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COZY NEWSLETTER #34

July, 1991

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WHAT WE HAVE BEEN DOING

Shortly after sending out the last newsletter we were able to pick up the Mark IV Section I construction Manuals and the large size drawings from the printer. We shipped out 20 sets right away, and have shipped out another 23 (as of this date) since, so it looks like the Mark IV is off to a good start. The Mark IV will have its own niche in the market place, because there is no other high-performance 4-place homebuilt in the same price range. We have at least a \$10,000 advantage over the nearest competition.

We have had a lot of requests for information on the Mark IV, so our next priority job was to put together an information kit. We were very fortunate to have access to all of the air-to-air photos of the Mark IV taken at Oshkosh by Carl Schuppel of the EAA. We picked out the two best and had 8-1/2 x 11 prints made by Castle Pierce in Oshkosh. We will get reprints of the feature article by Don Downie in the next issue of Kit Planes Magazine, and that will complete our kit. Our advertising for the Mark IV will start in Sport Aviation, Kit Planes, and the EAA convention program in July.

Meanwhile, construction of our plans model is progressing. We have had to skip around a bit because we still don't have the new landing gear hardware and other hardware from Brock. We were fortunate in being able to enlist the help of Tom McNeilly on the canard and Dennis Oelmann on the wings. We designed new jigs for the turtleback and are waiting for the new canopy from Airplane Plastics. We are working with Feather Lite and our plan is to supply them with molds or plugs so they can supply optional prefab parts like the turtle back, strakes, nose cone, arm rests, etc. in addition to landing gear struts and cowlings.

We have been asked if the plans model Mark IV will be finished in time for Oshkosh 91. We wish it could be, but of course, it won't. It is flattering that some might think we could provide builder support, publish newsletters, arrange to have all these new parts made, do all this drawing and writing, answer all of the mail, and still build an airplane in less than one year. It just isn't possible, at least for the two of us. It may take us a little longer than some, but then we expect to be around a lot longer by taking a more conservative approach.

OSHKOSH '91

The dates for Oshkosh this year are from Friday, July 26th through Thursday August 1st. We generally try to arrive a few days early, to reserve space on the flight line for Cozy's to park together, and to enjoy a couple of days of relaxation before the big week end. We also leave Tuesday or Wednesday, because things get pretty slow toward Thursday.

A Cozy dinner has been scheduled at Robbins restaurant at 6 PM Friday, July 26th. Robbins is our favorite restaurant in Oshkosh. They have a big selection on the menu, the food is excellent, and the prices are reasonable. We have reserved a room for 50, which we hope we can fill up. All of you are invited to join us. We will be ordering from the menu, so you don't have to pay in advance or send a deposit. Just be there before 6 PM. If you have any questions, see us on the flight line. Our Cozy forum is scheduled for Sunday, July 28th at 1 PM in tent #8. We hope to have a good turn out of builders and pilots.

FIRST FLIGHTS

There was only one Cozy first flight this quarter that we know about, and that was Ed Mouldin's N3EP, right here in Mesa AZ. We also have a little more information on two we reported in the last newsletter.

1. Ed Mouldin has a very pretty Cozy, N3EP, which first flew on April 20, 1991. Ed purchased plans in Nov. 1983, obtained serial #21, proceeded to build and equip a shop, and started construction of his Cozy in Jan of '85. Ed and Pearlle were instrumental in our deciding to move to Mesa, first by bragging about Mesa and Falcon Field, and then inviting us down to visit, during which visit we looked at houses and purchased the one which is now our home and headquarters.

Ed is a relatively low time pilot, with most of his experience in a 150 Cessna, so all of his 3.5 hours to date have been dual (yes, the FAA allows this if the second person is declared to be an essential crew member). We are all looking forward to Ed's soloing his Cozy.

2. Todd Morgan hasn't yet written, but a friend sent us a copy of his EAA chapter newsletter, which said the following:

Todd spent five years building N2TM, but his patience and attention to detail is reflected in the quality of the product. During this period he did no flying, so he needed a refresher before facing

the crucial 1st test flight. He took his BFR in a Cessna 172, then found a friend who had a Cozy, and flew it for 2 hours to get familiar with it's specific handling characteristics. A very sensible and enlightened way to prepare yourself to fly a new type of aircraft that you're not familiar with.

His Cozy is powered by an O-360 Lycoming of 180 hp, swinging a B & T propeller with a 63 x 80 pitch. He gives a lot of credit to Darrell Moore for his support extended during the construction period, and for the many overflights of his shop, which helped keep up his morale and enthusiasm. He also appreciated Jerry McAuliffe's expertise in dealing with radio and wiring chores. After everything was checked over, he taxied out on Saturday, March 16, 1991 and ran up for take-off. It was about 10 AM. The take-off was accomplished without a hitch. In his climb out he found that he had a remarkable 2,000 fpm climb at 110 knots. He climbed to 5,000 ft. and circled Brown Field for 1 hour before coming in for a text-book landing. He reports that during the flight everything was "in the green, and no adjustments were required. Since then he has put 14 hours on the aircraft, in just 1-1/2 weeks! That attests to the caliber of both the aircraft design and his workmanship. He has an objective of getting his flight restrictions flown off so he can attend our Ocotillo Wells Fun-In. He should make it!

Since Todd works in construction, Paul Hanson had to add a bit of humor by making this comment, "Todd's workmanship on the Cozy would indicate that he'd be a good construction finish man". Marshall Randall, one of our Chapter Technical Councilors, observed in all seriousness, that if Todd showed the airplane at some of the larger Fly-Ins, he would be assured of being awarded a trophy. Well done, Todd, and congratulations!

3. Greg Bastins first flight of his Cozy VH-CZY (in Australia) was Dec. 13,1990. He telephoned to say that he does not have enough time on it yet for a full report for the newsletter. Last October he had written me as follows:

Oct. 9, 1990

Dear Nat,

Well, it is only weeks before Cozy VH-CZY takes to the skys. It was transported to the local airport with the canard on it on Oct. 6. Of course it was well above the legal width, but with the help of several friends, including a Long EZ pilot who brought his unmarked police car with blue light, the trip was uneventful. By 8 AM the Cozy was in the hangar with main wings on. I will let you know when it flys and I will write an account for the newsletter (by the way, keep up the good work).

Nat, the only problem I have is the gross weight. I looked over my original estimates last night, which I worked out over 3 years ago. I took yours and Uli's weights and changed them to reflect what I planned to put in mine. My estimate was 1087 lbs empty. This includes a full HSI system, dual Navcoms, Omega nav system, and a 3 bladed variable pitch prop. By now, I guess you are sick of hearing of all these weight additions, but it was my dream (nightmare!) to build a long distance fully IFR equipped tourer. By the way, I didn't put in an auto pilot as I considered it too heavy!

This leads me to my next problem. We weighed the Cozy yesterday and well oh ohh it weighs 1106 Lbs!!! which I guess is the heaviest Cozy to date, but I feel that the brand new 160 hp O-320 and 3 bladed variable pitch prop will overcome the weight problem. As you are aware, the USA has a lot more freedom than we do (in Australia). As it stands, I can fly the Cozy solo with

full fuel if I weigh 40 KG or 2 up with about 2 hours fuel-not an exciting prospect. To be a useful aircraft, I need to increase the maximum take-off weight to 1800 Lbs, which I will only use for trips. I plan to fully flight test the aircraft and work up to this weight provided it is within cg., of course. I will also limit the landing weight to 1600 Lbs and no high G maneuvers above 1500 lbs. I hold an Australian Senior Commercial pilots license, instructor rating, and instrument rating. I don't take this lightly, the aircraft will have to be fully flight tested.

The only problem is the Civil Aviation Authority will not permit me above 1600 Lbs. without special approval. Will you help?

Kind Regards,
Greg

Editor: I believe that Greg was able to get the approval he sought.

BUILDER HINTS

1. The 3/8" dia. cold rolled steel rod installed in the leading edge of the ailerons is barely enough weight to balance the ailerons, and most builders have difficulty making their ailerons light enough to balance. To make matters worse, RAF now recommends overbalancing the ailerons to reduce hinge wear due to vibration (not flutter) excited by the engine and prop. This has required the addition of lead tape over the 3/8" CRS rod. For new construction, a better solution is to substitute 7/16" CRS rod in the leading edge, rather than 3/8" as called out in the plans. It is available in 6' lengths from either Wicks of Spruce.
2. Some time ago one of our builders experienced a pronounced vibration of his Cozy which occurred at certain airspeeds. He finally traced it to loose wing attach bolts. Recently a second builder had the same experience. They discovered what was wrong by shaking the wing tip, and they noticed a slight movement between the wing and the strake. Both thought that they had tightened the bolts, but the threads had "bottomed out" before the bolts were tight. Either the bolts were too long, or they hadn't used the right number of washers. Loose wing attach bolts are dangerous. Bolts which are many times stronger than necessary in tension could fail in shear if they are pounded long enough. Check your attach bolts. If more than 2 threads extend through the nut, add another washer.
3. Propeller bolts are in a similar situation. They must be in tension. If the threads "bottom out" before they are in tension, they will fail in shear from fatigue in short order. Check your prop bolts. Install one without any washers and turn it in until it bottoms out. Observe the gap that is left between the bolt head and the crush plate. Use enough washers to fill this gap plus one or two more.
4. Antenna location. We have used, with good success, homemade antennas (from Radio Systems Technology) for all radios and avionics except loran, where we thought the factory whip antenna might give a slight edge, and ADF, where we used a King electronic antenna. Recommended locations are as follows:
 1. Transponder. In the nose ahead of the rudder pedals with the probe extending through a 1/4" hole in the bottom of the fuselage.
 2. Nav. There are two good locations. The first is underneath the skin on the bottom of the canard, legs extending forward and offset to the radio side. The second is under the skin

- on the bottom of the fuselage, legs extending forward on either side of wheel well.
- 3. ADF. Use King electronic antenna and locate inside cockpit under right front seat.
- 4. Loran. Make mounting plate from 1/4" alum. and install it under the skin, bottom of fuselage, slightly off center, just aft of landing brake. Make ground plane from strips of copper tape, covering as large an area as possible, and interconnected with 3M conductive adhesive tape #1183. Ground ground plane to negative terminal of battery.
- 5. DME. Mount in the open space inside the strake tip.
- 6. Com. Located under skin of winglets, per plans.
- 7. FM and/or Marker Beacon. Under skin mid-wing.

FUEL LINES

A month ago I decided to take the 3-place up for a spin. It hadn't been flown for about 5 months. I aired the tires, charged the battery, checked the oil and pushed it out. I was going to pull the prop through a few times, so I turned on the fuel valve and boost pump and then walked around to the rear, and was horrified to see fuel gushing out of the cowl.

I pulled the cowl and discovered that my fuel lines were leaking like a sieve; not at the fittings, but right through the braid. They were Aeroquip type 601 with a stainless steel braid, and just two years old. I had purchased them to replace the previous ones, which were under recall. These were supposed to last more than 10 years.

The lines had the little metal tags on them giving the identification and the date purchased. I took them back to Varga, the local Aeroquip dealer. They said these lines were not under recall, and mine was the first complaint. They sent them back to the factory to examine, and said I would have to purchase replacements, and wait to see whether Aeroquip would give me a refund. I opted to go with Teflon and stainless braid this time. I consider myself to be very lucky this happened on the ground without the engine running.

I don't know if you can have complete faith in any fuel line. I would strongly recommend checking for leaks before every flight, by turning the fuel valve and boost pump on and checking the engine compartment before climbing in and hitting the starter.

EXHAUST PIPES

The Rutan Aircraft Factory reported in the last Canard Pusher that there has been a rash of reported exhaust pipe failures in Variezes and Long EZs. One pipe was reported to have gone through the prop and splitting one blade to the hub. It wasn't stated whether the failures were with the old design, without flexible joints near the flange, but that is our presumption. An exhaust pipe failure is a pretty serious event which can damage a cowl and prop, and force an immediate emergency landing.

Exhaust pipes are subject to severe conditions. They are repeatedly heated to cherry red and then cooled, subjecting them to expansion/contraction stresses. They are continually vibrated while at elevated

temperatures. They do not last forever and need to be inspected routinely for cracks. If they do not have flexible joints near the flanges, they tend to crack there. Fastening two pipes together rigidly is a no-no.

There is a need for a simple, 4-pipe exhaust system with flexible joints and a good heat muff which could provide both carb and cabin heat. We are working on it and will have more to say in the next newsletter.

LORAN UPDATE

We sent our M1 Northstar in for updating, and they programmed it to use the new SOCUS (south central US) and NOCUS (north central US) transmitter chains, but said the following restrictions apply:

SOCUS chain 9610(AZ, NM, TX, LA, AR, KS, CO, WY, UT)

- 1) The ASF corrections have not yet been developed, so accuracy is not yet optimized.
- 2) The Las Cruces NM transmitter is not yet programmed into the chain, but this will not significantly reduce the M1 's performance with this chain. NOCUS chain 8290 (WA, OR, ID, MN, WY)
- 1) The chain is programmed into the M1, but the chains not yet certified, so the chain should not be used for navigation.
- 2) If the chain becomes operational without any further changes, the M1 can use it without being updated. Great Lakes chain 8970. A new transmitter has been installed in Oklahoma to improve coverage, and the M1 has been programmed to use it. The transmitter has not yet been made operational, because some brands of loran will not operate correctly when receiving it.

FOR SALE

1. 0-235 C2C Lyc 825 hrs. since new w/prop & mount, needs mags, \$3,500. Contact Keith Hall (316) 697-2455 or (316) 697-4268.
2. 62 x 62 Sturba prop for 115 hp with AN76 bolts. Contact Steve Russell (815) 248-2719.
3. Cozy project through fuselage assembly. Excellent workmanship. \$1,500. Contact Tom Carver (208) 245-3944
4. .041 dia. high temperature, high tensile wire for hot wire saw. Contact John DiMilia (201) 206-4282.
5. Nose gear crank ratchet. Don't take a chance on your gear coming down in rough air, or retracting when taxiing over bumps. Simple, effective, and easy to install. \$34.95 from Curt Smith, 1846 Sextant Drive, Worden IL 62097 (618) 656-5120.
6. Shimmy damper, the best available. Retrofit on the Brock castoring nosewheel assembly. \$71.48 from Bob Davenport, PO Box 650581, Vero Beach FL 32965-0581 (407) 567-1844.
7. Aileron/rudder hinge kit. Prevents hinge wear. Teflon tubing and stainless wire replaces original hinge pin. \$21.00 from Gary Hall, 851 SW 63rd Ave., N. Lauderdale FL 33068 (305) 971-9731

(H) or (305) 974-6610 (W).

ENGINE OVERHAUL - WHAT DOES IT MEAN?

(Extracted from the "Lycoming Flyer")

According to FAR Part 43.2, an engine may be described as overhauled if:

1. It has been disassembled, cleaned, inspected, repaired as necessary, and reassembled, and
2. It has been tested in accordance with approved standards and technical data by an appropriately certified mechanic. An overhauler can meet the minimum FAA requirements for a major overhaul if, after disassembling, cleaning and inspecting, he replaces any parts which are worn beyond service limits, reuses worn parts which still meet service limits, runs up the engine and determines that the static rpm falls within the limits specified for the engine and propeller. Is the engine actually producing at the certificated power level and how long will it be until the service limits parts wear beyond those limits? These are questions no one can answer. Always make sure to find out more about an overhaul!

ENGINES

We have always considered automobile engines to be a poor second choice to use in airplanes, particularly experimental, because they have the additional requirements of a water cooling system and speed reduction, have to be converted to dual ignition, they are more difficult to install, usually weigh more, and cost as much as a used aircraft engine. It has been predicted that with the practically non-existent factory aircraft production, and the popularity of home building, the supply of used aircraft engines will dry up. Over the last 15 years we have purchased 2 good used Continentals and 3 good used Lycoming without any particular difficulty but, when you introduce and start selling plans to a 4-place airplane which could become quite popular, you wonder whether all of your builders will be able to find suitable engines 5 to 10 years from now. From what we have been able to gather, we think the automobile engine conversion which shows the most promise is the 13B Mazda rotary, with a planetary gear reduction by Lou Ross. We like it because it is in the right horsepower range (150 to 180), it has a streamlined shape, is compact, is lighter than most other conversions, already has dual spark plugs, and has very few moving parts. Lou has received quite a bit of favorable press, and we were favorably impressed when we visited him a year ago. The proof of the pudding, though, is to get at least a few hundred hours of favorable experience in a Cozy (or Long EZ). There are several tractor types flying with Ross conversions, but no pushers yet to our knowledge.

One of our Cozy builders, Jacques Genest in Montreal, has a 13B, has already built his engine mount, ordered a gear reduction unit from Lou Ross, and engineered (on paper) the installation in a Cozy. Unfortunately Jacques does a lot of traveling and isn't very far along on his project. I discussed this subject with him by phone and he answered in a letter. He says:

1. He has a partner who is moving to Wichita for two years and Jacques will be doing a lot of

- traveling too, so it will be some time (probably years) before he will be ready to fly.
2. He built the mount to fit the same attach points as in the plans, and added two extra supports to the lower comers of the firewall.
 3. The cg. of the engine/reduction unit is favorable, so he provided 3.5 inches clearance at the firewall and doesn't require a prop hub extension.
 4. He and his partner would be willing to complete the engine (make it ready for installation) and loan it free to someone with a proven airframe in order to compare Performance with that of a Lycoming.
 5. Jacques would be willing to use his vacation time to work on the project (10 days at Christmas and 3 weeks in 1992).

This is really quite a generous and remarkable offer on the part of Jacques. If any of you out there with completed Cozys are interested in getting involved in engine development work, please let us know.

There were eight pictures here -

1. Greg Bastins fully IFR touring Cozy in the land down under.
 2. The Mark IV fuselage tub through Chapter 8
 3. [Dave Chapman's](#) strakes under construction. Note elevated turtleback.
 4. Mark IV turtleback jig is very easy to make.
 5. Ed Mouldins Beautiful Cozy N3EP right here at Falcon Field, Mesa, AZ
 6. Dave Petrosino's Cozy in Alaska last winter, Should be flying soon.
 7. Interior of Jeff Russell's beautiful Cozy. Note Space saver panel, etc.
 8. Mazda 13B rotary with LOU ROSS planetary gear reduction on test stand.
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