

COZY NEWSLETTER #81 April 2003

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Co-Z Development Corp.

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Subscription rate: \$16.00/2 yrs., \$20.00/2 yrs. OUS

(2-year renewals save us record keeping)

Cozy Mark IV Owners Manuals - \$15

Cozy & Cozy Mark IV decals - \$5 ea. (specify color)

Subscribing to the Cozy Newsletter is a requirement for all builders. The Cozy Mark IV plans are obsolete unless updated by all changes or corrections in the newsletter. All builders must subscribe to the newsletter. First Edition plans holders need newsletters #34 to present. Second Edition plans holders need newsletters #52 to present. Third Edition plans holders need newsletters #74 to present. New plans purchasers will receive an assortment of back newsletters (we no longer have copies of all back newsletters) plus a complimentary one-year subscription to start them off on the right foot. They will need to renew when that has expired. The older copies, which we can no longer supply, are available on the Unofficial Cozy Web Page. The newsletter is the principle means by which we communicate with builders and support their projects. The newsletter contains plans corrections and changes, builder hints, information and updates about our suppliers, shopping info, first flight reports, and other news of interest to builders. We answer telephone calls whenever we are home and personal letters as well, but please enclose a stamped, self-addressed envelope if you expect a reply. We encourage newsletter input from builders (letters and pictures) which would be of interest to other builders.

“Cozy” and “Cozy Mark IV” are trade names of Co-Z Development and are the names given to airplanes built according to the plans and instructions of Co-Z Development. Just because you buy a set of Cozy or Cozy Mark IV plans, does not mean you have to build your airplane exactly according to plans. It is an experimental airplane and you can, in fact, make whatever changes you desire. But then you have a new, untested design, and shouldn't register or insure your airplane as a Cozy or a Cozy Mark IV.

Co-Z Dev. and Aircraft Spruce are the only ones authorized to sell plans and construction manuals, and Co-Z Dev is the only one authorized to provide builder support for the Cozy airplanes.

AUTHORIZED SUPPLIERS

Authorized suppliers are those suppliers we selected because of their excellent reputation in the industry, whose parts and materials we proofed in our plans model and who agreed to supply the same parts and materials to our builders.

1) Basic Materials

Wicks Aircraft 410 Pine St. Highland IL 62249 (800)221-9425	Aircraft Spruce Box 4000 Corona, CA 91718 (909)372-9555	A. Spruce East Box 909 Griffin GA 30224 (800)831-2949
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2) Metal Parts

Brock Mfg. Co.
11852 Western Ave.
Stanton CA 90680
(714)898-4366

3) Fiberglass Parts

Feather Lite
1327 S State St, Arpt.
Ukiah, CA 95482
(707)462-2939
(707)462-3424

4) Canopy & Windows

Airplane Plastics Co.
9785 Julie Court
Tipp City, OH 45371
(937) 669-2677

B & C Spec.
PO Box B
Newton KS67114
(316)283-8662

5) Specialties

Custom Aircraft
14374 Olde Hwy 80
El Cajon CA 92021
(800)561-1901

7) Propellers

Performance Props
Box 486
Patagonia AZ 85624
(520)394-2059

Sensenich Props
2008 Wood Ct.
Plant City FL33567
(813)752-3711

8) Prop Hub Exten.

Saber Mfg.
3601 Nassau Ct.
Granbury TX 76049
(817) 326-6293

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) 277-5996.
- 2) **Electric speed brake actuator kit.** Wayne Lanza (772) 664-8953; wlanza@bellsouth.net
- 3) **Switching and breaker panel.** Wayne Lanza (772) 664-8953, www.CompositeDesignInc.com.
- 4) **Fuel sight gages.** Vance Atkinson (817) 354-8064.
- 5) **Electric nose-lift.** Steve Wright (615) 373-8764.
- 6) **Electric nose-lift, Spring steel safety catch,** and improved **MKNG-6 and NG-6 Pivots** with tapered roller bearings. Jack Wilhelmson (843) 884-5061.
- 7) **Electric pitch trim.** Alex Strong (760) 254-3692.
- 8) **Voice annunciated warning system.** Richard Lewis (423) 376-1450.
- 9) **Rebuilt flight instruments.** Howard Francis (not a Cozy builder) (480) 820-0405.
- 10) **T-shirts,** etc. Bill Walsh, nogofsu@sprintmail.com. (407) 696-0942.
- 11) **Antennas.** RST Jim Weir (530) 272-2203.
- 12) **Teflon & Stainless Hinge Pins Replacement.** Gary Hall (954)979-9494.
- 13) **Nosegear crank ratchets.** Bill Theeringer (805) 964-5453.
- 14) **Embroidered clothing.** With pictures of a Cozy, name, N number, etc. in any color. Trish Vermeylen (609) 693-4819.

DESIGN CHANGES/CORRECTIONS

- 1) The nosegear LST shock strut assembly shown on Chap 13,p.3, is exactly as designed by RAF for the Long EZ and as supplied by Brock Mfg. The LST strut shown on drawing M-10 is not correct, because it is 1/2" shorter. We don't know how this happened. There is enough adjustment, however, so 1/2" longer should not cause a problem.

WHY BUY MK IV PLANS FROM CO-Z?

It is no secret that you can buy “knock-off” plans that are alleged to be “rewritten Cozy Mark IV plans” from a

company whose license agreement was cancelled, who stands accused of copyright and trademark infringement, who said it was closing its doors, who was trying to sell its business (?), and now is trying to sell its tooling, but you could save maybe \$50 compared to what Co-Z charges, so why not?

The rule is that you get your support the same place you got your plans. During the period you are building your airplane, which might be two years or many more, you are likely to have questions about design, about construction, or even about performance. Wouldn't the answers to your questions be more credible if they came from the designer, who prototyped the design, then wrote the plans, then built a "plans model" from those plans, then thoroughly flight tested that plans model, and wrote the Owner's Manual. A designer who has been helping builders since 1973, and with his own designs since 1980, with a sterling reputation amongst his peers and builders. Would you trust your life with anything less?

BUILDER HINTS

- 1) **Hot wire saw:** Cozy builder David Bynum said he went to a small appliance repair shop and purchased some nickel-chrome resistance wire used to repair toasters, and to a hardware store to purchase a \$4.00 light dimmer switch to control it. He says he has excellent control on the temperature, and the best cuts are when the wire is humming, but not glowing.
- 2) **Epoxy ratio:** Whether you use an epoxy pump, an epoxy balance, or a scale, it might happen sometime that you have an epoxy mixture with the incorrect ratio of resin:hardner. It is always good practice to leave a little of the mixture in the cup and check it for cure the following day. If it is cured correctly, a scratch on the surface will leave a white mark.
- 3) **MIL spec electrical supplies:** David Domeier says to check <http://www.terminaltown.com>
- 4) **Weather stripping:** Todd Silver said he used 1/4" thick foam weather stripping from Ace Hardware on the doorframe of his Mooney. He said it worked well, lasted a long time, and plans to use it on his Mark IV.
- 5) **Pipe and tubing sealants:** You should not use any type of sealant on flared fittings. On NPT threaded fittings you should use a sealant. Teflon pipe dope (comes in a tube) is the preferred sealant. You can also use teflon tape; however, you should be VERY careful not to put any tape on the first thread, to prevent any possibility of a strand of tape getting into the line.
- 6) **Canopy gas strut:** Clark Canedy couldn't locate the one specified in the plans, so he suggests the Mighty Lift 15" 60lb E95784, for \$19.99, or the 14.5" 40lb E95293 for \$24.99. He says both include the ball studs. Bob Bittner says he bought his from www.Mcmaster.com \$10 for the strut and \$2-3 for the ends. He says his matched the plans, except it was 0.03" shorter, for half the cost.
- 7) **Spare tire:** Vance Atkinson says to carry a spare nose tire and tube in your aircraft at all times (see For Sale). He says he has had 4 flats in 15 years. If you happen to have one of the old style 4" wheels, it isn't a bad idea to have the tire and tube already mounted on a wheel, for easy repair. He says it isn't easy to find this tire and tube combination at most airports.

- 8) **Spare parts kit:** Wayne Hicks says to carry a small parts kit in your airplane, to include safety wire, a few AN-3s and AN-4s, cotter pins, locktite, lightbulbs, spare batteries for flashlight, cell phones, ELTs, St. Christopher's medal, coinage (for telephone booth), and a copy of the CSA membership directory (for rescue). A saw-toothed knife for hacking thru a canopy isn't a bad idea, either.
- 9) **Cargo net:** Joe Turecamo says it isn't a bad idea to mount a little cargo net behind the front seat for storing misc stuff.
- 10) **Vacuum pumps:** It is hard for a vacuum pump mounted on the engine in a pusher to power vacuum instruments up front on the instrument panel, because of the long vacuum line and the resulting pressure drop. It is even harder if the vacuum pump exhausts into the high pressure area of the cowl. You can make the job easier and make your vacuum pump last longer if you use large diameter vacuum lines and exhaust the pump into the low pressure area above the engine (assuming you have up-draft cooling).
- 11) **Brake lines:** Wicks and Aircraft Spruce list the smallest Aeroquip 666 hose that you can get from them is a 666-4, which has an OD of .312", and therefor won't fit inside the soda straws of the gear leg, if you wish to use 666 for brake lines. He reports that Xtreme racing products (562)861-4765 sells the 666-2 and 666-3 with .200 and .250 ODs respectively.
- 12) **Nosegear spring:** The mechanical nosegear strut supplied by Brock Mfg. is normally supplied with a red spring. A stronger yellow spring is available. The red spring provides a softer ride, but allows the nose to sag more than the stronger yellow spring. We recommend the stronger yellow spring for the Cozy. It will support more weight in the front seat and will last longer, but you must request it when placing your order. It is possible to replace the spring, but it is not easy.

FOR SALE

- 1) **Plans built Cozy Mark IV wings and centersection spar.** Both upper and lower winglets are attached. Ailerons and rudders are cut out. The wings are match-drilled to the spar. Please contact Dennis Oelmann at (319)231-2635.
- 2) **Spare nose gear tire and tube for Cozy III.** Need a spare? Two nosegear 4-ply tires and tubes 2.80/2.50x4 for Cozy III. \$15 each includes shipping (\$35 value). (480)981-6401
- 3) **Performance prop.** I have a Performance Prop that was for my 0-360. I knocked off a few inches of one blade so I had Performance refurbish it for an 0-320. I will sell it for \$2,000, including shipping. Anyone interested can e-mail me at spengelly@cfl.rr.com
- 4) **Cozy Mark IV 4-place aircraft.** 220 mph cruise on 10gph. 150 TT airframe, 150 TT IO-360 Lycoming. First flight 9/8/98. Always hangared. Exceptionally nice Cozy with full instruments: KX155, Collins transponder, ELT, Stereo CD player, intercom, Audio flight engine monitor system. Electric trim, electric speed brake, electric retract, 3-blade Performance prop. \$99,900. Tel (480) 671-7355 or email cozy42cz@qwest.net for more info or reference.
- 5) **1994 Cozy Mark IV.** 480 TTAFE, Lycoming IO-360, Garmin GNS-430, Bendix/King Com/GPS, Bendix/King IFF, Century 360 slaved HIS, Electric nose lift, Tinted canopy, Catto prop, Cleveland brakes, 160 KTAS cruise, 10.5 gph, interior/exterior 8/8, price reduced to \$93,000 OBO,

bbop16@pobox.com <http://tappix.com/600939>, or call Brian @ (719) 472-9553.

FIRST FLIGHTS

- 1) Will Chorley writes: 1/09/03
After about 16 years which included several moves, renovating old houses, building new ones, and, of course, the many interruptions caused by having to earn a living, my Cozy III (which pre-dates the IV) N9455 finally took to the air just after Christmas in Spicewood TX. Flew "straight off the board" as advertised. Didn't want to come down, but when it did finally return to earth, effected the sweetest landing you could wish for (thanks are due to Vance for his help and advice and allowing me to try a few landings in his plane). Not quite the '46 Cessna 120 which has been my mount for the last 15 years or so, but this plane is going to be fun! So, to anyone out there who is wondering if they will ever get their project finished—keep at it! You'll get there in the end, and it really is worth all the effort! Thanks again, to Nat, for a great design that works just as advertised.
- 2) Bob Allen phoned from England: 2/18/02 He flew his Mark IV a few days previously and everything was AOK. He promised a more detailed first flight report.
- 2) Donald Swanson sent us a belated report that his 3-place Cozy first flew on Sept. 2, 2002 in Donnelly ID. We hope he sends us a more detailed report.
- 3) Doug and Patti Pitzer sent us a picture of their completed Cozy Mark IV in a Christmas card. It looks like it is ready to fly, and may be flying already in Corona, CA.

KITPLANES RADIO

Kitplanes has a weekly radio/internet show on Thursdays, from 8 to 9 a.m. Pacific time or 24/7 on the online archives at www.kitplanes.com. The editor of Kitplanes, Dave Martin, interviews various aviation persons of interest to homebuilders. Dave asked me to appear on this program on Thursday, March 20, at 8:40 a.m. Pacific time to answer questions about the Cozy program. If any Cozy builders are free at that date and time (or later) and can tune in, we would appreciate it.

COMPLETIONS – COZY

Any EAA member who completes a homebuilt aircraft between December 17, 2002 and December 31, 2003, will receive a centennial dataplate and a certificate of accomplishment from EAA as part of the commemoration of the original homebuilders' (the Wright brothers) first powered flight's 100th anniversary. EAA will also display a picture of the proud homebuilder with his completed aircraft on the EAA website. Send your name, EAA number, a copy of your registration Form 8050-3, a picture of you with your aircraft, and a brief description of your project to:

EAA Aviation Information Services
P.O.Box 3086
Oshkosh, WI 54903-3086

Also, both Sport Aviation and Kitplanes are requesting all builders to send in pictures of their completed projects, with short write-ups, because that is one of the most interesting features for their readers. 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 award**

each builder \$100 for their entry in either or both magazines, or an Alex Strong pitch trim, which would otherwise sell for **\$175**.

1) Wilton A Davis, Auburn AL, had a picture of his completed Cozy N9XD in Sport Aviation, February 2003. It took him about 8 years to build, but this included three moves. He is brushing up on his flying skills prior to soloing in his Cozy. We sent him a \$100 check in congratulations.

SUN n FUN

We are planning to be at Sun n Fun for the entire week. We will be exhibiting our Mark IV in our usual location, that is, AC-02. The Sun n Fun dates this year are April 2-8 (Wednesday-Tuesday). Bill Walsh has advised that he is making reservations for the Cozy dinner at the Red Barn for Saturday night at 6:00 pm. Hope to see many of you there! Several builders and prospective builders have asked for rides to Sun n Fun and offered to share expenses. Please make an email post if interested in paying passengers.

CANARD INCIDENCE

Brian DeFord writes: 1/1903
Well, I flew N309BD today for a very short hop after setting the new canard incidence per the last newsletter. I'm happy to report that two of the parameters I tested today were much improved. The takeoff speed was much lower. Before the change, I was not able to get the nose off at less than 80 kts. Today, I waited til 70 kts to pull back the stick and it took right to the air. At altitude, I am now seeing less than ¼" trailing edge down for the elevators. I measured 7 degrees down on all other flights in cruise. I have not had a chance to test the pitch stability yet, but stall speed was around 62 kts, about the same as before—maybe a knot or two lower.

I had been flying with the original incidence angle, so the new angle is quite different. The change wasn't really difficult, but I did rebuild the entire canard cover instead of just micro-ing the old one back on. All in all, it was about 8 hours of work plus cure times. Now, back to the testing!

Brian DeFord
Chandler, AZ

Kevin Funk writes: 12/24/02

I had to adjust the canard incidence on my plane. I found that the plane was not stable in flight, where a bump upward would cause increasing climb until stall, and a bump down would increase until redline. Nat rode with me at Copperstate 2000 to see this actually happen.

I heated and removed the incidence pin bushings. I filled the holes with flox and redrilled the holes ¼" above the original site. This was calculated to be 1.4 degrees. The front edge of the canard cover lifted up and I lost my precision fit. The trailing edge of the canard cover required a lot of grinding and refitting. I needed a little trimming on the fuselage sides, especially near the torque tube exit. I finished the job in 3 hours in the hangar. I used white electrical tape to hide the new joints, that were now ugly.

Flight is extremely better. The plane is now stable at all speeds and much easier to fly. I plan to redo the canard top this winter during my annual.

Kevin Funk M.D.
Lubbock, TX

CORROSION PROTECTION

We posted this on the internet, after receiving the RAF newsletter CP 109, too late to include in our NL #80. In CP 109, there was an extensive discussion of the corrosion problem with the Varieze wing attach fittings. The worst problem was with a Varieze in the Northeast, which had been parked outside, exposed to the moist salt air, near the coast for over 20 years. This is of little concern to Cozy builders, because our wing attach is a completely different design, not nearly as vulnerable to damage by corrosion. What was of more concern, however, was corrosion damage discovered on the Varieze elevator torque tube and hinges. The corrosion on the torque tube was underneath the fiberglass and evidenced by little bumps in the fiberglass. It was found that underneath the bumps there was pitting corrosion of the torque tube. Another Varieze builder reported finding evidence of corrosion of his elevator hinges inside the canard core, where they had been floxed in place in high density foam. He solved that problem by removing them and replacing them with hinges made of stainless.

Even more disturbing was the report that severe corrosion had been discovered in a Long EZ aileron torque tube. It was attributed to moisture finding its way into the A10 tube where the hinges are attached by pop rivets (see section I-I, Chapter 19, page 14), and caused corrosion in the confined space.

As a result of these findings, it is recommended that cozy builders inspect the elevators and ailerons closely before every flight, and at each annual for any evidence of corrosion, paying particular attention to the torque tubes. If any evidence is found, report it to Co-Z Dev., and ground the airplane until the problem is corrected. For new builders, it is recommended that all aluminum parts be protected from corrosion by cleaning first with Alumiprep 33 or metal prep #79, and then soaking in Alodine 1201, which is a visible (golden brown) moisture barrier, greatly increasing resistance to corrosion. This also acts as an excellent surface to bond epoxy or paint. Even if you do not live near the coast, the airplane you are building could some day end up there.

We have not observed any problems with our Cozy III or Cozy Mark IV prototype or plans model. But of course, we live in the desert where humidity is generally low, and our airplane is hangared. However, we have noticed when we fly to Florida and park outside at Sun n Fun, and even at Oshkosh, our airplane is wet with dew every morning. If we parked outside near the coast year-round, I am sure we would have to be greatly concerned and inspect our airplane very carefully for any sign of corrosion.

CABIN SIZE

Brian Walker writes:

2/03/03

Hello to everyone out there in Co-Z land. I am researching kits and plans and will start building after Sun n Fun in april. I'm looking at faster 4-seat planes and have the Co-Z info pack. One concern I have is cabin size. Being 6'3" and 195 lbs., it seems like the cabin would be snug. I'm looking forward to sitting in one to get a better feel. Any builders or fliers out there 6'3" or taller?

Brian Walker

Brianwalker@charter.net

We get this question a lot. One nice thing about building from plans, you can customize the cabin size to fit your bod. I

am 5ft.7in, and Shirley is 5ft.3in. When I built our Varieze (per plans), I found that I had to sit on a lot of foam, to get my head up as high as the canopy allowed, for good visibility. So when we built our 3-place Cozy, which became our prototype, I knew Burt was designing the Long EZ cabin size large enough for a 6ft.4in. pilot, and I didn't see the sense in flying around with a bigger fuselage than necessary (it only increases the drag), so I made the fuselage 1-3/4 in. shallower. But then when we designed the plans model III, we went back to the same depth fuselage as Burt used for the Long EZ because we knew there would be builders and passengers taller than we.

With our 4-place, I used the same depth fuselage as on the plans 3 and the Long EZ, but the fuselage is 2 inches wider and the canopy bubble is a little taller. So, Shirley and I sit on about 4-1/2 inches of foam, to get our heads up near the top of the canopy for good visibility. Since we have a lot of people trying our airplane on for size, I made the seat cushions in several layers, so I can use as many or as few as a prospect requires. That works pretty well up to a height of 6ft. 3or 4 inches. Beyond that, it is necessary to either make the fuselage deeper, or the canopy higher. The latter is the easiest, and has the further advantage that the decision doesn't have to be made until near the end (rather than the beginning) of the project.

Our tallest builders so far are 6ft.6in. One is already flying and two are still building. In all 3 cases, I have coached them to mount the canopy just a little higher. The canopy bubbles are supplied taller than the plans require, so it is a simple matter to just prop up the forward end of the turtleback about an inch, and then trim off less of the excess around the bottom of the canopy bubble. Before going to extremes, tall people should realize that usually half of their height is in their legs, and half is in their torso. So, if a builder is 6ft.6in., we only need to accommodate 1-1/2in. more torso, but since the front seat reclines at 45 degrees, bingo! We only need to raise the canopy 1 inch, which is easy to do and not even noticeable.

So now, how about the legs. Well, we have a bunch of options. The first is to use a thinner back for the seat cushion. The seat is comfortable enough to go to 0 thickness foam. Next, we recommend the adjustable rudder pedals that Dennis Oelmann supplies for the pilot side, and use the foremost setting. Also, you can move the pivot point for the rudder pedals ahead about 1 inch. And lastly, you can move the front seat back 1 inch farther aft. So, with our plans-built design, we can accommodate builders up to 6ft.6in. with no problem, and we may even have some builders taller than that.

When it comes to weight, it is not quite as simple. We had one 3-place builder who was on the heavy side, so he had the bright idea to make his 3-place Cozy 6 inches wider, and with all that space, he was able to install more instruments. But alas! All the extra structure and stuff up front moved his c.g. forward, so he was not able to carry as much as if he had built according to plans.

Our nominal front seat weight limit is 400 lbs. That is for pilot and passenger. Heavy pilots are okay with light passengers. But with heavy passengers, there is a problem. It helps a little bit to install an IO-360, which is 30 lbs. heavier than the O-360 we recommend. That will off-set an extra 30 lbs. in the front seat. But a person who is heavy (and there are an increasing number of them nowadays) has a body c.g. that is farther forward than for a thin person, which aggravates the

problem. So a heavy pilot should probably move the seat back 1 inch and use next to nothing for a back cushion.

For someone, either a pilot or passenger, who overflows a bit on the bottom, a good change to consider is to use the electrical landing brake actuator, instead of the mechanical one, which would then eliminate or greatly reduce the center console, between the two seats, and convert the bucket seats into a bench seat.

So, there are a number of things we can do to accommodate taller and/or heavier pilots, but there are limits. I tell heavy builders, that they can expect to lose weight while they are building, by watching less TV, keeping later hours, and being so engrossed, they forget to eat. Counting calories and exercise also helps. And tall builders usually lose height as they get older. But even so, there are still people who are outside of the bell curve. And we can't do anything about that.

We had a prospect, Brian Walker, in Lebanon TN, who likes the Cozy Mark IV, but was concerned about cabin size. He was 6ft.3in. and weighed 195 lbs. I advised him that there would be no problem building exactly per plans.

I know some of you are going to say that we don't want people to make changes, or if they do, they shouldn't register it as a Cozy. Making some minor adjustments to the fuselage does not change the aerodynamics or structure, but only make those that are absolutely necessary to accommodate the bod.

INSURANCE

As reported previously, EAA terminated its arrangement with AVEMCO, and has a new arrangement for EAA members with the Falcon Insurance Agency, (886)647-4322.

The following features have been added:

- Non-owned aircraft liability, including homebuilts
- No deductible on hull coverage
- Physical damage or loss of hand-held avionics
- First flight and builders risk
- Medical payments increased to \$10,000
- \$5,000 for personal effects of passengers
- \$50,000 for aircraft hangar and/or contents
- \$25,000 for emergency expenses
- \$25,000 for search and rescue coverage.

Not bad, huh?

POST CURING

Room temperature epoxies of the type we use do not reach a full cure at room temperature, even though they cure very hard and pass the "scratch" test. To get a full cure, i.e., all of the hardner and resin molecules link together, it is necessary to "post cure" them; i.e. heat soak them at an elevated temperature for a certain period of time. We do not believe this is necessary for a number of reasons. The degree of cure is measured by the Tg, i.e. the glass transition temperature. This is the temperature at which the epoxy begins to soften (and post cures). As a hypothetical example, post curing at 160 deg. might increase the Tg from 160 deg. F to 180 or 190 deg. F. So here are some reasons why we think post curing is completely unnecessary:

- 1) Some post curing will occur unavoidably as your composite components await assembly in your house, garage, hangar, or wherever.
- 2) If you paint your airplane white, the surface will never reach 160 deg. F. A white surface in direct sunlight only

gets about 10 deg F hotter than ambient. The hottest it has ever gotten in Phoenix in the last 10 years is 122 deg. F. Interestingly, the commercial airliners were grounded, because the operating handbooks only went up to 120 deg. F.

- 3) The strength of your fiberglass components is attributed to the glass fibers. The function of the epoxy is to hold them together, particularly in compression. When your aircraft is sitting on the ground, the part of the aircraft that is in compression (the underside) is in the shade.
- 4) If any of your structure ever reaches the room temperature Tg (which is unlikely), it starts to post cure and becomes stronger, rather than weaker.
- 5) The subject of post curing has only been discussed in recent years. Composite airplanes using room temperature epoxy have been built in large numbers for the last 27 years, almost all of which were not post cured, and there is not one reported case of any part of any structure failing for lack of post curing.

If anyone cares to refute the above logic, please contact us and we will print your comments in our next newsletter.

IMRON PAINT

Imron paint (a duPont product), has a nice wet look, but it is very difficult to patch, and very, very dangerous! This is a polyurethane paint that contains diisocyanates, which are a problem. They cause severe respiratory allergies and lung damage, which can cause sudden death, even in the middle of painting. DuPont makes it clear that there is no gas mask that is good enough, and that a fresh air fed respirator is the ONLY approved method. PPG Concept is an acrylic urethane which is almost as shiney, easy to repair, and does not have this same health threat.

TIE DOWNS

We prefer the tie downs we show in the plans; i.e. a hole through the wing about 12 to 18" inboard of the winglet, lined with a 1/4" I.D. aluminum tube, through which we can install a 1/4" eye-bolt for connecting tie down ropes. We have tried other methods and locations, but the hole through the wing near the tips is the closest to matching the spacing of tie downs installed in the concrete ramps at airports around the country, and provides better stability than tie downs farther inboard, at the strakes, for example.

We have a removable pitot tube, and used to also install an eyebolt in the nose for tie down, but we have learned that there is enough weight on the nose that it really doesn't need to be tied down, and there is little likelihood that our airplane would be moved backward in a strong wind anyway.

HEATING GARAGE/SHOP

Dick Finn writes:

12/19/02

I bought an electric furnace at a house sale—the house was being demolished to make way for new construction. Total cost was \$25. The downside is that after I installed it in the garage, insulated and paneled it, set up the work shop, etc., my wife won't let me kick the cars out and move the plane in. She likes getting into a warm car in the cold Chicago mornings.

Western Springs IL

WINTER STARTING

One reason it is hard to start aircraft engines in the winter, without preheating, is that aircraft fuels purposely have about

half the vapor pressure of auto fuels. In other words, they don't vaporize very readily in cold weather. The reason is obvious. Atmospheric pressure halves every 18,000ft, so the lower vapor pressure of aircraft fuel prevents vapor-lock at high altitude. Another factor, the vapor pressure of auto fuels is increased in the winter by refineries, to compensate for cooler temperatures—not true of aircraft fuels.

Mark Beduhn writes:

2/16/03

For those of you fortunate enough to have a hangar with 120 vac, this what I do. I rigged up two light bulbs to a plug, and placed them under my engine (I have a location where they won't touch any fiberglass). Then I cover the cowling with a blanket, and then plug the openings to the engine compartment with foam rubber. This arrangement keeps the engine toasty warm all the time! It also has some additional benefits:

- 1) Does not char the oil (like a contact heater).
- 2) Keeps the cylinders warm, not just the oil.
- 3) Does not drive moisture out of the oil (like contact heaters do).
- 4) In the spring and fall, it prevents condensation on the engine.

Before I used my light bulb heaters, a cold spring day followed by a warm humid one, would result in my engine compartment being completely soaked with condensation (it looked like it was hosed down). Although you may not feel that is a problem, I don't like moisture on my expensive engine and electronic ignition components.

I flew yesterday and the temperature was nearly zero deg. F. When I started the engine (it started right up) the oil temp was 45 deg. F. By the time I was ready to take off, the oil temp was over 70 deg. F. Hope this helps those with hangars.

Menasha, WI

SNOW REMOVAL

Morten Brandtzaeg writes:

1/07/03

Hi, I'm Morten and fly a Cozy III in Norway on top of Europe, and please excuse my English..it's not my native language. I have quite a lot of experience with the white stuff called snow. I have operated my Cozy in winter conditions for some years. My profession is Director of Operation Control Center in an airline in Norway that operates 28 Boeing 737s. From the airline operational side, the de-icing of commercial jets is a complicated issue.

The de-icing can either be preventive, where you can add a mixture on the wings to prevent it from icing. This can only be done if there are no snowing conditions.

The second option is to remove the ice from the wings and airframe. This removal is done in two steps:

- 1) Add a mixture of water and de-icing fluid (I think it is glycol) to remove all snow. This mixture depends on relative humidity in the air, temperature and dew-point. This mixture is named Type 1 fluid.
- 2) Add 100% de-icing fluid (type 2) over flying surfaces and take off within a defined timeframe with wet wings. The fluid will blow off during takeoff roll and you will have clean flying surfaces.

Will this work for canards (or small aircraft)? I do not recommend to do any of this mixing of fluids yourself. It is very complicated to be 100% sure that it will not freeze when

you are airborne. If you don't mix it 100% right, it will freeze on your wings and you don't have an aircraft anymore. Secondly, the de-icing fluid will surely destroy either your paint or other componenets if applied under high pressure. I would not use ANY type of de-icing fluid to my Cozy!!

Preferrably your aircraft should always be hangared. If that is not possible, I have a nylon fabric cover (did it myself) to cover the whole aircraft. Take the cover off and the aircraft is clean.

If your aircraft has been sitting outside and received ice/snow, I recommend the following:

- 1) Use a soft brush and remove all the snow.
- 2) Ice can be removed with a large plastic bag of hot water (2-3 US gallons). Lay the bag on one spot at a time and it will melt the ice. It will do no harm to your paint. NEVER use anything other than soft materials to remove ice. It will destroy the paint.
- 3) Be aware that melting water wil freeze AGAIN at 0 deg C so aileron hinges, elevators, and rudder travel and operation must be preflighted VERY carefully.
- 4) Be aware that although the aircraft is clean inside the hangar, it can accumulate ice/frost in 1 to 2 minutes when exposed outside to the right (or wrong) air temperature/humidity. Solution: Don't fly!
- 5) Also be aware that the Cozy does not fly very well in icing conditions. It is not approved for icing conditions. A situation where the canard does not produce any lift is not a good situation to be in. It will probably be your last flight with your valuable Cozy. Better sell the plane to another Cozy-lover before trying this.
- 6) Icing conditions eat small aircraft for breakfast.
- 7) In normal winter temp Mark Beduhn can expect the oil vent hose to close itself with ice if it is sticking out of the cowling. Keep it inside. Warm air comes out, meets cold air, creates ice. Will not let the oil pressure out and you will blow the oil seal gasket around the propeller shaft and lose all your engine oil. Emergency landing – no engine – is next item on your checklist.
- 8) Only fly when there is stable cold air with low humidity and clear sky!
- 9) Engine should be preheated and winter starting procedure used.

My conclusion for my Cozy (you are free to do anything you want): I don't fly if there are existing icing conditions. The flying surfaces should be as clean of ice/snow as in summer. Anything else will sooner or later kill you. I don't use any kind of de-icing fluid on my plane, I use my "top-hat" for the Cozy. Ground roll increases enormously, depending on RWY condition. Can, in some cases, be doubled.

Morten Brandtzaeg
Norway

LANDING LIGHTS

There was an interesting discussion on the internet about the pros and cons of using landing lights. I expressed my opinion that it was easier to make a night landing by relying only on the runway lights to judge the time to flare. Another expressed the opinion that there were many deer at his airport, and landing lights were needed to see if there were any deer on

the runway. Then David Volrath, a corporate pilot, related his experiences:
12/04/02

Let me add some of my observations from having two deer strikes in corporate jets. Both times were right after touchdown, with thrust reverse activated. Both times the deer were not on the runway when we were landing, but ran onto the runway as the noise from the aircraft scared them, and then they ran directly at the landing lights.

The damage to a Westwind the first time was a torn off MLG door, \$18,000.

The damage to a Citation "V"Ultra the second time was a smashed radome, lower antennas, and a big mess, as the nose gear cut the five point buck into two pieces. Fortunately the nose gear did not collapse. \$87,000.

So, now I also do low passes before landing at this W. Virginia airport in low light conditions, and land with the landing and taxi lights OFF. Even if the lights would let you see the deer, you cannot dodge or second guess their moves on the runway.

A friend of mine hit a deer with his T-18, and messed up his wing real bad. His landing lights were on also. Another factor that attracts deer to this airport (CKB) is the red clover that is planted there; and the deer love to graze on it.

David Volrath

ENGINE OVERHAUL vs REBUILD vs NEW

In shopping for an engine, the following information may be of help.

In our last newsletter we reported that ECI is on the verge of marketing an 0-360 engine kit for \$14,700, which will include all the new parts required to assemble a new 0-360 (correct web address for ECI <http://www.eci2fly.com>)

Superior Air Parts has a similar kit which is priced slightly higher. Both companies claim that their parts are better than Lycoming parts. We believe that you can get a reputable engine shop to assemble an engine kit for about \$1,000. That would get you a factory-new Lycoming clone engine for under \$20,000.

The Lycoming 0-360 we purchased for just under \$6,000 in 1990 was originally manufactured in 1965, and had 1650 hours on it since new. We flew it for several years and several hundred hours, and then had it rebuilt. We purchased all new Superior cylinder assemblies, a new camshaft, new oil pump, other new parts, and had the crankshaft reground. In effect the engine was "remanufactured", at a cost of \$11,000, so we have about \$17,000 invested in our engine, and about 300 hours on it since remanufacture. We have 650 hours on our airframe, but some of those hours was with the Franklin engine.

If you are looking at a "run out" engine, you should consider how much it would cost to bring it back to new specs (remanufacture), and compare that to the cost of a new ECI or Superior engine.

Beware of so-called "overhauled" engines, or low time SMOH (since major overhaul). An engine can be considered "overhauled" if it has only been taken apart and all parts have been determined to be within service limits. Such an engine could already have considerable time on it, and out of service limits shortly after you buy it. Also, refurbished cylinders will not necessarily go for 2000 hours.

In the "Letters" section, Bill Swears reports on the used 0-320 engine (1350 since overhaul) he purchased to replace the 0-235 in his Cozy.

LETTERS FROM BUILDERS (some from the net)

Builders,

2/19/03

I blew my #4 cylinder head during the Great Hawaiian air race this weekend. Had a couple warnings that something was happening, but didn't get the message until the cylinder failed twice.

First, two weeks ago, I got leaks from both shroud tubes. Replaced the seals, and the leaking went away. I had a 100 hour done on the engine preparatory to running the race, and the valve clearances were all off. Reset those, very large adjustments, and continued. During an air rally on Sunday, I lost some power, landed and found the #4 not producing power. The spark plug gaps were closed and the ceramic broken off. Chips in my new prop. I paid for my A&P to fly out from Oahu to Molokai with spark plugs and tools. On investigation, there was nothing noticeable, and the cylinder still had compression, with no holes, although the piston head was pretty rough looking, so we opted to put in the spark plugs, and after a successful test flight with no unusual temps or indicators, return to Hana for the last day of the race. On the way back from Molokai to Hana, I diverted into Kahalui Maui for another power loss, this time accompanied by periodic engine hesitations.

On the second landing, we found no compression, new chips in my new prop, and two closed spark plugs. I hired a local A&P to pull the cylinder, where we found a chipped valve and substantial scratches on the cylinder head and piston head, and turned it over to the one guy in the islands who does cylinder work. Yesterday, we were looking at the piston, found the intake valve guide broken (source of metal in cylinder which closed the plugs twice), and after substantial inspection, a gap at the base of the cylinder head that was larger on one side of the cylinder than the other.

I've ordered a new cylinder, and will check my other cylinders for similar patterns. The engine is about 1350 since overhaul. I got to see the result of a cylinder head that actually blew off while I was in the shop looking at my #4....I guess I was lucky, although the 2K or so this will set me back kind of dampens that feeling.

Mililani, HI

Dear Nat,

12/18/02

My project #850 is on house remodeling hold for another few weeks, but I am really motivated to get back to work. I am just about done with CH-9 and anxious to start CH-10. The plans are great and I enjoy the building process. Thanks for your efforts and hope you and family have a great Holiday Season!

Ron Hunter

Mission Viejo, CA

Dear Nat,

12/19/02

Enclosed is a picture of my Cozy. I have started CH-9 as you can see; the build is going slowly, but I believe that my work is good. Despite the slow progress, I am satisfied, because during the building in these past years, I have taken the private pilot license, I have had two twins, and many other things.

In the picture, you can see the first three pilots. On the left is twin Sofia, and on the right my twin Paolo, both almost 3 years old. In the center is my daughter Angela, 9 years old.

I built an epoxy balance which you can see on my web site:
<http://web.tiscali.it/cozyitaly/Italiano/epoxybalanceengl.htm>

I wish to you and all your family a Merry Christmas and Happy New Year!

Oreste Muccilli
Boiano, Italy

Dear Nat, 1/14/03

I have now 93 hours on my Cozy C-GESK. Last summer I did close to 7300 miles in 44 hours, for an average speed of 165 mph. Since I retired last April, I have had a greater opportunity to go flying. Again, Nat, this is a great flying machine. Hope the new year brings you and Shirley peace, health and happiness.

Gaetan Roy
Montreal, Canada

Dear Nat, 2/12/03

I can't tell you how fired up I am! For the last eight months or so I have been researching which plane I wanted to build and the Cozy Mark IV won out easily. Actually I knew about two days into the search I wanted this plane.

I started flying at 18 years, my dad and I bought a Piper Tri-pacer, had wing extensions and droop tips put on, and that really made a plane out of it. Although we both had at least 100 hours, neither of us ever got our pilots license. Out in the middle of South Dakota nobody cared if you were certified. I'm 42 now, but 24 years ago I read about Burt Rutan's canard design and fell in love, but unfortunately no money and no place to build left me no choice but to forget for 20 years. One of my employees just built a plane and he got me interested again, and doing the research all these memories came flooding back.

Please send me a set of plans yesterday. A great friend of mine is a flight instructor and he wanted me to ask how I could get the Mark IV IFR rated.

The time I've spent on your web site has been time well spent. I feel like I could build the plane already, and I haven't even seen the plans. I have an extensive shop and much construction experience, including welding and a lot of fiberglass work, but I won't let any of my bad habits inject themselves into this project.

Murdo SD
2/25/03

Builders, 2/25/03

I am a plane-less pilot living in Lebanon, TN (30 miles E of Nashville) and would like to fly to Sun n Fun. I am willing to share flying chores and expenses. I'm looking to start a custom-built plane after Sun n Fun. A Cozy is in the top running for my choice. I live 3 miles from the Lebanon airport and could leave as soon as you arrive or you are welcome to spend the night at my home before leaving the next day. If anyone out there is willing to have me along, I would sure appreciate it.

Brianwalker@charter.net

Builders, 2/25/03

In a Cozy, nothing is too far out of the way (to pick up to take to Sun n Fun). I have been flying shuttle service for my family for two and a half years. It requires 3 round trips to take the whole family, with one round trip being solo and without luggage. It has been worth it. Soon I will start the second Cozy so that Carrie or my son Chris can fly in formation with me.

Kevin Funk M.D.
Lubbock, TX

Builders, 2/26/03

Today was a fun day. My wife and I took our Cozy out of the garage and with some friends help, we loaded it onto a trailer and hauled it to our childrens' elementary school. This makes its fourth trip, but first time after being painted.

Amelia (after Amelia Erhart), our kindergartner got to show it to all four kindergarten classes. I gave the presentation that a Cozy is built by using the same skills that they are learning in school; i.e. counting, measuring, cutting, reading, following steps, cursing (oops). I then let all 100 children sit in the plane. Even the teachers took a seat for the class pictures. Our son's sixth grade class then got their chance to see the finished plane that they had seen years ago in raw glass.

The kids thought that the plane was totally awesome. One kid argued with me that the plane had to be remote controlled since there was no way to sit in it and still see out the front. I educated him on pusher canard designs like the Wright Brothers.

The previous show and tell was last year as I flew the plane over the school as school let out, and some kids got to talk to me over the handheld radio.

Kevin Funk MD
Lubbock, TX

Dear Nat, 1/6/03

I received the plans. I have to tell you and all prospective builders that your plans are written in a very good manner and, with the figures that accompany the instructions, it is hard to make a mistake. The language you use to describe the process is very easy to understand even for a person like me who speaks another language.

I am 27 years old and I am an airline pilot. In the last two years I read a lot about the Cozy on your site and in all other builder sites (I want to thank those who spend a lot of time building a site on the net for prospective builders around the world, like Marc Zeitlin, DeFord, Oreste Mucilli, and those geniuses for the AFIS project at CAS, thanks guys!).

I want to say to prospective builders, stop to think, buy the plans and start to study!! Don't waste time! Matteo Zangirolami
Rome, Italy

Dear Nat, Arnie Waddell 2/26/03

Thanks for the reply. I'm still per plans. As a matter of fact, the airframe is just about done except for the cowling lips. Not much mechanical left either, just firewall and brakes. As for sticking with the plans, I have had very little delay due to building excursions away from the plans, so your advice is paying off.

Yorba Linda, CA

Dear Nat, 2/25/03

My wife decided we needed a bigger yard for our little one and I just happened to know of a house with a good yard, and by coincidence (believe that if you want to), a two car garage. We're now working our way through the initial education section of the plans and converting the garage into a Cozy factory. We'll be performing our first layups soon, I think, as soon as the new lighting is installed. This certainly beats the heck out of TV!

Evan Kisbey
Killeen, TX

Builders, 1/12/03

I started with MGS 335 from Wicks. I am very happy with this system. I buy one fast and one slow hardener. I make most lay-ups with a 50/50 mix. This gives a nice balance of working time and cure time. For small lay-ups like reinforcements and BID tapes, I use fast hardener, and on larger lay-ups like fuselage sides and bottom, I used slow. This epoxy has very little odor and I don't wear a respirator. I would highly recommend it. I did read a

posting lately about using MGS 285 inside the wing tanks. I will have to check this out later. Also, don't let price alone make your decision. With the MGS system one gallon of resin and two quarts of hardener makes 1 and 1/2 gallons of epoxy, something I didn't consider when pricing. I recently helped a builder with a wing lay-up. He uses EZ poxy. The odor forced me to use a respirator. No fun at all!

Timothy Lumpp

Silver Lake, OH

2/11/03

Builders,

I just joined the wings to the spar and thought I would share a few things I did. I basically followed Wayne Hicks web page on wing joining, which worked very well.

Remember to drill the 1/4 pilot holes in the spar as per the plans, before making the final alignment. My holes ended up smack bang in the middle of the hard points. It took me quite a while to get everything lined up, like several hours. I used 6 pieces of 1x2 wood top and bottom to hold the wings/spar to each other, fore and aft. You will be putting a reasonable amount of pressure, which will try to force the two apart, when using the hole saw, as well as some shims and epoxy in the gap between the spar and wings to hold them together vertically.

Drill through the 1/4 holes in the spar and into the wing hard points. At this stage I got some lengths of 1/4 rod and inserted them in each hole as I drilled them, just in case anything decided it wanted to move. Then enlarge the 1/4 hole in the front of the spar so that your hole saw will fit through to the hard points.

I purchased four 5/8" or 16mm HSS hole saws (Starret or Diston). As it turned out, I only used one. Put it in your drill press and hold a sanding stick to it as it rotates to get it to the right size if necessary. Test the size in some 1/8 scrap aluminum. Made mine tight at this point and they were a very nice fit after completing the drilling.

I purchased some 5/8" hardware bolts and as I drilled each hole, I inserted a 5/8" bolt in the hole, again just in case my epoxy bonds holding everything together let go, I would still have good alignment. I left the 1/4" rod in place until the 5/8" hole was drilled.

My holes took an average of 25 min. each to drill. As I went through each section of aluminum in the hardpoint, I withdrew the holesaw, and cleaned it out. This gave the hardpoint and drill time to cool down. You will need a helper behind the wing so that you can push against it. Don't forget to epoxy the incidence blocks to the spar before separating.

Once done, separate the parts and begin the fun of inserting the bushings and 1/2 bolts. I used a disc sander to get the bushings to the correct length. They can be held square by inserting some 1/2 rod in them and use that as a handle. Have plenty of 1/2" washers on hand in case your 1/2" bolts are too long. I guessed on mine and the bolts were way too long, but serve the purpose for now. Do have on hand a variety of socket drive extensions, including two 3" extensions. This takes time, but towards the 6th bolt, you get the hang of it. You will need to have removed the UNI over the wing attach access holes. It is not easy to get to with everything only six inches from the floor.

End product, two wings stretched out, sure looks good.

Chris Byrne

Sydney, Australia

11/17/02

Builders,

Wings complete, winglets attached, construction of strakes giving trouble....did not follow plans, that's how you waste time! Got an IO-360 and making mount. I finally got a hockey puck to

rest the nose of my Cozy on, for \$1.06 from the Sports Authority, Atlanta. So what? I hear you say. Try Africa for that item!

Bryanston, S.Africa

1/27/03

Builders,

I made the mistake of taxi testing for 1 mile at 70 mph into a strong cross wind. It was night, and when I got to the hanger, the brake was mushy, there was a boiling sound, and the brake was glowing red hot, shining on the ground (I have wheel pants). The next day, I found that the wheel pant had partly burned and caused a small blister on the paint, the brake was leaking since the rubber O ring was totally fried, but the landing gear leg was fine with the fiberfrax and the aluminum tape wrap. I peeled back the insulation to look at the leg (definitely not easy) and saw no damage except to the dirt and oil on the aluminum tape. The O ring was replaced, new brake linings since 1/2 was gone, and new brake fluid since the old fluid had boiled. No problems since with the brakes and leg. I think the insulating and reflecting worked great.

So much for high speed taxi testing with 3 big men passengers for fun!

Kevin Funk M.D.

Lubbock, TX

1/29/03

Dear Jack (Beale)

When I started looking for a plane to build, I knew I wanted a cross-country, four-place, composite aircraft. I looked at the available kits but found they were well out of my reach financially. I learned about the Cozy Mark IV at an aircraft kit builders seminar in San Diego. After reading everything I could find about the plane, I ordered the plans and started building even though I had never even seen one in person. After one and a half years, I was finally able to get a ride in a 3-place Cozy. It validated everything I had heard about the plane and then some.

I had only flown Cessna 152s and 172s and had a couple flights in a Piper 140. None of those could be compared to the Cozy other than they all left the ground. It is a dream to fly, but things happen much faster, which takes a little getting used to. Landing is not difficult, but it is different than the spam cans.

Don't miss an opportunity just because you haven't ridden in one. If you want a fast, fun, four-place plane to fly, it would be difficult (if not impossible) to beat the Cozy on a price/performance basis. Be aware that it does have it's limitations (such as landing on paved runways) so have a clear idea what you want to accomplish with your flying. And by all means, get as many rides as you can 'cause they inspire you to keep building.

San Dimas, CA

Co-Z Development Corp.

2046 N. 63rd Place

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