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# COZY NEWSLETTER #71

## October, 2000

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### OTHER PARTS WE RECOMMEND:

We can recommend the following items:

1. Improved Rudder pedals for lay-down brake cylinders, adjustable both sides. Dennis Oelmann (319) 234-6109.
2. Water tight fuel caps: Jack Wilhelmson (843)884-5061.
3. Improved MKNG-6 and NG-6 Pivots with tapered roller bearings. Jack Wilhelmson (843) 884-5061.
4. Electric speed brake actuator kit. Wayne Lanza (561) 664-9239.
5. Switching and breaker panel. Wayne Lanza (561) 664-9239.
6. Fuel sight gages. Vance Atkinson (817) 354-8064.
7. Electric nose-lift. Steve Wright (615) 373-8764.
8. Electric pitch trim. Alex Strong (760) 254-3692.

9. Voice annunciated warning system. Richard Lewis (423) 376-1450.
10. Rebuilt flight instruments. Howard Francis (not a Cozy builder) (480) 820-0405.
11. T-shirts, etc. Bill Walsh, nogofsu@sprintmail.com. (407) 696-0942.
12. Antennas. RST Jim Weir (530) 272-2203.
13. Teflon & Stainless Hinge Pins Replacement. Gary Hall (954)979-9494.

## PLANS CORRECTIONS/CLARIFICATION

### 3 INCH UNI SPARCAP TAPE

As you may know, Alexander Aeroplane purchased the machinery used to make the 3 inch uni sparcap tape. It was pretty old. Then when Aircraft Spruce purchased Alexander Aeroplane, it acquired this equipment. So Aircraft Spruce has been making the sparcap tape and supplying it to Wicks as well. The equipment keeps breaking down, and the tape has been in short supply, except that Aircraft Spruce always seem to have a little stock even when Wicks is out. It seemed rather risky to be dependent on a single source for spar cap tape, under the circumstances, so I suggested to Jerome, at Wicks, that it would be prudent to look for an alternate source. As I was working on this newsletter, the doorbell rang and UPS dropped off a package from Wicks. Very nice looking 3 inch uni sparcap tape! But instead of having a woven cross thread that can be pulled out, or even a woven thread that couldn't be pulled out, it had a very fine hot-melt thread every 2-1/4 inches holding the yarns aligned. I checked the weight, and it was correct at 22 oz/sq.yd. It wets out quickly and well, and is now an approved substitute for the spar cap tape we have been using previously. It will be easier to work with since there are no cross threads to pull out. We have given Wicks our approval, they will stock it, and will list it under a new part number in their next catalog printing.

### BUILDER HINTS

1. In time, the piano hinges on the ailerons and maybe even the rudders will become loose due to wear. The fix for this was discovered some time ago. The steel hinge pins can be replaced with a teflon tubing with a smaller diameter stainless steel hinge pin inside. Gary Hall will sell you enough tubing and stainless for one airplane for \$27.00 US or \$32.00 OUS. His address is 777 S. St. Rd. 7, Ste 506, Margate FL 33068-2803 (954) 979-9494.
2. Colby Farmer reports that a supplier for -2 teflon brake line is Xtreme Racing Products in S. Gate, CA, Tel. (562) 861-4765. He says that if you haven't already installed the conduit, consider the -3, because the fittings are cheaper. He says the -3 is .250 OD and may not fit thru the soda straw conduit.
3. In Chap. 4, you were instructed to grind flats on each side of the blind, flat-head screws, before installing them with flox, to keep them from turning. If you neglected to do this, when you install the CS-72 brackets in Chap. 15, one or more of these screws may turn when tightening the nut. In this event, saw a slot in the threaded end of the screw to hold it with a small screw driver so it won't turn while tightening the nut.
4. Builder Burkes wanted something more flexible than a sanding block, so he put on a vinyl glove,

- sprayed it with adhesive, and stuck a sheet of sandpaper to it. He said it worked great, he could feel the bumps that needed sanding down, was hard to lose, and it contoured to almost any shape.
5. A general rule is that whenever joining two or more intersecting surfaces together, they should always be floxed and taped, whether instructed to do so or not.

## **FOR SALE**

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

## **FUEL SYSTEM FOR FUEL INJECTION**

In airplanes with downdraft cooling it is customary to mount the fuel distribution block for fuel injection on top of the engine. This location puts it in the cool airflow when the engine is running, but when the engine is shut down, the distribution block can become heat-soaked, and the fuel inside vaporize. When that happens, it is very difficult to restart the engine until it cools down and the fuel recondenses, because the cylinders do not get enough fuel. To avoid problems with "hot starts", the fuel can be recirculated back to the tank from the distribution block to ensure that liquid fuel will always be present for engine start.

Recently, there has been a discussion on the internet about how to redesign the fuel system of the Cozy Mark IV to circulate fuel to the distribution block and back to the tank. With two separate tanks, another problem arises. How do you make sure you are returning the fuel to the tank in use? If you return fuel to the tank that you are not drawing from, and it happens to be full, the return fuel would be dumped overboard. Not good! Some suggested a double pole, double throw valve, (to use an electrical analogy). With such a valve, the return would be switched at the same time as the feed. Others suggested a sump inside the fuselage, with both tanks feeding the sump simultaneously, and the return line returning to the sump. Both of these suggestions would require changes to the fuel system, introduce complications, and increase the likelihood of problems.

There is a much simpler, fool-proof solution which doesn't require any modification to the fuel system shown in the plans. The fuel system shown in the plans is about as simple as it can be, it is tried and proven, and it is not subject to vapor lock. With up-draft cooling, like we have, the entire fuel system is on the cool side of the engine, in the cool air regardless of whether the engine is running and the airplane is flying, or simply idling on the ground, or parked with the engine shut down. When you park after flying, air continues to flow up through the engine due to natural convection. There will not be a vapor lock or a hot start problem, period! The solution is so simple you wonder why people don't think of it. All you have to do with fuel injection is to put the distribution block on the cool side of the engine. Nothing could be simpler. Simply make a bracket on the cold air side of the engine to mount the distribution block. A number of builders have done this and report there is absolutely no vapor lock or hot start problem in hundreds of hours.

This is one of those imaginary problems that many people spend a lot of time trying to think of solutions, when no problem exists. A large number of accidents in general aviation are fuel system related. Don't become a statistic. Install the fuel system exactly as it is shown in the plans.

Mike Pollock writes: 8/8/00

We have an IO-360 with updraft cooling with the spider distribution block mounted under the engine behind the oil sump. It is mounted with a bracket and we used Airflow Performance for the SS lines. Hot starts are not a problem, and we also have not had any problems with fuel distribution. We use 3 to 4 seconds of boost from the Bendix electric fuel pump to pressurize the fuel lines and the engine always starts - hot or cold.

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## **FLUTTER**

Flutter can occur if control surfaces are not properly balanced. If the center of gravity (same as center of inertia) of the elevators is aft of the pivot point, a force on the canard which deflects it upward will cause the trailing edge of the elevator to lag behind. With the trailing edge down, the lift of the canard is increased, and this drives the canard even farther in the upward direction, until the canard reaches its elastic limit. Then the canard starts down. Again the elevator lags behind, and with the trailing edge of the elevator up, it reduces the lift of the canard, and drives it farther down until it reaches its elastic limit, and the cycle repeats. This continues with increasing amplitude until something breaks, or the pilot takes corrective action. In metal airplanes, usually something breaks first.

In Chapter 11, Step 6 you are instructed to make sure the elevators balance NOSE DOWN after painting. If you do this, the elevator will dampen any upset caused by turbulence. The same thing is true of the ailerons. We have never had a case of flutter until just recently. It happened after an unusual set of circumstances. Names will be omitted.

A Cozy builder left his plane in primer while he flew off his 40 hours. He then sold the airplane. The second owner disassembled the airplane to ship it, and while it was disassembled, sent it out to be painted. But before he could reassemble it and fly it, he lost his medical and ultimately died. The estate sold the airplane disassembled. The next owner assembled it and proceeded to fly it. After 7 or 8 hours he hit some turbulence, and the canard started to flutter violently. He said the canard tips oscillated up and down about 8 inches and were just a blur (incidentally, an 8 inch deflection is about equal to 8 gs.). He immediately chopped the throttle and pulled back on the stick to slow down, and the flutter stopped.

This owner was terrified and after landing, called me. It was immediately obvious what was wrong; too much paint had been used on the elevators. I told him to remove the canard, check the balance on the elevator, and send me a picture. The elevators balanced TRAILING EDGE DOWN. I suggested that he sand the bottom surface until the elevators balanced nose down, even if he had to go into one layer of glass, and if that wasn't enough, to build new elevators. The next time we talked, he said he increased the balance weights until the elevators balanced nose down, was back flying again, and everything was okay. Score another point for composite construction!! In a metal airplane, I'll bet you wouldn't live to tell about it.

On this same subject, Michael Pollock, who flies a Velocity, but is building a Cozy, writes:

...."I was flying back to my home base. As I slowed to 130 kts IAS, I reached up and tapped the control stick momentarily. What I got was a flutter of about 2 to 4 Hz with a deflection of the canard tips of about 12 inches. Scared the #@! out of me. I immediately grabbed the stick and retarded the throttle and immediately the flutter stopped. I landed and contacted the Velocity people. They informed me that I did not have sufficient torsional strength around the ends of the canard, and to add more BID in those areas (WRONG!!). Since no other person had experienced this before, I decided to investigate. We had balanced our elevators bottom flat per instructions I received from the Velocity factory. Going back to the book, Danny Mayer, the designer of the Velocity, said to balance the CHORD of the elevator slightly nose down or level (NOT the bottom of the elevator). We added extra lead to the mass balance weights to balance the CHORD of the elevator slightly nose down. The flutter is now gone at all speeds from min to 210 kts IAS. Remember, just because someone says to do something a certain way, check to see what the designer says. I feel that I am very lucky...."

## **PITCH STABILITY**

David Domeier writes: 6/12/00

Cozy Newsletter 56, page 5, contains some very good flight test stuff on elevator position relative to c.g. and airspeed. It helped solve a problem of pitch sensitivity in my machine (the sensitivity bordered on instability).

Recently, the rather expensive altitude hold system I installed in the Cozy has been acting up (and down). What's been happening is the system would go into a porpoise at speeds above 125 KIAS. It maintained altitude within 50 ft but never right on. The ride was most uncomfortable and unacceptable.

After much exploring the problem, which included almost sending the processor back to S-Tec, and a lengthy discussion with Nat Puffer, I nailed it down this evening with a 30 minute flight test. The airplane is now more stable than it was before.

With the addition of a prop spinner, wheel pants, and a spin-on angle oil filter adapter, the c.g. of my machine has gravitated aft since day one. I've been flying (solo) with 24 pounds of ballast, which resulted in an original c.g. of 101 for solo flight. Of late, I've noticed the pitch control of the airplane to be very sensitive, especially at high speeds. I also noticed the elevators to be very neutral except at 80 or 90 kts. I had a hunch that neutral elevator might be S-Tec's problem. I recalculated the c.g. to be 102, but then moved it forward to 99.1 with ballast. With the elevators out of neutral, the airplane is definitely more stable and the S-Tech problem is no more. I had it cranked up to 160 KIAS and it stayed glued to the selected altitude like it should.

I hate to admit it, but I am going to install about 60 pounds of ballast forward for solo flight. The airplane needs it.

## **OSHKOSH**

We missed Arlington this year because our help was needed at the same time in Minnesota. So we flew there directly before proceeding on to Oshkosh.

We arrived in Oshkosh the Sunday before everything started. The heavy traffic had not yet started, so I called the tower from 40 miles out asking for a straight in approach to downwind for 27. "Negative!" was the reply. So we flew down to Ripon and followed the railroad tracks in, as instructed. Dumb! I was cleared for runway 36. At the last minute on final a spam can taxied onto the runway. I was diverted to 36R (a taxiway). Boy, was it narrow!!

We parked N14CZ in our reserved exhibit spot at Exhibit Bldg. A, set up camp in the woods (see pictures after clicking on Oshkosh on our web page), picked up some supplies in town, and then hit Friar Tucks for Rueben sandwiches and cold beers. Then we started looking for David Domeier and Nick Ugulini, whom we had invited to camp with us, and had a couple of days of fun before work started. Cozy builder/pilots Greg Mallia and son, and Brian Scott also camped with us.

More Cozys arrived, and most were parked out on the north 40 with the other canards (per Carl Denk). Our 3-place, N 22CZ, along with some other airplanes, had been removed from the museum to make space for some new airplanes and activities, and was parked just north of the fly-market.

Friday was the big day for us. The Cozy Forum was in the afternoon and was well attended. We invited Nick (Ugulini) to tell us about his new ideas on propellor making. The Cozy banquet that Kim and Daryl Lueck arrange was at the Ramada that evening. I think we had about 70 in attendance. As usual, the cuisine, ambiance and camaraderie were excellent. Our speaker was Cozy builder David West. He is a helicopter pilot in the reserves, and spent about 9 months in Bosnia. He had a very nice slide presentation, and helped us understand a little better what was going on there.

There were somewhere between 15 and 20 Cozys there. First time for some, like the Funks, the Richards and the Mallias. Many builders stopped by our exhibit. The only time we get to see some of them is at Oshkosh each year, and we made some new friends of new builders as well.

It was quite cloudy this year, which wasn't too bad since it relieved the heat a bit. And there was one day, Sunday, when it rained most of the day. The weather was looking bad for later in the week, so we left early on Monday. We had to fight our way out of Oshkosh in heavy rain, but once out of Wisconsin the weather was fair to clear the rest of the way home. We stopped for fuel in Goodland KS, and decided to stay overnight, to hit the mountains in the morning. The FBO was very hospitable, loaning us a car to get into town. The Best Western had a very nice complimentary breakfast.

The flight thru the mountains the next day was uneventful, and it was good to see Falcon Field once more. Another Oshkosh successfully under our belts.

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## **SPEED**

The theme for Airventure 2000 was "SPEED" (even though the Concorde couldn't make it), so in preparation for our forum, we compared the Cozy Mark IV with some of the current, factory built, 4-place airplanes (per the AOPA Pilot, March 2000):



Make	V - kts	Hp	Cost - \$
Lancair Columbia	190+	300	189,000
Cozy Mark IV	189	180	35,000*
Mooney Ovation	187	280	500,000
Mooney Eagle	175	244	319,000
Socata Trinidad	163	250	347,000
Commander 14B	160	260	370,000
Cirrus SR20	160	200	171,000
Cessna Skyland	140	200	223,700
Gavilan	130	350	336,000

\*Of course, all of the above factory-builts come equipped with new engines. But even if you had to spend an extra \$10,000 or so for a remanufactured Lycoming, a Cozy Mark IV would still be a better investment by far. Unlike a Cozy, none of the above factory builts have a resale value 2 to 3 times what they cost. Even if we compared the Cozy Mark IV to 4-place kit-built airplanes, it would still be both the fastest and least expensive, and that is only the beginning, because we have state-of-the-art construction and technology, our maintenance and insurance costs are less, and we have a safety record twice as good as Cessna!! The reason we decided back in 1990 to sell plans to the Mark IV was that all the other 4-place designs (Prescott Pusher, Wheeler Express, White Lightning, Velocity) were having problems. We thought we had a better design, and we haven't seen anything since then to make us change our opinions.

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## **COPPERSTATE**

The Copperstate EAA Regional Fly-In October 12-15 will again be held at Williams Gateway Airport, Mesa. It is about 10 miles away from our house. We plan to have a barbeque at our house again for builders and friends after the airshow on Friday, October 13th.

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## **PROPELLERS**

Sensenich sent us a new, 2-blade 70 Dia x 85 Pitch propellor to evaluate. Static rpm was 2280 (not quite as high as we would like), but acceleration was good and rpm increased to 2390 in climb. It topped out at 2700 rpm at altitude, full throttle. At 2400 rpm, which is our economy cruise and the rpm we usually fly at, average TAS (from 4,000 to 10,000 ft altitude) was 187mph (161 kts). Within the margin of error, it is the same as our Performance prop. The two advantages of the Sensenich prop is that it is much less expensive and can be "clocked" to miss the exhaust.

## **FIRST FLIGHTS**

We have learned about 3, Gaetan Roy, John Vermeulen, and Kevin Funk. Their reports follow:

8/02/00

Nat,

C-GESK (3-place) has flown two hours so far. I had to find myself a new test pilot. My present one is a retired Canadian Air Force instructor. He is very impressed with the Cozy, which flies hands off. I went up with him the last time and did more than half an hour. GREAT PLANE! Thanks a lot, Nat!

I had to work out a few glitches, but all with the power train. My throttle control is not very smooth. I used the Brock throttle quadrant and a return spring. I am thinking of changing it for a push-pull cable with a rigid end.

Hope you two had a great time at Oshkosh.

Gaetan Roy,  
Montreal Canada

7/26/00

Dear Nat,

Enclosed is a copy of my first flight announcement. Thank you again for your devotion to the aviation community by making the Cozy MKIV a safe and affordable design.

Well, it finally happened. After 6 years of building, N69CZ made its maiden flight @ 0630 on 7/1/00. For those of you still building and have been persuing a ride in a Cozy prior to first flight, keep trying, but it is not necessary. I made my first flight without a check ride in a canard type (but believe me, I tried) and had no problems with pitch control. I've built according to plans and performed the taxi testing laid out in the Cozy Owner's Manual. All you have to do is follow Nat's instructions and recommendations and your first flight will be a breeze. The only problem you have is you void the insurance coverage for the first two hours.

My first flight lasted 45 minutes with a greaser landing at the end. They say that all your other landings would not be as good as your first, but I proved that wrong on my second landing. My second landing was slower and used less than 2500 ft of runway without heavy breaking. The air was very smooth for my first flight with no wind and temp at 60 degrees. I had some butterflies after applying full throttle but they went away soon after rotation when I knew this baby wanted to fly. I climbed out at 90 kts and before I knew it, I was at 3,000 ft. I leveled out there, staying over the airport, and kept local traffic informed of my testing intentions. She trimmed out and flew straight hands off which I just find amazing. I limited my speed to 120 kts and tested my flight controls. The flight controls are superb. I love the side stick and hopefully will never have any need to fly another Cessna or Piper again.

Now I'm at 5,000 ft and going for that famous canard bob stall. I cut back on power and pulled back on the stick to maintain altitude. As I approached 62 kts, the nose started to bob up and down, It felt like I



was driving a cadillac down the freeway with bad front shocks. The ailerons had good response during the bobbing. It felt so cool that I just trimmed it out and flew like this for a while. I took this time to enjoy the spectacular view. I surveyed Robert J Miller Airport, Toms River, NJ (my departure point) and turned my glance North to New York City and then South to Atlantic City. Now I looked straight up (something most airplanes don't offer) and saw some air traffic from the New York area. I was simply just enjoying myself but had to break away to focus on the task at hand - my first landing.

I entered the pattern at 80 kts, lowered the speed brake, descended at 500 fpm, and made a conventional approach. The landing wasn't much different than the Skyhawk's I last flew with the exception of flying the Cozy down on the runway instead of stalling it. I enjoyed the excited feeling of my first flight without any anxieties. I have no fears of this airplane. The Cozy flies great and I'm looking forward to my next and my next and my next.....

John Vermeylen  
Lanoka Harbor NJ

6/18/00  
Carrie Funk writes:

At 3.18 PM this afternoon, Kevin took off in N871F! This was supposed to be a taxi test, but the nose being lifted up caused the plane to LEAP into the sky! By the time power was reduced, Kevin was too fast and too high to land on the remaining runway, so full power sent the Cozy climbing 1300 fpm. Kevin announced to the tower that 871F was airborne!

At 1000' Kev reached the clouds and had to back down to 900' with clouds just above the canopy. Fortunately, we had called the tower on the phone before this test and had permission to fly "special VFR" in case of a take off.

The tower was great and asked Kevin what he WANTED and they would make it happen! 145 mph downwind was smoother when Kevin took his hand off the stick! 100 kts was too fast on final but he slowed it down to 80 and did a greaser landing! Kevin's voice cracked on the radio when he told the tower he was ready to taxi back to hangars and we could hear the excitement in his voice. Today is Father's Day, which is exactly 8 years since we started building the Cozy! 2,920 days of building and 2,920 hours of work into the project!

On 6/20/00 Carrie writes:

Tonight was a beautiful night for a flight. Kevin took off shortly after 7 pm and came in just before 8 pm. I think he is still on cloud nine! He left the traffic pattern, climbed up to around 6,000 ft and tested out turns and such. I don't have the numbers, but he said everything looked great and the temperatures on the engine did fine. Kev tested out full throttle, red line, 1/2 throttle and slow speed with front nose gear down and landing brake extended. He says it is a dream to fly and you just think what to do and the plane does it. He hardly has to move his wrist to control the stick.

I'm jealous now, I can't go up yet and it was such a beautiful night and not bumpy! Kevin kept going on about how much you can see from the canopy and pretty and how smooth it was. I guess he'll spend all weekend flying so he can get the required hours flown off and take up the family.

On 6/25/00 Carrie writes:

Never a dull moment around here anymore. Friday night was really exciting - surprisingly I stayed pretty calm. Kev was doing touch and goes and all of a sudden lost oil pressure. He was 2 miles out and called the tower and declared an official emergency. Kev came in and landed on the short runway downwind! On final with the tailwind, he was doing 132 kts! He landed on the main tires with a thud and applied brakes, then let the nose wheel touch and bounce back up. After the nose came down a 2nd time, full brakes. He stopped with about 200 ft of runway left! The fire trucks and police came out because of the emergency, and when all the officers saw everything was OK, they started oohing and aahing about the plane!

Kevin checked everything out and the only thing we could find was a loose wire from the engine monitoring instrument. Wow, 3rd flight and he had to test his skills landing downwind. For my friends who don't fly, you normally land against the wind!

Saturday he practiced landings again, then went on his first cross country flight. Remember, he has to stay within 125 miles of LBB, and he didn't want to venture out too far for the first time, so he was only gone about an hour.

However, today he covered 800 miles in 5 hours of flight time! He went to Midland, TX, Hobbs, NM, Amarillo, TX, Childress, TX, and home. We now have 13.3 hours on the hobbs meter and at 20 he can report to the FAA and find out how many hours he needs until they sign off the airplane. The Cozy is performing great and he is really impressed with it. Needless to say, the kids and I are ready for our first flight.

Carrie Funk,  
Lubbock TX

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## **AWARDS**

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

1. Mike Brown and Lisa Aufill, Sport Aviation Jan. 2000 (We missed them earlier).
2. Dennis Oelmann, Kitplanes Aug. 2000. (He gets mentioned a lot!)

Congratulations and thank you, guys!

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## **OUR WEB PAGE (WWW.COZYAIRCRAFT.COM)**

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

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## **ENGINES**

Continental had advertised that it would have their new diesel engine in a flying airplane at Oshkosh, but didn't quite make it. I guess they ran into some installation problems. At any rate, they have more than one that is running, and the claims are quite impressive. Because it is a two-stroke cycle, it can have a smaller displacement than an O-360, run at a lower speed (2200 rpm), and still be smoother. It is, of course, direct drive, so it doesn't require any speed reduction unit. And since it is a diesel, it doesn't require any ignition system. Because of its slower speed, fewer parts, and cooler operating temperature, its TBO is expected to be 3,000 hours. It is claimed to have a BSFC of 0.36 compared to 0.45 for a 4-stroke avgas engine, which would translate into a 25% increase in range for a Mark IV, and to deliver 200 hp up to 12,000 ft. And it is expected to weigh no more than a 200 hp Lycoming. If all this turns out to be true, it should be a perfect engine for a Cozy Mark IV. Continental says they will not sell any engines until they get certification, and expects that production quantities are at least 2 years away.

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## **MARK IV vs WINDOW/GARAGE DOOR**

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

Roy Grossinger writes:

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

Gregg Perry writes:

I started my Cozy Mark IV a few years back when I was living in N. Carolina. I built all the major parts and had the fuel strakes in place. I then finished residency and my wife and I decided to move to Tennessee. I was "sure" I could get the fuselage out a single garage door by putting small platforms with

castors under each wheel and finessing it out the door.

It didn't work - no matter what way I danced it around, it just didn't fit. Fortunately, Jeff Russell was living nearby at that time and a panicked phone call brought him over. He showed me (with four strong helpers) how to "tilt" the plane so the edge of one strake grazed the concrete at one corner of the door and the edge of the other strake grazed the upper door frame of the other side of the door. Marks were left on both the garage door frame and the fuselage (no major damage) but we did get it out.

Then my father-in-law brought a hay trailer to our house and we pushed the plane up on the trailer facing forward. I attached two red flags to the end of the strakes, covered the canopy carefully, lashed down the main gear, retracted the nose gear, and used the canard cut-out to put a strap across the nose. Off he went.... He got lots of stares and waves (including from a State Trooper), but had no problems on the 400+ mile trip. The wings, canard, etc went by moving van.

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## **FINISHING**

Poly-Fiber of Riverside CA is one of the oldest, manufacturers of aircraft finishes in the country. It was founded by aircraft designer Ray Stits. It was sold in 1992 and a number of changes were made to its product line. It recently developed a non-hazardous finishing system for composite aircraft called the Flight Gloss system. It comprises 3 products. The first is a lightweight filler called SuperFil. It smoothes out the rough spots in the still unfinished airframe. The second is called UV Smooth Prime. It is used to fill the tiny pinholes that are the curse of every builder. It also blocks the sun's ultraviolet rays. The final coat, Top Gloss, is a non-hazardous, water-borne polyurethane. Because it is water-borne, there are no inflammable solvent problems.

These are new products with which we have had no experience. Many of our builders, however, are using them. We receive generally good reports on the SuperFil and the UV Smooth Prime. But we have received some bad reports on the Top Gloss.

Builder Mike Bowden reports:

Last night a friend and I removed three weeks worth of work from my wings. While carefully trying to remove masking from the "N" number and trim, I kept having "Top Gloss" lift off of the "Smooth Prime". After fighting this for several days during the various stages of masking trim, I finally gave up on "Top Gloss" and started to literally peel off huge sheets of paint. It was like pulling plastic wrap off of a smooth surface. Once a corner was lifted, a gentle pull would do the rest. We stripped both wings in less than three hours.

I am not an expert painter, nor am I a novice. I have painted R/C aircraft, cars, and repairs on jet skis and Ezs. All had excellent long term adhesion. Even "Krylon" works good. I have never seen any other paint behave this way. Yes, I did follow the Flight Gloss Manual to the letter, and reviewed it again to make sure I wasn't sticking my foot in my mouth before writing this. The primed surface never contacted human skin and was cleaned thoroughly with the recommended cleaners prior to top coat. At this time, I cannot find fault with the "SuperFil" or "Smooth Prime", although I wonder if the primer had anything to do with the top coats not sticking."

On our last 3 airplanes, we have used either a urethane or an epoxy high-build primer, and then a PPG Deltron (now known as Concept) top coat with excellent results. Adhesion and repairability have been excellent. After bad experiences with our Varieze, we hesitate to gamble on something new.

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## **ALLERGIES**

Builder Omar Filipovic published the following excerpt from MGS' data sheet on the internet:

"Since the approval of laminating resin L 285 in 1985, it has been used by nearly all manufacturers of planes and gliders, and especially, because of the extremely good physiological compatibility, it is the most commonly used system in the aircraft industry today. It often happens that workers who have experienced problems with some epoxy resins concerning allergies or skin irritation are able to process laminating resin L 285. The relevant industrial safety regulations for the handling of epoxy resins and hardeners and our instructions for safe processing are to be observed."

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## **DELAMINATION**

6/13/00

Vance Atkinson writes:

After a week of flying, and returning from Sun 'n Fun, I discovered a huge delamination on the left, outboard winglet. It was highly irregular in shape and covered about a square foot in area. I mapped it out using the ol' quarter tapping trick, drew my outline, and proceeded to think about how I was going to fix it.

I wound up getting several syringes from where my wife works, and by not using the add-on needles, was able to make them work for me. This how it went. The base of the syringe is tapered (this is where the needle attaches if you were to use the needle part), and by carefully matching up the end of the taper (small part), I selected a drill so that just the end of the syringe would fit in the hole. I then proceeded to drill 9 holes evenly spaced over the delaminated area. After mixing epoxy and pouring it into the syringes, I then jammed the syringe into the hole. This does two things: 1) Makes a tight seal so the epoxy can't back out, and 2) Most importantly, allows me to pull back on the syringe without pulling the syringe out of the hole and take a fair amount of skin with it. This allowed me to squirt epoxy into the void between the skin and the foam.

I did this in 9 different holes. In order to push the skin flat against the foam again, with the fresh epoxy gushing around in there, I came up with some duct tape on the leading edge of the winglet, coming straight back to the trailing edge, with a wooden block in the middle. Kind of, a reverse suspension bridge. I had 4 of these on there.

Of course, when I had all these compression devices in place, about 75% of the epoxy I injected in, came out, all over the place. A bit messy, but effective.

The vertical winglet is one of the more challenging areas to fix a delamination. Hope this helps out some of you if you encounter this type of problem. The root of the trouble, I believe, is the copper foil strip antenna that runs along the outside of the winglet. I believe the glass debonded from it initially, and as we kept flying it during the week, it became bigger and bigger. Normally, one would catch this in its early stages with regular checks. Fly safely!

Vance

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## **AIR RE-STARTS**

There was some discussion on the internet about what happens if you run a tank dry and the engine stops firing and it gets very quiet. This isn't very likely to happen during an approach to landing, because then (hopefully) you are alert and going over your check list (let down, slow down the speed, wheels down, fuel boost on, landing brake down, fullest tank, etc.). It is more likely to happen in the middle of a 5 hour cruise when you are sitting there, fat, dumb and happy, and forget to switch tanks. I can remember three times (once in the Navy) in my lifetime when this happened to me. While cruising along (or just starting a torpedo run in the Navy), all of a sudden it gets real quiet. What happens is the propellor keeps windmilling, you switch tanks, and the engine springs to life again. It seems like a long time. Actually, it takes 4 to 5 seconds to switch tanks, and only a couple of seconds later, you hear that comforting noise again. The propellor will keep windmilling down to 100 mph or less. If it stops, just point the nose down, and it will start again. If this ever happens in the pattern (very unlikely) you should ALWAYS be at such an altitude that you could put her down on the runway, dead stick, as they say.

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## **LETTERS FROM BUILDERS (some from the net)**

8/15/00

Hello Nat,

Enclosed is a check for the plans. I have followed the Cozy series for quite a long time. Watching the many builders' progress at the various web sites is very inspirational. I will be very excited to receive the plans after years of trying to decide what type airplane to build.

Alvis Jenkins Sr.  
Baltimore MD

8/21/00

Builders,

I wanted to make sure I had the tanks 100% sealed before covering some of the edges with fairings. I knew that I was not holding pressure, so here's what I did.

I connected the vents and returns side to side, with an altimeter on one of the lines and a plugged line that could be used for filling and such. I put in some environmentally safe R134A, and went after it with



a sniffer. I found all kinds of leaks, at the ends of tubes, altimeters, and plugs, but none at the tank itself. I tightened and adjusted clamps and such, got the sniffer to be quiet, and left everything alone. The tanks held pressure just fine. Couple hours later, sniff everything again, no problems with the tank, but several of the tube ends were leaking again. Reseal and retighten clamps, again. Bottom line, I had more problems trying to get the tube ends sealed than to get the tank sealed. The freon sniffer was finding small leaks even when the altimeter was not showing pressure drops. If I were chasing a troublesome leak, I think I would use something better than the vinyl tubing and worm gear clamps for sealing the vent tubes. The sniffer worked great for identifying the leaks and didn't leave a soapy goo on the tanks.

Norm Muzzy  
Cedar Falls, IA

8/17/00

Dear Nat and Shirley,

I wish to order an info pack. I believe I met you a few months ago and didn't even know it. I was at Georgetown Airport, TX, one afternoon reading an old article in Custom Planes magazine about the Cozy, when I saw a Cozy land to get fuel. When I saw that the N number on the airplane (N14CZ) matched the number of the plane in the article, I approached the pilot and showed him the article and said something really dumb to the effect .... "did you know you were famous?" The pilot also asked me to show the article to his wife. I just assumed it was another Cozy builder/pilot out for a day of flying. But then it starting coming together when I read on your web-page that you were a 3M'er, and I remembered seeing a 3M ring on your hand (My father, mother and brother in law were all at 3M). Anyway, it was a pleasure meeting you and Shirley, and I look forward to receiving a set of plans in the not too distant future.

Bo Magnusson  
Round Rock, TX

8/18/00

Dear Nat,

I have found a source for engines and parts, Bobby Osborne. He is located 11 miles north of Milsap VOR (60 miles west of Tallas, TX, and has a 2,400 ft blacktop strip. Bobby's Planes and Parts (940) 682-4220. I picked up my 0-320 D2J thisweekend. Everything was as represented with no problems. He said he has about 200 Lyc 0-320s and some 0-360s. The 0-360s go pretty fast. I have found Mr. Osborn to be very reputable. I would certainly recommend him to other builders as a good source for both engines and parts.

David Jones  
Reno, TX

8/25/00

Builders,

I have now joined the legions of Lycoming owners. For those of you looking for engines, I will share how this all happened. Monday morning, I received an email from Lori at ModWorks saying that she had an engine that I might be interested in. Within 4 hours I committed to buying it. From discussions

with her, I don't think it would have been there if I had waited to call the first thing Tuesday morning (perhaps even another hour would have lost it). I had been looking at several engines there previously, and made an offer on one recently, so she figured I was serious about buying. At one time I think she said that she had a list of 50 people or so that wanted to know when she had an engine for sale. They advertise in the engine section in Sport Aviation.

Advice #1: Decide ahead of time what your criteria are as far as budget, hours, damage history, etc. I have been watching the engines coming out of Mooneys, and there are several typical scenarios.

Engines with high hours coming off a Mooney that has been flying, the engine needs an overhaul or is at TBO, and the owner decided to put in a bigger new engine. History on the engine may include a prop strike.

Engines with low or midtime hours and prop strike. Owner decides to put in a bigger new engine and to sell used engine as is. They may have one of these for sale that has 115 TTSN. (Can you imagine what it would feel like to fold a front gear with a new engine?) The one that sold last week had not been started since the owner landed it in a sugar cane field and bent the prop. The engine had stopped due to a mechanic failing to tighten the mag base clamps.

There are a number of engines available that have been built from components into a freshly rebuilt (overhauled?) engine. Such as what AeroSport Power is doing. There are some privately built up engines that have been put together for either power, or weight, or durability, or a bit of all three. There are several of these for sale, you just have to make it known that you are looking for an engine.

Advice #2: When you go looking for engines, be ready to buy. Know where you are going to get the money, know where you want the engine shipped to. I ship my big stuff and heavy stuff to a company that I have worked with in the past. They have a loading dock and forklifts, and the freight companies know where to find them. As soon as the freight gets to their dock, I show up with my trailer and we get it loaded up and out of their way. Much easier than having to break down the load and take it off a piece at a time, or having to mess around trying to skid out an engine on planks.

Advice #3: Find an engine mechanic that you trust and can talk to. I had some questions about the background on my engine and feel much better about it after talking to my engine guy.

So, 4 days later (with the engine enroute) I am starting to feel more comfortable with what I did. Until I go over it with my mechanic and complete some repairs, I will not know what the final bill truly is. I bought an IO-360 A3B6D, 823 TTSN, new in 1994. Prop strike in 1998 (at 660 hrs), engine inspected by Mattituk, who opened it up, replaced bearings and some other stuff, put in new rings and signed everything off. 1999 annual had 80/80 compression. August 2000 annual, a crack in the crankcase and owner decided to put in bigger engine. The plane has been flying and engine ran great. Good maintenance records and regular oil changes with good stuff.

My mechanic said that a cracked case is not uncommon, and that we could probably repair it for \$1600 to \$2000. This can be done without pulling the pistons out of the jugs, and does not force an overhaul. With only 160 hours since Mattituk put the rings in, they are just nicely seated.

My estimate was that a fresh overhauled Lycoming with accessories would be close to \$20K. This engine comes with all accessories, but I will replace the starter and alternator with lightweight B&C

stuff and sell the heavy stuff. If things go my way, I will hang a 200 hp engine that is only 7 years old with 824 TTSN for about \$13K.

Some of you know that I was working on a Mazda installation. I still am, but it might go into my next Cozy or something else. The Lycoming is the quickest way to get the plane flying. Everything is known and available.

Norm Muzzy  
Cedar Falls, IA

8/9/00  
Builders,

The highlight of Oshkosh for me this year was watching someone pull the prop through on a biplane and telling my girlfriend that there was a large rubberband inside that they were winding. Not that she believed me, at least not for very long.

Steve Hagan  
Woodridge, IL

Dear Nat,

Last Tuesday night, August 1st, at about 11:30 PM MST, a line of severe thunderstorms moved out of southeast Montana into western South Dakota. My Cozy 204TJ was tied down at the Spearfish airport when winds in excess of 100 mph slammed in the airport and nearby city. There were numerous reports of funnel clouds and hail. Hangars were blown down and at least 16 aircraft were badly damaged or totaled. The debris field from the hangars extended for several miles from the airport. One airplane (a spam-can) that was tied down had its wings, still tied down, ripped from the fuselage which was several yards away in a twisted pile. The winds hit my Cozy at a 90 degree angle to tie down. I inspected my airplane very carefully and AMAZINGLY there was NO DAMAGE. I use spring clamps to secure the rudders when I park outside and the clamps had been forced off by the wind but the rudders were fine. The folks at Star Aviation were in disbelief that my plane was not damaged. My Cozy was tied down not more than 30 yards away from a hangar full of airplanes that was blown down. The only thing that I noticed was that the mains were moved about 6 inches and one side up tight against the tie down rope while the other side tie down rope was loose. After now putting more than 600 hours on my plane since 1996, I continue to be pleasantly surprised by the performance. What a testimony as to this amazing design built with quality parts. The aluminum planes were tossed around like tinker toys.

Tim Jones  
Jefferson, SD

6/29/00  
Dear Nat and Shirley,

Progress on our Cozy MK IV is coming along nicely. A gentleman by the name of Dennis Oelmann just delivered some parts to us. I would HIGHLY RECOMMEND his workmanship to anyone. Thank you Nat and Shirley for all that you do.

Peter Smith,  
Rochester, MN

7/3/00  
Nat and Shirley,

In the nearly 3 years we've been flying, we've taken the plane to all kinds of places. Mike's also done some racing with it, tho it's just a stock plane, nothing fancy. I enjoy it for visiting family in Phoenix, Las Vegas, and friends in the Southwest. My most frequent destinations are Santa Barbara, and Camarillo. I've also flown into Mammoth and Oakland. It's just a fabulous plane We have 570+ hours in it, and it's been a wonderful experience all the way around!.

Mike will begin training with SkyWest in August, and I will begin my master's program in the spring. We'll try to find time to fly, tho! We love it!

Liese Aufill  
Redondo Bch CA

6/25/00  
Nat,

I am Don Westerfeld and I recently purchased Bruce Elkind's Cozy (N795DB). I am currently sharing a hangar at Carlsbac-Palomar Airport with Dave Lind and his EZ. I was a 27C carrier pilot (Oriskany) that had its hull laid in '44. I never did get to land on one of the big carriers, but over 300 times on the little ones. An amazing experience, carrier landings - and night especially.

I've noticed EZ and Cozy pilots seem to have a tendency to fly a flat glideslope in comparison to my training. In the Navy we flew a 4 degree that with wind and the ship moving away was effectively a 3.5 degree. The Ezs and Cozys seem to fly about a 2 degree slope with a fairly flat angle of attack.

Do they just like a low, flat, and somewhat fast approach? And they don't deploy the speed brake until they have the runway made. They use it to bleed off the excessive airspeed from their low, flat approach.

As an ex-Navy carrier pilot of 3000+ hours, that seems foreign. I don't like changing aircraft configuration on short final even though it is center hung. And, I tend to like to fly a similar approach whether or not it is a short field landing and control the length of the roll-out by either using brakes or just letting it roll.

Don Westerfeld  
Dana Point, CA

6/28/00  
Dear Nat,

I am a former Navy carrier pilot and think that sliding into the Cozy is the next best thing to being back in a military cockpit. It is a pleasure to fly and a lot of fun on 7.5 gph! I saw the item in your recent

newsletter about the redesigned Cozy web page. I took a look today and think it is great. I was motivated to send you some information about my Cozy. It is N23CZ, plans number 108. It was built in Burbank, CA and first flew in October, 1988. I purchased it from the original builder in August 1988 with just over 500 hours on the engine and airframe. I've flown from my home base at Houston Southwest TX to Oshkosh, Sun 'n Fun twice and have made numerous trips to Augusta, GA and Tampa, FL to visit family and friends. I now have over 750 hours on the 150 hp Lycoming O-320-E2A and Great American prop. The plane was built to plans and has an empty weight of 997 lbs. It has a max speed of 180 KTAS at 2700 rpm but I usually cruise at a comfortable 2450 rpm with a TAS of 150 KTS on 7.5 gph.

I will be on the lookout to meet fellow Navy Pilot, Don Westerfeld (Editor, and Jeff Mallia, a 300 landing carrier pilot as well!) We had a local EZ fly-out from Houston to Galveston a few weekends ago. A former F-14 Naval Aviator led a VERY LOOSE formation flight. We prearranged to fly over the small outlying area airports picking up a plane or two from each. I flew "tail end Charlie" to keep an eye on the group as I was the only other military trained pilot. All went smoothly, safely and we entered the break at Galveston in a loose five plane echelon.

I was the only Cozy, but a total of 14 EZ's turned out including two flown by NASA astronauts. Frank Caldeiro, who has been training at Russia Space City for a new space station mission and Jim Voss who just returned from the most recent Shuttle mission to replace space station batteries only three days earlier! We all had a great time and there were some envious looks at the room in my Cozy cockpit from some of the Varieze and Long EZ guys.

Richard Reitz  
Houston, TX

HI Nat,

Just a quick one from England. My Cozy G-COZI is now 4 years old, no changes or mods. I just keep filling up the fuel and oil and FLY, FLY, FLY!

David Machin  
Kent, UK

6/23/00  
Dear Nat and Shirley,

Hope all is well. Sign me up for another 2 years. Thanks again for all you do for us and for sport aviation!

Robert P Irving,  
Charlotte NC

Dear Nat, 6/23/00

Dave is back from Bosnia now and planning to fly an AH-64 to Oshkosh (Editor: He was our speaker there). We are working on the spar. We just finished the top. Done in 8 hours. Not too bad. Hopefully

we will have a plane in December 2000 without an engine but paid for. Even I read the newsletters. Thanks for your help.

Barb West  
Laconia, IN

6/25/00  
Builders,

My job during the building process is to read the email and gather information requested as my partner builds. Since we moved the process to the hangar 5 weeks ago, my husband (and partner), Dan, works 10-12 hrs a day building. Every third day he goes to work for 24 hours as a fireman. I see him for a couple hours each day either before or after work. The feelings evoked as I got to the hangar and see the progress I cannot put into words. I have watched a collection of parts become a thing of beauty. I am amazed at what can be done with a set of plans, time and determination. Thanks Nat and Shirley!

For those just starting - keep going. We started this project by buying the plans for Christmas 1996. The first parts were built in April 1997 and completion should be in just a few more months.

Lori Cruger  
Mobile, AL

Did you know? 95% of pilots who crash in bad weather are buried on a clear day!

"Knowing about a thing is different than understanding it. One can know a lot and still understand nothing." C.F.Kettering

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