

COZY NEWSLETTER #86 July, 2004

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(2-year renewals save us record keeping)

As of January 1, 2004 Aircraft Spruce purchased the intellectual property (copyrighted plans, Construction Manuals, Owner's Manuals, information kits, etc.) of Co-Z Development and since that date, Aircraft Spruce is the only one authorized to sell Cozy plans and Construction Manuals, info kits, etc., but Co-Z Development will continue to provide builder support for the Cozy airplanes.

The 3rd Edition Cozy Mark IV plans were updated with all changes and corrections through newsletter #73. Since then, there have been no changes or corrections of any significance, except for revised canard incidence template drawings 80-3 and 80-4. These revised drawings will be included with each new set of plans, and extra copies may be obtained from Aircraft Spruce by sending them a stamped, addressed envelope.

The Cozy newsletter will continue to be published by Co-Z Development. It contains any plans corrections or changes, builder hints, information and updates about our suppliers, shopping info, first flight reports, and other news of interest to builders. It is the principle means by which we communicate with builders and support their projects.

The latest copy of the newsletter and older copies of the newsletter, which we can no longer supply, are available on the Unofficial Cozy Web Page, <http://www.cozybuilders.org/> and also on a CD available at Aircraft Spruce. We will continue to 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.

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

Aircraft Spruce West	Aircraft Spruce East	Wicks Aircraft
Box 4000	452 Dividend Dr.	410 Pine St.
Corona, CA 91718	Peachtree City GA 30269	Highland IL 62249
(909)372-9555	(770)487-2310	(800)221-9425

2) Metal Parts

3) Fiberglass Parts

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

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

4) Canopy & Windows 5) Specialties

Airplane Plastics Co. B & C Spec.
9785 Julie Court PO Box B
Tipp City, OH 45371 Newton KS67114
(937) 669-2677 (316)283-8662

6) Exhaust Systems

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

7) Propellers

Performance Props Sensenich Props
Box 486 2008 Wood Ct.
Patagonia AZ 85624 Plant City FL33567
(520)394-2059 (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) **New and rebuilt Lycoming engines.** Aerosport Power, 2965 Airport Drive, Kamloops, B.C. V2B 7W6 Tel (250) 376-2955, Fax (250) 376-1995.
- 2) **Luggage pods.** Gary Hunter (Epoxy expert) writes. I have been providing baggage pods for Variezes and Long Ezs for a number of years now. A few people have ordered them for the COZY. The standard pod is 6.5 ft. long and 12" dia at the fattest section. I am currently working on a slightly larger pod that will look proportionally better on the COZY. They aren't much longer, but they are 1.5" larger in diameter along their entire length. That doesn't sound like much, but they are noticeably larger. They will hold a lot more duffel style baggage. Larger items, like golf bags, will fit much more easily. Incidentally, for CG consideration, the tail section of the pod (24") is not used for carrying luggage. But long, light items, like snow skis, can be carried in the tail section. The pods have a fairly flat bottom, so skis can ride on the bottom, and baggage sits on top of them in the front section. I anticipate completion of the molds in a month or two. Gary gluegaru@earthlink.net.
- 3) **New TMX Engines.** Teledyne Mattituck Services, 410 Airway Drive, PO Box 1432, Mattituck, NY 11952, (800)624-6680.
- 4) **Improved Rudder pedals** for lay-down brake cylinders, adjustable both sides. Dennis Oelmann (319) 277-5996.
- 5) **Electric speed brake actuator kit.** Wayne Lanza (772) 664-8953; wlanza@bellsouth.net
- 6) **Switching and breaker panel.** Wayne Lanza (772) 664-8953, www.CompositeDesignInc.com.
- 7) **Fuel sight gages.** Vance Atkinson (817) 354-8064.
- 8) **Electric nose-lift.** Steve Wright (615) 373-8764.
- 9) **Electric nose-lift, Spring steel safety catch,** and improved **MKNG-6 and NG-6 Pivots** with tapered roller bearings. Jack Wilhelmson (843) 884-5061.
- 10) **Electric pitch trim.** Alex Strong (760) 254-3692.
- 11) **Rebuilt flight instruments.** Howard Francis (not a Cozy builder) (480) 820-0405.
- 12) **Antennas.** RST Jim Weir (530) 272-2203.
- 13) **Teflon & Stainless Hinge Pins Replacement.** Gary Hall (954)979-9494.

- 14) **Nosegear crank ratchets.** Bill Theeringer (805) 964-5453.
- 15) **Featherlite:** Their email address is: ftlrlite@pacific.net
Check there for latest prices.

16)

DESIGN CHANGE

See the drawing and note on the last page of this newsletter.

BUILDER HINTS

- 1) **Extra M drawings.** Some builders have asked if they could buy additional copies of the M-drawings, to replace those they have cut up. We did not have an extra supply, however, Cozy builder Kenneth Knevel, and architect by profession, has arranged to supply Aircraft Spruce with extra copies. The neat thing is that he has joined the drawings together so that the bulkheads, jigs, templates and fuselage cross-sections are in one piece and no longer need to be pieced together. Order P/N 01-00570 from AS for \$49.95.
- 2) **Eyeball vents.** Bulient Aliev says that he found the best, lightest and cheapest eyeball vents are from older model Mercedes. You can get them both for about \$10 at a junkyard.
- 3) **Eyeball vents.** Al Wick says he bought 2" plastic ones from Spruce. Since they were too large cosmetically, he installed them differently than specified. He counterbored the fiberglass panel for the flange to fit behind the panel and so that only the eyeball was showing on the front of the panel.
- 4) **Perfect contours:** Jean-Jacques Claus writes: I found a method to make the final canard contour perfect per plans. I used the checking contour templates for the canard to cut out (hot wire) a block of styrafoam. Then I stuck a large piece of sandpaper to it and used it to give the canard a perfect contour ove its entire length. The same thing worked fine for the elevators.
- 5) **Metering pumps.** Russ Fisher says that he caps off the nozzles of his metering pump with little plastic caps which protect the fiber-optic ports on a network device, because he has a million of them, but fat nails could be used instead. If air can't get into the tube, then the hardner or resin can't seep back into the tank. It also prevents the fluid from leaking out of the nozzle into your cabinet and makes your first pump as accurate as your fifth. If you use a nail, be sure to cut it very short so it barely sticks into the tube.
- 6) **Winter flying:** Ken Brimmer says he just got back from a vacation in the warm sun, but he took off in 27 deg F with no heater. He has been flying this way for 11 years. He dresses in 3 layers, and as he flies south he strips off one layer at a time. This year he used foot warmers that he bought at Wallmart. He used them going down and they worked just fine. However, on the way back one got jammed as he was sliding his boot on. It worked fine in the air, but when he landed and pushed on the brakes, his toes went hard against the heat pad. The pad got quite hot. However he was on the ground and able to get his boot off quickly. In the air, it would have been a problem. He says the pads work fine as long as they are not bunched up, and keeps his feet nice and warm.

- 7) **Winter flying:** Eric Westland says that a couple of year ago he bought a "Winterseat", which is essentially a 12v heated seat cover. He never tried it until recently when it was cloudy and cold (28 deg F). He already had on long underwear and insulated coveralls. He was very toasty during his one-hour flight, in fact too toasty. It didn't have a thermostat, so he is planning to install one. It didn't help much with his feet, but only draws 4 amps and weighs almost nothing. It only cost \$25. See www.12vautotech.com/winterseat.html.
- 8) **MGS cost:** Dan Tomlinson reminds everyone that MGS is priced based on 1 gallon of resin and .45 gallon of hardner, resulting in almost 1.5 gallons of epoxy. He says it wets out so well that it goes farther than Aeropoxy, making the effective cost about the same.
- 9) **Data plates.** Brian DeFord says he took his to a local trophy shop and they engraved it for him. He says it didn't cost much and looks great.

TRANSITION OF SALES TO SPRUCE

The transition of sales to Aircraft Spruce continues to go well. Renee Gelinis is doing a good job of supporting Cozy builders, and Jim Irwin has responded very quickly to any builder complaints or suggestions. We are pleased at how well they are doing.

SUN N FUN

We had a very successful trip to Sun n Fun this year. Lee Parlee came down to mind our business (although there wasn't a whole lot to do except water the trees and clean the pool) while we were gone. We left a few days early, as in the past, after one front came through and before the next one. We kept catching up to weather, so we overnighted at College Station Texas, home of Texas A and M, and learned about the Bush library there. The next day we got as far as Panama City before running into weather, and overnighted there. On on the 3rd day, we made it to Lakeland, parked, and called up our rental car.

We stayed outside of Orlando, with the Wilhelmsons, in a resort called the "Liki Tiki". No, it didn't "Leaki".

At the show, Wayne Lanza supplied us with chairs (thank you Wayne) and AS with a table, which we couldn't bring in the Cozy (thank you Jennifer).

We enjoyed having all the Cozy builders and prospects stop by to sit in the shade of our tent and renew acquaintances. An interesting diversion—Ken Murphy flew in in our prototype, N44CZ, also a few days early. Because there was no food available on the EAA side, he taxied across the field (through the grass) to the other side for meals. On one such trip, he taxied his nose wheel into a hole, and broke the NG-30 structure. We helped him move the plane to the maintenance shack, and then they moved it to the composite workshop. I think Ken and his airplane were the highlight of the show. They rebuilt the nose gear structure, and completed the work on the last day of the show. It was also a popular gathering place for Cozy builders.

The barbeque, hosted by Keith Lukat (thank you Keith), was a screaming success. It was oversubscribed, he ran out of food, and had to send out for an emergency supply.

We had a chance to visit a lot of the booths. One I wanted to be sure to mention was Teledyne Matituck, and I picked up literature on their TMX-360 experimental engine series. These engines are new, built from FAA approved ECI or Superior parts, with improvements over other manufacturers (I suppose the reference is to Lycoming), available with or without any accessories one might want, mags or electronic, carbureted or fuel injection, light weight alt and starters, and the price with all new accessories starts at **\$17,990!!!!**

Another thing of interest is that Dynon will soon bring to the market a matching EFIS for engine monitoring. Boy, how fast things are changing!

We left on the morning of the last day, flew over the top quite a way, and got as far as College Station, TX, where we hung it up for the day. The next day we made it home, but not without battling a 40 kt headwind and terrible turbulence, and even about 1 hour getting through a dust storm. We had stopped at El Paso for fuel, and we hit turbulence on the leeward side of the mountains at El Paso, the worst we had ever experienced. That is why my article on load factors, and something from Vance on landing with gusty winds.

WHAT WE HAVE BEEN DOING

This spring, after Sun n Fun, our 6th grandchild graduated from high school. So we flew commercial back to Minnesota to attend the ceremony and party, and then to do a little more visiting with relatives. Going commercial is sure a pain these days, and we wished we had flown our own airplane, except the weather was cold and rainy most of the time, and IFR most of the time.

OSHKOSH

Oshkosh this year is from July 28 to August 2nd. We will be exhibiting in our usual spot, just outside the south entrance to exhibit hangar A, which is also just outside the AS booth. We heard from Daryl Lueck and his lovely wife about the Cozy dinner. They say, "The Cozy dinner will be on Friday evening, July 30th, at 6:00 pm. Cash bar begins at 5:00. Robbins has added a new room to the back of the building this year, so we will be in that room. The room holds 60 for dinner, so we'll have a sign-up sheet at Nat's booth for attendees to get in early. We hope that Friday evening dinner will work out better for the people flying in. They tend to leave on Saturday or Sunday at the latest, to avoid the weekend crowds". This has been one of the Oshkosh highlights in the past, as I am sure it will be this year. In addition to the fantastic buffet at Robbins, the Luecks have always arranged for door prizes, and last year MGS supplied wine for us at all the tables. This is a good way to meet other builders, and we hope it will be on the top of your Oshkosh agenda.

For the Cozy Builders forum, we invited Marc Zeitlin to be the featured speaker, and he has accepted, except he asked for it to be scheduled on Thursday, rather than Friday, so he has 3 days to get home (in case the weather is bad). We will be there to listen and to field any questions—there are always a few. Again, we hope to see as many builders as possible.

FIRST FLIGHTS

In the last 3 months, there were 4 first flights that we heard about: Interestingly, three were with auto engines.

- 1) Jindrich Thomas
- 2) Stephen Brooks
- 3) John Slade
- 4) Keith Spreuer

Jindrich Thomas writes (from Prague):

6/7/04

My Cozy #529 was licensed on April 19, 1996. She was built in the Czech Republic, painted with the engine in (preserved) in the summer of 1999. Then I took a rather demanding appointment with the Czech Government, and was able to fire up the engine only late in 2001.

That was the time when my trouble with registration and other paper work started. It was impossible to do it strictly in the Czech Republic, since the local CAA did not deal with home built aircraft before. So after many trial and error loops, I registered her with the FAA, and later found a DAR, one Mr. Williams, who commutes between Florida and Germany. That was on June 19th, 2003.

Then I applied for permission to use the Czech airspace for Phase I testing. Permission was granted in late November under condition that the flight will be performed by an unrestricted test pilot, who will be supervised by another approved person, and supported by a certified mechanic (that position could be filled by me as an FAA certified repairman for the aircraft).

The problem with this arrangement is that it was set up for a factory based environment, when all those people are located in one place, one hangar. Here we were spread around the country, all with other prime duties, to show up on a given day. If you count in the heavens as the provider of acceptable weather, you are in for a long haul. On top of it all, the test pilot got involved in a terrible traffic accident just before Christmas, so he was not able to get back in the cockpit until sometime in March.

With the new year 2004, I started to look for alternatives. While checking the aviation maps, I found an airport in Tivat, Montenegro, where one end of the runway (14) goes to the sea (Kotor Bay). I contacted Belgrade CAA and MOT, and was granted permission on the condition I will be able to sequester patronage of the local Air Club—an easy task through the internet. Edy Gverovic got on my case and the whole thing started to roll.

With the help of Kamil Rudolf, my son's friend and building helper, and my uncle Frank Hollis, we got to load the disassembled Cozy on a 24-ft trailer and after annual inspection of the engine, we got on the trail to Pilsen, Prague, Brno, Bratislava, Gyer, and Belgrade. Then at night we got all confused and cruised through Kosovo. Going through the plane, don't miss Kosovska Mitrovica—it may make a lasting impression on your life. Then Barane, Podgorica and Tivat. It is not that in that last part of our terrestrial journey we passed through 32 tunnels on roads which were probably very good decades earlier, but the traffic was quite heavy. Looking at the rear view mirror, the tractor trailers were passing us with just fractions of an inch to spare. By the end, the left strake was like new, but the right one got marks of tree branches we failed to see at night.

After recomposing her, I took her over the Kotor Bay for an hour. That was on May 19th, 2004. The only important act I omitted was a chat and coffee session with the air traffic controllers. That neglect caused me being unable to tell them my position, as ATC in that bay is all procedural and the Cozy is so small (local topography is a part of such coffee sessions, is it not?). Then, for almost two weeks I followed the routine of AC90-89, at least four hours a day. The weather in that part of Europe is mild, people are nice and orderly. ATC professional and English established. I was told that the reason for that is that Yugoslavia was fully supplied by the US first during the war, then right after, with not only the aircraft, but with supporting equipment and training as well.

I can attribute smoothness of the first flight for hours spent in my Cozy taxiing back and forth back at the Plzen airport, and wearing off two sets of break pads. Before taking off in Tivat, I made quite a few Wright Bros flights—they give you a sense of both take-off and landing in one swoop—good for your mental preparedness. Another conservative maneuver I practiced during testing is a go-around routine: get your approach and landing speed in line, drop the air brake, aim at the numbers, then when about 10 ft above the runway, go around.

Something must go wrong, that is what the flight testing is for. Well, I had two problems to deal with. One was a loosened rudder cable, the problem fortunately found on the ground. The bad one was when an aileron piano hinge wire wiggled out off the hinge on a two-hour flight. Although I thoroughly peflight every time I go up, I missed this one, or it worked itself out during the flight. Anyway, the safe way out of the limited bank control regime in a Cozy is to slow down to about 80 kts and use rudders. The technical problem was that the hinge wire stopper on the wing side was too shallow.

I would like to thank my family for support and toleration, my friends for help, and Edy Geverovic and other people of Yugoslavia for enabling me to do the testing in Tivat.

Czechoslovakia

John Slade writes:

5/31/04

Y'know what—after 7 flights I still haven't experimented with slow speed flight. I don't feel that this is urgent, and I've been too busy watching the engine. Paul Stowits taught me how to land a Cozy at 80 kts, and I'm comfortable with putting it down in the short distance available. Right now, I'd rather stay away from slow speeds on final. I want it a little high and a little fast so I can stretch it if needed. I'll push the slow flight envelope later, when I have more confidence that I'll have power to get away from the "edge" if I need to. I know this is contrary to popular belief, but especially if you have a decent length runway, I'd recommend putting slow flight on the back burner. It's a little different for students, and people with stock Lycoming installations. They're fairly sure of their power (and their maintenance costs) from the get go.

We have a different equation. We have lots of engine systems that are being tested for the first time, so our priorities are different IMHO. I'd suggest that getting the feel of dumping height with both rudders is much more important than trying to cultivate a minimum speed touchdown on the numbers.

John Slade

Lakeworth FL

Steve Brooks writes:

5/21/04

This evening I made the first flight in Cozy N75CZ (plans #1071). I started building Sept 19th, which goes to show you what you can do if you put your mind to it. The plane got it's sign off on Wednesday, and I spent that last few days tweaking various things, and doing the taxi testing. I made several high speed taxi tests today, and by the time I was ready, the temperature was up to 93 degrees, and the density altitude was a plus 2000 MSL, so I decided to wait until evening. I made the flight at about 8:00 pm, and it was still 87 degrees, but at least the sun was coming down.

There are certainly a lot of emotions, and thoughts that go through your head when you push the throttle forward for that first flight. The flight was pretty uneventful with the exception of a few squawks. I have a turbocharged Mazda rotary, and the temps were a little higher than I had seen, and definitely higher than I like to see. As a result, I didn't climb very high, and kept the flight short. I only flew once around the pattern. On the downwind, the temperature was on the decline, and actually when I throttled back on final, they dropped off pretty quick.

The plane flew very smoothly, though pitch was an issue (electric pitch trim stuck). Since I couldn't trim the pitch, and didn't fly very long, I really couldn't fly it hands off, but I didn't feel any roll tendencies, and it seems to fly pretty straight.

I pulled the cowling off when I got down to check that everything was still screwed, clamped, nailed, and glued down. Everything looked fine. Aside from keeping a wary eye on the temps, it was awesome. I was too focused on flying the plane, and keeping an eye on the airport to enjoy it, but when I was on downwind, I was much more relaxed than I thought I would be. I'm really looking forward to the next flight, which I plan on making a little longer. I only flew 0.2 hrs. tonight, so maybe I'll do a whole 1/2 hour tomorrow. Who knows:

Chappells, CS

On June 6, Steve Writschy Thomas

I made my 6th flight today, and after flying for 0.8 hours, came in to land after I noticed that I had a vacuum failure. Talk about ruining my day, it definitely was not good, but could have been much worse.

I was evidently distracted by wondering about what happened to the vacuum, instead of doing my landing checklist. I was worried that I could have lost a belt, so I was keeping a watchful eye on the temperatures. I did however, turn on the boost pump, and check fuel. I haven't been used to having to put the gear down (*apparently Steve has automatic gear extension*) and coupled with the distraction, and stupidity, was the formula for a problem.

I came in high and a little on the fast side, in fact, I couldn't figure out why I wasn't descending and bleeding speed. How about the fact that the gear was up? I was deploying both rudders, and marveling over how well that worked to get the altitude problem solved. Apparently, the AEX was in the process of extending the gear when I touched down, which probably saved me from a lot more damage. I landed a little faster than I had been, and sat it down without letting it float along like all of my other landings. If I had landed like I did before, the extra 4 or 5 seconds could have let the gear get all the way down...but it didn't.

As soon as I realized what was happening, I pulled back all the way on the stick and hit the nose gear switch, which was already turning. The nose came up and I was still rolling at maybe 20-30 mph. I pulled off on a taxiway, shut down, and got out to inspect the damage. I expected the worst, but really it was pretty minimal. I decided that everything was good enough to taxi back to the hangar, where I pulled the nose cover to check for any other damage. Everything inside looked fine. The nose lift is fine. The landing gear strut will have to be replaced, as well as the lower casting on the nose wheel assembly. I may forget a lot of things in the future, but I'll bet that landing gear won't be one of them.

I pulled the engine cowling, and the belt on the smog pump that I use for vacuum was fine, so I still don't know the cause of the vacuum problem. I need to pull the canard, and the IP cover anyway to troubleshoot a NAV system problem, so I'll get to the bottom of it when I do that I'll have plenty of time while I'm waiting on parts.

The only damage to the nose at all was a couple of cracks in the micro around the hockey puck. I'll have to sand it down to get the rest of the puck off anyways, so that isn't a big deal. The engine continues to run superbly. I still am running warmer than I like, but I have a plan to remedy that. The rotary engine is so smooth and quiet that you forget it's running, almost.

Steve Brooks
Chappells, SC

Keith Spreuer writes, 5/30/04

They say the first flights should not be eventful. Well, unfortunately mine was. I'm sure there will be those who jump on the auto conversion vs Lycoming band wagon and I suppose that is not completely unwarranted. These conversions are all in the detail, and I missed one. Here's the story.

As you know, I underwent a thorough FAA and DAR final inspection and felt pretty good about things Friday night as I finished a fuel tank calibration and recalibrated the water pressure gage and topped off the coolant and got the fuel load the way I wanted. Everything ready to go for a Saturday morning flight. The weather had been overcast all day Friday, so I wasn't sure about Saturday.

I awoke on Saturday with sun streaming in the window, so I was really stoked. I picked up my flight advisor and off we went to Chino. It wasn't perfectly clear, but scattered at 3400 and some higher layer. When we got to the hangar, first I discovered that I left the master on and one battery on. So it was pretty low. I put the charger on, did a preflight, and a few odds and ends. Since one battery was fully charged and one had been on the charger for about ½ hour, I figured the alternator would quickly charge the low one. So I pushed it out and it fired right up. The plan was for a ½ hour flight to check cooling on climb, and in level flight up to 120 kts. and then check out the landing speed handling qualities and land. Chino is near Ontario International so there is an overlying class C airspace. I planned to climb in several patterns up to the floor of the class C, and then call and continue climbing to 5000. I taxied over to the long runway, at least a ½ mile from my hangar. The engine temps were good about 180. I did my altered Subaru style "mag check" which consists of turning 2 of the 3 power sources off to be sure that the engine runs well on any one of them. That was good. I went thru my

run up check list and took the runway. I put off the static check until this point to avoid heating the engine any more than necessary. Static was 3860 engine, or about 2100 prop. Not great, but where I expected. So off I went. I knew I was still over pitched on the prop so I expected to have about a 1300 ft. roll to 80 kts. I had marked the 2000 ft. point as an abort if I was not airborne. It rotated at about 75 and lifted off right after the time I crossed the 2000 marker. Engine temps were good around 200. I let it accelerate to 120 kts and climbed at about 500 fpm. The RPM had steadily climbed during the acceleration. It handled just as I expected a Cozy to handle. A few pitch cycles as I got accustomed to the feel of it, but it was great. I had turned for downwind by now and climbed through pattern altitude. Somewhere in here the EFIS went black and rebooted. I had not had that happen before but it came back up and the engine ran fine. Temps had climbed to 220 during the climb but in level flight at 120 kts. they were back down to 215, and the RPMs were up to 4400 (2378 prop). So I retracted the gear to see if the cooling would improve, and asked the tower if I could go over to SoCal Approach and climb into the class C. They agreed and I switched over. But SoCal was swamped and would not answer me. So I went back to tower and told them I would go to the south and orbit there. They cleared me to the south, but restricted me to 2500 ft. So I decided to start checking out the slower speeds and reduced the throttle a little. The engine went awfully quiet. I checked the fuel and the pumps, both fine. I thought I was getting partial power, but decided it was time to get on the ground. I headed for the airport. It looked like I could make it. It became clear now that I had no power. I put the gear down and headed for the approach end of 26L, a 7000 ft. runway. It became clearer and clearer that I was going to be short. I cut the pattern as close as I could, but I touched down 15ft short of the asphalt and pretty slow. It hit pretty hard and the nose went down immediately. I was not lined up with the runway and went diagonally across. That was not a problem, with the nose gear retracted it stopped incredibly quick. The total distance from touchdown to full stop was 290 ft.!!! Well, that may be a little shorter than if just the nose was retracted, it turns out the left main wheel departed on touchdown too. I was uninjured and amazingly calm. The damage is the left main wheel and about 2 inches ground off the leg. The nose strut and for sure the shock strut and who knows what else in the retract mechanism? I think the main gear attach is okay, but I need to inspect that. The right lower winglet is damaged and there are some cracks in the paint outboard of the outboard attach bolts that need to be inspected. The gear leg/fuselage fairing is cracked too. By the time we got it back to the hangar I wasn't ready to look any deeper.

What happened? While waiting for help to move the airplane back to the hangar, I noticed that the alternator C/B was popped. Now things start falling in place. My best guess now is that the breaker was good at least past the "mag check". Probably it popped after full power was on and the alternator got up to full output. On takeoff I had everything going. Two electric fuel pumps, two engine fans, the ECU and its systems, the strobes, radios, transponder, etc, probably approaching the 50 amp rating on the breaker. Add on to that the amps that were being pumped back into the batteries, and

yeap, it should have popped. That may have been the reason for the reboot of the EFIS. The EFIS is the system I use to monitor most everything. It always give warnings on startup so if it warned of low volts or alternator output, I did not notice. Probably from that point on I was on batteries and they were probably not fully charged yet. It did not take long before the voltage apparently dropped too low for the ECU to keep the engine running. There was not enough juice left to crank the engine much less start it even if I had pushed the C/B back in. So I thought I had that base covered with 3 power sources and a system that monitors voltage and current. But I had not added all the redundant systems up that are used on takeoff. I also let that 50 amp breaker stay in there even though the alternator is good for 65. Clearly, I need to rethink that system to get a more robust power source to the engine systems. Sorry I don't have a more upbeat story to tell, but hey, fiberglass heals much better than bones. They say any landing you walk away from is a good one. I'll get it back up better than before.

Keith Spreuer

Los Angeles, CA

COZY MARK IV DESIGN CRITERIA

The design criteria for the Cozy Mark IV was for it to be a high-performance, safe, 4-place aircraft that could be built by first-time builders, for a minimum cost, in the least amount of time, requiring the least amount of skill, which would require a minimum maintenance, and which could be flown (safely) with a minimum of pilot qualifications. This dictated a simple design, built from plans, with fixed gear, fixed prop, and a time-tested aircraft engine. The retractable nose gear was incorporated to eliminate nose gear drag and allow nose down parking. The main gear strut was streamlined with an airfoil shape and the wheels equipped with pants to minimize drag of the fixed main gear. The fuselage was shaped to minimize parasite drag. Low drag and light weight provided excellent climb rates and cruise speeds. The use of composite mold-less construction eliminated the need for previous skills, reduced building time, and contributed to high-performance by allowing smooth airfoils and contoured shapes. It is generally agreed that the Cozy Mark IV not only meets its design criteria well, but is one of the best performing airplanes in its class.

ALTERNATE ENGINES

We believe that a responsible designer should base his design on a readily available, time-tested, reliable, simple to install, direct drive, air-cooled, aircraft engine, prove it in his prototype, and instruct builders on how to install it. We designed the Cozy Mark IV around the Lycoming engine (O-320, O-360, and IO-360), which met these requirements, and recommended that builders purchase a used engine to save money and avoid breaking in a new engine in a new airplane.

When good, used Lycomings started to become scarce, and the price of new engines started to skyrocket, we started looking for an alternative. The Franklin seemed to be a good candidate, so we tested one in our Mark IV for 12 months. We weren't completely satisfied for a number of reasons, so we decided not to support it and returned to our Lycoming.

In the meantime, better possibilities started to develop. ECI and Superior entered the market with XP-O-360s, claiming to be superior to Lycomings, approved for auto gas and priced

under \$20,000, with light weight accessories, electronic ignition, and fuel injection. Jabiru is offering a 180 hp, direct drive, air cooled aircraft engine. Honda is working on one, and Delta Hawk is preparing to market an aircraft diesel engine. A side benefit of all these developments is that the price of good, used aircraft engines may stop escalating and start to come down.

Some of our builders, like Al Wick with his Subaru conversion and John Slade, with his turbo rotary conversion have done marvelous jobs of adapting auto engines to the Cozy Mark IV (John Slade detailed his installation in the most recent edition of Central States Newsletters). However, these conversions require different supporting systems than are used in their respective cars, which represents a significant engineering challenge. A high performance airplane like the Cozy Mark IV is not a good vehicle for engine development. It places an additional burden on the pilot during the critical initial flight testing which will certainly result in more accidents and possible injury. If you cannot afford the engine the Mark IV was designed to use, it is suggested you build some other airplane.

RETRACTABLE MAIN LANDING GEAR

The one builder modification which violates most of our design criteria, we believe, is a retractable main landing gear, the one that attaches to the centersection spar and retracts into the strakes. There never has been a before and after test made for the Cozy Mark IV, but we believe the benefit to be about 5 kts, because the Mark IV has such a clean fixed main gear. But conversely, the penalties are considerable, for example:

- 1) Cost. We understand the cost of a retractable gear to be close to \$5,000.
- 2) Time. We estimate that it would add several hundred hours to building time.
- 3) The skill required would be more than required for the fixed gear.
- 4) The maintenance would be more than required for the fixed gear.
- 5) Reliability would be less than a fixed gear.
- 6) Insurance would cost more than for a fixed gear.
- 7) Structural integrity. Several aspects to this. We don't know how the torsional rigidity of the wings will be affected by cutting away the bottom surface of the strakes. We don't know how the integrity of the fuel tanks is affected by cutting away the bottom surface of the strakes, and if a retractable gear, attached to the centersection spar, is ripped off in an off-field landing, there would be major damage to the airframe and engine.
- 8) Collapse of the gear, or neglect to lower it will do major damage to the airframe and engine. This not only has happened, but probably will happen again.
- 9) Range. Even though speed would be increased by an estimated 5 kts, range would be reduced by the loss of fuel capacity. More frequent fuel stops would more than negate any greater speed or savings in fuel. Yes, you could install an auxiliary tank in the fuselage, if you are comfortable with that, but we don't like to see fuel tanks in the cockpit and it would increase the complexity of fuel management.

10) Pilot qualifications. The FAA considers retractable gear and constant speed props to increase the complexity of the aircraft and require greater skill. Each builder needs to judge how this would affect him (or her), but it would increase the opportunity for "pilot error".

Here is what some builder/pilots have to say on this subject:

Richard Riley (Berkut) writes:

6/17/04

My airplane has retractable main gear. The airplanes I manufactured had retractable main gear. While I have, and sold retractable main gear, I think retractable main gear is complex, heavy, expensive, takes a lot of labor to install and maintain, is failure prone, does a lot of damage to the airplane when it does fail, and contributes very little speed. I believe that retractable main gear contributes less speed than the combination of a pressure recovery spinner, the elimination of external antennas, and a well-shaped cowl.

The problem with getting real world data is that so few airplanes have been flown both with well-faired main gear, and then with retract gear, with all other factors the same. But our best guess was a 5 kt increase over a really well-faired fixed gear. That's about what we had over a well finished 360 Long EZ.

You might note that Klaus Savier, of the 250 mph 0-200 Varieze is building a Long EZ. He's changing the wings dramatically, but he's staying with fixed gear.

I helped repair a Berkut that had it's main gear ripped out 3 times. That is, on three separate occasions the gear was torn out under different circumstances and was repaired. I've also worked on one that needed a major spar/strake repair/replacement. It can be done, but it's a tremendous amount of work.

One difference between the inboard and outboard gear pivot points is that with the inboard points, if the gear fails catastrophically, you aren't breaching the fuel tanks.

The only real reason to use retractable gear on these airplanes is that it looks good to people on the ground. The 5 kt speed increase (over well-faired fixed gear) really turns into 3 when you factor in the increase in empty weight. If you want to be cool, use retracts. If you want to fly, use fixed.

Richard Riley

Todd Silver writes:

6/16/04

I read an article in "Kitplanes" several years ago which stated that well faired fixed gear offers less drag than leaky gear doors. If you have retracts and the gear doors are not sucked up nice and tight, there goes your 5 kt increase.

Todd Silver

Vance Atkinson writes:

6/16/04

Jezz this is such an exciting topic, I can't stand it! Everyone wants to go fast (retracting all the gear will allow faster cruise speeds). Everyone wants to look good (retract gear on ANY plane makes it look sexy) Really fast planes NEED gear retraction (don't see any jets cruzin wit da gear down!!).

However, since YOU are paying the bills, ya might look at what you get for your money:

1) There is ALWAYS a possibility of a main gear failure and major damage to your airframe, engine and prop. Did you know a sudden prop stoppage requires an engine tear down? But nose gear failure results in a flat spot under your nose.

2) There will be a significant increase in the cost of your project to go all retracts...don't believe me? Just look at

aircraft kits that are fixed gear and look at the same plane that has the gear retracted.

3) Our Ezs are right on the cusp of needing full retracts while cruising...Burt calculated a 5 kt penalty for our draggy mains....So you are gonna spend how many thousands more for 5kts??

4) Yeah, I'm jealous, my gear is stuck down, I take the hit on the speed increase, but I don't worry about a gear malfunction or getting stranded anywhere because of it. And I don't have to go thru the system every year checking the gear bushings, geometry, and sequencing of the gear doors, etc.

5) If you think retractables are very reliable...think again. The company I fly for has about 480 planes and about every week there is a gear problem of some sort on one of the planes....gear doors, bad light indications (by the way unsafe lights calls for blowing the gear down regardless of a visual sighting)...low pressure on the back up, hyd. pump malfunction, list goes on and on....These are all certificated jets with the appropriate maintenance.

6) Oh yeah, don't forget to call your insurance company and ask what the difference of the premiums will be if ya go retracts...

7) So enjoy your day....Oh yes. One last thing. Nat fessed up on his nose gear up landings. I too have had a gear up landing in 1991 after I had installed some new nose gear doors. The spring hung up on the wheel and jammed the gear half up or down. My passenger crawled into the back seat in flight to lessen the weight on the nose when the moment of truth arrived. YES, a modification of the gear doors fixed that. Jack Wilhelmson writes:

6/16/04

Vance, I agree with everything you have said about retractable main gear. I flew retractable gear airplanes for 20 years before I built my Cozy. All the problems you listed I had at one time or another. When I built my Cozy I was actually relieved to not have a retractable main gear.

Also the estimate 5 kts increase in cruise on our airplanes is pretty close (despite the claim of 15 to 20 kts). Very careful attention to drag reduction on the fixed gear can bring the improvement with retracts to a lower number. My experience is that using smaller tires and wheel pants and increasing the fairings where the gear leg meets the fuselage and the wheel pants will yield 1 to 2 kts increase in cruise speed. These changes improve the cosmetics and cost much less than \$4,000.

Jack Wilhelmson

Ken Miller writes:

6/16/04

I first need to go on record that the Infinity gear system is impressive. It is very beefy, as though it were designed for a much heavier aircraft. The Lancair IV gear looks spindly in comparison. I am impressed with the design and workmanship.

My one and only concern is repairability in a catastrophic situation. I personally have seen or heard of over twenty cases of hard landings both on and off field that resulted in the gear being torn from Varieze's Long EZ's and Cozy's. This is just under one a year for as long as I have been building and flying canards. Virtually all of these aircraft were repaired and flown.

Eventually this is going to happen to an aircraft with the Infinity gear. I will be very interested to find out how extensive the damage will be. Since the gear box and trunion

attach to the main spar box, my interest lies in how much damage will be done to the strake, spar and wing.

If the damage extends to both the main spar and wing spar as the gear leaves the aircraft, this could result in almost if not certainly decommissioning the aircraft. This means that you would have to re-fabricate the wings, main spar, repair the strakes, and repair the belly damage (engine tear down?). Very extensive indeed. I am not an engineer, but I do have some working knowledge of stresses and repairs on the EZ type airframe after 24 years of experience. Ken Miller

LOWER WINGLETS/FLIGHT TESTS

We think it is appropriate to review again our flight test program many years ago and what we learned.

When we built our plans model Cozy Mark IV 12 years ago, we omitted the lower winglets because we had been told by people whose opinions we respected that the lower winglets didn't perform any useful aerodynamic function. We showed them in the plans, however, because it was our intention to make tests ourselves before we recommended to our builders that they could leave them off. Our reasoning was that it would be easier to include them in the plans and tell builders not to install them, than not to include them and have to send out additional plans later on. We really didn't think that leaving off the lower winglets and adding just a few inches to the canard span (compared to our prototype) would make a measureable difference. We fully expected that our plans model, as we were building it, would not be capable of a main wing stall within our design c.g. range of 97.5 to 102, and that the aft c.g. flight tests we were planning would amount to no more than one or two test flights in one or two days at the most. We contacted a very well respected test pilot, Jim Patton, graduate of the Navy test pilot school and test pilot for NASA, to participate in our flight tests and write up the results for Sport Aviation to give them credibility.

In preparation for the tests, Tom McNeilly prepared a mechanism for the inside of our airplane which could move the c.g. through a range from 96.7 to 104 while in flight. It consisted of a 135 lb weight which could be driven electrically almost the entire length of the fuselage.

When we started testing, it came as a total shock to discover that the Mark IV would enter a main wing stall at a c.g. of 101 (well within the design c.g. range) and fall off on one wing with altitude loss that depended on how long the stick was held back. It was learned during the Velocity stall test program that wing cuffs helped to prevent a stall, so we installed and tested these, with negative results. In fact with the cuffs, the main wing stalled even sooner. So we took off the cuffs and then started questioning the matter of lower winglets. Jim called his friends at NASA, to see if they had any data on the affect of lower winglets, and was told that they did not. The only way we could find out was to install them to see if it made any difference. In the meantime, Jim had to return home to Florida. He said if I was able to achieve any improvement, to call him and he would return.

I installed lower winglets, and when I flight tested them, the improvement was nothing short of amazing. I could not get the main wing to stall with full aft stick until I moved the c.g. aft to 102.1. Only then could I get the main wing to stall, as evidenced by the airspeed suddenly dropping toward zero.

But there was no tendency for the aircraft to roll off on a wing, and recovery was immediate as soon as I released stick pressure, with no loss of altitude. By repeated testing, I determined that the start of main wing stall was about half way between 101 and 102.1, namely a c.g. of 101.6.

This demonstrated that the lower winglets performed two important functions:

- 1) They provide lateral stability at high angles of attack, and
- 2) They delay the onset of wing tip stall by 0.5" of c.g.

Now all we had to do was to move the c.g. at which the wing stalled, a little farther aft. I knew from Varieze days that shortening the canard span would move the c.g. range aft. So I trimmed 4 inches from each tip. The results were remarkable. I could not believe the difference. There was no main wing stall even when the c.g. was moved all the way aft to 103.2. The nose would rise until the canard stalled, then it would drop and start flying again. If the stick was held back, the nose would rise again and the canard would stall the second time. There was no tendency for the aircraft to make an uncontrolled fall off on one wing with substantial loss of altitude.

I called Jim and asked him to come back and do some more flight testing, which he did. He verified the improvement due to the lower winglets and the affect of shortening the canard span. He was concerned, however, that if he abused the controls at a c.g. of 103.2, he might be able to induce a main wing stall, so he talked me into lopping off one more inch of canard span, each side for a margin of safety. Builders were notified that installing lower winglets (in addition to vortilons) and shortening the canard span 6 inches each side (for 1st edition plans) was mandatory.

We believe that our flight test data proves that the installation of lower winglets provides an extra margin of safety, and we urge all of our builders to install them and consider any advice to the contrary to be unfounded.

We shared this information with Duane Swing, at Velocity Aircraft awhile back and it is my understanding that he also recommends lower winglets on all models of the Velocity as well. RAF is on our newsletter mailing list, and knowing how safety conscious they are, I believe they don't condone removing the lower winglets on either the Long EZ or the Varieze.

LOAD FACTORS

Every builder/pilot should understand load factors and how they apply to the airplane he is building and how they are affected by the way he operates it. Simply put, the load factor is the ratio of the load on the wings to the weight of the airplane. In straight and level flight and smooth air, this ratio is 1.0, which is usually referred to as 1g. (where the "g" refers to gravity). Any maneuver, like a banked turn or a sudden pull up, or any other control input, as well as turbulent air, increases the load factor. Any airplane structure can yield (become permanently distorted) or fail (come apart) if stressed beyond its design limits.

The FAA has established 3 categories of certified aircraft, based on their intended use. The first is the "normal" category, for which they require the structure to withstand 3.8 gs positive without yielding, and 50% safety factor (5.7gs) before failure. The next category is the "utility" category,

which covers things like pilot training. This category requires 4.4gs positive and 6.6gs before failure. The third category is "aerobatic", which must be designed to a load limit of 6gs positive before yielding, and 50% more (9gs positive) before failure.

Burt Rutan classified the Long EZ as in the "utility" category, and it is my understanding that the canard was static tested to 14gs positive before failure, the wings to 12gs positive without failure, and the center section spar to 18gs without failure (or even yielding). It is our further understanding that no Long EZ, built according to plans, has ever had an in-flight structural failure.

Co-Z Development has classified the Cozy Mark IV in the "normal" category, based upon its intended use as a family cross-country airplane. Even though the Long EZ has been operated at gross weights in excess of 2,000 lbs, the Cozy Mark IV structure was strengthened over and above that of the Long EZ. The spar caps in the wings, center section spar and canard are thicker, the wing and canard attach points are farther apart, and other components like engine mount, main gear, nose gear, etc. were strengthened. As far as we know, no Cozy (III or IV), built according to plans, has ever had an in-flight structural failure.

As previously stated, in smooth air and straight and level flight, the load factor is 1g. However, rough or turbulent air places additional stresses on an airframe, the same as aerobatic maneuvers. That is why trained pilots who know their airplane's operating limits reduce their cruising speed when going through areas of rough air.

Banked turns increase the stress on an airframe. A 70 degree banked turn is usually regarded as the safe limit for "normal category" small planes, because it causes a load factor of approximately 3, and increases rapidly above 70 degrees.

Increased angles of attack also create greater loads. An abrupt pull up at high speed is by far the most likely maneuver to cause structural failure. No matter how strong the designer makes the airplane, there will always be some speed above which the pilot can break the wings in an abrupt pull-up. Abrupt pull-ups are the most common cause of structural failure, so it is important to know the maximum speed that is safe for an abrupt pull-up. For the "normal" category, this maximum safe speed is about twice the stalling speed (minimum flying speed, limited by canard stall, in our case) in level flight at gross weight. To be perfectly safe, it is advisable to confine abrupt maneuvers to speeds even lower than twice the normal stalling speed. This is referred to as the "maneuvering speed".

As the load factor is increased (as in a steeply banked turn), the stalling speed also increases as the square root of the load factor. So in a steeply banked turn, with a load factor of 4, the airplane will stall at about twice the normal stalling speed. You can actually feel the nose of the Cozy nod in a steeply banked turn if the speed is not fast enough.

As mentioned earlier, turbulent air increases the load factor on an airplane, so one should always reduce cruising speed to less than the "maneuvering speed" in turbulent air. Although the Cozy Mark IV is much stronger than required for the "normal category", it is recommended that it not be operated beyond the limits for that category. For the Cozy

Mark IV, it is suggested that the maneuvering speed be considered to be about 120 KIAS.

Most of the above information was obtained from an article on *Load Factors* by Bob Whittier, in May 2004 *Sport Pilot* magazine.

GUSTY WIND LANDINGS

Vance Atkinson writes:

6/16/04

The standard speed adjustments for gusty wind conditions is to add 50% of the reference speed. What is reference speed? For jets it is the calculated speed for landing, given the weight, temperature, and altitude of the aircraft and airport. This is usually looked up on a quick reference table and will give you the landing distance and speed of the craft. How does this apply to our planes? Even though most of us are not using a table for a landing speed on every weight change on every landing, we still use a reference speed for our final approach.

For us Cozys, its usually about 70 to 80 kts. (my Cozy lands and takes off at 68 kts). So lets say you use 75 kts for a final speed. The wind is blowing 10 kts gusting to 30 kts. The basic adjustment would be 75+15 and that would equal 90 kts final. You will fly the entire final approach to touchdown at 90 kts!

The idea of half the gust factor added, gives the pilot an additional safety margin of controllability should the wind suddenly stop and you are now faced with a stall or an uncontrollable plane due to loss of flight control effect ability.

To go further, some jet aircraft require you to add half the steady state wind and ALL the gust factor. In the above case that would work out to be 75+5+20=100kts, a bit much for our planes, but not necessarily out of the picture. We have a very highly swept wing and the wing doesn't like gusty winds. The planes that require this last equation have slats, flaps, lots of main wing sweep, and a high angle of attack on approach. Sound familiar? Yesss...

Try one of these methods....they work great!

Vance Atkinson

MOGAS vs AVGAS

Chris Byrne writes:

6/5/04

Superior has just had their Advantage 360 certified to run on premium unleaded. It is basically an 0-360.

Their experimental 320 and 360 SP series, 0 or I0 is ok for auto gas as well I guess they proved it on this prior to going for certification on the Advantage. They don't approve it on engines with higher compression pistons installed. The maximum compression is 8.5:1, and they say to use 91 octane or greater with the 8.5:1 pistons. If you are running 7.2:1 pistons or lower, you can use 87 octane or higher.

Due to the higher vapour pressure of auto fuel, they caution to not operate with a fuel temperature of 85F above 12,5000 ft., to guard against vapour lock and carb icing.

They say to not use fuel blended with ethanol or gasohol etc, They recommend the use of an alcohol tester. Acceptable gasolines are those that meet ASTM D-439 and D-4814 standards. (For Europe EN228). In other words, good quality gas.

If running in your engine, use 100LL. If running consistantly on auto fuel, they also recommend retarding the

timing from 25 BTDC to 22 BTDC, since auto fuel burns a bit faster. This will provide a better performance and detonation margin if running purely on unleaded fuel.

This is all from their Operation Manual. Chris Byrne
Sydney, Australia

LETTERS TO/FROM BUILDERS

Gents, 6/17/04

I am an extremely lucky man to be able today to come and share with you my last experience dead stick landing on a busy city boulevard. First, let me describe the event, and then I will follow with my findings and analysis.

I was flying my Cozy III back to my home base, St. Hubert airport near Montreal, after visiting friends at a small airport, Charlevoix, half an hour east of Quebec City. I was cruising at 6,500 ft, 170 mph, 2550 rpm, clear sky, no turbulence. Suddenly, the plane started to shake violently. My first thought was: "this is a real emergency, not practice". I immediately put the throttle to idle, the vibrations diminished somewhat, but still were very strong. I suspected right away a problem with the prop. I killed the two electronic ignition switches. The engine stopped as did the vibrations. I switched the radio to 121.5 and declared "Mayday". They asked me my position and my intentions. I told them where I was and my intention to land on the boulevard stretching for miles under me. This was my only alternative, because on my right was hilly terrain and on my left, the mighty St. Lawrence river. I put the transponder on 7777, unlocked the canopy and trimmed the plane for 100 mph. It was 4:40 pm (heavy traffic hour). The boulevard is a four lane divided one with street light in the middle, power lines on the right, next to a railway. A small power line crossing the boulevard at 20-25 ft. elevation caught my plane a couple of inches above the pitot tube, slid over the nose to then be caught by the canard and be sectioned. Fortunately for me, this boulevard has traffic lights, they turned red at the right time, stopping the traffic to allow me to land with nobody under me or ahead of me. A few feet before coming to a stop, my right wing tip strobe light caught a flimsy road sign and was torn off. I was safe and unhurt. All along, to my great surprise, I stayed calm and I had the absolute conviction that I would be landing the Cozy safely. I informed 121.5 that I was down safely, and then shut everything down. I stepped out to push the plane toward the ditch to clear the road.

Findings. As soon as I stepped down, I saw the prop shattered with a good 10 inches missing. I also noticed that the right fuel cap was missing with a length of its safety chain still there. I saw minor fiberglass damages (about 2 inches) to the canard at the junction to the fuselage. Also the right wing tip strobe light was down on the ground. A wire still holding it.

Analysis. You have likely concluded already that the culprit is the fuel cap. This is also my deduction. The fuel cap is an ACS flush fuel cap (PN 10450-1) that I bought at Oshkosh while I was building. "The bottom of the cap is secured to the bottom side of the ring by a safety chain to prevent loss of cap in flight". I am reading in the ACS catalog. Why I bought this one rather than the one from Brock called for in the plans. Simply because ACS had it right there in stock at Oshkosh, while Ken Brock didn't. Also, it has a "safety chain". Where was it installed, you may ask? The inside edge of the cap was at 36 inches from the plane center line, while my prop has a 34 inch radius. The prop is a Felix BiCambered 68" x 14"(?) made with 6 maple laminations. On my

walk around before departing the Charlevoix airport, I had, as I always do, checked the prop and checked that both fuel caps were secured. Why did it pop up? I don't know. Why the safety chain didn't do its job? I don't know. Why did the cap hit the prop at 24" from its center (there are visible marks) rather than going straight out and missing the prop? Likely because the prop sucked it in.

What I will be doing? I have already ordered a new prop from Fred Felix (I was very pleased with it BiCambered prop which gave me a 1000 fpm climb at 1700 gross weight and 120 mph and 197 mph true at 8500 ft). I will replace the missing cap with a new one but replace the chain by a SS cable. I will repair the fiberglass (mostly cosmetic) and do paint touch up.

Voila. I elected to share this mishap with you all so you can draw your own lessons for yourself. I will not tell you what to do or not do. But we should all learn something from this "unpleasant" experience.

Gaetan Roy
Montreal

Builders, 6/15/04

I recently joined the newsgroup. I have a simple formula that I feel everyone should identify with:

COST + SAFETY + INSURANCE = FLYING

I am a forty-nine year old student pilot just about ready to take my checkride. What drew my attention to a Cozy was an article I read on the internet about a Cozy owner who crashed his plane into the back of a house which I think occurred in either New York or New Jersey, who walked away relatively unharmed – SAFETY.

I am currently training in a C 172 built in 1965. The reason I wanted a private ticket instead of a recreational ticket is there are three of us in my family. To purchase an affordable 4-seat airplane would mean paying between \$40,000 to \$60,000 for a forty year old airframe that flies at about 100 mph. The Cozy caught my interest because you can fly four people at close to 200 mph with about 1,000 mile range for that same \$40,000 to \$60,000. The only catch is you have to build it yourself. – COST

This last April I went to Sun n Fun to check out a Cozy. While there I stopped at the insurance booths and ball-parked what I might see as far as cost to insure the plane in order to fly. The impression I got was you needed to be at about 200 hours total with about 15 – 20 hours in a Cozy to keep the liability and hull damage around \$2,000 to \$3,000 a year – INSURANCE.

If people building/flying Cozys start experiencing problems resulting in an influx of claims to insurance companies, no matter the cause, that number will surely climb, affecting the formula above, which bottom line means to me – NO FLYING. I don't want to start my plane only to find out I can't insure it once I am done.

Oh, by the way, I recently read the April 2004 newsletter on the Cozy Builders web site – what a valuable resource.

Mike Coates
Crestwood, KY

Builders, 6/6/04

How about leaving the gear down until all the cooling, electrical, and other problems are worked out. First few flights are not performance (top speed) flights anyway. One less problem to deal with, especially if you choose to use an alternative powerplant with its inherent teething problems.

Ken Miller A&P
Builders, 6/6/04

Don't count on never landing nose gear up, or not more than once. My ex hangar partner forgot to put his gear down THREE times in his Long EZ. Each time he was distracted by another problem, one of them being his engine was reduced to idle and that was all he could get out of it.

Vance Atkinson
Bedford, TX

Builders, 5/31/04

Shouldn't the first flight or two be done such that you are never outside of the glide path to the airport? Certainly. But first let me say that I'm glad that Keith is safe and sound, and that the airplane didn't sustain too much damage. But AC90-89A recommends climbing to 3000 ft. and orbiting the airport. This AC should be mandatory reading for all homebuilders, and the procedures in it should be followed religiously. The busy airspace and overlying Class C that Keith is in may make some of the recommendations in it more difficult, but not impossible. As for one pass around the pattern, see the AC. It's explicit. One pass around the pattern is NOT recommended. The AC is available at www.faa.gov/certification/aircraft/av-info/dst/amateur/ac90-89a.pdf. As an aside, and with no specific reference to anyone in particular, for whatever reason, there are some folks that seem to want to invent their own test procedures (or use no procedures or plans at all), rather than using tried and true methods that keep them safe and acquire the necessary information to truly know their aircraft. All I can say to those folks is "good luck".

Marc J. Zeitlin
Acton, MA

Builders, 5/31/04

It appears that Keith's experience reveals a lot more than an undersized main circuit breaker. It shows that as we progress toward all electric airplanes, a lot of rethinking about how we design electrical systems is required.

First: the main bus circuit breaker should not have battery charging current going through it. If it does, this is a design error. Second: The alternator field switch should not be wired through to the main bus. Many airplanes are wired this way. So when you turn off the main bus switch, the alternator goes off line. NOT GOOD, if the batteries are down and the engine needs electrical power to keep running. A split master (alternator master) is used in some panels and this is the only good reason I know of.

Keith did not say how his two battery system is wired, but somehow a popped circuit breaker took the alternator off-line when its first priority was to charge the batteries. Every electrical load in the airplane (except the vital engine systems) should have been removed from the batteries when the main buss breaker popped, and the alternator should have kept on pumping current into the batteries.

We need to examine the failure modes in detail after we design a new system. Even the commercial aircraft designers are finding new failure modes in systems that have been flying for many years.

Jack Wilhelmson
Charleston, SC

Editor: Isn't this problem a good reason to keep at least one magneto? Isn't this why Unison (Slick) combines their electronic ignition with a back-up magneto, so the engine will keep running when the entire electrical system goes down? What is the sense in having a dual electronic ignition system, if the engine shuts down when the lights go out?

Nat

Keith and Builders, 5/31/04

Thanks for the report. We're all glad you didn't get hurt. Please take the following comments in the spirit in which they are intended, and that is to educate others that are getting prepared for their first flights, not to preach.

I have done several first flights in EZ's, including mine. Here is what we all should learn from your experience.

You were "stoked" and ready to fly. Your airplane wasn't however. The dead battery was your first warning. In the certified world, a dead battery means no go until the battery is removed from the aircraft and charged and tested, even though the aircraft engine will run fine without a battery installed in the aircraft.

Unless you are at a deserted airport and have an emergency, you never should take off with a soft battery, especially if your powerplant requires battery power to operate. This is one rule we should all abide by.

When your EFIS rebooted, the airplane was trying to tell you to abort the flight. Second warning.

The third thing is your choice to fly away from the airport and start performing tests at low altitude, out of gliding distance. Anyone doing early testing should inform the tower and/or other pertinent controllers of your intentions to stay directly over the airport. If they are too busy, or can't grant clearance, then that day or that hour is not a good one for flight.

You mentioned checking the pumps after the engine quit. The breaker will be on that check list next time. I have a short checklist velcroed to my panel to help my feeble memory. A printed list is much better than trying to remember everything at a very stressful time.

I hope your repairs go swiftly and you are back in the air soon. This will be a good time to re-group and get everything perfect for your next flights. I would also send your prop back to get it repitched for better climb performance.

Ken Miller A&P
Long Island, NY

Builders, 6/12/04

In preparation for assembling the fuselage, I did a practice assembly with the sides, temporary firewall, and bulkheads. One minute it's a bunch of random pieces lying around the garage, the next it looks like a fuselage. My wife was stunned! She said, "Isn't it supposed to look like a boat?"

D'Armond Speers
Denver, CO

Dear Nat, 6/13/04

I appreciate your input (on nose gear doors). I'd love to have a nose gear door. They are very "cool looking", but the further I get into the project, the more I appreciate the KISS approach. I fly a B-757 everyday, and it is very tempting to get all the speed "mods" and avionics bells and whistles like I use at work, but I have to keep reminding myself of the mission profile this plane is meant to fill, i.e. mostly reasonable VFR with occasional light IFR primarily to get in and out of a field, NOT globe trotting to deliver troops to the mideast, etc. in all kinds of WX. The "couple of knots" the door might give me, I probably won't be able to see on the AS indicator.

Jerry Eaton
Fishers, IN

DESIGN CHANGE

Several builders have had the NG-30s fail when their nosewheels dropped into a hole while taxiing. The failure occurs at the cut-out for a battery, which was located in the nose for the Long EZ but is no longer needed for the Cozy, because the battery is located at the centersection spar. It is suggested that the height at this low spot be raised 2.0", and

and additional 2 plies of BID, both sides, be added. Make this change in Chapter 13, page 2, Step 2, and on drawing M-10.

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