

THE COZY NEWSLETTER, #5, April 10, 1984

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TABLE OF CONTENTS

- [WHAT WE HAVE BEEN DOING](#)
- [PROGRESS-PROOF OF PLANS MODEL](#)
- [PROGRESS ON PLANS SECTION 1A](#)
- [CORRECTIONS – NEWSLETTER #4](#)
- [CORRECTIONS – PLANS](#)
- [BUILDER HINTS](#)
- [DESIGN CHANGES](#)
 - [Long EZ Rudders](#)
 - [Q200 Canard](#)
 - [Non-aircraft Engines](#)
 - [Larger Engines](#)
 - [Starters](#)
 - [Leaving out Landing Brake](#)
 - [Substitute Materials of Construction](#)
- [GENERAL](#)
- [T-SHIRTS AND HATS](#)

It is mandatory for all COZY builders to subscribe to this newsletter, as this is the only formal system we have for communicating plans changes and/or corrections, builder hints and other information of interest to builders and prospective builders. Issues prior to No. 4 are not necessary, in that they were only reports on the progress of plans, and extra copies are not available. Starting with issue No. 4, the newsletter will contain important builder information. We will try to keep the subscription price low, so cost won't be a problem.

When writing to Co-Z with questions, please send along a stamped, self-addressed envelope. Please leave space after each question, so we can fill in the answers (without having to rewrite the question) and return on your original.

If you call, please call me at home (612-776-1145) after regular working hours (I'm not retired yet) or on weekends. We have visitors dropping in to see the proof-of-plans model in our garage or the prototype hangared out at Anoka Co. Airport, 20 miles away. So far, we have been able to handle it.

June 1, 1984, the following new prices become effective:

Information kit \$8.00

Newsletter \$5.00/yr.

Plans \$210.00

We have not as yet programmed our computer to print expiration dates on the mailing labels, but hopefully we can get to this after more urgent business is completed.

When you receive your plans, don't neglect to sign and send in your license agreement (Chapter 1, Page 4), so we can issue your serial numbers. Also, don't neglect to mark in the corrections published in the newsletter. In spite of our best efforts, errors do creep in, and we will publish them as soon as they are discovered.

Please check your plans when you receive them to determine that there are no missing pages. We don't know of this happening, but we don't want anyone to leave one whole page out of construction (The manuals were put together by the printer, and it isn't possible for us to check each one).

We are making such good progress at the moment, we hate to take the time out right now to write, print, and send the newsletter, but we owe a progress report to all you good people.

WHAT WE HAVE BEEN DOING

We didn't mention it previously, but we have been blessed with 4 wonderful children. Some of you may have met some of them last year at Oshkosh--two doctors, one dentist, and one dentist to be. Quite recently we have been becoming grandparents several times, most recently just before Christmas, and we take a little time off now and then to visit them (or to baby-sit). We also signed up for 2 weeks vacation in Mexico during February--our first vacation in 2 years. I felt guilty, but enjoyed it. Our mail load has picked up, what with answering letters, sending out info kits and plans. We also put together a press release to about 40 aviation publications and had advertising copy made. Alternately, I work on Section IA of the plans and then on constructing the proof-of-plans model. Haven't had a chance to fly since late last fall--just too busy! We turned down an invitation to enter the CAFE 400, even though we were practically assured we would win the 3place category. But I didn't think I could afford the 2 weeks it would take to get ready for the race and all the required activities involved.

PROGRESS PROOF OF PLANS MODEL

The proof-of-plans model is now on its gear, centerspar installed, nose and nose gear complete,

controls about half installed, turtle back built and installed, and canopy being fitted.

Working out the best method of constructing the turtle back was a big accomplishment, because I wasn't at all satisfied with the method I used for 22 CZ. We took some very accurate measurements and templates from 22 CZ at the airport, and then constructed a female jig. The first layup didn't produce perfect results, so we modified the jig a little and also the technique, and the second one turned out perfect. We have documented all the dimensions and procedure, so it should be a snap for anyone else. We made a mold from the turtle back and hope to arrange for it to be supplied prefab for those who have more money than time. With the turtle back done, I sent templates and dimensions to the Airplane Factory and paid for construction of canopy tooling. The first canopy from the tooling arrived last week, and was a perfect fit. I have asked the Airplane Factory to make a slight adjustment in their blowing and trimming so it will be ready to glass in place as received.

You ex-EZ types should appreciate this, because trimming EZ canopies is a big and scary job. We specified blowing the canopy from 3/16 in. acrylic, rather than 1/8 in. like the EZ, so it will be less prone to breaking. Canopies will be available in clear and lightly smoked. The smoked are a little more expensive but look awfully nice. We haven't received the side windows yet. Tooling for them was more complicated, because they will be drape-molded.

It was another significant accomplishment to get all of the special prefab parts for the control system, trim system, engine mount and firewall drawn up and off to Ken Brock. The rudder pedals are the only parts we have received back so far and approved.

Most recently we have been hard at work re-contouring the cowling. The 22CZ cowlings fit too close around the exhaust pipes, and the paint kept blistering. They were also designed for a 3 in. prop hub extension and I used a 5 in. We provided a little more space around the pipes, smoothed out the alternator blister, extended them aft another 2 in., and lessened the sweep underneath. They look very nice and give me a couple of extra mph as well as saving a little weight over my originals. It was a big job, though. We have just completed making the molds, and two sets of new cowlings from the molds. We plan to turn the molds over to a fabricator to supply all of you. We have in mind Quality Aircraft Components, in Wisconsin, but want to visit there and inspect their work first.

Last week we wheeled the proof-of-plans model out of my single car garage for the first time (spring is finally arriving in Minnesota) and the lines are very pleasing. Deepening and widening the fuselage at the front seat really improved the looks.

PROGRESS ON PLANS SECTION IA

Chapter 15 (Firewall) and 16 (Control System) are complete now except for typesetting. All of the parts for Chapter 17 (Trim system and landing brake) are designed and out for proof. One half of Chapter 18 (Canopy) is done. This work should go faster after we have the prefab part suppliers all set up and have finished installing the canopy and cowlings. In the meantime, we are supplying builders with advance copy if needed. Fortunately there are only 2 this far along, because it is extra work. Actually, we are in danger of getting passed up by these 2 eager builders, which keeps the heat on us.

CORRECTIONS - NEWSLETTER #4

-Chap. 4, p.2, Fig.3 should have read Chap. 4, p.2, Fig. 11; Change 13 in. dimension to 14.5 in. and 3 in. dimension to 3.5 in.

-Chap. 7, p.3, 3rd par. should have read Chap. 7, p.1, 3rd par.: The template shown on A-5 is a little too large. Remove material from the top of the template from 1/4 in. on the left to 1/8 in. on the right.

CORRECTIONS - PLANS

-Chap.2, p. 1, MG-1L and NG-1L are no longer supplied by Rutan Aircraft Factory. Order them direct from Task Research, 848 East Santa Maria, Santa Paula, CA 93060. (805) 525-4545

-Chap.2, p.2, Miscellaneous: Add two B-10 universal joints

-Chap.2, p.5, Miscellaneous: Add two B-10 universal joints

-Chap.5, p. 3, Section AA: 1/2 in.(typ) should read 3/8 in.(typ)

-Chap.9, p.5, Fig.27: Main gear strut extends 1/2 in. beyond axle flange, not flush as shown.

-Chap.13, p.6. last par: 2 mm should read 0.2 in.

-Chap.13, p.10; Change 11.5 in to floor to approx. 13 in. to floor. Drawing A-8 shows correct location of NG 65 passing through center of instrument panel at W.L. 14.5 (8.5 in. below top of longeron).

-Drawing A-5 matches to drawing A-4.

-Drawing A-8: Roll trim screws are reversed. They will be shown correctly in Chap.17. Pitch trim bracket design has been changed slightly. See Chap.17 for detail. Roll trim arm at forward end of torque tube will mount with 2 bolts, and will be shown correctly in Chap. 17.

BUILDER HINTS

1) Save your scraps of foam. Foam is expensive, particularly PVC. Many parts can be made from small pieces glued together (5-min.) at no sacrifice to strength. Save the large sheets for the large parts.

2) Jack Wilhelmson says a hot melt glue gun works better than 5-min.

3) French ski pole grips make excellent stick grips, left and right. Eat your hearts out, those of you

- who live in sunland. 4) Micro joints, used to hold urethane blocks together, interfere with contouring and will cause a bump when glass is laid over them. Undercut all joints with your Dremel before shaping and before glass layup. Fill undercuts with fresh micro just before making glass layup.
- 5) Anticipate where BID overlap joints will occur on flat or curved surfaces and sand slight (1/32 in.) recess in foam so overlaps won't cause bumps in finished surface.
- 6) Epoxy is expensive; don't throw excess away. Mix microballoons into a very thick paste (most people mix it too thin) and trowel over your finished fiberglass parts. This will save money and time later on in finishing (rough up the surface with 36 grit first).
- 7) The more balloons you put in, the lighter and the easier it will be to sand later. Adding a few drops of MEK or acetone will let you mix in more balloons, but be careful not to do this over styrofoam layups (wings, winglets, canard). The solvent dissolves styrofoam!
- 8) Notice how difficult it is to trowel micro smooth? Try putting peel ply over the micro and trowel over the peel ply (be sure to remove peel ply after cure).
- 9) Ever have bubbles under a layup that come back after you work them out? If you let them cure, you have to fill them with epoxy from a hypodermic needle. Better, before cure cover area with Saran wrap and squeegee the air out. The plastic will prevent the air from returning.
- 10) When bolting axles to gear strut, use slightly longer bolts so you will have enough threads left to install wheel pant brackets later on. Use one or two extra washers under each nut in the meantime so you can tighten nuts without running out of threads.
- 11) I think aluminum doors (nose access, canopy latch access, cowling, etc.) are ugly. Much nicer solution is to use the piece you cut out for the door. You will have to make a very careful precise cut. Use a hand-held hacksaw blade. Cut a taper in the blade with tin snips so you can saw around a radiused corner. Take the piece you cut out, contour the foam on the backside smoothly to 1/2in. bare fiberglass along all the edges, and glass the back side with 1 or 2 layers BID. Cover back side of door with thin plastic (dry cleaning bag), bondo it in place in the opening, and lay up a flange all around the back side. Make adequate provision for hinges, fasteners, etc. You will end up with a much neater, flush door installation.
- 12) Removable pitot tubes can save a lot of pain (from bumping into) and heart ache (being stepped on in nose down parking). Try making a removable one from a 1/8in. pipe coupling and a 1/8in. pipe plug (use AN fittings) with a 1/4in. hole drilled through the pipe plug. Slide the 1/4in. alum pitot line through the pipe plug hole and flare the end slightly. Screw the coupling on the plug and pot the tube, plug and coupling in the nose. Plug the hole with a pipe plug during construction. Replace the plug with a 1/8 in. pipe to hose adaptor for a pitot when you are ready to fly. Make sure you have a fool proof system to remind yourself to install the pitot before flying--like hanging it on your ignition switch.
- 13) Don't cut holes in your panel until everything else is all done, and you have purchased your

instruments and radios and decided how to arrange them. Most builders change their minds many times during construction. When you are finally ready, make a mock panel first, exact size, from 1/4in. plywood and mount your instruments and radios. I did this and turned over the whole thing to an electronics whiz to make the electrical harnesses in his own shop on his bench. This will proof your layout and give you practice so you don't screw up the real thing.

14) You can cut the holes a little undersized Find the right size jar (at home or in the grocery store) with slightly tapered sides. Glue 80 grit sandpaper around the outside and grind the ID of the instrument holes to exact size.

15) We acquired an extra supply of vinyl wood-grain(brown with black background) burl wood with pressure sensitive acrylate adhesive on the back. We have used it for two airplanes so far. It gives a beautiful wood panel which enhances the black instruments. Send \$3.00 and we will mail you enough for one airplane, while the supply lasts.

16) Planning to use Loran? See March Sport Aviation article by Jim Weir from RST. Looks like a lot of work. Is it worth it?

17) Antenna hint. Plan locations ahead of time and bury the copper foil and coax in the layups. If you use slightly wider foil tape (like 3/4 or 1 in.)you will have broader band coverage and greater chance of success. Antenna kits are available from RST, Grass Valley, CA. Keep transmitting antennas as far away from receiving antennas as possible.

18) Your friendly aircraft salvage dealer is a good source of all kinds of aircraft hardware and gear at friendly prices. Don't overlook the Fly Market at Oshkosh. Make out your shopping list ahead of time and get there early. The bargains go fast. Stock up on miscellaneous AN3 and AN4 bolts. You are bound to run into situations where the specified bolt isn't quite the right length.

DESIGN CHANGES

We are occasionally asked whether we intend to make any design changes to the Cozy (for example the new Long EZ rudders, Q 200 canard, etc.) or whether we would approve changes proposed by builders (for example larger engines, starters, etc.). A restatement of our policy, which is consistent with EAA policy, appears in order. Namely, that we cannot recommend or even encourage a design change which involves the structural integrity or the flight performance of the aircraft unless we have first tested it ourselves and determined that it is safe and would enhance our original design objectives.

Aircraft design is a very complex matter. In spite of all the knowledge which has been compiled, and all of the powerful computer programs which are available, there are many interacting variables, not all of which are known, and the exact flight behavior can only be determined by actual flight testing. The canard configuration, which offers many advantages, is still relatively new, and not all canard designs have been as trouble free as those of Burt Rutan. Burt Rutan canard designs have been flying for almost a decade now, the numbers have swelled to probably over 1000, and they have probably been tested under actual use conditions more extensively than any other homebuilt. The Long EZ is

the embodiment of all the best features of those designs which preceded it, and we attempted to stick as close to the Long EZ design, aerodynamically and structurally, as possible, changing only those which were absolutely necessary because of the wider fuselage.

A great deal of thought and study went into the design concept for the Cozy. Various options available were considered, and those which were selected were done so on the basis of best meeting the design objectives, that is, a comfortable, safe, efficient, high-performance, side-by-side, cross-country airplane, without any unnecessary frills. It is possible that not everyone would agree on the selection criteria embodied in the Cozy design, and the requirements (c.g. management) or restrictions (front seat weight limitations) imposed by this design. To them we must say that they should either select another design more to their liking, or else undertake the development of their own design, assuming full responsibility for the risks involved (both limb and money) and the flight testing required. Our obligation is to explain and to instruct how our builders can build an airplane like N22CZ, with those refinements of design and technique we learned while building it, and are incorporating in the plans. We will not consult on other designs.

Against this backdrop, we can comment on several specific subjects:

1) Long EZ Rudders. Similarly to the Long EZ, larger rudders on the Cozy would lessen or eliminate braking on cross wind taxiing and cross wind take off. In normal flight operations, there should be no effect, because very little rudder is used. The only question is what would happen in unusual maneuvers, such as in a steep side slip, and this is why it will be necessary to perform flight tests. There were a few Variezes which, because of builder differences or aft e.g., or whatever, would lose lift on one wing in an extreme side slip, initiating a roll. When this was discovered, RAF restricted Varieze rudder travel to 2 inches. This is probably the reason Burt used larger winglets and smaller rudders on the Long EZ. In due course, we intend to test the new rudders, and if they appear to perform exactly as on the Long, with no undesirable characteristics, we will approve them. In the meantime, if any builder gets to test them before we do, we will appreciate a detailed test report.

An important point to make is that because of individual builder differences, even when following the same plans, two airplanes may not perform identically, so each builder must test his own airplane (at 10,000 ft. with a parachute) to determine its behavior in unusual as well as normal attitudes.

2) Q 200 Canard. Do we intend to test it? No! The new canard on the Q 200 was designed to solve a serious problem, peculiar only to the Q 2, and that is, insufficient pitch control to overcome the slight loss of lift caused by rain or bugs. In the Q-2, the canard is the main wing, and a greater loss of lift on it than on the aft wing, if there isn't sufficient elevator authority, can lead to a life-threatening situation. Without slotted elevators, the elevators couldn't compensate. Apparently the new airfoil solves this problem but it is too soon to know whether it will cause any new ones. I have heard that the airfoil has an undesirable pitching moment. It also has a thinner cross section, which could increase the likelihood of broken canards during hard landings.

Burt Rutan has employed a number of different canard airfoils on his different designs. To date, he hasn't found anything better in all around performance on the Varieze and Long EZ than the GU airfoil.

3) Non-aircraft Engines. The cardinal rule is, you don't use an experimental aircraft for an experimental engine evaluation. You use a Piper Cub or a Cessna 150 so your forced landings will be easy and you won't attract too much attention and bad press. What we don't need is some irate congressman suggesting more regulation of homebuilding. Also, be prepared to spend a pile of money and don't feel bad if you fail. Most people do (both).

4) Larger Engines. We continue to be questioned about larger engines. Perhaps we need to be more emphatic. The approved engine is the Lycoming O-235 series, the model L2C with mechanical fuel pump preferred, which is the one that we have demonstrated, and the one we consider optimum. For those who are not easily dissuaded, consider the following:

a) The O-235, without starter, is the heaviest engine installation approved by Burt Rutan for the Varieze and Long EZ. The engine mount structure on the Cozy is similar to the Varieze and Long EZ. I don't know how much stronger it would have to be.

b) Other engines might be cheaper, but that is because they are less desirable, and will cost more to operate.

- a. The extra power available for takeoff is offset by the heavier engine weight and the extra fuel you will have to carry to travel a given distance. Same consideration applies to rate of climb.
- b. Remember that you would be trading hoped for shorter take off distance or longer landing roll. Heavier engines require faster approach speeds and more mass to slow down to a stop. You can start your take off roll at the very beginning of the runway, but few pilots can touch down safely at the same spot.
- a. If you have a heavier engine, you will have a lower useful load for a given gross weight. This, combined with fuel consumption, means more frequent fuel stops, with attendant waste of time on the ground and time and fuel climbing back to altitude.
- b. It is fun to brag about top speed, but you will probably find it more sensible to cruise at less than full power. Drag increases as the square of velocity. As you approach 200 mph, propeller efficiency drops off significantly. You will find that the amount of power required and fuel consumed to gain 10 mph at the top end is rarely justified. You can go almost 50% farther at economy cruise than at full power cruise. So if you aren't going to cruise at full power anyway, why not use a smaller, more efficient engine.
- c. With excess power it is tempting to show off. This isn't always premeditated, it is just spur of the moment. Hot dogging causes accidents in an otherwise safe airplane, and gives it a bad name. This design was optimized for efficient cross country travel, and is classified in the "normal" category to discourage any thought of acrobatics.

5) Starters. We are following RAF's practice in not approving installation of starters. On the Lycoming, the starter is positioned near the propeller--the worst possible location for c.g. considerations. Installing a starter on your O-235 is essentially equivalent to installing an O-320, without starter. The starter represents a 25 lb. anchor installed on the tail of your airplane which is a 100% liability in the air, since the propeller will windmill anyway when the engine isn't firing. The

starter's only useful function is on the ground, where hand propping can easily be substituted. It is much safer to hand prop a pusher than the other kind, for the following reasons:

- a) With a pusher, you don't have to reach through the prop to grasp the trailing edge. It is the edge closest to you.
- b) Any air blast pushes you away from the prop; it does not suck you into it.
- c) If the airplane moves when the engine starts, it moves away from you, not toward you.

This does not mean that you can afford to be careless, but it is an awful lot harder to hurt yourself propping a pusher.

6) Leaving out Landing Brake. We were asked by a very experienced pilot if it was O.K. to leave out the landing brake. He was very skilled at side slipping. We don't like this idea. Side slipping involves extreme cross controls, requires skill, and thorough familiarity with aircraft behavior which one wouldn't have during early check out stages. Sooner or later, a less skilled pilot might fly such an airplane. An air brake is a very useful tool to have available, just in case you need it. Even if I don't use it in an approach, I always pop it out after touch down to slow down the roll out, rather than getting on the brakes. It can also be used to shield the prop when taxiing over gravel. It is a useful tool!

7) Substitute Materials of Construction. Recently, on TV, they were talking about counterfeiting. Products that look just like the original, but grossly inferior in quality. So what do you say to someone who has found a cheap source of foam at the local lumber company, or a cheap source of epoxy at the local chemical company, or a cheap source of glass cloth at the local fabric store? The only way to be sure you are using the correct materials is to buy from an approved aircraft supply company. They have a long term interest in aviation and a reputation to protect. The materials they supply will be correct. This assurance of quality may appear to cost you a little more, but you will save in the long run. Sooner or later, shopping for bargains, you will get stung, and it will off set any savings you may have made earlier. It could even be worse! We know, its happened to us!

GENERAL

We receive some very nice letters. Quite a few people have expressed appreciation that we pioneered the side-by-side design and demonstrated it was possible. They also appreciate our efforts to make the design available to others. Here is a recent letter:

"Dear Nat,

I have just read your comments on larger engines in CZ#4 and find I am forced to correct part of what you said. Fully agree with your philosophy on weight control as the way to build, but your 85 h.p. Varieze's speed advantage over most 100 h.p. Variezes was not the result of lower weight. Your higher speed had to be related to lower drag resulting from more careful rigging and construction,

better surface contour control, better fairing, etc., just as the performance of the Cozy is enhanced by these items. At gross weight, a 10% reduction in weight of a Long EZ will result in about 2 mph speed increase, but will result in over 150 ft/min increase in rate of climb. This is where the ounces pay off-as well as at take-off.

I'm building a Long EZ, with the structure just about complete, but I sure wish it were a Cozy with that nice, wide front seat and panel. You certainly are to be commended for developing the Cozy, it's a masterpiece and I'm recommending it to anyone considering the Long EZ,

Congratulations,

John D. Meyer

11700 Tesla Rd.

Livermore, CA 94550

Pres.,EAA Ch.663"

We would be interested in hearing about your progress and receiving pictures.

We are following the progress of Ulrich Wolters in TX and Jack Wilhelmson in SC closely. At last count, Jack was slightly ahead. He is mounting the canopy. Don't think either will make Oshkosh this year, but they should be flying shortly thereafter.

It will be exciting to see the first (and all thereafter) plans built Cozy show up at Oshkosh. We can share experiences and make sure a Cozy receives recognition in the award ceremony (ours didn't because it didn't qualify as the best Long EZ). We have scheduled a forum at Oshkosh again in 84 for 9 AM Mon., - July 30th. Hope we can meet many of you there and have some good discussions.

In one letter we were asked what was the not-to-exceed speed, above which the Cozy would come apart? I said I didn't know and I hoped I never found out. From the last Canard Pusher I read that that has been determined for the Long EZ. Its somewhere over 400 kt. I think you have to go straight down to go that fast!

T-SHIRTS AND HATS

We have noticed that people like to brag about airplanes they are building (we do!). So we made arrangements with a quality house to supply quality T-shirts and hats with a picture of the Cozy on them. The inscription on the shirts says "We like to be Cozy in a side-by-side." We paid for the artwork, so they are yours at cost plus 10% postage. Order them direct from CUSTOM TOPS. Pertinent info is:

P.O. Box 55386

Tulsa, OK. 74155-1386

Office 918-665-4519

Home 918-371-5789

We lost our good deal on trailer rental at Oshkosh. Dick Wieland's wife died and he is moving away.

We are setting up another one (we think) with Schiek's Camping Center, 406 E. Main, Eden, WI 53019 (414-477-4561) They will charge \$205 for 12 days, delivered 5 days before the fly-in starts, to get a good spot in the woods, plus a \$50 deposit. Registration and camping fee is extra. The campers sleep at least 6 people, so if you want to share, it would be less expensive. They can help out a few more. Make your own deal, and let them know you want to share, if that's what you want. Then they, rather than we, can co-ordinate things. We would enjoy it if you would request the same spot in Paul's woods that we are requesting.

See you there!

January 19, 1984

Mr. Nat Puffer

Co-Z Development Corp.

2182 No. Payne Ave.

St. Paul, Mn 55127

Dear Nat;

We are happy to hear you are doing well with your plane. We would like to build a Cozy; however we work out of a 2300' runway with power lines at one end. it is a grass strip, therefore we feel it probably wouldn't be right for these conditions. What do you think? It would be at gross with both of us in it.

We are glad that you are letting us do you a design of your plane. We will be happy to work with you anyway we can. It would be fine to take orders from your referred customers, and ship directly to them. Your only charge would be \$20.00 for the set-up and art work.

The aircraft design would be white with brown trim. we like the view you sent us best. It shows the wheel pants and color trim better than the design I sent you. We could also add the wording as shown in the sketch you sent us. If some of your customers didn't want all the wording, it could be deleted at their discretion.

*This design would be exclusively yours, and would only be sold to your customers
you refer to us. The price of the shirts would be as follows:*

Short sleeve t-shirts = \$6.50

Long sleeve t-shirts - 8.50 plus 10% postage

Sports shirt (golf) = 9.50

Hat = 4.00

T-shirt available colors are powder blue, yellow, and tan.

Sport Shirt available colors are blue and yellow.

T-shirt sizes are Small, Medium, Large, X-Large, and XX-Large

Sports Shirt sizes are Small, Medium, Large, and X-Large

Hats will be available in the color of Brown and Beige.

We will be at Oshkosh, and would plan on having your design available,

Thanks again for your business. We will be waiting your reply.

Respectfully;

Irene McCutchan

CUSTOM TOPS

IM

Specializing in Aviation T-Shirts