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COZY NEWSLETTER #72
January, 2001

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Newsletter Info. Subscription Info. Authorized Suppliers

OTHER PARTS WE RECOMMEND:

We can recommend the following items:

1. Improved Rudder pedals for lay-down brake cylinders, adjustable both sides. Dennis Oelmann (319) 234-6109.
2. Water tight fuel caps: Jack Wilhelmson (843) 884-5061.
3. Improved MKNG-6 and NG-6 Pivots with tapered roller bearings. Jack Wilhelmson (843) 884-5061.
4. Electric speed brake actuator kit. Wayne Lanza (561) 664-9239.
5. Switching and breaker panel. Wayne Lanza (561) 664-9239.
6. Fuel sight gages. Vance Atkinson (817) 354-8064.

7. Electric nose-lift. Steve Wright (615) 373-8764.
8. Electric pitch trim. Alex Strong (760) 254-3692.
9. Voice annunciated warning system. Richard Lewis (423) 376-1450.
10. Rebuilt flight instruments. Howard Francis (not a Cozy builder) (480) 820-0405.
11. T-shirts, etc. Bill Walsh, nogofsu@sprintmail.com. (407) 696-0942.
12. Antennas. RST Jim Weir (530) 272-2203.
13. Teflon & Stainless Hinge Pins Replacement. Gary Hall (954) 979-9494.

PLANS CORRECTIONS/CLARIFICATION

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3 INCH UNI SPARCAP TAPE

We have been advised that Aircraft Spruce has repaired the equipment they use to make the 3 inch spar cap tape, and can now supply orders from builders and also from Wicks. It might be a good idea for you to place your orders in advance.

CAUTION! AN BOLTS - IMPORTANT!

You must make sure that you use the correct AN bolt or screw for each application. The bolt or screw should be selected such that the grip length is just slightly less that the thickness of the material being held, and the protruding threads are just enough to tighten the nut without running out of threads, with a minimum of 2 threads protruding from the nut. This is critically important in a number of applications - Read on!

Canard lift tabs. Just a short time ago a builder reported that the holes through his lift tabs were elongated! This builder had purchased an almost complete project from the original builder. He had completed and flown this airplane for 25 hours, and then removed the canard (he didn't say why). He called to ask me if it was normal that the holes in the lift tab became elongated. He said that when he first installed the canard, the holes were so tight he had to tap the bolts in. He asked me if the AN-4 bolts were strong enough to withstand the shear loads. I was horrified! I told him that I had never heard of this ever happening to anyone else, and it meant only one thing. He had used bolts that were too long, and the nuts had bottomed out before the lift tabs were pressed tightly against the bulkhead. The AN-4 bolts were intended to be tensioned so the friction between the tab and the bulkhead supported this shear load. I told him to immediately ground the airplane until he replaced the lift tabs or built a completely new canard. I told him he was very fortunate that neither the lift tabs nor the bolts had failed. I told him

how to determine the correct length bolt to use, and how to determine that the nut had not bottomed out.

Wing attach bolts. Some time ago a builder reported that he could feel a vibration in his airframe, but could not determine the cause. We discussed a number of possible causes. After further checking, he discovered that his wing attach bolts were too long. When he had a wrench on the nut, he could not turn the bolt. But when he took the wrench off the nut, the bolt turned easily. I don't know if he substituted shorter bolts, or added washers, but when the bolt was tensioned, the vibration disappeared. The half-inch wing attach bolts are larger than needed to provide the necessary tension, but if not tight, they might fatigue and fail in shear.

Propellor bolts. It is well known and has been discussed many times that the engine torque is transmitted by the friction between the propellor flange and the propellor, and not by the lugs and bolts. The function of the bolts is to provide the tension which generates the necessary friction. We use a 7-inch diameter flange on our prop hub extensions to make sure there is enough friction to transmit 180 hp. We do not know what the horsepower limit is for AN-8 bolts, a wood propellor, and a 7 inch flange, but any builder thinking about increasing the horsepower above 200 hp ought to be concerned. If the prop bolts are not tensioned enough to provide the necessary friction, the bolts will fail in shear in short order. That is the reason that propellor bolt tension should be checked regularly, particularly after a new propellor installation.

Other critical applications. There are a multitude of instances where it is critically important to use the correct length AN bolt or screw, but the above 3 examples are probably the easiest to understand. Every builder should understand the way to select the correct bolt and the way to determine whether his selection was correct. We have not had any failures yet that we know of, and we don't want any in the future.

CANARD INCIDENCE vs PITCH STABILITY

The Cozy Mark IV is designed to have positive pitch stability and to be resistant to a main wing stall throughout its approved c.g. range. But for this to be true, the canard must be set at the correct angle of incidence. During your initial flight tests, you should determine whether your canard is set at the correct angle of incidence, and there is an easy way to do this safely in flight. If you notice on large drawing M-18, there is a protractor which shows the full travel of the elevator from minus 15 degrees at full forward stick to plus 30 degrees at full aft stick, and there is a notation that at cruise, the elevator should be in trail, i.e. at zero degrees. In newsletter #56, page 5, there is a plot of elevator position as a function of c. g. and speed for our plans-built model, and on this plot, the zero elevator position occurs at a c.g. of 101 and 150 knots IAS. For several years now, we have been including a copy of this page with each Owner's Manual. It also lists several changes for you to make to the Owner's Manual. So, before you expand your flight envelope, and before you fly at slow speed and aft c.g., check your elevator position. It is perfectly safe to do this at a c.g. of 101 and 150 kts IAS, or even better, at a c.g. of 100 and 150 kts IAS, your elevator position should be at less than minus 1 degree, i.e. about 1/16th inch trailing edge down. If your canard is set at too low an angle of incidence, it is a dangerous condition. The indication will be that the trailing edge of the elevator will be too low in cruise. The symptons will be difficulty in rotating, pitch instability, and a tendency to react too fast to back stick. And the result could well be a

main wing stall.

Very recently two builders complained of pitch instability, and difficulty rotating. I went for a demo ride with one of the builders in his Mark IV. With both of us in the front seat (and estimated c.g. of 100), the elevator trailing edge was down almost 3/8 inch or 5 degrees. For comparison, we both went up in our plans-built Cozy and the trailing edge of the elevator was zero to 1/16th trailing edge down. We concluded that his canard was set at too low an angle of incidence.

After a telephone discussion with the other builder, he sent me this e-mail:
"Hi Nat, Thanks for your input the other day. I adjusted the canard incidence by 2 degrees. Did so by relocating the guide bushings that engage the alignment tabs, as we discussed. Had to slightly modify the canard cover, but it was really much less of a task than I'd envisioned. Bottom line is that the aircraft now flies lovely all the way out to the forward c.g. limit. The c.g. and weight envelope is fully expanded as well as all flutter testing and low speed/min speed tests. Cooling is pretty good though I'm still working on it. Will provide more soon. Regards, Rob"

This is an important matter. Make sure you check elevator position early in your flight test program.

FAA REGISTRATION

The FAA recognizes two classes of homebuilts, plans-built and kit-built. If you are registering a kit-built, they ask you for a receipt for purchase of the kit. Somehow the FAA got the impression that the Cozy Mark IV was built from a kit (we can't imagine how that could happen), and several of our builders, when they applied for registration, were sent a form letter from the FAA asking for a receipt for their "AeroCad Cozy pre-fab kit".

We have notified the FAA Aircraft Registration Division that the Cozy Mark IV is a plans-built design only, that hundreds have been built from plans, registered, and are flying, and that there is no such thing as a Cozy pre-fab kit, and no Cozys have ever been built from a pre-fab kit. We asked them to correct their records and stop asking our builders for a receipt for purchase of a non-existing Cozy pre-fab kit. Knowing how difficult it is to change a bureaucracy, we might have to go all the way to Jane Garvey. Please let us know if any of you are asked for a Cozy pre-fab kit receipt and we will pursue it further.

SOLENOIDS

There are two different types of solenoids, and it is important for you to understand the difference and use the correct one in each application:

- Battery solenoids. The battery solenoid is actuated by the master switch. It powers the master buss at the instrument panel. It is designed for continuous duty, so it doesn't draw much current. Also, since there shouldn't be any electrical load when it is activated, it is not designed to switch heavy loads.
- Starter solenoids. The starter solenoid is designed to switch heavy electrical loads, up to the cranking capacity of the battery. It needs to snap closed as fast as possible to minimize arcing. It has much fewer windings than the battery solenoid, and draws much more current. But since it is only used briefly in starting (hopefully), current draw is not a problem.

Now what can happen if you use the wrong solenoid for each application? If you use a starter solenoid for the battery, it is not designed for continuous duty, and will draw far too much current and overheat. If you use the battery solenoid for the starter, it is not designed to switch heavy loads, will arc, and probably the contacts will stick together, so the starter will not disengage when the engine starts.

You should be careful in installing the commonly used solenoids, particularly starter solenoids. The posts (where you connect the cables) are bolts, with the bolt heads on the inside. The flat of the bolt head serves as the contact surface. If you tighten the cables too tight, the post may turn, so the contact on the inside is no longer the flat, but the point between the flats. In that case, the surface area for transferring the heavy electrical load is greatly reduced, can overheat, and weld closed. B & C Specialties (see Authorized Suppliers) has a special starter contactor with posts and contact surfaces that cannot turn, so this problem (if it is a problem) can be avoided.

BUILDER HINTS

Norm Muzzy writes:
"I put the drip lip on the front fuselage cover last night. Here is a hint for those who have yet to do this. The plans say to build up an 1/8 inch ledge with basa or foam. I used a piece of 1" wide webbing (either climbing rope type webbing or load binding strap type webbint) with duct tape on top of it. The webbing will bend around the curve just right, and it is about the right size."

You can ruin your avionics by hitting the starter with your avionics on. A way to protect your avionics is to put a IN4007 diode across your master and starter solenoids to short out the spike which occurs when you release the starter or the master switch. (Claude Preston, Seattle WA).

I thought it was in the plans, but maybe not. An easy way to make the fairing where the main gear strut enters the fuselage is to shape it with molding clay (Playdough), glass over with at least 2 layers of BID, attaching to both the strut and the fuselage. Then after cure, make a sawcut at least 1/8" wide halfway between the fuselage and strut, remove the strut, and dig out the clay. If the cut is wide enough and the inside of the fairing is empty, the strut can flex without cracking the fairing. This should be done when the fuselage is upside down with no weight on the gear. Then when you are flying, both halves of the fairing will be aligned for minimum drag.

FOR SALE

- Sensenich 2-blade propellor 70 diameter x 85 pitch, for 180 hp or 200hp Cozy Mark IV. (480) 981-6401.
- Plans-built Cozy Mark IV. Empty weight 1067 lbs. 0-320 Lycoming 500 SMOH. Electric nose lift and trim. Michael Davis flyboy@creative-net.net. (912) 826-3768. Want to build another Cozy.

FUEL VALVES

One of our builders, Mike Skorija, ocasionally calls us on Monday after he and his partner spend the weekend working on their Cozys. I happened to mention that after almost 9 years, my Weatherhead fuel selector valve was getting a little harder to turn. You can imagine my surprise when, a few days later, a new fuel valve showed up in the mail, Mike's complements. Then the following Monday he called to ask whether I had installed it yet. I took the hint and installed the new valve. Out of curiosity, I decided to take the old one apart to see why it had gotten stiffer to operate. It looked like it was in perfect condition, except that there were numerous tiny black specks on the surface of the delrin plug. They were non-metallic, and I guessed they might have been deposits of the dye in 100 LL. I removed the specs with some polishing material I have, reassembled the valve, and guess what? The old valve works just as good as new. This little experience reinforces my faith and confidence in the Weatherhead valve. I also learned that you can remove the delrin plug to clean it without removing the entire valve. Thanks, Mike!

LYCOMING 0-320s?

When we designed the Mark IV, I thought the 0-320 would be an ideal engine choice, but I knew from past experience that builders expect the designer to be conservative, and so most builders put in the next larger engine size. Knowing this, I decided to put in the 0-360 right off the bat. So I didn't have any first hand experience with the 0-320, and always wondered how well it would perform. Tim Merril (1996 Grand Champion winner at Oshkosh) had an 0-320, but he also had a constant speed prop, and his performance was superb. But how about an 0-320 with a fixed pitch prop, I wondered? Well, at Oshkosh Kevin Funk showed up in a Cozy Mark IV, very heavily loaded with 3 people, a lot of luggage and baggage pods, all the way from Texas with an 0-320 and a fixed pitch, 2 blade prop. I asked about performance, and he offered to take me for a ride. The opportunity didn't happen until Copperstate, however. So I had a chance to ride in Kevin's Mark IV, and was impressed with how well it performed. Rotation distance seemed a little longer than in my N14CZ, but I noticed that Kevin was only pulling about 2350 rpm on take off, which is about the same as I get with my 0-360 and Performance prop. So here is the thought that went thru my head: I get about 2350 rpm for takeoff and I cruise at altitude at

about 2450 rpm. If the 0-320 has 10% less rated horsepower, but you ran it 10% faster, wouldn't you get the same performance as with an 0-360? That would mean 2585 rpm for takeoff and 2695 rpm for cruise at altitude. Supposedly a Lycoming can run forever at 2700 rpm at altitude. So I suggested to Kevin that he try a "climb" prop that would give him more rpm for takeoff. It so happens that there were about 10 times more 0-320s built than 0-360s, so they are a lot more plentiful and are a lot less expensive. It seems that it would be a very practical alternative for builders to install 0-320s and just run them a little faster to get the same performance as we get with 0-360s. We asked Kevin Funk for more details on his airplane, and he writes:

9/11/00
Dear Nat,

My engine came from Bobby's Planes and Parts in Weatherford/Mineral Wells TX as an 0-320 E2A (150 hp) from a Piper. It was 28 years old, had 3330 hours and no overhaul. The oil checks had been good to the end. Bobby gave me a money gack guarantee for $4500. The tear down showed frozen lifters, 2 worn camshaft lobes, a small scratch on the crankshaft that was ground out, 3 exhaust port cracks due to years of car gas (replaced with 4 overhauled cylinders) and 2 cracks in the case that were easily repaired. I did all of the manual labor and an A&P (RV homebuilder) helped me with the rebuild. We rebuilt it as if it were a 160 hp D1A. Total cost was $12,000.

Data:
Cozy Mark IV per plans, no wheel pants, 1150 lbs empty wt.
Propellor is 2-blade Performance
Takeoff roll 2350 rpm, 200# pilot, 32# ballast, 3/4 tanks, 5 kt headwind, 1300 ft.
Takeoff roll 2350 rpm, with 460# front seat, 200# backseats, full tanks, baggage pods (30# total), 2800 ft.
Climbout, 1300 fpm at 100 mph, 2380 rpm
Cruise light example, 2840 full throttle rpm, 210 mph
Cruise heavy example, 2680 rpm full throttle, 180 mph
Landing light is 75 mph
Landing heavy is 95 mph (probably could be slower)

There are 2 RV-6As in town with the same engine and we have flown in formation. One is using a 2-blade metal Sensenich and the other a 2-blade wooden prop. These planes have only 2 seats, 120# baggage capacity and 40 gallons fuel. I can beat them by 5 kts at full throttle with 2 people on board. Overall, I am very satisfied with my 0-320 powered Cozy Mark IV and have no intentions at this time to change engines. I hope to be able to have a 3-blade variable pitch prop someday but it could be as long as a year from now. I would expect it to produce a shorter takeoff roll and even better climb when fully loaded, but the top end would be about the same.

Kevin Funk
Lubbock TX

COPPERSTATE

The Copperstate EAA Regional Fly-In was held October 12-15 at Williams Gateway Airport, Mesa. It is about 10 miles away from our house. It has three parallel runways about two miles long and acres of concrete for parking airplanes. A wonderful place for a fly-in and the weather was great - clear skies, little wind and temps in the 70 - 80 F range. There were 9 Cozys altogether, from as far away as Kentucky, and northern California. Two couples stayed at our house, and we had 40 builders and friends at the barbecue at our house, after the airshow on Friday. The cusine was good and the camaraderie outstanding!

FIRST FLIGHTS

We have learned about 2 first flights in the last 3 months, Rob Kittler and Alain Raposo. Gary Juergens probably is also flying, but we don't have a report from him yet.

Rob Kittler writes:

11/12/00
Hello Nat,

Thought I'd pass along the good news regarding Cozy N751RC. The aircraft was completed and received its airworthiness certificate on Sept ll,2000. Inspection was by the FAA here in Detroit. It turned out to be a painless process, with everything going rather smoothly. First flight was planned for the next day. We waited for the passing of a cold front in the morning and for clearing weather in the afternoon. Finally about 4pm friends arrived in their Long Ezs to assist in the flight and fly chase for me. First flight was conducted from Ann Arbor, MI at about 1650 lbs and with a c.g. of 100.3. Total flight time was 45 minutes and needless to say, we were all elated as everything seemed to go quite well. During subsequent flight testing, while expanding c.g. forward, it was discovered that the canard angle of incidence was slightly off. I'd made an error when making the templates so long ago, and only just found it. Total error was about 1.5 degrees too little incidence. After discussing this with you and others, the correcting adjustments were made and flight testing confirmed the correction to be satisfactory. I've since flown off all the time and then some and have found the aircraft to be a delight to fly. No significant problems arose during testing. After some minor adjusting, she flies hands off and trims out nicely. I'm still working on various cosmetic items as well as cabin heat. Many thanks to you for all your support over these last few years. It's been a very interesting and worthwhile journey. Not to mention very enjoyable throughout the building process. Thanks go out to many people for their support through the project. Special thanks to Alex Becker, Jim Price, Mike Scoval, Pat Charles, Tom Carey and Dennis Oelmann. Friends and helpers all. And to my wife Carla, who shared her house with the project and supported me wholeheartedly throughout.

Best wishes.

Rob Kittler
Canton MI

Alain Raposo writes:

9/19/00
Hello Nat,

I did my first flight on 8/31/00. It was fantastic!!! Today, after 10 hours of flying, I have 2 problems: When I pass 120 kts I hear a high vibration and I can't identify the source. I think it's an airfoil vibration in the left wing because the last hinge (winglet side) has a big clearance of .2 to .3 mm. The right airfoil is OK, normal clearance around .05MM. What do I have to check to identify clearly the problem? What modifications do I have to do if it's an airfoil vibration? The second problem is a high oil temperature at cruise speed. At 2400 rpm and 4000' with 160 kts, the oil temp is around 230 deg.F and the cylinder head temp is around 180 deg. C. I have to check the oil sensor and try a new deflector after I resolve the first problem!!! I don't know if you remember me. I met you at Sun'n Fun 97. I work in Renault engines design, and you speak about your trip in France with a Renault 4L a few years ago! Thank you for your help.

Alain Raposo
Malmaison France

***(Editor:** I have been exhanging emails with Alain. He found the vibration was caused by his engine baffling striking the engine cowling. He intends to install a larger oil cooler in the spring.)*

AWARDS

Both Sport Aviation and Kitplanes are requesting all designers to have their builders send in pictures of their completed projects, with short write-ups, because that is one of the most interesting features for their readers. Kitplanes even offers the incentive of entering the builders in a drawing for a free hand-held GPS. We have found that these pictures and write ups are more impressive with prospective builders than an equivalent sized picture ad. That is why we reward each builder $100 for their entry in either or both magazines, or an Alex Strong pitch trim, which would otherwise sell for $175. New recipients for the last 3 months are:

- Gene Davis, October 2000 Kitplanes.
- Eric Westland, October 2000 Kitplanes
- Gaetan Roy, November 2000 Sport Aviation

Please let us know if we have missed anyone.

OUR WEB PAGE (WWW.COZYAIRCRAFT.COM)

Cozy builder John Slade designs web pages professionally, and volunteered to spruce ours up a bit. He has completely redesigned it, made a number of good suggestions, added the "Virtual Fly-In", the "Builder Contacts", the "Photo Gallery", "Shirley's Corner", links to builder web pages, and made some other suggestions we haven't gotten to yet. We are very pleased with the result, and I am sure it has brought us some new builders. John has done all this "pro bono" (refuses to accept any money), thank you, John! We would like to add more names to the builder list. If you have a web page, or e-mail address, please check the accuracy, and if you wish to be added to the list, please let us know. Also, we only have pictures of about 1/7th of those who are flying, so send us your pictures, too. John has added some nice pictures since the last newsletter, including Brian Bishop alongside his Mark IV and F-16. Have a look.

MARK IV vs WINDOW/GARAGE DOOR

A commonly asked question is how to get a Mark IV out of a basement, or through a single garage door.

Roy Grossinger writes:
When I first started in my half basement, I took the dimensions from the plans and measured the dimensions of my largest window. The window was just big enough. However, when I was getting ready to move (the tub was done thru Ch 8) I could not figure out how the window shrank while I was working on the plane? Epoxy fumes? Well, my circular saw and a new larger window took care of that problem; my neighbors helped haul it out after being bribed with beer. I guess the moral is: measure more than once your opening, if not, have a backup plan.

Gregg Perry writes:
I started my Cozy Mark IV a few years back when I was living in N. Carolina. I built all the major parts and had the fuel strakes in place. I then finished residency and my wife and I decided to move to Tennessee. I was "sure" I could get the fuselage out a single garage door by putting small platforms with castors under each wheel and finessing it out the door. It didn't work - no matter what way I danced it around, it just didn't fit. Fortunately, Jeff Russell was living nearby at that time and a panicked phone call brought him over. He showed me (with four strong helpers) how to "tilt" the plane so the edge of one strake grazed the concrete at one corner of the door and the edge of the other strake grazed the upper door frame of the other side of the door. Marks were left on both the garage door frame and the fuselage (no major damage) but we did get it out. Then my father-in-law brought a hay trailer to our house and we pushed the plane up on the trailer facing forward. I attached two red flags to the end of the strakes, covered the canopy carefully, lashed down the main gear, retracted the nose gear, and used the canard cut-out to put a strap across the nose. Off he went.... He got lots of stares and waves (including from a State Trooper), but had no problems on the 400+ mile trip. The wings, canard, etc. went by moving van.

Kent Ashton writes:
I'm pushing hard to get Mark IV #150 painted before cold weather sets in here in North Carolina. Canard, wings, engine, and cowlings are all done. I'm down to wiring, instruments and little stuff. It's all downhill now. Here's proof that a Mark IV will go out through a one-car garage door, but very carefully!

I can't take credit for the airplane flipper idea but these devices sure made it easy to sand and prime the bottom. I made them so that I could flip the airplane with the gear installed. If I had to do it over, I would just build the slots for the strakes in the center of the flippers.

Kent Ashton
Charlotte NC

CRANKCASE BREATHER

A Long EZ driver reported on the internet that he had a night forced landing when his engine stopped because his crankcase breather froze shut. This caused the crankshaft seal to blow out and lose oil, but fortunately the engine stopped before all the oil was gone and before the engine siezed. And fortunately his GPS directed him to the nearest airport and he was able to put down on the runway. This should serve as a warning for those of you flying in below freezing temperatures.

The possibility of the breather freezing shut is well understood in Alaska. Water is one of the products of combustion, and there is always some blow-by of combustion gases past the piston rings into the crankcase, and these gases must be vented from the crankcase. If the breather exits the cowling in below freezing air temperatures, it will freeze shut, usually with dire consequences.

There are two simple ways to prevent the breather from freezing shut. The obvious one is to run the breather on the hot side of the engine and/or along the exhaust pipes (use a metal breather line). Another solution is to have an opening in the breather line inside the cowling close to the engine. The theory being that the gases will exit outside the cowling where the pressure is lower, and not inside the cowling unless the line going outside freezes. Running the breather into one of the exhaust pipes is not recommended, because it might cause an explosion in the crankcase. Some builders seek to avoid this possibility by installing a back pressure valve where the breather joins the exhaust pipe, but these have been known to plug with a result similar to the line freezing.

We prefer to have absolutely nothing in the breather line, like an oil separator or back pressure valve, which might plug up and cause a forced landing and possibly ruining our engine (like happened to Uli Wolter), so we run the breather straight down from the accessory case and out the bottom of the cowling. We cut it 45 degrees facing aft to help in the exhausting of the gases. Sure, we get a small streak of oil on the bottom of the cowling during long flights, but the inconvenience of wiping this off after landing is a small price to pay for the peace of mind it provides.

INSURABILITY

As I was reading the November 24th "Flyer", an article caught my eye: "Avemco agrees to Velocity Coverage." Apparently Velocity builder/owners were being refused insurance coverage because of too many Velocity accidents, so Velocity Aircraft appealed to the EAA for help. The EAA met with representatives from Velocity Aircraft and Avemco to work out conditions under which Avemco would provide coverage. The details, still in the works, include:

Velocity Aircraft will inspect completed Velocity aircraft and provide owners with a list of items required to conform to specifications. The builder/owner would be responsible for completing the work recommended to obtain insurance coverage.

Flight training and/or a one-day session must be completed with Velocity's flight instructor, who will sign the endorsement and forward it to Avemco.

This same situation has occurred in the past with Glasair and Lancair builders, who were denied insurance coverage because of accident history. Insurability was regained, conditioned on compliance with design specifications and flight instruction requirements. The insurance industry is especially concerned about builders who make major design changes.

The lesson to be learned here is that all of us are collectively affected by the way each individual builds and operates his airplane. The mistakes of a few can affect us all. The Cozy has an excellent (but not perfect) safety record to date. Please help us to keep it that way!

AUTOMOBILE ENGINES

My research on the subject of insurability turned up the fact that the accident rate for airplanes with automobile engines is significantly higher than with aircraft engines. For this reason, it is very difficult (I was told), if it is even possible, to get hull and passenger insurance for airplanes with auto engine conversions. This would be especially true for a 4-place airplane. Be advised that when you apply for insurance coverage, you may be asked what engine you have installed, and coverage might be denied if you have installed a non-approved engine. Anyone and everyone contemplating the use of an auto engine ought to determine in advance whether they will be able to obtain insurance coverage, or if not, whether they are willing to accept the risk of flying without insurance.

SPEED

In newsletter #71, we compared the speed and cost of the Cozy Mark IV with 4-place factory airplanes. We recently read that the Tiger (formerly the Grumman American Tiger) will be back in production. It is a 4-place with a 180 hp 0-360 Lycoming engine. Cruise speed is quoted at 143 kts and base price, just $219,500! Aren't we lucky!

BRAKE CHATTER

Cozy Mark IV driver David Domeier (retired TWA captain) reported occasional brake chatter after landing and asked the Cozy email group for suggestions. At first he thought his main gear strut (it wasn't from Featherlite) didn't have enough torsional strength, then maybe his wheels didn't have the right amount of toe-in, then maybe the wheels were out of balance, then maybe the discs weren't true enough, etc., but none of these were found to be the cause, although the chatter gradually became less. Finally he called Cleveland, and they suggested that maybe the rigid Nylaflow tubing brake line might be causing binding of the calipers if it were not long enough to provide flexing, or if it was tie-wrapped too tightly to the strut. Sure enough, when he installed 303 AN flex lines at the calipers, the chatter went away. So then he re-connected the Nylaflow lines, making sure they weren't too tight, and the chatter was gone. He writes:

"After removing the 303 AN3 hoses, bleeding the brakes one more time, a flight check proved the system to be OK without the flex hose as recommended by Cleveland. As per usual, the Cozy performed just dandy. I was alone in the traffic pattern for a rare change of pace, so two close-in full stops were accomplished with just 0.2 logged on the hobbs. This airplane is a delight to fly - once airborne, accelerate to 120 kts, a tight climbing turn to down wind, gear down, power to idle and a 180 deg turn to touch down. Works great if there aren't any Cessnas dragging in a 3 mile final at 65 kts after a cross country around the pattern."

BUILDING TIME

In answer to a builder's question, Marc Zeitlin writes:

"The 2500 hours is turning out to be about right for me - I'm at 2000, and I figure I've got about 300 to 500 to go. There are people that have built planes in 1.5 years after 1500 to 1800 hours, and there are people that have spent 5000 hours over 7 to 8 years.....

The average may be 2500 hours, but the standard deviation is probably 500 to 700 hours, so the distribution is large and flat. Don't fixate on time - look at each task separately and get satisfaction from doing and finishing it. After you've been working for six months or so, you'll see a trend in your time input and you might be able to predict (within a factor of two) a completion date. I originally estimated 3 to 5 years, and it'll end up being about 6 years and 2500 hours."

BALLAST

I have been asked many times what happens if you forget to remove the ballast after you have been flying solo, and I have said that I didn't think it was very likely. Well, it finally happened to me.

I had been flying solo and had 37 lbs of lead in the ballast compartment. Since I weigh around 160 lbs, this gives me an equivalent of 253 lbs in the front seat. So one day I got a call from a prospective builder, Bill Swears, who was visiting here from Alaska, who asked if he could get a ride. He said a friend said he should tease me about needing ballast to fly solo. Well, I decided to show my visitor how simple it was to add or remove ballast, after he arrived. So Bill arrived, I raised the airplane up with my electric lift, pushed it out, explained all the features, and asked him to get in. I was planning to take out the ballast at this point, but forgot. So I got in, we taxied out, and proceeded to take off. I told him that I wait until I see 80 kts, and then I rotate. But guess what? At 80 kts, N14CZ didn't budge. Then I realized, Oh sh.... I forgot to take out the ballast!!!. So with a little more force back on the stick, we rotated. I told Bill (he weighed 190 lbs), " we have the equivalent of 443 lbs in the front seat. It flys okay, but just seems to be a little more nose-heavy than I am used to."

CENTER CONSOLE

Tim Jones writes:

I did not build the console with the electric speed brake. I'm 6'4" and weight 250 lbs so the extra room in the front was my choice. I installed the throttle/milture control on top of the heat duct towards the front where my right hand rests. I really like this setup.

Tim Jones
South Dakota

Paul Stowitts writes:

I kept the armrest to the dimensions in the plans, but put a hinge on the cover to use it as a small storage spot for flashlights, pens, gear retract backup lever, etc. Worked out great.

Paul Stowitts
San Dimas CA

LETTERS FROM BUILDERS (some from the net)

10/18/00

Nat and Shirley,

Wanted to thank you for the hospitality at your home. The food was great and the fellowship was wonderful. We really enjoyed ourselves. The flyin was a lot of fun too. Hope you did well and it was worth your while. Thanks again for a wonderful weekend.

Carrie & Kevin Funk
Lubbock TX

10/18/00
Nat and Shirley,

I just wanted to drop you a line to tell you that it was finally nice to meet you at the airshow and barbeque. That was a great idea. I met some really quality people with some pretty interesting stories. I met a couple of other builders from Texas. Hopefully, we will be able to share information and stories about our projects.

Elizabeth and Nicholas enjoyed the gathering. I want to thank you both for your hospitality. It is a great idea to get builders/flyers together. It fosters a sense of family among such a large and diverse group. Thank you and keep up the good work!

Jonathan Graf
Webster TX

10/11/00
Dear Nat & Shirley

Two years ago I optimistically thought I might be done by now. Looking at the pictures, you can see I have a ways to go. Thanks for your words of encouragement this summer It was really nice talking to Shirley, and nice of you to let me take pictures of your plane. It was a sanity check, while I was working on the canopy frame. Thanks for your support.

Tom Brusehaver
Bloomington MN

11/25/00
Dear Nat and Shirley

I have the Cozy on its back and am finishing the bottom sides of the fuel tanks and all of the attendant contouring and pointing. Its looking good. Wish me luck on the pressure test.

I finally installed a gas heater wall mounted and outside vented to keep the shop at 70 degrees during the painting process. It works well. That's a non-issure in Arizona. I plan to fly my bird to Oshkosh next year. I think that it is a doable do. So we are pressing forward and hope to be airborne before June.

Hope this finds you both well and happy. See you all soon.

Don Ponciroli
Ledyard CT

11/26/00
Builders,

Well, we found out the hard way what can happen to a hot wire saw. Just like all the magazine articles warn - using a hot wire saw can be tricky. We just finished chapter 10 and had no trouble cutting the canard cores and we were in the middle of chapter 11 when it happened. Thane was cutting the elevator cores to length, when he went to plug in the saw, instead of using the regulator ON the bench, he used the plug IN the bench. Although the difference was only 10 inches, the saw saw the difference. It promptly turned into a 3 ft. bright red heating element, broke off at one side, and proceeded to burn a stripe into our workbench. To those of you who would like to trim the bench with the wire saw, don't try it. It will only make it about an1/8th inch at a time.

Fortunately, we had extra wire and were able to restring the bow and continue cutting. We have not had any trouble cutting with the saw, and have completed chapter 10 twice and are almost done with two times through chapter 11 (we are building 2 planes).

Mike, Dave & Thane
Troy, MI

11/16/00
Dear Nat,

Based on how I screwed up yesterday, I have a recommendation for a small change to the plans. I was fitting the elevators to the canard, chapter 11, p.7. Per newsletter #68, change 3, I had made a note to figs. 17 and 18 to use the jig templates on drawing M-18, not the template as described in figs. 17 and 18. However, when I posted the change, I failed to include the note that the 0.2" gap shown in fig 18 would not apply: i.e., new template, new gap (now 0.0"). So, when the elevators matched up to the canard with zero gap, using the M-18 templates, I thought I still needed a 0.2" gap. I proceeded to shim and then floxed in the middle NC-3 hinges. When the flox cured I checked for sufficient elevator rotaton to 15 degrees, and of course discovered I already had 15 degrees due to the new M-18 jigs. But now I had the 0.2"gap too. Rats! After some discussion with other builders I discovered the error. Luckily I had floxed in only the middle hinges on each elevator and was able to drill them out of the canard (no damage to surrounding foam or glass - I should have been a dentist). New NC-3s are due in from Brock tomorrow. Anyway, my recommendation would be to change the "0.2" min. gap" in fig. 18 of page 7 in chapter 11 to read "0.0" gap using template from M-18." Also a note to change the text in the first paragraph, p.7 to reflect the need for 0.0" gap would help. I guess I got overconfident because the canard and elevators were looking very, very good, and the gap was uniform for the entire length of the elevators. Overconfidence often precludes due diligence. I hope my story will help someone else.

Al Sweeny
Louisville, KY

***(Editor:** Have added a note under "Clarifications" as you suggested, Al. Thank you.*

10/13/00

Dear Nat,

Thanks for sending the plans so quickly! I've had a quick look at them and they are excellent, just as I expected after reading other people's comments on the net. I'm not so sure about signing the license agreement on Friday the 13th though!

Andy Richardson
Norway

10/21/00
Dear Nat,

When my cheap saber saw broke and I couldn't get parts for it, I decided to treat myself to a really good one. I got a Bosch Progressor. It's an excellent tool and I recommend it to anybody in the market, but the blades are simply a miracle. They're very rigid, so they make a perfectly vertical cut, they track perfectly straight, and they positively EAT fiberglass. I trimmed the ends of my main landing gear strut in about two minutes each, literally, with no heat buildup at all. I don't know if they're available separately yet, but if you can find them and they fit in your saber saw, I REALLY recommend giving them a try.

Doug Shepherd

10/10/00
Hi canardians!

My eight year old daughter said something yesterday that I think you will appreciate. We live on the approach end on one of the runways in Appleton WI, and frequently see planes on final approach for landing. Yesterday my wife and daughter were in the yard when a plane landing at Appleton flew over. As always, they looked up to see the plane, and my wife marveled at how the plane just seemed to "float" in the air. Then my daughter made her observation: "it's weird...you think it's going backwards, because the propellor is in the front!"

Mark Beduhn
Appleton, WI

9/20/00
Dear Nat,

I am having so much fun building my Cozy that the past couple of years have gone by real fast. Thanks for a great design and all of the direction you continue to give to the Cozy group.

Michael Pollock
Sachse TX

9/21/00
Nat and Shirley,

Our summer has been very busy with getting settled into a new home and job, so I am just now starting

to build again after a year and a half break. I now have an 800 square foot heated shop so the long winter up here should be productive. We missed you at Arlington but did get to meet the Westlands. They are a very nice family with a very nice airplane. Thank you Nat for the ride in your plane when we were down in the spring. I tell people that comparing a Cozy to a Cessna is like comparing a Lexus to an old Ford pickup.

Jeb Butler
Leavenworth WA

9/15/00
Dear Nat,

I am trying to fit the main strut into the fuselage, and still having a heck of a time getting the leading edges to line up at FS 108.25. Mike Davis is coming by tonight to help. He has been great support for me. Also, I just received Newsletter #71, and after having read it through, am remotivated to press on. All aspects of the letter, the builder testimonials, the technical articles, as well as your great job as the ultimate referee regarding building controversies, help confirm my decision to accept this challenge. Thanks again.

Al Sweeny
Louisville KY

10/1/00
Dear Nat,

Many thanks go to Marc Zeitlin for the information collection on the "unofficial Cozy" web site. During the Arlington flyin 2000, I attended the composite workshop, and determined that my layup technique and composite knowledge to be the same as the instructor. An ex-Boeing engineer with 15-year old Varieze plans and I did the test panel plus a second side layup in the alloted time. Have worked with composites on my 5-year large 42 ft. trimaran-building project; summer jobs as the paint and fiber glass technician at Cruising World; and R&D trim carpenter on the CAL 35 production line.

Have been a fan of Burt Rutan aircraft development from the beginning, as well as his comments about building them light. The Arlington discussion reinforced my resolve to complete an aircraft project by the weight and the numbers. Understand and appreciate your comments in the newsletters too. Also know what it is to fill a million epoxy pinholes.

My previous biggest aircraft project was a 1.6 flying model of my dads Aerocoupe. I am currently IFR, with 1082 hrs so that part is long out of the way.

Howard Trefethen
Des Moines WA

8/23/00

***(Editor:** Tony Rothwell ccd me on his letter to John Slade)*

My Cozy was built in Canberra Australia. Brenda and I met Nat at OSH 87, bought the plans, came home and organized the workshop, ordered materials and cut foam in June of 1988. It took until March of 1998 to get flying but I had long breaks due to work commitments. Engine I0-320-D1B 160 hp with an MT 3-blade prop and Lightspeed electronic ignition in place of the right magneto. Full IFR with GPS and S-Tec autopilot. Weight is 1076 lbs with oil and ELT installed. Top speed is about 180 kts TAS, usual cruise at 65% power is about 164 kts TAS at 1600 lbs and this varies about 3% per 100 lbs either side. With an oxy system, I have had 157 kts TAS on 50% at FL190. We now have 340 airframe hours and 380 landings. Canberra to Adelaide, Brisbane or Hobart each take just over 3 hours. Canberra to Sydney is a bit over 40 minutes and to Perth about 10 hours, all at our regular 65% power. Fantastic aeroplane.

Fuel flow seems to run about 10% below Lycoming book figures which I attribute to the electronic ignition. I've just given it a Microlon treatment and suspect flow is even lower (certainly smoother feel) but it is too early to have solid figures yet. Now, who has some plans for drop tanks?????

Tony Rothwell
Australia

8/31/00
Dear Nat

Thank you for such a great set of plans. Building the Mk-IV has been a great learning experience. I am just completing work on chapter 7 and so far everything is moving along smoothly.

Gus Delalcazar
Bakersfield CA

9/20/00
Dear Nat,

Here is an interesting bit of information. Two days ago we loaded up the Cozy to go to Chicago to see Cory. She moved to a different apartment closer to school.

When I say loaded, I mean LOADED! In addition to full fuel and the two of us, I took out the back seat cushions and proceeded to stack the rear seat area to the ceiling. We had rugs, a pair of standing wall lamps, light fixtures, an old fashioned type-writer, half a dozen suitcases, so on and so forth. It was a LOT of weight. Some of the items were HEAVY.....

It was a very smooth ride going up there We did about 180 kts due to a slight tailwind. The amazing thing was, once at altitude, I'll bet I didn't touch the pitch trim more than twice in the whole 4 hours. It stuck on altitude like it was on rails.....I was amazed. I'm thinking all that weight in the back somehow stabilized the pitch plugoid mode. Whatta ya think? We paid big-time coming back, it took 6 hours to get home as we were bucking a 40 to 50 kt head wind. . Yes, we did a night landing at home, first one in about 3 years....(in the Cozy)

Vance Atkinson
Bedford TX

10/19/00
Dear Nat,

I have finished the wings in August. Working on the fuel tanks and strakes so I can push it outside the shop, attach the wings, and show everyone the fruits of my labover the past 3.8 years. Have jumped ahead and installed the engine cowling flanges and the fiberfrax and aluminum sheet for the firewall. I considered stainless, but felt the payoff wasn't worth the additional weight. I felt the 2300 deg F fiberfrax supplies enough protection. I found a 2000 deg F adhesive to adhere the aluminum sheet to the fiberfrax.

I can see the end of the construction "tunnel" now and hope to procure an engine soon. My goal in 2001 is to have the airplane make its own noise and drown out the Harley Davidson motorcycle enthusiast across the street from me. Thanks for all the great support these past few years!

Kevin Short
Lexington SC

11/4/00
Nat,

Thanks for your quick answers. I have completed the basic right wing structure, up to cutting out the aileron and completing the root ribs and aileron controls. Today I complete the shear web lay-up for the left wing. As soon as I get it to the same stage as the right wing, I'll take them through the remaining steps together, on the assumption that I can work more efficiently on both wings at the same time and double up on each step. I plan to install the Rutan internal rudder horn design, and have routed the rudder cable conduit accordingly.

The fuselage is complete up to building the canopy and turtleback. I installed Steve Wright's electric nose lift, and Dennis Oelmann's rudder pedals. I carved the nose shape by hand, strictly as instructed in the plans, and am happy with the result.

I plan to be here in England until the end of 2001, then ship the Cozy back to Seattle and complete the construction there. I'll have to leave the strakes and canopy construction until then, due to space restrictions in my household goods shipment, but should be able to spend my time working on systems installation in the fuselage shell once the wings and winglets are complete. Installing the winglets on the wing tips will also have to wait until I get back to Seattle.

Thanks again for a great design, excellent plans and your continued support. Every time I consult your plans and complete the next step, I am amazed that the clarity and completeness of the plans. As an engineering design manager for Boeing, I have some grasp of the magnitude of the task of just getting a design frozen, not to mention the task of describing its execution to what must be assumed to be a novice builder. I have not yet found a question for which the answer was not in the plans somewhere.

Paul Kuntz
Lancashire UK

11/14/00

Hello Nat,

Just wanted to send you a quick email to let you know how much I am enjoying building my Cozy Mark IV. I have just hit one of my milestones....completing Chapter 7. I have attached a few photos including one of my 2 girls (Sarah and Sydney) sitting in "DAD'S AIRPLANE". Sarah, my oldest, insisted on wearing my PILOT hat (I fly for US Airways) to show that she was the PIC.

I just completed training on the Airbus 320 and on November 10 flew my first trip. Though I have never flown a Cozy, I imagine it feels very similar....side stick and throttles in the middle of the cockpit.

Thanks again for a great set of plans and the super builder support you provide. Hope to see you soon.

Phillip Sill
Duncan SC

9/11/00
Dear Nat,

The wings have been mated to the spar, now installed in the fuselage. It took 3 bits to bore through the holes, but as far as I can tell, I am only one thin washer off. The spar installation was less trouble than I expected. Joining all these pieces hanging in the garage has resulted in a marked visual progress. Also, the engine is now paid for. Yes!

I decided to make the turtleback myself. It was very satisfying to construct something with so few straight edges. It popped out of the form and was ready for glassing with only minimal sanding! Kudos on your exemplary instructions.

There are several Cozy builders in the SoCal area who are further along than I. You can expect there will be a flush of Cozys taking flight. Together with an active canard group (Squadron III) it is looking promising indeed!

Thomas Kennedy
Aliso Viejo CA

11/6/00
Dear Nat and Shirley,

I'm trying hard to get the outside layups on the strakes done before it gets too cold for epoxy curing in SC. The firewall is on, all torque tube assemblies are complete. Only a few more major assemblies. A previous newsletter discussed how to add a 2" wide flange on top of the fuel strake ribs, and I added these. It took 6 to 8 hours, but was worth it. Plumbing the fuel and vent lines was a piece of cake using the spring tube benders from Wicks. MGS 285 epoxy gave me a workable pot life of about 30 minutes. I use the slow hardner for very large layups. This allows me to relax and make a really nice layup. I post cured my strake parts, after the initial cure, by putting them inside the cab of my pickup truck on a 95 deg day in August. The temp inside the truck reached 145 deg at 3 pm. I left them there for 2 days.

I have been using apple cider vinegar to clean my hands and tools of sticky epoxy for two years. I keep

a small jar of vinegar near my shop sink. If I get epoxy on me, I blot some vinegar on the spot and then wash with soap and water - works great! If my tools have cured epoxy on them, I plunk them in the jar overnight and in the morning the epoxy is easly removed. Works on brushes and squeegees too!

Kevin Short
Lexington SC

I WANT TO BE A NAVY PILOT

I want to be a Navy pilot when I grow up because it's fun and easy to do. Pilots don't need much school, they just have to learn numbers so they can read instruments. I guess they should be able to read maps so they can find their way if they get lost. Pilots should be brave so they won't be scared if it's foggy and they can't see, or if a wing or motor falls off, they should stay calm so they'll know what to do. Pilots have to have good eyes so they can see through clouds, and they can't be afraid of lightning or thunder because they are closer to them than we are. The salary pilots make is another thing I like. They make more money than they can spend. This is because most people think airplane flying is dangerous except pilots don't because they know how easy it is. There isn't much I don't like, except girls like pilots and all the stewardesses want to marry them, so they always have to chase them away so they won't bother them. I hope I don't get airsick because if I do, I couldn't be a pilot and would have to go to work.

Edwardo Cordona, Age 10 (A Fifth Grader)

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