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COZY NEWSLETTER #47

October, 1994

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FAILURE OF PROP HUB EXTENSIONS

There was a recent reported failure of a Brock Mfg. 6" prop hub extension on an E-Racer with an 0-360 Lycoming after 70 flight hours. The propellor flange separated from the extension, and the flange and the propellor bolted to it departed the airplane. The propellor and flange were not recovered, but examination of the remaining portion of the extension (by others) indicated that it was a fatigue failure. Since this was the only known failure of a Brock extension, and similar extensions on 0-360 powered pusher aircraft have accumulated hundreds of hours of satisfactory service, there has been considerable speculation as to what could have been the cause of failure in this instance. A fatigue failure in metal can occur if a sufficiently great load is applied repeatedly over a large number of cycles - usually in the millions. If there were one (or two) impulses per propellor revolution, 70 hours at 2700 rpm (or greater) would be over 11,000,000 cycles. This would be enough cycles. The next question is, what kind of a load would it take.

Extensions are designed to withstand the normal vibrational loads imposed by the engine-propellor combination, as long as these loads are not imposed at the resonant frequency. The resonant frequency is the natural frequency a part would vibrate when struck (like a tuning fork). If loads or stress are applied at the resonant frequency, the loads or stresses are not damped out, but become additive, and can eventually build to a high enough level to fail the part in fatigue. Mike Melvill has been making a vibrational analysis on his Long EZ with an 0-360 Lycoming, 6" Brock prop extension, and a Great

American propellor, and found the resonant frequency to be approximately 2750 rpm. He has accumulated 1300 trouble-free flight hours on this combination, which he attributes to the fact that he does not exceed 2600 rpm in cruise.

We normally select a propellor which will not overspeed (not exceed 2700 rpm) at full throttle cruise. In fact, we have our high-rpm alarm set at 2700 rpm, and generally cruise at a lower rpm, in the 2450 to 2500 range. A propellor which will not exceed 2700 rpm in cruise in a high-speed aircraft like a Cozy will not produce more than 2400 rpm static (full throttle, standing still on the ground). The builder-pilot whose extension failed said he was able to get 2600 rpm static with his propellor and over 2800 rpm in cruise at full throttle. If the resonant frequency of his propellor-extension combination was somewhere between 2700 and 2800 rpm, and the same as the rpm that he cruised, it would explain why the extension failed. What do we recommend to prevent this type of failure on a COZY?

Given that the power pulses on an 0-360 Lycoming are particularly harsh, we wouldn't want to make matters worse by having a bent crankshaft flange, which would cause the extension to wobble, or an unbalanced propellor. We would suggest that the run-out of the propellor flange on the extension should not exceed .002", and you should check your propellor for balance, not just for static balance, but also to verify that both blades are identical. For sure we would want to avoid running our engines at the resonant frequency of the extension-propellor combination. Mike says that on his airplane with his propellor, the resonant frequency for the Brock extension is about 2750 rpm, and that he considers speeds up to 2600 rpm to be safely under the resonant frequency.

On our plans Mark IV, we are using an extension by Woofter Mfg. (1951 NW 84th Terrace, Pembroke Pines, FL 33024 (305) 436-9496), which is a slightly different design than Brocks, and stronger at the propellor flange. We don't know what the resonant frequency is, however, but Mike is going to measure this. Woofter advises that if we desire, they can thicken the wall to provide an additional safety factor on strength. By increasing the stiffness and mass in this way, it would also move the resonance frequency farther above the approved operating rpm range of the 0-360 Lycoming. We will keep you apprised of future developments.

WHAT WE HAVE BEEN DOING

This year we decided to take in fly-ins at Arlington, WA and Duluth, MN on the way to Oshkosh, visiting builders, family, and friends in the process. My sister, Lee, came down from Rockford IL as in previous years to man the office and answer the phone and mail while we were gone. We left on July 6 and headed north. The weather was CAVU. Shortly after passing over the Grand Canyon, in the vicinity of St. George, I noticed that the battery wasn't-charging, and the voltage had dropped to 11.7. The alternator circuit breaker had popped, and when I pushed it in, it popped again. Not wanting to fly all the way to Arlington over more or less continuous mountains, not knowing how long the battery would last without charging, we decided to make an unplanned landing at St. George. We let down from 12,500', landed, taxied to the FBO, and talked to a maintenance man. We pushed 14CZ into an air-conditioned hangar, dropped the cowlings, and did a continuity check. The voltage regulator had shorted. We called Bill Bainbridge (B & C Spec. Products), described the problem, and he offered to ship us a replacement next day air, at no charge. We accepted! So we had an unplanned day on the town. The next morning, Fed Ex arrived at about 9 AM with our new regulator, and shortly thereafter we were on our way.

We made a brief stop at Boise, ID to stretch and you know what, and then continued on to Everett, WA, where we were greeted by [Eric Westland](#), a Cozy Mark IV builder. Everett is only a short distance from Arlington, and Eric and his wife, Victoria, had invited us to stay with them. We inspected Eric's Mark IV project, which was about 50% complete. We were very impressed with the fine job he was doing. The next morning we flew on to Arlington, which was just a short hop away. Ken and Carol Murphy showed up shortly after we arrived in N44CZ, the Mark IV prototype.

We very much enjoyed the 3 days we spent at Arlington. The weather was wonderful, and the scenery was beautiful. The fly-in was very well run, and we were made to feel very welcome and at home. We departed Arlington Sunday morning, to fly across the northern states to St. Paul MN, where we spent a few days with our daughter and her family. Then up to Duluth for a fly-in there. The fly-in at Duluth didn't have many home-builts in attendance, but it sure had a lot of military heavy-metal.

After Duluth it was back again to St. Paul to visit more family, and then off to Oshkosh. For all this flying, we were blessed with very good weather. Ours was the first Cozy to arrive at Oshkosh, and a short time later, our good friends, Gene and Carol Davis, arrived in our 3-place Cozy prototype, N22CZ. All in all, 15 Cozys arrived at Oshkosh. Some were parked in the camping area, and [Mike Pinnock](#) was a bit intimidated by the Oshkosh traffic, so he parked his Mark IV at Fond du Lac. Doug Koster flew his brand-new Mark IV to Oshkosh, and it was gorgeous! We heard that he won an award for best plans-built, but this must have been an error, because it wasn't reported by Sport Aviation. He should have won!

This year the weather on the east coast was socked in for a couple of weeks at Oshkosh time, so some of our Cozy friends were not able to make it to Oshkosh, and we missed them! The Cozy builders forum was well attended. Several high-time Cozy pilots talked-Walt Suminski, Dennis Oelmann, Chris Esselstyn, and Vance Atkinson. Also, Bill Peterson of Superior Aircraft Parts attended and assured everyone that they were still serious about marketing an O-360 engine kit.

We had 104 people attend the Cozy banquet on Saturday evening at Robbins. The meal was family-style with 3 different entrees, and the food was plentiful and very good. The Pershings had arranged door prizes, and a very entertaining speaker, Barry Dawson, a Brit who built his Cozy in France, and had a hilarious story to tell about his bouts with the French bureaucracy. We have had several very complimentary comments from prospective builders about the very friendly Cozy "family". Thanks to the Pershings for the banquet arrangements!

Monday noon we had a little ceremony at the announcers stand on the flight line, conducted by Greg Anderson, Vice President of the EAA. The occasion was our donation of the 3-place prototype, N22CZ, to the EAA museum. It will be displayed in the EAA museum at some future date. Later that evening, when we were dining with the Davises at Nick and Joan's Supper Club in Appleton, they had heard about it, and told us our dinner was on the house! The Davises, who had flown N22CZ up to Oshkosh, had to return to Arizona commercial, sans Cozy. Thank you, Gene and Carol.

As we were leaving Robbins restaurant Tuesday evening, the manager, Mark Haigh stopped us and asked if we had seen the August 8th issue of Time Magazine. There was a one-page report on the EAA fly-in, with a picture of Gene Davis examining the engine of Cozy N22CZ, and a quote from yours truly at the end of the article.

We left Oshkosh on a Wednesday, and this time the central states were socked in by a low pressure

trough. We detoured to the east and south to get around the worst of it, but it completely closed in on us before we could get to Albuquerque. So we overnighted at Tucumcari and continued on in the morning. At Albuquerque we visited friends, Herb and Jane Peterson, who are building a Mark IV. Their project also looked very good. It is encouraging to us to see so many people doing such good work! We finally arrived home August 6th after a month on the road (in the air), and after a very wonderful trip!

PUBLICITY

We have been monitoring the completions reported in Kitplanes and Sport Aviation, and noted that both Marc Pichot's and Ed Strickland's Cozys were pictured in the August issue of Kitplanes. Also, Jeff Glynn and Mark Kraft were shown in the August issue of Sport Aviation flying their Cozys in formation on Gus Sabo's Long EZ. Nice going, guys! You all get a renewal to your newsletter, our compliments!

OUR FALL SCHEDULE

We get invitations to a lot of fly-ins, and would like to go to as many as possible, but we do have to spend some time at home. We plan to go to the fly-in at Brown Field, San -Diego CA over the week end of October 15th, weather and business pemitting. The one fly-in we don't want to miss is Copper State, which will be held at Williams Gateway Airport (a retired military base) here in Mesa November 10-13. It's less than 10 miles away from our house! We have room to put up several couples at our house (if you fly here in a Cozy) on a first come (or first reservation) basis and a car and a van for transportation. It should be a fun weekend! RSVP.

YOUNG EAGLES

The Young Eagles is a program started by the EAA at least a year ago to get more young people interested and involved in aviation. Specifically, EAA members are encouraged to take young people up for their first airplane ride. One of our Cozy family, [Keith Spreuer](#), has been quite active in this program, and sent us a nice, long letter describing his activities. Too long to print in its entirety, we will try to capture the gist. Keith describes how, on one nice day in Escondido, CA, he arranged to take 5 young, prospective aviators for rides in his Cozy N84CZ. They were: Craig Hardy, age 8, Parker Gillis, age 6, Parker's sister Taylor, age 7, and two Japanese exchange students Junko Kobayahsi and Tomoe Fujimoto, both 19. He describes their enthusiasm and appreciation, and concludes: "As is the case so often, when you do a good turn for others, you usually benefit more yourself I did in this case; the excitement of the youngsters brought back fond memories of my early flying, brought East and West a little closer, and maybe helped to brighten the future of aviation with another pilot or two. One of the best things to come of this day was it gave the mothers of these children an opportunity to avoid passing on their fear of flying to their kids. They deserve a lot of credit for encouraging their kids to venture beyond the bounds of their own apprehension". Keith is to be congratulated! We know others of you out there are also active in this program and we wish to encourage more of you to participate. As I reminisce, my first airplane ride was a free one offered by a total stranger when I was about age 8.

FLIGHT ADVISORS

The Flight Advisor is a quite new EAA program directed toward helping builders prepare for their first flight in a new homebuilt and to help them do it safely. Perhaps you have read about it in Sport Aviation. The objective is to promote safety by taking advantage of experienced EAA volunteers who use their own backgrounds to help other sport pilots evaluate their ability to fly a given airplane. Flight Advisors need not be flight instructors, but they should be a mentor; i.e. a friend who will help in the planning and organizing of a first flight, helping to insure that no important details are overlooked and that the builder has the necessary skills and is prepared mentally and physically for his first flight. Although the EAA isn't suggesting that the Flight Advisor check out the builder in his own airplane, it obviously would better prepare a builder for his first flight. We have already had numerous reports of Cozy pilots checking out builders before their first flights, and we hope this continues.

FIRST FLIGHTS

We continue to hear second or third hand about Cozys that are flying that were never reported to us. How about more first flight reports and pictures? Here are some we know about:

1. David Higgins first flew his Mark IV on 5/12/94.
2. Richard Runyon is flying Cozy N531 OL. Don't have a date.
3. Mark Kraft is flying a Cozy. Don't have a date.
4. James Edwards, previously mentioned, sent a picture and a first flight report.

The reports we have received are as follows:

6/8/94

Dear Nat,

Enclosed please find a photo of our Cozy Mark IV. I completed this project in just under 21 months and am currently flying off the forty hour requirement. My first flight was on 5/12/94 and it was a great feeling to be up in the sky again. Three attempts at landing and I was successful. Since that time, I have found that landing takes precise speed control for successful landings on a 3,000 foot runway. For my aircraft, the approach at 75 KIAS seems to work well.

My Mark IV has a 180 hp Lyc. with a 64 x 76 three blade propellor, and weighs in at 1,040 pounds. At this point in the testing I have taken her to speeds of 178 knots, without wheel pants, and have climbed at 1,800 fpm. Needless to say, I ain very pleased with the performance and have really enjoyed the open view that I receive from the design of the canopy.

I would like to thank you and all those associated with the EAA for making my first attempt at building an aircraft a successful one.

See you in the sky!

David and Vicky Higgins
Pembroke Pines, FL

8/10/94
Dear Nat,

Thank you for a wonderful Cozy banquet at Oshkosh this year. This was our first time in attendance and we were thoroughly impressed by the family environment. At the banquet Todd Winegar won a coupon for 3 Cozy decals. Since Todd doesn't have an airplane yet, he gave the coupon to me. I would like 3 Cozy decals to brighten up our white aircraft. Our Cozy N5310L is flying well and we should have our time flown off by the end of the month. If you ever get up to eastern Washington, you are welcome to stay at ffie Runyon.

Sincerely,
Richard Runyon
Cheney WA

9/9/94
Dear Nat,

Here is a photo of Cozy N151JE, completed in just over 6 years. It would have been finished in half that time, but I underestimated the time demands of building a new house. My Cozy flies just great, and the first flight was 5/15/94. To date I have 7.5 hours logged, and I have taken a year off from teaching at Prescott College so I can fine-tune the Cozy and build up some flying time. Thank you for all of the much-appreciated help.

Cordially,
James B. Edwards
Prescott AZ

EPOXY RESINS

Epoxy resin systems can be tailor-made for any specific application. For composite aircraft construction, using the wet layup technique, an epoxy needs to have very special properties; i.e. a reasonably low viscosity, a reasonable pot life, and cure at room temperature. After cure, it should have optimized values for bond strength to glass, peel, shear, tensile and flexural strength, good impact resistance, high glass transition and heat distortion temperatures, etc. It is a fallacy to think that all epoxy resins are the same, or that any epoxy can be used to build a safe, composite airplane. As a licensee of the Rutan Aircraft Factory, we have only approved those epoxy resins which have been tested and approved by the Rutan Aircraft Factory. Since there have been some new developments in

epoxy resins since the Cozy 3-place and Cozy Mark IV plans were published, and there might, as a result, be some confusion on the part of new builders as to what epoxy resins are recommended, we thought it would be worth reviewing those epoxies which have been approved:

1. The first epoxy system to be developed for composite construction was the RAE (Rutan Aircraft Epoxy) system (Epolite 2426). It featured either a slow or fast catalyst, which determined both pot-life and rate of cure. It was first produced by Lambert, then by Applied Plastics, and most recently by Hexcel. It is still approved for composite construction.
2. When it was learned that some builders were allergic to the RAE system, Hexcel developed an alternate system which they called Safe-T-Poxy. Its viscosity was a little higher than RAE, so Hexcel modified it to Safe-T-Poxy II (Epolite 2410) by changing the catalyst. It is still approved for composite construction, although OSHA objected to the chemical MDA, which was present in the catalyst in small quantities.
3. While waiting for Hexcel to reformulate, to eliminate the MDA, the Rutan Aircraft Factory tested a number of epoxy resin systems (they said 60) and approved one manufactured by P&W called Aeropoxy (PR2022). Although its physical properties appeared to be quite good, it was difficult to dispense and use in wet layups because of its viscosity. Nevertheless, it is still approved.
4. Hexcel successfully reformulated their Safe-T-Poxy to eliminate MDA and any other chemicals on OSHA's toxicity list, the Rutan Aircraft Factory tested and approved it, and it is available from all of our suppliers. It is called **Epolite 2427**. We have also tested it. It has very good properties, including a low viscosity, and is **highly recommended!**

The West System is an epoxy system developed by the Gougeon Bros. for boat builders. It is a softer epoxy and recommended for contouring (mixing with micro and spreading over finished layups), because it has excellent adhesion and is much easier to sand. It is **not suitable** for making glass layups! We were very distressed to hear that one builder was using it for all of his fiberglass layups. **It is not approved for layups!**

We have recently noted that one of our suppliers is promoting an epoxy called "Poly Epoxy". It has not been tested and approved by the Rutan Aircraft Factory nor by us, and when we studied the physical properties, they do not appear to be as good as Epolite 2427. It is therefore **not recommended!**

Polyester resins, commonly used in boatbuilding, are not recommended, nor are vinyl resin systems.

With polyester resin systems, the ratio of catalyst to resin is not critical, because the amount of catalyst only determines the rate of cure. With epoxy resin systems, however, the ratio of catalyst to resin is very critical. Think of the resin as bolts, and the catalyst as nuts. To get the designed strength (and resistance to solvents), it is critical to have the same number of nuts as bolts! Therefore you must strictly adhere to the mixing ratio stated by the manufacturer. It is an advantage that Epolite 2427 has exactly the same mixing ratio as the Safe-T-Poxy it replaced.

GLASS ROVINGS

In our last newsletter we published a letter from Rego Burger, in S. Africa, about how he made his spar caps using rovings which he was able to buy locally. Mark IV builder [Gordon Bowen](#), who works for Hexcel, wrote to us to point out that rovings use glass filaments of 13 micron diameter whereas the yarn used in the spar cap tape specified in the plans is between 6 and 9 microns in diameter. Even though theoretically you can pack the same amount of glass in the spar cap troughs, using larger diameter filaments would result in fewer strands and larger spaces between strands. Gordon thought that the rovings wouldn't make as strong spar caps as would the yarn-tape. This is just another example, that when you start changing things, you can't be sure of what you are getting into.

ENGINE KITS BY SUPERIOR?

Superior Air Parts reassured us at Oshkosh that they are still planning to market an O-360 engine kit. They have finished tooling up to make cylinders, have run them on a test engine and submitted them to the FAA for certification. They now need to tool up to make crankcases and crankshafts. They seem very serious and we are sure hoping that they can produce a kit for a reasonable price!

INSTRUMENT PANELS & AVIONICS

One of the more daunting challenges for the average builder is installing avionics and wiring the electrical system. There is good news! There is a way to greatly simplify these tasks. We reported previously that Cozy builder [Wayne Lanza](#) has designed and is manufacturing a state-of-the-art switch and circuit breaker panel (see picture in [newsletter #45](#)). It uses DC switches and all aircraft grade components, and mounts at the top of the instrument panel so that all of the terminals are easily accessible. All a builder has to do is run wires from each component in the electrical system and connect it to the appropriate terminal in the switch panel. This greatly simplifies installing the electrical system, except for avionics.

Now we have arranged with Gulf Coast Avionics to help on the avionics installation. Gulf Coast is pretty well known in the avionics business. They sell all of the major avionics lines at greatly discounted prices, just a little over their cost. We are partial to the Bendix/King line, which is top of the line and which we have used for years. King has introduced a Crown Series, just for home builders, or you can also get the Silver Crown Series as well through Gulf Coast. Gulf Coast will sell to Cozy builders a radio stack, with the trays mounted together with sockets installed in the trays, and with a wiring harness with the ends clearly labeled and ready to connect to the switch and breaker panel, mic and headset plugs, antennas, etc. In other words, a complete avionics package ready to slide into your panel and hook up. They also carry a complete line of electrical supplies, like wire, cables, connectors, etc. If interested, you can get more information by contacting:

Brad Miller, Gulf Coast Avionics
 4243 N. Westshore Blvd.
 Tampa, FL 33614 Phone: (813) 879-9714

BUILDER HINTS

1. We use peel ply extensively on all of our layups. Glass fibers act somewhat like a sponge, and can soak up extra resin. If a layup is resin-rich, it is not only too heavy, but it is weaker than a layup with just the right amount of resin. The peel ply seems to hold the fibers down more compactly, so they don't soak up too much resin. Sort of a poor man's vacuum bagging. If you use peel ply, you can make the layup a little wet, then lay down the peel ply, and with a squeegee and hair dryer, remove the excess epoxy (if the layup was really wet) or else free up almost enough epoxy to wet out the peel ply, and add epoxy as necessary to wet it out completely. The only thing you need to be careful of is that the layup underneath the peel ply isn't so dry that it is porous, because then the compressive strength would suffer (buckling in compression). Synthetic fabrics with a straight weave (not knit), like nylon, polyester, or dacron, as long as they aren't fuzzy, and don't contain cotton or rayon, seem to work well. Sometimes you can find real bargains at fabric stores. But test a swatch first. Alexander Aeroplane lists peel ply at \$2.25/yd. in 45" widths, which is quite reasonable.
2. We have been advised that the hardner for the new epoxy resin, Epolite 2427, is not compatible with the old Safe-T-Poxy hardner, so the hardner container in the dispenser should be thoroughly cleaned and flushed before switching from Safe-T- Poxy to the new hardner. Also, the container should be kept covered to keep moisture out.
3. We have learned that the first production run of MKMG-4 stainless steel bushings made by Brock Mfg., and used in Chapter 9 (Fig. 28 & Fig. 30) had a larger I.D. than we specified. As a result, they were a loose fit rather than a snug fit over the special MK-100 4140 steel studs 1/2" x 10-3/4" used to mount the main gear. This could result in a small (1/8") fore-aft movement of the gear, which was not intended. If you ordered these bushings previously, check the fit, and if loose, return them for replacement.
4. We have heard that GPS is becoming so popular and is so reliable, that the FAA may phase out the VOR system several years hence. If you have just started to build and have not purchased your avionics yet, you probably should wait until you are ready to install them, because change is so rapid. For example, Bendix/King has introduced a GPS/com which you may wish to consider rather than or in addition to a nav/com.
5. The builder who sent us a disk with the EAA calendar picture of the Cozy Mark IV scanned in, so it could be used as Windows Wallpaper is: Tom Bailey, 14720 Day Break Drive, Lutz Fl 33547. We failed to give him credit in a previous newsletter, and apologize!
6. We can't emphasize enough that to prevent leaks in your fuel tanks, you must coat them several times with epoxy, allowing several hours between coats for the previous coat to become tacky. Squeegeeing each coat wherever possible helps to fill up the pinholes. Better to take a little extra time in building than to have to cut them open to seal them later on.

MARK IV CHANGES/CORRECTIONS

FOR SALE

1. Cozy builder [Dr. Curtis Smith](#) invented a little gem of a ratchet which locks the nose gear up or down. It is still available for \$38, which includes postage and packaging. No need to call, just send check or money order. This little device should be considered a "must" by all 3 and 4-place Cozy builder/flyers. Once you have flown with it you will wonder how you ever did without it. Allow several months lead time. Contact: Dr. Curtis Smith, 1846 Sextant Dr., Worden, IIL 62097 (618) 656-5120.
2. Fuel sight gages, \$35.00 per set including postage. Vance Atkinson, 3604 Willomet Ct., Bedford, TX 76021-2431 (817) 354-8064.
3. Rebuilt aircraft instruments, much less expensive than new, guaranteed. Contact: Howard Francis, 5631 S. Crows Nest Rd., Tempe, AZ 85283 (602) 820-0405.
4. Cozy builder, [Bill Walsh](#), has arranged a source of tee shirts (sweatshirts available on request) which come in various colors but only adult sizes. They have a detailed picture of the Cozy or Cozy Mk IV. The Cozy name is printed above. Bill is also working on other Cozy items, such as jackets, caps, pins, and cups. The shirts are available at \$9.95 plus \$1.50 shipping and handling. Orders for 2 or more are sent 2-day priority. Make checks out to Linda Walsh, PO Box 160884, Altamonte Springs FL 32716. (407) 695-3543.
5. Cozy Mark IV counted cross stitch (needle point) kits to make caps (\$5.99), tee-shirts (\$7.99), or framed pictures (\$8.99). Chart also available (\$4.00). Send \$2.50 S/11 with order or SASE for more info to: Carolyn Cullen, 9456 Mast Drive, Las Vegas NV 89117.
6. [Wayne Lanza](#) makes a number of very nice goodies for the 3 and 4-place Cozys. He has an electric speed brake actuator kit with all the parts needed for installation, with instructions for \$250. His latest creation is a switching and breaker panel for the Mark IV. It is similar, but not identical to the one we had made for our plans model. It is located at the top of the panel, which is the best location for appearance and access to the electrical system. Wayne is using the highest quality DC switches (they are hard to locate) and circuit breakers, and pre-wires the panels, making the rest of the electrical system installation very EZ. Cost is \$375. We really appreciate Wayne's contribution, and heartily recommend his products to you. Contact him at: 9425 Honeysuckle Dr., Sebastian, FL 32976 (407)664-9239.
7. We believe that the 4-pipe stainless steel exhaust system we designed and is being manufactured by Custom Aircraft Parts (see "Authorized Suppliers") is far superior to anything else available or advertised for the 3 and 4 place Cozy (or Long EZ, or any other pusher, for that matter). Cost is \$500, which includes shipping and handling.
8. Rebuilt 0-360 Lycoming engines at a reasonable price. Contact: Dan Brown, (918) 834-0791.

9. 0-320 H2AD Lycoming (duplex mag) 1980 TTSN. \$2300. Woofter prop hub extension and crush plate for 0-320 \$200. Prestolite geared starter, original equipment \$150. 500 x 5 Cleveland heavy duty wheels, brakes, axles, and Gerdes master cylinders \$300. Contact Steve Russell (815) 248-2719.
10. Choice building lot at Voyager Village fly-in resort in Northern Wisconsin. Lot is on a 27 hole golf course and 1500' from a paved runway and country club. It is close to swimming, fishing, tennis, riding, etc. \$10,900 OBO. (602) 981-6401.

LETTERS FROM BUILDERS

8/10/94

Dear Nat & Shirley,

Thank you again for receiving me as a guest in your home. I wanted to meet you and talk about the airplane firsthand before purchasing the plans. I enjoyed meeting you and really appreciate you indulging my questions. The demo ride was an unexpected treat as I had only hoped to just sit in the Mark IV! Thank you also for the ride back to Sky Harbor. I'm looking forward now to construction, the first flight, and being a member of the Cozy family.

Sincerely,

[Roger Shell](#)

Ogden, UT

7/17/94

Dear Nat,

Please send me your info. pack. I just started dating a beautiful woman who is also a pilot. We are anxious to get started on a plane. This may be the tie that binds.

Regards,

Paul Gunderson

Scottsdale, AZ

7/25/94

Dear Nat & Shirley,

I just discovered that I neglected to renew my newsletter. I do have an excuse...his name is Brian Adam Mackowiak, just over two months old. The news of his "flight plan" last fall caught me, my wife, and 13 year old son by surprise. We had just given away the last of Jason's old baby clothes and stuffed animals, figuring we would never need them again. We have been busy getting our house ready to sell, because now we need a bigger one.

It looks like I'm going to need a bigger airplane! I had the opportunity to finally fly a Cozy at the fly-in in Rock Falls IL. It was very nicely built, nimble and extremely responsive. I was impressed. Brian's

birth seems to have clinched it; I need to build a Mark IV. So I will have to sell my 3-place plans to offset the cost of Mark IV plans. Let me know if you have any interested parties.

Your friend,
Larry Mackowiak
Glendale Hts. EL

7/14/94
Dear Nat,

Progress on my Mark IV is proceeding forward slowly. There are times when I don't think I'll ever see the light at the end of the tunnel. Fortunately, I enjoy the building process as much or more than flying itself. I've got the Cozy on the main landing gear and am nearly finished with Chap. 13 (nose). The canard is built - kind of. I still need to make the modification from your c.g. testing. I got the good news in your newsletter one week after completing the canard - guess it's better to find it out now while mods can be made, rather than later when we are flying. My main spar is also complete. Hope to see you at Oshkosh once again.

Sincerely,
Steve Cornelius
Rochester, MN

6/29/94
Dear Nat,

I have been reading your plans and adding the changes from the newsletters. So far I'm impressed with what I have been reading. I am assisting a friend to build a KR-2, who wishes his plans were written as comprehensively as yours. I plan to start building after I complete my check ride for my private license in July. I will be the first member of EAA Chap. 52 (Sacramento) to be building a Mark IV, and the members with composite projects are anxious for me to get started. Have a wonderful trip to Oshkosh, and some day I will meet you there.

Sincerely,
Quent K Toyloy
Antelope, CA

6/21/94
Dear Nat,

Please continue my newsletter for 2 more years; I thoroughly enjoy reading each issue. You certainly have advanced sport aviation with your design and intense flight test programs. I've never seen data as extensive as your c.g. data on any of the popular 2/4 place kitplanes -- I wonder why?)

Sincerely,
Marv Royster
Doraville, GA

6/15/94

Dear Nat & Shirley,

Good to see you and the Mark IV at Sun 'N' Fun. Brought my girlfriend this year to see the plane. She spoke with Shirley for awhile. I don't know what she said, but THANKS! She now is all for building a Mark IV.

So here's my check for \$500. Please send the plans.

Regards,
Chiis Blakeley
W. Palm Beach FL

9/8/94

Dear Nat,

I must confess that after a bout with what I thought was an epoxy allergy, I had given up on the project and was dallying with a more conventional design that was less expensive, but had 3 less seats. Without even batting an eye, I threw out ten years of wanting a canard IFR platform and took a giant step backwards to tubes and wood. This might have continued to my completing an aircraft only to discover it wasn't the one I wanted in the first place, except for three things:

The first was taking my son to Ins first airshow (he was 4 weeks old). I noticed that the only airplane that Nicholas (my son) was interested in was a beautiful Varieze. It could have been because it was so very WHITE, but I prefer to think he inherited his father's aesthetic sensibilities.

The second was comparing the plans for the two aircraft I was considering. With the Cozy plans I had a good support network of builders and a proven design, along with COMPLETE plans that explained things in an EZ to understand manner. In the other design, I had an incomplete set of blueprints (second package to follow on completion) for an aircraft where only ONE was flying, and a support newsletter that was sketchy at best. I also ran the numbers on how much the two aircraft would cost, and the Cozy came out on top.

The third was our phone conversation. Since then I have started using a barrier cream that is sold at TAP plastics and ceased using latex gloves. This seems to have eliminated my problems.

Anything this easy to do (building a Cozy) has to be either illegal or immoral. Best in all things,

[Martin Cameron](#)

Petaluma, CA

8/19/94

Dear Shirley & Nat,

Enclosed are the pictures I took at the "Cozy Prototype Donation Ceremony". Richard Randall and I are charging ahead on our Mark IVs,. Oshkosh is always inspirational, particularly the Cozy family.

Best regards,
Hank Grudberg

May 31, 1994
Dear Nat and Shirley,

I'm really pleased with your aircraft (Cozy MK IV. I've had a chance to fly the 3-place Cozy - it was a wonderful experience! I'm really glad to see the work you have put into the plans and instructions. I'm helping a friend build a MK IV and it seems to go together very easily and per the plans.

I intend to build one of my own in the near future - but for now I'm still in the planning stage. I am planning to purchase the plans at Oskosh '94 and I look forward to seeing you there. Thanks for all the hard work and dedication!

[Chris Mitchell](#)
Hermitage TN

June 6, 1994
Dear Nat,

While my visit to Sun & Fun was too brief, I enjoyed the time spent. Late Saturday afternoon several builders retreated to the shade of [Mike Pinnock's](#) Mark IV and an exchange of building experiences poured freely. The fraternity was building and I felt like a brother to these guys!

While on a recent business trip I was able to detour "slightly" and visit with [John & Becky Wilemski](#) in Mason, Ohio. John's Mark IV is a credit to the breed. I talked to him again a few days ago and he is working on the main gear. He does such nice work that I have no doubt that he will continue to progress at a constant pace.

As for my own Cozy, I am putting the final touches on the engine cowling installation. This week I will collect a small army to invert the fuselage; for the last time, and finish the bottom. I have decided to take your advice of painting the bottom while inverted this final time. I have made my choice of paint; Ditzler Durethane in Juenue White. All of the covers for the interior are complete. Now if I can con my mother-in-law to stitch up the upholstery This long, sleek airplane in my shop is taking its final shape. Thank you for your support.

Mike Davis
Elizabethtown KY

5/15/94
Dear Nat,

I enjoyed seeing you again at Lakeland - my Cozy is coming along slowly but surely. I am doing as much as possible in the interior before attaching the center spar, starting on armrests, etc. Please send me an Owners Manual. My theory is that reading about flying the Cozy will help keep me motivated (although my wife already believes that spend entirely too much time "buried in the basement").

Thanks again for making the dreams of so many people attainable, by providing plans for a great airplane.

Sincerely,
Michael Link
Nashville, TN

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