

# The COZY NEWSLETTER #6 July 8, 1984

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It is mandatory for all COZY builders to subscribe to this newsletter, as this is the only formal system we have for communicating plans changes and/or corrections, builder hints, and other information of interest to builders and prospective builders. Issues prior to No. 4 are not necessary, in that they were only reports on the progress of plans, and extra copies are not available. Starting with issue No. 4, the newsletter will contain important builder information. We will try to keep the subscription price low, so cost won't be a problem.

When writing to Co-Z with questions, please send along a stamped, self-addressed envelope. Please leave space after each question, so we can fill in the answers (without having to rewrite the question) and return on your original.

If you call, please call me a home (612-776-1145) after regular working hours (I'm not retired yet) or on weekends. We have visitors - dropping in to see the proof-of-plans model in our garage or the prototype hangared out at Anoka Co. Airport, 20 miles away. So far, we have been able to handle it.

June 1, 1984 the following prices became effective:

Information kit \$8.00

Newsletter 5.00/yr.

Plans 210.00

We have not as yet programmed our computer to print expiration dates on the mailing labels, but hopefully we can get to this some day after more urgent business is completed.

### ABOUT THE PLANS

When you receive your plans, don't neglect to sign and send in your license agreement (Chapter 1, Page 4), so we can issue your serial number. Many of you haven't done this yet. Also, don't neglect to mark in the corrections published in the newsletter. In spite of our best efforts, errors do creep in, and we will publish them as soon as they are discovered.

Please check your plans when you receive them to determine that there are no missing pages. We don't know of this happening, but we don't want anyone to leave one whole page out of construction (The manuals were put together by the printer, and it isn't possible for us to check each one individually).

The plans were laid out in the same sequence as the Long EZ plans. You will find, however, that there are some detours. For example, you should not attempt to install the landing gear before the centerspar is installed, and it is much easier to jigbore the centerspar to the wings before the centerspar is installed in the fuselage, which means that you will have to build the wings before installing the centerspar and gear. Also, it is easier to do the turtleback and canopy before building the strakes, although not absolutely necessary.

Some of you have asked whether there will be an extra charge for Section 1A of the plans. The answer is no, although it is beginning to look like the printing cost may be substantial, because it is growing. We haven't decided how to handle the engine installation instructions yet, because parts of it will already be covered in other chapters. We will advise you of our decision when it is made.

If you have questions, please make sure that they aren't already answered in the plans, or newsletters. Don't expect to understand everything perfectly on the first reading, particularly if you have just received your plans and haven't even started the project yet. Very often the instructions presume that you have completed preceding chapters and have developed a basic understanding of how things are done, without having to return to square 1 each time.

Thanks to those of you who have commented on the plans being very complete and well done. We have been trying as conscientiously as we can to find the best way to do each step, explain it in detail, avoid poor grammar and misspelled words, and type set it for easy reading. It helps to know that our efforts are appreciated.

## PUBLICITY

We have discovered that in spite of what we considered to a fair amount of publicity about the Cozy, there are still Lot of people out there who do not know it exists. It makes us feel bad when we hear from people who say they wish they were building a Cozy, but started something else because they hadn't heard about it. So we have started advertising in Sport Aviation, Homebuilt Magazine, Plane and Pilot, and Kit Planes.

Our first advertising copy printed poorly so we had to go through the art work preparation all over again and now we are quite pleased with the results. Have you seen our ad? The need for publicity influenced our decision as regards the Cafe 400, which we will comment on in detail later.

We have been advised that even if we can't advertise in all aviation publications (there must be a million of them!), we should at least put them on our mailing list so they can keep up to date and advise others on what we are doing.

Watch Sport Aviation for a report on the Cafe 400 and also a pilot report by Shirl Dickey and Al Yarmey.

Incidentally, we had some new pictures printed of the Cozy from the slides Bud Davisson took last year. They are much nicer than our previous ones. We will try to have some available at Oshkosh.

## LETTERS

We receive many interesting letters and like to publish one occasionally. Vernon Lehman writes:

Dear Nat,

After much investigation, my wife and I have made our decision that the Cozy is the aircraft for us. Therefore please find enclosed my check for \$8 for the information package. Our decision was based on the performance, the lines, and the ease of IFR operation. As a point of interest, you might find it interesting that I am employed by Beechcraft and am currently a sheet metal mechanic on the Starship 1.

Work on the Starship is progressing and most of the engineering is finalizing into tooling up for production. Burt Rutan certainly is held in high opinion on his genius among the R and D mechanics in the Starship shop.

Looking forward to doing business with you.

Sincerely,

Vernon

## WHAT WE HAVE BEEN DOING

This past quarter I haven't had to do a lot of business traveling, so we have concentrated all of our available time, that is, apart from my job at 3M, on Co-Z business. We think we have accomplished a lot, but it has been frustrating that we couldn't accomplish more. Everything, it seems, takes more effort than we expect.

Correspondence, that is, answering letters, is taking an increased amount of time. We try to answer most reasonable questions, but side step some on occasion which don't relate to builder support and would require some research and an investment of time to answer. We are having to turn down a request from an author who wants a whole bunch of stuff including a lot of special photography so he can write a book. We also have been declining a number of fly-in invitations this summer, for lack of time. We always enjoy having customers drop in. They have all been very wonderful people.

Setting up prefab suppliers has been a time consuming process this last quarter, and has taken much more time than we anticipated. It involves making very detailed drawings of mechanical parts and plugs (or molds) for molded parts, and lead time for making tooling and checking the first parts made. The good suppliers are also very busy and it has taken them time to fit us into their schedules. A little more on this later.

Since the last newsletter, the Cozy is back in the air again, all dolled up in new cowlings. They really look nice and we think they increased our TAS by at least a couple of mph. We also decided to try out a new Great American propeller which, according to Burt's data, is the best available. We wanted it for the CAFE 400, and really like it a lot. It is a premium propeller, and priced accordingly. It is made up of 32 eighth inch laminations (I counted them) and covered with Kevlar. It is designed with more twist from the tip to the hub than the propeller we were using. I measured and calculated that every segment of the blade is at the same angle of attack to the relative air flow, which means that the thrust load is distributed evenly over the entire blade, and the drag should be minimum as well as the bending loads. Our observed static and full throttle cruise rpms agree with the data published by RAF, and we have concluded also that it is a super prop.

We were fortunate this quarter in being able to visit two builders, Jack Wilhelmson in Cheraw, S.C., and Al Yarmey, in Salt Lake City, Utah. Jack's Cozy is well along. The canopy is installed and he is about ready to mount the engine. He deserves a lot of credit for building all of his own parts and being able to figure out some of the details based on my rough drafts of unissued chapters. He should be flying later this Year. Al Yarmey and his lovely wife of 3 months, Cathi, have converted their master bedroom of their apartment into a nifty workshop and are well along with the fuselage. After having been up all night working the morning of my visit, the most important thing on their minds wasn't sleep, but how soon they could get back to work on their Cozy. That's dedication!

## PREFAB PARTS

We decided in the beginning to use the same suppliers of prefab parts whom Burt uses for the Varieze, Long EZ, and Solitaire, in so far as possible. In addition to having Burt's blessing (and that of other designers as well), we have used their parts ourselves on our Varieze and on the Cozy. These

suppliers are familiar with aircraft requirements and the homebuilt market, and have their reputations at stake. It's the only way we can be confident that you will receive good parts and be treated fairly and honestly. This isn't to say that there might not be many other good suppliers, but it could take a lot of time and effort to search them out and research their track records. With this in mind, we went to the Airplane Factory on canopies, Ken Brock Mfg. on mechanical parts, and Task Research on fiberglass parts. The latter was in the process of moving their facilities from California to Arizona, so they declined taking on any new business at this particular time.

We turned to a friend, Larry Fitzgerald, of Quality Aircraft Components, in Bristol, Wisconsin, who has been making custom parts for composite aircraft, and he asked if he could do our molded parts. So we made new plugs for the Cozy cowlings, and a mold for the turtleback, and took them over to Wisconsin for him to get started, and we took advantage of the occasion to inspect his facilities. We were much impressed, and he was anxious to help, so we established him as our supplier. He is investing in a curing oven and permanent cowling molds, and should be ready to honor your orders shortly.

The Airplane Factory did an outstanding job of building a canopy mold from our drawings, and the first two out of the mold were perfect fits. We have given them the trimming dimensions so they can trim them just right in the factory and save you the pain and anguish. The side windows were a different story. They didn't turn out right the first time, and we traced the problem to our not having supplied a rigid enough impression which became distorted in the mold making process. So the 2nd time around we made very substantial molds which we laid up right against the turtleback. We checked them ourselves, after cure, by drape molding a set of windows, and then shipped them off to Jeff Rogers. He is going to make another set and ship them to us so we can check out his work as well.

We sent detailed drawings of all of our special Cozy mechanical parts to Ken Brock Mfg. in March, and requested that they send us a set of parts to proof as soon as possible. Unbeknownst to us, they were deeply involved in making parts for the Voyageur at the time, and put our project (along with others) on the back burner, figuring that they had plenty of time before they would start receiving orders from Cozy builders. Of course, this put us in a bind because we were waiting for parts to proof before completing the chapters on controls, trim, landing brake, and engine installation. This has all been resolved now. They are hard at work making tooling so they can produce the parts in quantity. We anticipate that we will soon have the parts we have been waiting for and that they will soon be in a position to service your orders promptly.

### PROGRESS OF PROOF-OF-PLANS MODEL

The purpose of the plans built model was to proof the plans and also the prefab parts. Actually, we have been doing the plans simultaneously with building. We have been holding up on Chapter 16, Controls, and Chapter 17, Trim and Landing Brake, until we get the parts. In truth, this wasn't much of a delay so far, because we have been working on the canopy chapter, which was pretty long, and required about 80 illustrations. Don't get scared! This included a lot of other things too, and this chapter was the best place to put them. Well, it's done now, except for typesetting, and it was a big accomplishment! Chapter 15, Firewall, is also done and out for typesetting. The chapter on arm

rest's, console and fairings shouldn't be too tough to do after the parts are installed, and electrical, finishing, and upholstery should be practically a breeze. The engine mount was designed some time ago and Ken Brock says he is fabricating it. Engine and cowling installation are partly covered in previous chapters, and won't be much different from the Long EZ anyway.

Have faith! The plans should be complete before most or you need them, and we have been and will continue to give special help to those builders who have completed Section 1.

We hate to keep making excuses, but believe me it is a big Job, and hard to do on less than a full time basis.

## ACCIDENTS

A Long EZ from California crashed at Flying Cloud airport in MPLS one week ago. It had an engine failure at 300 ft. after take off, made the runway but couldn't stop, and ran off the end of the runway into a ravine, where the canard and wings broke off and it tipped over. The aircraft was totaled, but the pilot and his wife weren't hurt, even though the girl was thrown out when the safety belt failed. I mention this because you might not be aware that a Varieze, Long EZ and cozy will stop mighty fast if a nose gear collapses on roll out, and the damage will be quite minimal. I learned this with my Varieze (and so did almost everyone else), before Burt redesigned the retract mechanism. Now you will probably never need to do this intentionally, so just tuck it away in the back of your mind as a viable alternative to running off the runway into a ditch, or to running into cars if you decide to land on a highway during rush hour.

The FAA checked the engine pretty thoroughly, but couldn't find any cause for its stoppage. I understand that they are consulting with Lycoming about a possible cause. Dirt or water in fuel, or carburetor icing are always suspect, but hard to prove, so it is always best to err on the side of caution.

## CAFÉ 400

Several months ago we received a personal invitation to enter the Cozy in the Cafe 400 (Competition for Aircraft Fuel Efficiency). After giving it some thought, we decided to decline for several reasons, the most important being we didn't think we should take the time away from working on the plans. Then, the 2nd week of June, I happened to be talking to Shirl Dickey, a friend of mine in Salt Lake City, who built a superb Varieze which he has 600 hours on now, who is an extremely good pilot and interested in racing, and the subject got around to the Cafe 400. He asked, if I wasn't interested, could he enter the Cozy? I told him that I had never flown the Cozy over gross but we did some careful calculating and decided it was feasible, and that he should be able to get it off the ground with a 600# payload plus fuel in less than the allotted 2000 Ft. But just to be safe, I ordered a Great American propeller (overnight delivery which was judged by Burt to give the best take off performance at no sacrifice to top end performance. Shirl flew to ST. Paul and together we made a new spinner and back tip plate, installed the new prop, checked over the airplane, checked him out in it, and had him checked out by a CFI to satisfy my insurance carrier.

Shirl arranged for a friend of his and a Cozy builder, Al Yarmey, also from Salt Lake City, to fly as

copilot in the Cafe, and I arranged for another Cozy builder, Jim Finnegan in California, to provide ground support and a heavy passenger for the back seat. Shirl and I did some c.g. calculations to see how far back we could get the c.g. to minimize drag. With Shirl and Al in the front seat totalling 325 lbs, and a 192 lb. passenger in back, we figured we would have to put the remainder of the ballast to get us up to 600 lbs as far back as possible. With 83 lbs of lead in the centerspar, the c.g. was about 100. We would have preferred 102.

So we loaded up all the lead I had, and Shirl flew the Cozy back to Salt Lake, where he picked up Al and his wife and their luggage, and then headed out to Santa Rosa. He told me later that it was a little scary when they stopped at Carson City to refuel, because it was so hot and high, but they made it off okay.

At Santa Rosa, Jim provided his friend, Paul Liebenberg, 6 ft. 4 in., for the back seat plus enough extra ballast to get up to 600 lbs. Shirl said he purposely held the Cozy on the ground until he hit 90 mph, and then it just "leaped" into the air with plenty of room to spare. They flew a superb race. Al programmed all the pylons into the RNav and they flew by the needles and dials. The Cozy won the best new design award and had the 2nd highest score of all the experimental entries. The score is calculated as payload x speed x mpg. The fact that Mike Melvill entered his Long EZ with a 400 lb. payload and Dick Rutan entered his Long EZ in the special exhibition category with a 804 lb. payload allows an interesting comparison:

Airplane Payload Speed Miles/Gal.

Long (Mike) 400 165 31.0

Long (Dick) 804 158.4 28.31

Ave. of above 602 161.7 29.65

Cozy 600 160.3 29.27

You can see that the Cozy, in spite of its larger fuselage and larger wheels and wheel pants gave up only 1.4 mph and .38 mpg compared to a theoretical Long carrying the same payload. -We still remember how disappointed we were when Burt predicted that the Cozy would be 15 knots slower than the Long, and I vowed that I would do everything I could do to cut this down. We think these results should prove to all the world that the Cozy is a very clean design.

The Cafe 400 not only established the Cozy as a very efficient design, but it also established it as a legitimate 3-place aircraft. Shirl did one other thing for us. He demonstrated operation over gross with 3 people, 70 lbs. of lead and luggage at high density altitudes ( Salt Lake and Carson City). Admittedly, Shirl and Al are experienced pilots, and we don't recommend that others try to duplicate these feats, but it does demonstrate the capability of the aircraft in the hands of experienced pilots.

This event accomplished still another thing. It was the first extensive flight test of the Cozy by two experienced, impartial pilots, under all kinds of competitive situations. Shirl has 600 hours in his

Varieze, and Al logs about 80 hours of Lear jet time each month. Both were lavish in their praise of the Cozy. Even Cathi Yarmey, who rode the back seat to California and return couldn't seem to find enough words to express how much she enjoyed the trip and the experience. We hope we can get them to write an article for Sport Aviation.

If you will permit me a further observation, in this event, with 325 lbs in the front seat and all the weight we put in the rear seat and centerpar, we still would have preferred to have the c.g. farther aft, at the aft limit of 102, to minimize drag. Frankly, a larger engine or a starter would have helped us to achieve this. But two words of caution:

1) We have not proved the installation of a larger engine and therefore it isn't ethical for us to recommend it.

2) If you are near the aft c.g. limit with 2 people up front, ballasting the nose for solo flight becomes even more critical-don't forget!

Our first two builders, Jack Wilhelmson and Ulrich Wolters, are both installing O-320s, in spite of our recommendations. We have asked them to do a complete flight test evaluation and report the results.

Incidentally, I hitch-hiked a ride to Salt Lake with Al Yarmey in his Lear jet to pick up the Cozy last week after the Cafe 400. It seemed unreal to me, sitting in the front seat of a Lear jet at 40,000 bombing along at mach .83, listening to Al telling me what a wonderful airplane the Cozy is. I personally thought the Lear jet wasn't too bad, if you have several million extra to spend and can afford to buy an entire fuel truck every time you stop.

At Salt Lake, I met Al's wife Cathi, who presented us with 2 Cafe 400 T-shirts and a whole bunch of pictures from their trip, including some choice shots of Lake Tahoe and the Golden Gate Bridge from the back seat of the Cozy. Also I got to inspect their project, as reported earlier.

Coming back the Cozy made it in 6 hours against a 14 k headwind part of the way, using about 35 gal. of fuel. It was about 1000 miles, so I probably had a TAS of about 173 mph and netted about 28 mpg against the head wind.

We filed a protest with the Cafe 400 committee over two of their rules. The first being that 3 place aircraft must compete against 4 place aircraft without consideration for the 33% scoring advantage a 4 place has because of the extra seat. The second has to do with the rule that if there are only 2 entries in a category (which was true in this case), the second place prize money isn't awarded. Even though the Cozy almost tied the BD-4, though handicapped, and had the 2nd highest total score of all experimental entries, it was the only one in the top 6 which was not awarded prize money. Those of you who may wish to compete in future years might wish to make your views known to the Cafe committee on these rules.

In the final analysis, the Cafe 400 did detract from our work on the plans. However, it did establish official performance figures, which are beyond dispute and we are proud of, and it expanded the performance envelope considerably beyond the testing we had done previously. We think it was very



worthwhile and thank Shirl and Al and Cathi and Jim and Paul for the super job they did. We have always said that airplane people are a very special breed.

We don't plan any more diversions from getting the plans done, except for Oshkosh, of course.

## PLANS CORRECTIONS

-Chap. 4, p.2, Fig.11: Holes in rear bulkhead. There appears to be a disagreement among builders as to whether the original dimensions were correct, or whether they should be changed per newsletter #5. Builder differences make the difference. Use whichever dimensions work best on your project.

-Chap. 2, p.3: Interferences (overlap) of parts shown means you have to glue in a scrap of foam on one of them to complete the part. Saves money!

-Chap. 5, p.3, Fig.7, Sec D-D: Change 1/2 in. to 3/8 in.

-Chap. 9, p.2, Item 3 & Fig.9 instruct you to trim gear legs level fore and aft, and identically both sides. After so doing, trim another 1/2 in. off each leg. After so doing, your fuselage will sit about 1 in. higher in the rear with the large wheels, which is desirable for prop clearance at gross weight and allows a little for future gear sag if you neglect to set the gear when you park.

-Chap. 9, p.5, Fig.31: The jig orienting the axle flange is not the desired orientation. Orient so the axle flange flats are approximately parallel with the gear trailing edge.

-Chap.21, p.4, Step 6: Instructions for making the O.D. rib. When you build the strakes, it is difficult to prevent the PVC foam from bowing in, between ribs R-23 and R-45, particularly the top skin, unless you use a lot of straight edges bondoed to the foam. If it does bow in, it will also bow out outboard of R-45, and cause you to make the O.D. rib too large. Most Long EZ builders end up with a dip in the middle of the strake and a bump outboard, which can't be blended in to the wing contour without drastic surgery after the fact. We have tried to minimize the problem by redimensioning R-45 (which is also too large in the Long EZ plans). Please check your strake contour before glassing the outside. If, in spite of your best efforts, you have a hump outboard of R-45, sand down the foam to correct it before glassing.

## BUILDER HINTS

1) If you ever need anything in a hurry (that never happens, does it?), Bud Meyer of Wicks tells me they are shipping many of their orders the same day they are received, and almost all within two days, unless they are backordered. Our own experience has been very good, and we even got them to give us overnight delivery when we needed prop bolts in a hurry before the Cafe 400. Try not to wait until the last minute to order, though.

2) Aircraft Spruce may not list Divinycel in their catalog under that trade name, but it is identical to the PVC foam that they stock, and supply in the kit.

3) It has been our experience and that of quite a few other builders that skin cream (ply 9 or 3M) gives better protect than latex gloves. We don't know why this is, unless with rubber gloves your hands perspire and all the pores open and allow vapors to come in. Please wash your hands often and apply new cream. and avoid exposure wherever possible.

4) Some people have an allergic reaction to Safety poxy. We don't like it because it is more viscous and requires higher working temperatures. The original RAE epoxies work better cool (we live in Minnesota, remember?) and we have been using them now for 8 years with no ill effects or complaint

## OSHKOSH

We are planning to be there, one or two days ahead of time, to avoid the heavy traffic and get a good camping space and parking space. We are looking forward to seeing all of our old friends again and hopefully meeting a lot of new ones. We have scheduled a forum for 9 AM Monday, July 30th. We won't have any earthshaking news, but hope to use the opportunity to meet and update our builders, answer questions, etc. Please try to make it. We also plan to stop at the Wicks booth each morning and be available for any builder questions. Check their schedule.