

ED DASSOW'S DRAGONFLY

Dragonfly Newsletter No. 17

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Winter Issue 1984

Newsletter time is on me again. It seems like we just finished one and got the DRAGONFLY SWARMING behind us. I don't know where the time goes.

We attended the Kerrville Flyin in Texas just before the DRAGONFLY SWARMING. Saw Tom and Sharon Wolfe there with their DRAGONFLY. Matter of fact, they got the Reserve Grand Champion Award there. We returned from Kerrville, missed a weekend, and then went to the San Diego Flyin at Brown Field. There were three DRAGONFLIES over there--Jack Hoggervorst's, Don Purdy's, and the prototype.

The DRAGONFLY SWARMING was the following weekend. We had a good time this year. I think it was a productive time although I will have to admit it wasn't quite as well organized as before. Some of the people we had scheduled couldn't be here because of bad weather in various parts of the country. But, we did have a good time. It was the first public showing of the MARK III DRAGONFLY. Mike Quigley was out here running up and down the runway doing high speed taxi tests. F.A.A. had not bought it off for flight at that time. Mike is still trying to finish it.

A lot of the builders had a chance to get a ride in the prototype. More than a few of them went home with the new in board gear leg set up after deciding to change their airplane over. Some of them haven't got the canard built yet. Others are retro-fitting the canard.

We even had Jim Maisel here who writes the Quickie Builders Association Newsletter. He is a really nice guy. I enjoyed his company. We have had several of the Quickie builders inquire about the inboard gear to retro-fit it into the Quickie II's and some of them inquired about the tricycle gear. We have no plans to do any work to fit any of our

goodies into their aircraft but, it does indicate, I think, that they feel that our new landing gears configurations are an improvement.

We had several things going on here during the SWARMING-- builder tips, tricks, and that sort of thing. There was a lot of question and answer going on. We had Dick Rutan and Jeanna Yeager speak at our banquet meal on Saturday night. Dick talked for a while on the aspects of test flying and how to get you and your aircraft ready and some of the pit falls that a guy can get into while test flying. That was very well received by the DRAGONFLY builders. Dick and Jeanna spent about an hour and a half with a slide show presentation, giving us many of the details of how Voyager was put together and what the design objectives of the aircraft are. That is a fantastic project and we just wish them all kinds of good luck in their endeavors.

I don't know how many people realize that these two people with this dream of theirs, are trying something virtually impossible. But, they are making it possible. The most mind boggling part of it all is that they are not sponsored by any big company. What sponsorship they have had has been by little people like you and I. Both Wicks and Aircraft Spruce have helped them out considerably with hardware. Ken Brock built the landing gear on the aircraft and many other people have helped a little bit as they can. But they do not have a single large contributor and are still looking for the nickels and dimes that will help them to make this trip. If you would have a few bucks and want to feel really good why don't you send it to them. Give them a hand with their dream. It might make you feel good when they make it, as I firmly believe they will. You can sit back and say, "I had a little hand in that."

After the successful around-the-world flight, I understand, the airplane is to become a permanent exhibit at the Smithsonian. After all, when you have flown around the world non-stop what else is there?

ANOTHER DRAGONFLY FLIES

I just received some very nice pictures from Ed Dassow of Wisconsin. He just sent a brief note saying that his DRAGONFLY first flew on November 11.

I had Ed out here for a pilot checkout several months ago. Ed has quite a bit of tail dragger experience in his background and flies very very well. I made the first take off to show him what to do and how to do it. Ed made the next three take offs and landing without help and did a nice job on them. Ed, I hope you'll send us some more pictures of the aircraft and a pilots report of the first few flights for use in the next issue.

AND ANOTHER ONE

Just received word that V.O. Augustine of Colorado has finished his DRAGONFLY. It made its first flight December 18 and he reports that it lasted 55 minutes, with no problems. Everything stayed in the green.

Congratulations to both of you. You can bet that these guys are on such a high that they won't be down for a month.

HAPI'S FUN FLITE CENTER

Since the last newsletter several things have happened in the way DRAGONFLY parts have been marketed. Task Research has been building the beautiful prefabricated DRAGONFLY kits for a year now and marketing them. Ken Brock has been making the prefabricated metals kits for some time and those were available through Ken Brock.

Many of the builders have complained that they had to chase around to a lot of sources to get the materials for the DRAGONFLY. It was time consuming and a bother to them. Many other builders have expressed a desire to buy the whole airplane in one box with all the parts necessary to complete it. HAPI ENGINES, through its FUN FLITE CENTER has created just that situation that the builders asked for. The DRAGONFLY is now available all in one box, if you choose to buy it that way, for one price. Everything is in the box to finish the airplane, except the paint, battery, and the radio. Those items are included are the deluxe engine with the starter, alternator, dual ignition, and all the goodies that you guys order anyway.

Many of the prefabricated parts, like fuselage sides, forward cowling, forward deck covers, canopy frame can also be used on the scratch-built version. And many builders are finding it easier to use the prefab rather than build the tooling to make up all the component parts that are normally built out of Clark foam.

HAPI has bought out Ken Brock's stock of prefabricated parts and has them stocked at Eloy. Also, HAPI has made a contract commitment with Task so that HAPI is doing all the marketing on their prefabricated DRAGONFLY parts. Task is no longer selling directly to the customer. The price on the Task and Brock built parts remain unchanged. And if you buy a prefabricated DRAGONFLY kit all in one box there is a considerable savings in dollars on the price of those same parts bought on an individual basis.

BUILD IT AT HAPI

HAPI has started a new building concept called FUN FLITE CENTER where a DRAGONFLY builder can buy his prefabricated kit, come to Eloy, and in a span of two weeks (8 hours a day, 5 days a week) can build his wing, his canard, fuselage, plus fit the

three pieces together with proper alignment with proper wing incidence, and such, disassemble it and take it home with him. We estimate that the builder will accomplish as much here in two weeks as is normally accomplished at home in 6 months. One big added advantage is the builder may start with no experience and gain knowledge in the composite construction very quickly here under HAPI supervision. The construction goes very quickly because the builder does not have to build tables or tooling. All he builds is the actual airplane. HAPI has developed special tables for cutting the fiberglass cloth. Tables are laid out for cutting the carbon fiber spar material, also. . So many of the little jobs that take a lot of measuring, figuring, and lay out that absorbs hours and hours of work are done in minutes by virtue of having the tooling. All hand tools are furnished by HAPI, including power tools. All the work is done in a large building room where the temperature is controlled and ideal for the large layups. Each builder is required to buy a safty kit and a few disposable hand tools that he will take home with him whenever he finishes the course here. So far two builders have completed their program here. They are Bill Patterson of Jacksonville, Florida and Justin Mace of Tucson, Arizona. Several other builders are scheduled in towards the first of the year. The holiday season seems to be a bad time to schedule people because everyone seems to have things to do. The question of how to get the airplane home comes up. We advise the builder to bring a car with a small trailer. Or if you happen to have a travel trailer you can park it on the airport to stay in while you are here and take the airplane home on top of it.

Bill Patterson came over on the airlines and solved his transportation problem of how to get home by finding an independent trucker at the local truck stop about two miles away who was running empty. The trucker agreed to take Bill and his airplane all the way to Florida for a very low fee. It worked out very well. Since the truck stop is the biggest in the state of Arizona I would imagine that this same situation would be pretty easy to come by for other builders who might be in the same circumstances.

FOREIGN VISITORS

In the past few months we have had several foreign DRAGONFLY builders here to get a chance to ride in the prototype, to see what is going on here, and ask a lot of questions. We have had Ladislo Kiss from Sweden, Philip Soulas from France, Gary Bracken of Ireland, Ezra Lebovitch of Israel, Ray Plante of Canada, and Bjorn Alfer of Sweden, R. A. Wigleven of Holland. Currently, I have as a house guest Father Don Coutt, a DRAGONFLY builder from Australia, who has been to Rome and is swinging by Eloy on his way home. You know, there is not another home-built company, at least not that I am aware of, that backs up their performance claims by putting the customer in the airplane and letting them do the flying and in fact prove to himself that the airplane does indeed do exactly what we claim for it.

I do not know of any other home-built company that has a broader pilot familiarization training offered at absolutely no cost either. We do this in order to minimize the amount of risk involved in flight testing a new aircraft. If a new pilot knows what to expect, what he should do, and has experienced it in another DRAGONFLY his chances of a first flight without any problems are much greater.

The DRAGONFLY SWARMING with its builder forums and lectures, plus the talks that I give to various groups around the country as often as I can, are all designed to do the same thing. We want to get the DRAGONFLY builder into the air with

a minimal amount of effort and insure that his airplane does indeed fly the way it is supposed to.

Recently there have been a couple of legal actions taken against designers of other aircraft alleging that the aircraft did not fly or perform the way it was supposed to. The builder was seeking compensation from the designer.

The experimental category was set up by the F.A.A. to allow an amateur to build and fly his own aircraft, listing himself as the manufacturer. As the manufacturer, the builder is entirely and totally responsible for that aircraft. The builder, and the builder alone, has made the decision that each and every part that he has put in that aircraft is "airworthy", in his opinion. The builder has passed judgement on the quality of workmanship put into the aircraft and, again, he has decided it is airworthy.

Many builders seem to think that F.A.A. is going to inspect the airplane and that the issuance of airworthiness certificate means the aircraft is airworthy. This is absolutely not true. Along with that certificate, you will be assigned an area to fly in, a list of operating limitations, and are expected to use the restriction time to test and prove that the aircraft is safe to operate. It is also expected that any handling problems, mechanical problems, or other deficiencies will show up during this period and will be corrected. Any major modification or rework may well require additional hours of restriction time. The F.A.A. does not decide that your airplane is airworthy, YOU do. Many F.A.A. inspectors are quite capable of spotting a problem in the aircraft that may result in unairworthy condition and will refuse to sign the aircraft for flight until those things are corrected. Some F.A.A. inspectors have very little experience on the technical side and really are not qualified to make the judgement. This is in no way meant to be derogatory to those people. The point is that a builder should not depend on anyone other than himself to be absolutely certain that the aircraft is going to be ready to fly.

We encourage each and every builder to become very much involved with an E.A.A. chapter with other DRAGONFLY builders, to thoroughly study the plans, and read everything you can on aircraft construction. There are several good books available. E.A.A. has a lot of them. Two of the very best that I can recommend are The Sport Plane Builder and Firewall Forward by Tony Bingalis. These are very good reference books.

There are many areas of an aircraft that are virtually impossible to inspect after the airplane has been closed up, particularly in a composite airplane. It is impossible to look on the outside of a composite structure and to know how many layers of cloth are in there, what the orientation of those layers are, whether or not it is the proper cloth, what the weight is, what the style number is, or what the surface treatment is on it. You can not tell from looking at a finished structure what kind of resin it was built with.

Recently, we were comparing DRAGONFLY airfoils and we made up a set of templates that fit the prototype and checked them out on the other airplanes as a means of determining the angle of incidence on the wing and the canard. We ran into the fact that no two airplanes have airfoils exactly alike. A couple of builders have chosen to modify their canard airfoil to something different. It is anybody's guess as to how those airplanes are going to fly.

What the designer sells to you in the form of plans is a record of how the prototype aircraft was built, what it was built out of, how it was put together, weight and balance data, flight data, and all the things that he found to be true in

building and flying the prototype. If the builder will faithfully follow those plans he should be able to duplicate the prototype. BUT, there is absolutely no guarantee that the clone aircraft will be exactly like the prototype because there are so many types of variables possible that the builders can build into the airplane.

Mistakes can be made in incidence, degrees of washout, shape of the airfoil, or any one of hundreds of possible errors that are made in each airplane and have to be corrected or in some way worked out. Most of these things are taken care of in the building process but, the residuals of some of the problems show up in flight testing. Maybe your jiggling was not exactly right and the wing or the canard are a little twisted. The result is an airplane that wants to turn to the right or the left. Let's say your angle of incidence is not just perfect, the airplane does not want to climb or hold it's nose up. Perhaps when you laid the canard up you didn't cut the cores as well as you could have and you end up with a lumpy canard which you have smoothed out, filled, and sanded until you have a nice finish but the airfoil is nowhere near what is on the plans. I'll guarantee it will fly differently. How differently? Who knows. We find that out in flight testing.

The bottom line is this: The designer or plan seller has absolutely no control over the materials that go into a home-built aircraft, the quality of workmanship, no opportunity to inspect the work or materials, has no participation at all in the decisions pertaining to test flying. Is the airplane ready? Is the pilot ready? Are all systems go? Is the weather right?

The designer or plan seller can not be responsible for your actions. Most designers, though, will do everything in their power to insure the builders success with one of their designs. Having someone have a mishap with one of your airplanes is just bad for business. The best advertisement is an airplane that goes out there and does exactly what the designer said you could expect of it. If

If you are a new builder get yourself a library of reference books to go along with the plans. Get involved with E.A.A. and other DRAGONFLY builders. After you have got something built get as many people with home-built or aircraft maintenance experience as possible to look at your work. If any of them criticize your work and says that something ought to be improved, take a real strong look at it. Do not be afraid to throw something away that is not right. Your best assurance of success is to adhere strictly to the plans and to build it out of the right materials. We have a lot of DRAGONFLYS flying now. We have had a few minor incidents but no injury accidents and we want to keep it that way.

ALTERNATE ENGINES

Rarely does a day go by when I do not get a phone call or letter from somebody who would like to know about using something other than the Volkswagon engine in the DRAGONFLY. Generally speaking, the one I am corresponding with or talking to has somebody's literature about some wonderful new engine that produces astronomical horsepower out of just a tiny bit of weight, just a fraction of what the Volkswagon is. These builders are fantasizing about how much of an increase they will get in DRAGONFLY performance with whatever engine they are dreaming about.

Before we get too carried away with installing these "super" engines in DRAGONFLY, let's take a couple of minutes to think about reality. That's spelled R-E-A-L-I-T-Y. There has never been a reciprocating aircraft engine in general use that

weighed less than three pounds per horse power. In fact, regardless of what engine we install in DRAGONFLY we have to keep the propeller tip speeds at below sonic. That means that we are going to have to a small diameter prop at less than 3600 (rpm) so a lot of the high speed engines that develop a lot of horsepower when turning at very high rpm do not lend themselves to this application at all. There is always someone who says that they will just put a gear box on it and get the high speed and reduce it down to a propeller output rpm that we can live with. Even Continental and Lycoming's geared engines have not been real successes and they were not turning their engines at anywhere near the kind of rpm that we might find useful to turn at.

To put all of this in proper perspective, I think, you might be wise to start asking questions when someone offers you one of these engines that produces phenomenal performance. How much flight history has it got on it? Who is flying it? Ask for a list of addresses of people that are flying that engine. Make the seller document their performance through some third party who has had reason to measure these things. Do not just go by what they tell you horsepower is or what the fuel consumption is. I read some of the same advertisements that you do. The bottom line is that most of these things are just experimental engines that are running on the ground--certainly not in the air--and are looking for you to finance their dream. Be careful that you don't finance a dream that could turn into a nightmare. Any reputable engine manufacturer will first develop the engine, then put it into an aircraft and develop a whole bunch of flight history on it before even offering it to public, I believe. I certainly do not consider anything that has not flown as an aircraft engine. If you do start out by pioneering some kind of alternate engine you not only have to test fly an airplane but you have to test fly it with an engine of unknown performance. Most people in the engine business, and that includes myself, always put an engine on an aircraft of known performance--something that is well flight tested--and then test only the engine. It might not be as exciting that way but, you stand a much better chance of living to a ripe old age.

THE NOBLE GAS ENGINE

A close friend of mine, Ole Oleson, of Reno, Nevada, has been working on the development of the Noble Gas engine for several years now.

Noble Gas is a rare gas found only in parts of the world where there is a lot of volcanic activity, since it is generated by the earth's molten core in the very intense magnetic field that exists there and only found in quantity in a very few locations, which remain closely guarded secrets to those aware of the commercial possibilities of Noble Gas.

The unique property of this gas is that when excited by an electrical spark it expands tremendously in volume but does not ignite. When the source of the spark is shut off it contracts very very quickly back to it's original volume.

Ole has designed an engine which uses Noble Gas and has some very exciting features. It has no intake and no exhaust system. It does not use any air when it runs. This means the engine can operate at any altitude without power loss, it could even run on the moon. The Noble Gas engine is absolutely non-polluting. Engines charged with Noble Gas do not require recharging for approximately 500 running hours. A Noble Gas engine is a one stroke engine, meaning that the down stroke of the piston, when the Noble Gas has been excited and expands with the electrical charge, is a power stroke. At the bottom of the stroke the sparkplug is turned off the Noble Gas

immediately contracts to pull the piston upward so that we have a dual power stroke. No cooling system is required. Although Noble Gas, like most gases, does create heat when it expands, the Noble Gas contracts on the upstroke and produces a sudden drop in temperature, that cancels out the heat that is generated by the expansion side of the stroke. So, the engine is self-cooling and thus, does not require any engine cooling system in the aircraft. This means a cowling with no holes in it. We decrease a lot of the cooling drag on the airplane. A Noble Gas engine can be built virtually any size--from a very very light aircraft engine, even small enough for a model airplane engine, and on up to an engine that is ideal for a light weight aircraft such as our home-builts. The Noble Gas engine is very simple to build because you only have the piston, the connecting rods, the crankshaft, and an ignition system. There is very little else and it is almost as simple as a two-cycle engine.

Ole's projected plans for the engine are to continue to develop it to the point of working models. His long-range plan is to marry the Noble Gas engine to the new fans that NASA is developing for high speed super sonic aircraft that will ultimately replace the jet engine. Just think, an engine that requires no fuel, is quiet, and non-polluting. This would be ideal for transoceanic travel. An aircraft like the Concord could be equipped with a Noble Gas engine and the fans. The Concord has been faced with a problem, however, when flying over land due to the terrible sonic boom created by the high speeds at which it travels.

Ole has applied his engineering expertise to that area also and has come up with a solution so simple that I am surprised that no one has thought of it before. The reason the Concord creates the sonic boom is because of its terrifically heavy weight and high speed. Ole proposes to use the Noble Gas engine to power a super sonic dirigible which, being lighter than air, will create a very welcome blast of silence instead of a sonic boom.

Ole is every bit as far along in his development of his Noble Gas engine as some of these others who are offering fantastic engines to power your DRAGONFLY. True, he does not yet have an engine flying, but then neither does his competition in the SUPER engine field. I personally have every bit as much confidence in Ole's Noble Gas engine as I do in some of the other as yet unflown engines. At least Ole is so confident his engine is a world beater that he will not accept anybody's money, confessing to being very greedy and wanting to sell it for millions to some major manufacturer. I would suggest that if you want a really super exciting engine that produces all kinds of horsepower at almost no weight that you wait for Ole's engine, he will probably fly as soon as his competitors.

HAND CLEANER

Applied Plastics, the makers of Safety poxy has come up with a waterless hand cleaner that removes epoxy from your hands like magic. It is in the form of a light cream. Just put a small dab on your hands and rub them together to loosen up the epoxy. Then rinse with warm water. It leaves the hands super clean and does not seem to remove natural oils. We are using it for cleanup in the FUN FLITE CENTER and everybody loves it. HAPI has the product in stock. Epoxy hand cleaner-- a 1 pint container is \$3.75.

INSTALLING WINGS AND CANARDS THE EASY WAY

Being essentially a lazy person I am always on the lookout for an easier way to do something. Someone, sorry I don't remember who, suggested one easy way to fit wings and canards to the DRAGONFLY fuselage. Do not install the wing or canard drag or lift bulkhead. Rough-fit them in place only and then bolt them to their left and drag fittings on the flight surfaces.

With fuselage blocked at waterline level, level horizontally too, set the wing on the fuselage, sliding the bolted bulkheads into the fuselage from above. Next, align the wing at 90 degrees centerline; set to waterline "0" as shown on plans. After all waterlines and angles have been checked and rechecked and you know it is perfectly aligned, flux the bulkhead in place in about 4 spots (top and bottom of the bulkheads on both sides), allow to set overnight, unbolt the wing, and finish installing the bulkheads according to the plans.

This method is a lot easier than fighting everything to fit. NOTE: Place a .060 thick flat washer between lift tabs and bulkheads to allow for buildups on surface of bulkheads at final installation. Try this approach. You will like it.

EASY GAS TANK SEAL METHOD

DRAGONFLY builder, Dee Brown of Payson, Arizona, says the easy way to seal the corners inside the gas tank while reaching through the holes is to utilize those cone shaped frosting bags the cake decorators use. You know, they fill them with frosting, twist the end to close it, and squeeze the frosting out through the tip. Dee says to mix up your flux pretty dry but still fluid and just go around the inside of the tank squeezing out the filler directly into the seam. He then smooths the seam and spreads the fill in place by dipping his gloved finger in pure resin and smoothing in the fillet of flux. Easy, huh?

CANOPY INSTALLATION HINTS

Builder Bill Patterson attached his canopy frame to the fuselage in the proper position and bonded it there with dabs of the auto putty to insure it stayed. He then trimmed the inside edge where the frame meets the canopy to finish size and shape. The fuselage was then inverted over the sawhorses and the canopy laid inside the frame. It is held there by gravity and assisted by small sandbags as needed. The edge of the canopy is now marked to overlay the frame by 1/2 to 3/4 inch. The canopy is reinstalled and checked for fit. Fit is O.K. so tape around all the edges of the outside of the canopy with duct tape, leaving just the edge that will be joined to the canopy frame exposed.

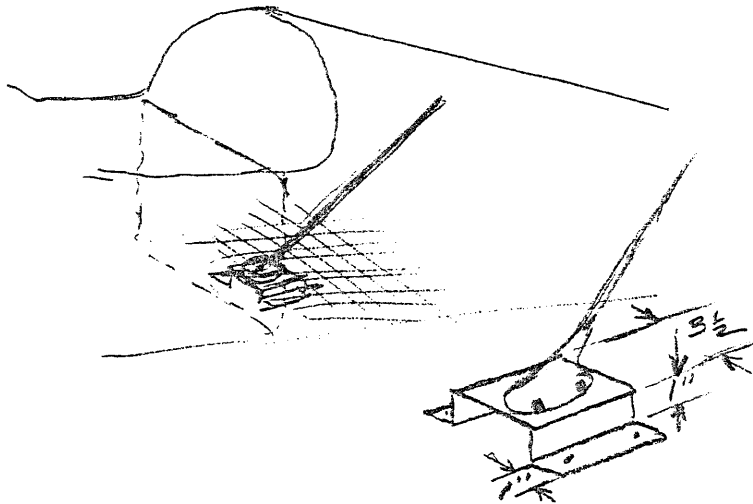
Remove canopy from frame and remove the protective coating from canopy in the area to be bonded. Rough up canopy bond area with 150 grit sandpaper. Rough and clean with the bond area on canopy frame. Carefully place the canopy in the frame and bond in place with flux by lifting a small area of the canopy edge at a time and smoothing flux binder with tongue depressor. Use sandbag to hold position until flux is cured. Gravity does all the work for you.

RADIO TRANSMIT ANTENNA INSTALLATION

Easier to sketch for an effective way to internally mount a broad band communications antenna.

These antennas are plentiful in aircraft salvage yards at low prices. Install by placing a ground plane 18" square of aluminum screen wire just aft of the wing drag bulkhead on fuselage bottom. Retain it here with 4 spots of flux at the

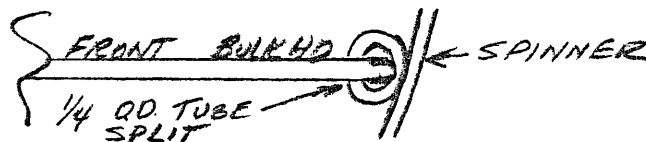
corners. Bend a bracket, as shown, to mount the antenna on. This will raise it up enough to enable you too attach the coax cables on the base. Ground the screen wire to battery negative terminal and be sure antenna base is grounded to the screen. Do not worry about the antenna having to transmit through the aircraft. It will not be affected by the structure unless you paint the aircraft with silver paint, made with aluminum powder. That will cause a problem.



SPINNER PROBLEMS

A couple of builders have reported cracking the spinner backplate around the outside perimeter of the prop hub drive plate. Talks with them revealed that they had not used the front plate bulkhead supplied with the spinner, because the propellers they were using had a thicker hub which repositioned the front bulkhead too far forward to be used with that particular prop.

You must have a front bulkhead to prevent the spinner from getting off center and wobbling which will result in, at the least, a broken prop back plate, and could result in throwing the spinner off. Usually when this happens, one of the prop blades hits it and it does a lot of damage. I had that happen on a Stits Playboy I built several years ago. If you have to, make a new front plate from .093 flat 6061 aluminum, turned round and concentric, just enough smaller than the point where it contacts the inside of the spinner to allow you to cover the outside edge with a split soft plastic 1/4 o.d. tube. See sketch.



PRESSURE PACK DISC BRAKES

When developing the landing gear legs and fairing for the MARK II we started looking for a really good brake with a very narrow profile. We wanted to keep the frontal area of the wheel pant as narrow as possible. The Cleveland style disc brake works well but the axle and disc assembly sticks out of the side of the wheel over 3" past the outside profile of the tire.

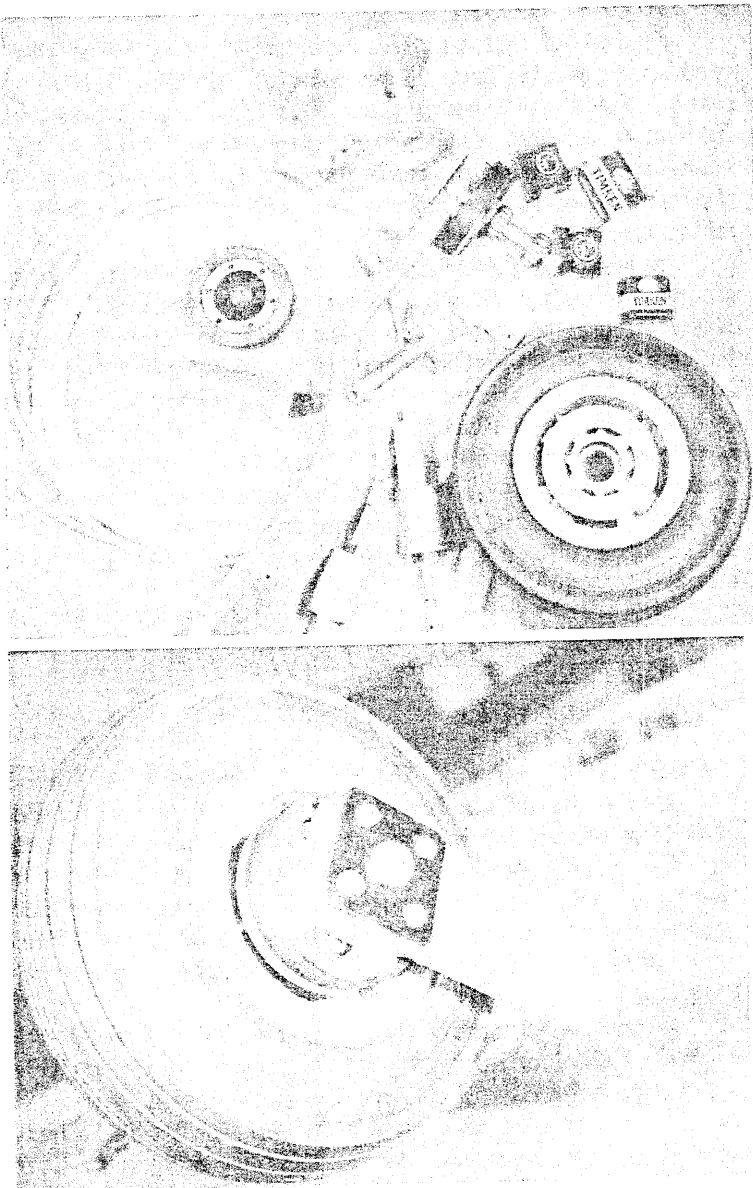
We found a disc brake that uses a patented pressure pack instead of wheel cylinder actuated calipers. The full circle brake pad, faced with a sintered lining is pressed against the brake disc with absolutely uniform pressure on the full circle when brakes are applied. The result is no brake grab, super stopping power, and very light pedal pressure. The expanding area of the pressure pack is equivalent to a 1 3/4 diameter

wheel cylinder. We are acuating them with 1/2 diameter bore master cylinder so the hydraulic leverage is more than adequate.

I have flown this brake system for over six months now with absolutely no maintainance required. We removed a wheel to check for wear and found virtually none, even though my demonstration flights are usually very short (15 min.) and I use the brakes hard, demonstrating how short the aircraft can be landed. The brakes have now over 150 hours of this type of flying.

We also located some good, round, true running wheels and married them to quality Timken sealed tapered roller bearings. The end result has been worth the extra expense. This gives a low profile area, super good braking without grabbing of fading, and self-adjusting brakes. The master cylinders are Gerdes vertical cylinders with reservoirs and operated by toe pedals which slip on over the standard D.F. tubing rudder pedal.

HAPI is marketing these brake sets for MARK II, now, complete with wheels, bearings, Mk 2 axles, fittings lines, master cylinders and pedals for \$389.00. The cost is a little higher but the low profile and high quality make them worth it. Wheels are set up for 11 x 400 x 5 Lamb tires or standard 500 x 5 aircraft tires.



TERRA RADIOS

HAPI is now distributing the complete line of Terra Radios and will meet or beat the best price you can get anywhere. Call HAPI for a quote on your radio need. HAPI can also fix you up with David Clark headsets.

HAPI NOW STOCKS:

- *DRAGONFLY canopies
- *All Task prefab parts
- *All Ken Brock hardware
- *Wheels and brakes kits
- *Engines
- *Motor mounts
- *Exhaust systems
- *Engine and flight instruments
- *Throttle assemblies
- *Spinners
- *Propellers
- *Tail wheels
- *Tail wheel springs
- *MARK II conversion kits
- *Canard and wing lift and drag fittings

Lift and drag fittings kits are now available from HAPI for those builders not having the time or metal working equipment to make them.

All fittings are finished to size and all holes are pilot drilled only.

For a complete listing of the new goodies available and prices, send a self-addressed, stamped envelope to HAPI, Rt 1 Box 1200, Elroy, Arizona 85231.

EASY GAS TANK SEAL METHOD

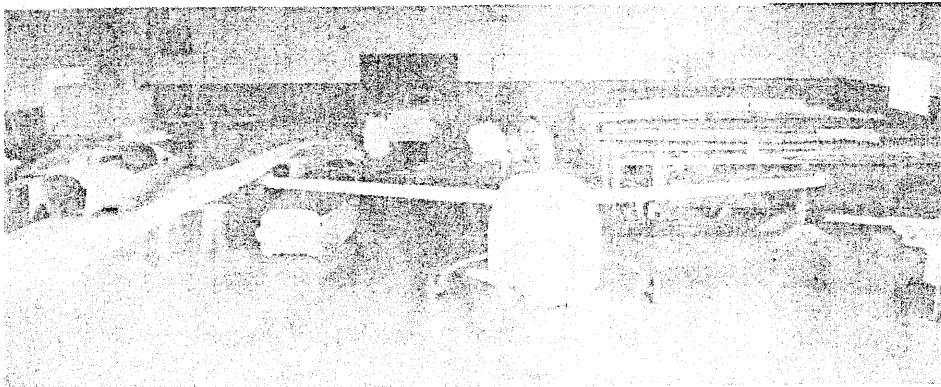
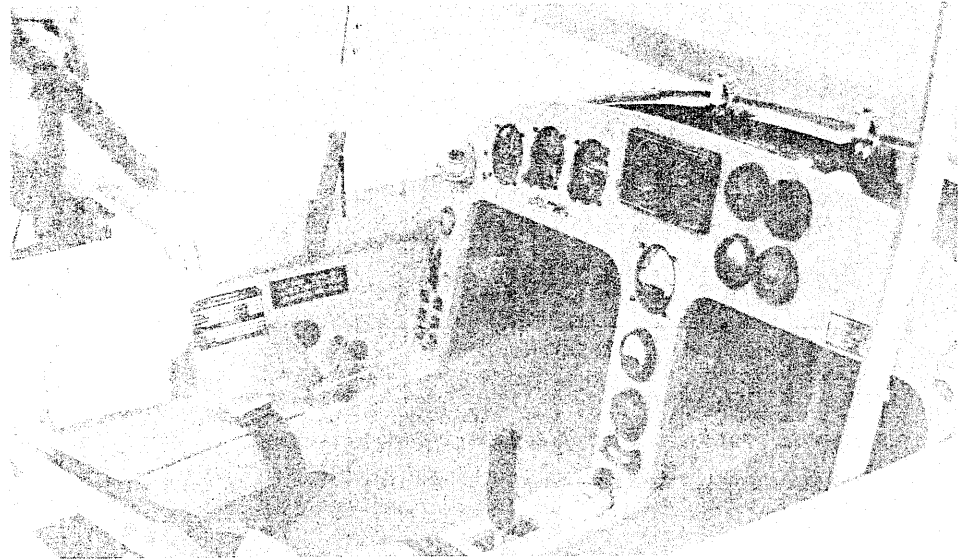
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Gifford Gillingham is about ready to fly. His DRAGONFLY is beautiful, we expect to hear from him about his first flights very soon. Perhaps a report in the next issue.

Ed Dassow laid out his panel just a little different. Note the canopy hinges, they are the same hinges normally used on the side hinged canopy as per plans. Canopy supports appear to be solid flat stock, with over center locking. Cam lock latches are visible on side rail. Simple, effective and low cost.



HAPI FUN FLITE CENTER WORKSHOP

Mike Quigley will have his tricycle geared DRAGONFLY in the air soon. Its just about ready. Pictured here with the canard off, you can see the glass gear legs. We believe this gear arrangement will attract a lot of new builders who prefer the nosewheel way to fly.

BUILDER SUPPORT

Please try to call for builder support between 2:00pm and 6:00pm mountain time. We have set aside those hours to be available to help you. Builder support costs us a lot of time, which we are not complaining about, but we do have to schedule it so we can get necessary work done too. Please, help us to help you by calling in the proper time slot.

For those of you who write for builder support, please keep the letters short and to the point. Ask the question and leave room for an answer. Send your letter with a self-addressed, stamped envelope and I can get your answer to you PRONTO.

HAPPY NEW YEAR

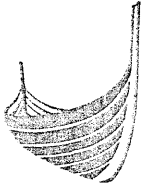
This past year has been super busy for us and has seen many changes. We have seen a lot of new DRAGONFLYS hatched out and flying. The prefabricated kits developed by Task and HAPI are now a reality. The new landing gear options are making

DRAGONFLY appealing to a much larger group of potential builders.

In the coming year, VIKING will continue to provide you with builder support, newsletters, and pilot familiarization training. Our other corporation, HAPI engines, will have some products and services for DRAGONFLY builders in the next few months that will really excite you.

The Taylor family and our employees would like to thank all our DRAGONFLY builders for your loyalty, cooperation and your friendships. We have many of you coming through Eloy, and while you are customers, we feel a special bond with our DRAGONFLY builders.

We wish every one of you a happy, healthy, and prosperous new year. May you always have tailwinds behind you, beautiful weather to fly in, and a happy landing to end each flight.



VIKING AIRCRAFT

ELOY MUNICIPAL AIRPORT
R. R. 1, BOX 1000V - ELOY, AZ 85201
Telephone: 802/466-7538

Dragonfly

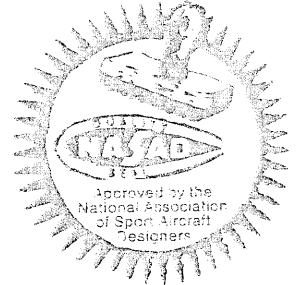
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ITEMS AVAILABLE FROM VIKING

PLANS: \$175 (\$200 overseas) includes 1 year subscription to quarterly newsletter.
INFORMATION PACKAGE: \$7.50 (\$8.50 overseas) includes color lithograph.
QUARTERLY NEWSLETTER: \$8.00/year (10.00 overseas)

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