token of his efforts, tenacity and spirit which kept the project moving through the more difficult times. It will remain a tribute to his memory as long as it flies.

Neville Langrick
Huddersfield
England

This year we didn't make any progress in the Falco. The Falco construction is difficult at these times becaue we are in a very bad economic year here. About our construction stage, the tail group is approximately 60% done. The Falco kit and airplane are great, so we hope to someday finish it all.

Aldo Mortari Pucciariello
São Paulo
Brazil

It's now been a few months since I received the plans for your beautiful Falco, and it's about time to let you know what I think. Although I work with construction drawings almost every day, I haven't seen a lot of aircraft plans. Recently, I had a chance to browse through a set of plans for the RV-4, and that just seemed to confirm what I was beginning to believe. The Falco plans are certainly in a class by itself when it comes to completeness and overall quality. The construction manual is absolutely invaluable. I can feel a strong sense of professionalism and devotion in the Falco-project from your side, and I appreciate that.

Terje Aanerod
Holen, Norway

So far I'm making slow but steady progress on my project. I've finished the tail components, wing ribs and most of the fuselage frames in 18 months. At least the project has acquired a name, "The Other Woman", because (a) she has beautiful curves, (b) she demands a lot of attention and (c) she is expensive. Marilyn has realized the futility of trying to compete with purpose-built curves that aren't subject to the ageing process and the laws of gravity, and seems to have accepted the (unfair) competition because at least I'm not likely to catch a nasty disease. Although there are some jibes that I may not be man enough to handle a high flyer.

My question at the moment concerns fuselage frame #3. The dimension "S" on sheet C1 is 308mm, while on sheet C3 the drawing shows it as 300mm. I assume tht 300 is the correct dimensions, but could you please confirm?

Graeme Lean
Landsborough
Australia

Yup, the 300mm dimension is correct. Now a question for you—do you pay that much attention to an 8mm difference in one of Marilyn's curves? (A week ago we received a reply from Lean, ever the macho Aussie, saying that women, like horses, are measured in hands.)—Scoti