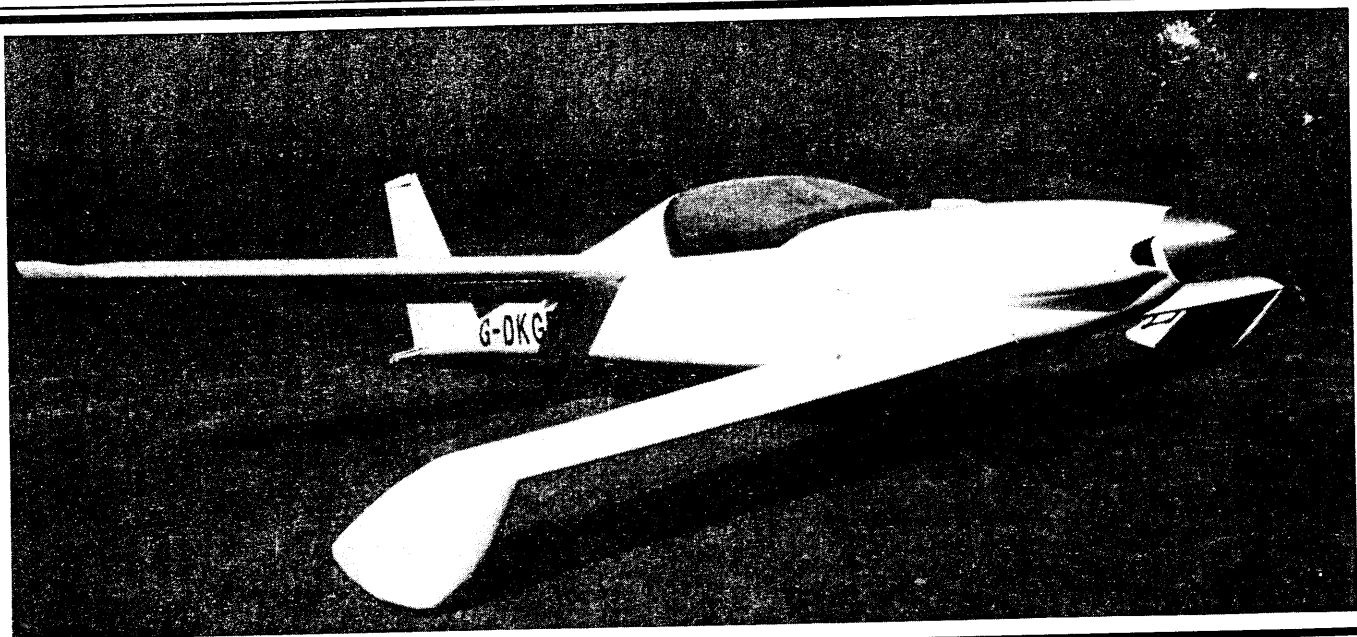


DRAGONFLY BUILDERS AND FLYERS NEWSLETTER

THE OFFICAL VOICE OF DRAGONFLYERS ALL OVER THE WORLD

VOLUME 44

NOVEMBER - DECEMBER 1992



KEITH FATHERS MARK I OF ESSEX, UK

Hello Spud

Here's the basic details of my aircraft:

Dragonfly MK I scratch built

Plans#: 174

Engine : 1834cc (own conversion w/ Hapi parts)

Weight : 580 lbs. less prop, upholstery, battery & eng. oil

The Dragonfly is now painted and I have finished the wiring, except for fitting the battery - which will wait until nearer the first flight. When I have decided on the size of the battery I will try to get a hold of a "dead" one to use as a dummy for building the battery tray and connectors. Location will be behind the seats as a preliminary weight & balance check places the CG near the forward end of the

range. I am quite pleased with this in relation to some of the figures I have seen quoted in DBFN as I seem to have contained the weight escalation reasonably well.

This year has seen the Dragonfly progress to being ready for final assembly at last. The engine has been stripped down for a check, having stood for so long unused, and been reassembled: The propellor (Warp Drive) has been installed and final items of wiring and plumbing have been fitted. Even instrument panel labels, seats and some external decoration have been added. Unfortunately there is one important item mssing which I am currently finding impossible to obtain - an airfield. I keep you posted.

Sincerely Keith

SUPER ECONO INTERIOR

Hell Spud

I am sending you a couple of pictures of my DF interior that has evoked some favorable comments.

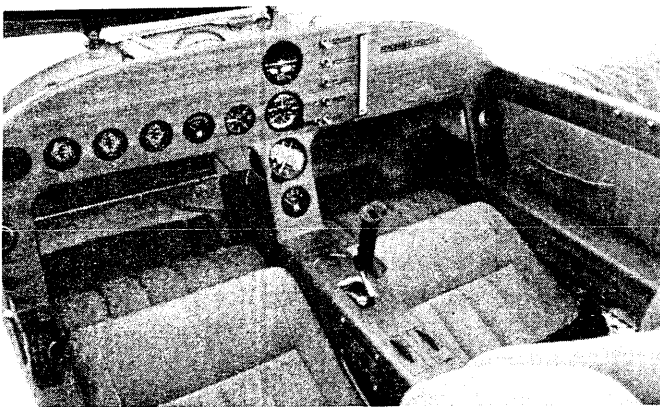
The upholstery is taken out of a wrecked Subaru, I simply took a EXACTO knife and cut off the seats leaving all the vinyl and metal there. The foam rubber form comes off with the material. The material from the rear bench became the side panels, floormats, headrest, etc..

I paid \$70.00 for the whole interior (don't this just make ya sick when someone else does it for about 1/6 of what you did it for -Spud). No sewing is required unless someone wants to do fancy things like side pockets etc. A little foam has to be trimmed off the seat backs to fit around the center, side consoles and the seats have to be trimmed to the proper width. I glued the cover for the seatbacks end panels to 1/8" plywood with contact cement which are fastened to the structure with Velcro.

For the panel and consoles I used a natural wood laminate veneer which is very pliable. Its applied with contact and a polished steel bar. I used walnut but its available made of any woos, sold by wallcovering wholesalers that cater to architects.

Sincerely

Gary Gutsche Terrebonne, Quebec Canada



MULTICOM

New 40 Amp Alternator

Great Plains Aircraft of St. Charles, Ill has a new 40 amp alternator kit available. The price of the kit is \$660.00. Your Hapi, Revmaster or Diehl accessory case may be modified which will save you some money off the total kit price. The people using the Hapi dual ignition system (big amp user) and have your DF loaded down with all the goodies like strobes, landing lights, AM/FM/CD's, etc., etc. that have had to keep up with the amp load, this will be just what the doctor ordered. Give Steve a call for all the details (708) 464-4178

Oshkosh 1993

I have had quite a few suggest that we have a dinner banquet (not formal) dinner at Osh like some of the other groups do on the first weekend of the event. We have had 25 to 30 people attend our informal gatherings on the spur of the moment which we'll continue to have. I like the idea of one scheduled dinner. So you Oshkosh attendees lets have some input on this. (yes this means YOU!)

Tentative 1993 Dragonfly/Quickie/Q-2/Q-200 Fly-in Date Change

We are already planning the 1993 event. At the 92 Fly-in I asked the group what could we do to make it better. The thing most requested was a date change. We have a lot of people in the group that do not have flexible work schedules and is a major hassle to get time off at certain times of the year. What they would like was the event coupled with some type of three day weekend or holiday. As I got deeper into the request, here's the logic. Most people liked the Labor Day weekend. Here's how it would work. We still would kick things off on Friday afternoon, run all day Saturday and close Sunday at 1:00. Which would leave Sunday afternoon and Monday for the return home if you had a long distance to drive or maybe get weathered in (I can't control the weather) like some did this last year or just wanted some time off at home that weekend. Everybody I have talked to about this change thought this was an excellent idea. So unless I here some strong opposition to this date that will be it for 1993.

People with flying DF's PLEASE READ

In the last issue of DBFN #43, page 4, (please reread). I requested some help for Len Dyson on the gross weight of 1150 lbs for 100 hours. I have received two of the letters from Rob Kermanj and Reg Clarke so far, super thanks. I need three more and quite frankly I'm really pisset off about this very poor response to this request.

CONTINUED ON PAGE 10

KAPLAN'S AIRBRAKE

Kaplan's air brake installation follow-up

Hi Spudley

I guess I can't procrastinate any longer, here's the information on my landing brake installation as promised (Better late than never-Spud!).

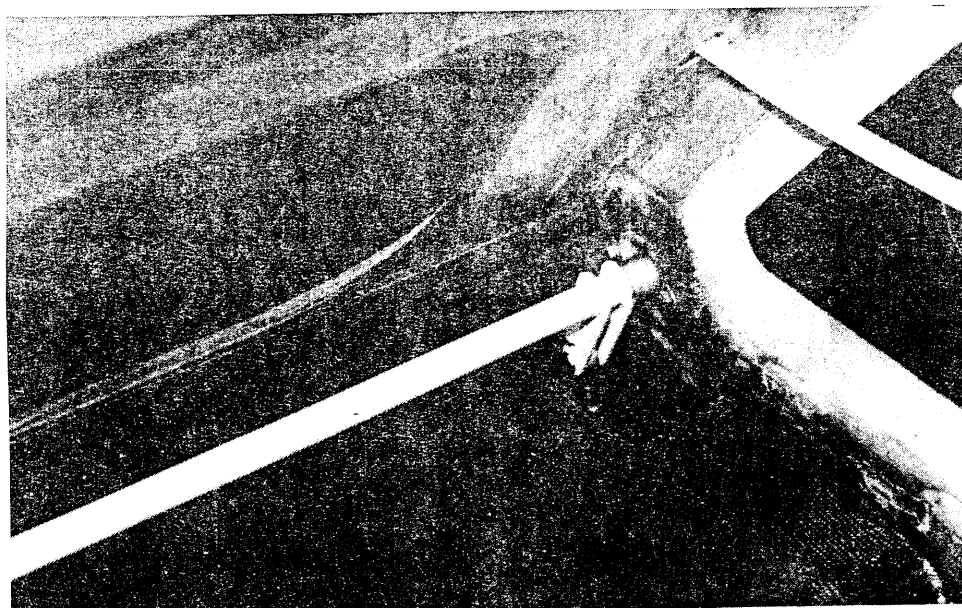
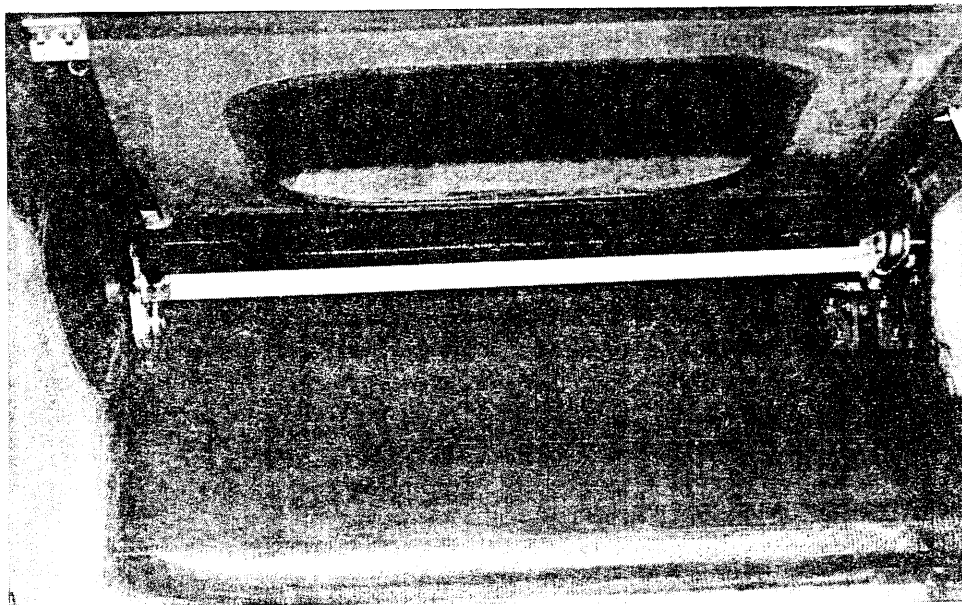
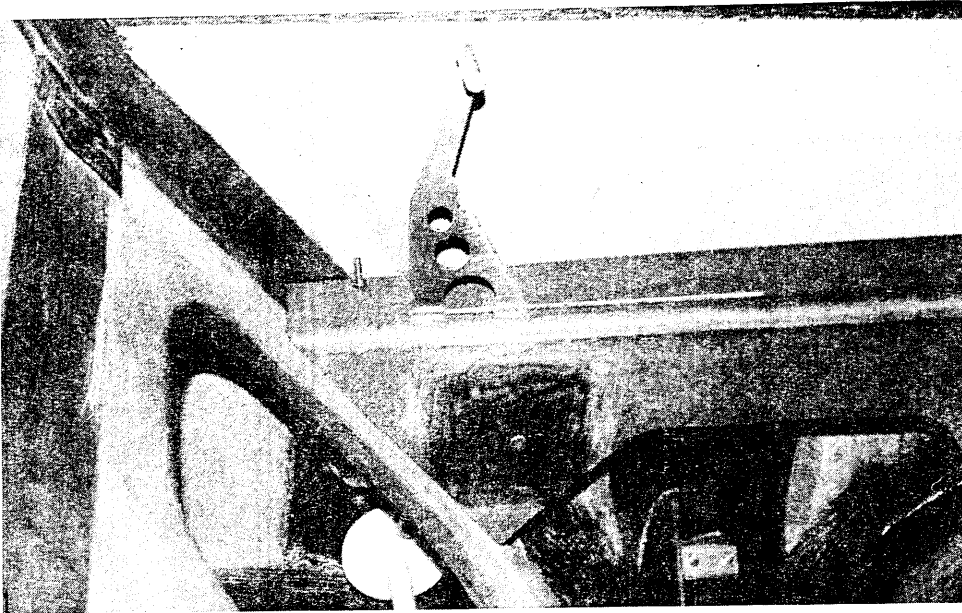
My installation was a retrofit on a Task kit fuselage using Len Dyson's plans. Len's plans are rather detailed and are pretty self explanatory, but there are some differences between a scratch built fuselage and the Task kit fuselage that everyone should be aware of.

The biggest difference is the fuselage thickness. The scratch built uses 1/2" thick foam for the floor while the Task kit uses 3/8" thick foam. When fitting the new air brake floor overlay (the piece that replaces the floor where the air brake panel is cut out) in the Task fuselage 5/8" thick foam should be used instead of 1/2" foam as in the Len's scratch built application. Then the extra 1/8" should be routed out to make the depth 1/2" rather than 3/8". This will give the needed clearance in the piano hinge for the bolt heads when the brake is in the retracted position.

The distance from the seat back to the actuating crossshaft is very important. The distance controls how thick the latch & latch stop have to do. These keep the brake from opening over center. If this happens, the brake can't be retracted. I trial fitted mine with a cardboard latch after two previous attempts.

The only other changes I made were cosmetic. I countersunk the bolts in the hinge and glassed over them with 2 strips of 4 oz. BID. I also countersunk the bolt heads in the seatback for the return spring attaching point.

There is one other thing that I feel is



important, after building the metal pieces I spotted them on a friends Vari-EZ. After some inquires about them, he dug out his plan's (He's been flying it now for 12 years). After comparing his plans to the ones published in DBFN, I now see where Len got the majority of his brake..... From Rutan.

Once identified the design, I asked to see any verbiage that might of came with the Vari-EZ plans. After reading them, I realized that the spring pressure was important. Rutan set his at 40 lbs. so it will close the brake automatically at 110 knots on a go a-round. Ours will probably be different, we have more than twice the area but a shorter arm when the brake is deployed. So I guess the spring tension will have to be played with to retain this feature. If an electric motor is used for actuation of the brake you won't have to worry about the spring pressure. You won't have the springs or the automatic closing feature.

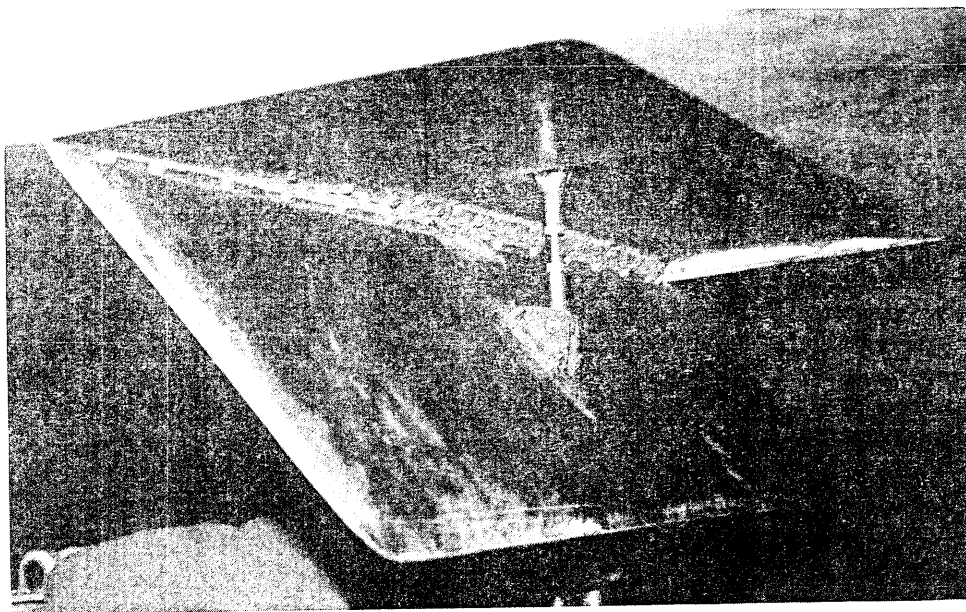
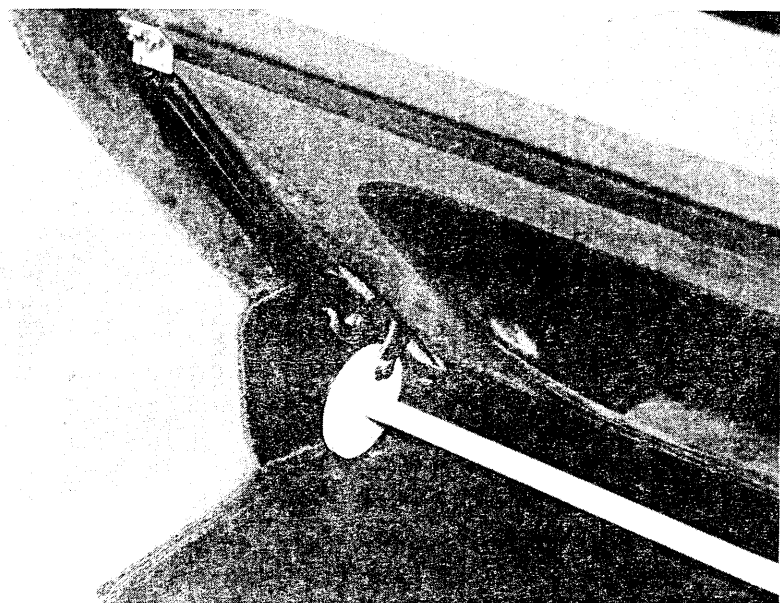
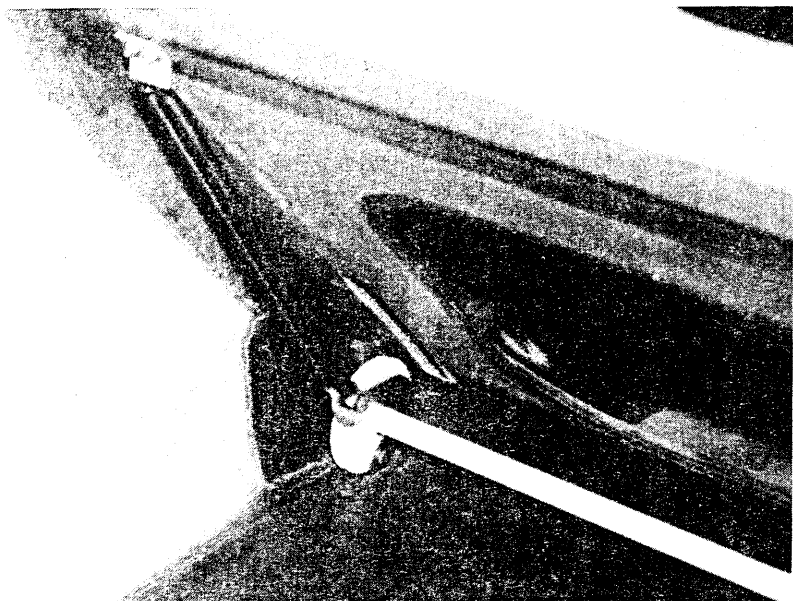
If nothing else, all this work should be worth the trouble when I can wave my brake at my friends as I taxi by!

Hey Chuck, maybe you should put the word "HI!" and a big yellow smiley face on it so they know its you! -Spud.

Chuck Kaplan

When you brought up the fact that this system came from the Vari-EZ/Long-EZ family a "light went off". I dug out the current Ken Brock catalog and sure enough, Ken makes the the brake apply handle, the spring arm, the cross shaft. I would check there dimension before putting down your money but they sure look identical except for maybe the width of the crossshaft. The basic cross shaft could be purchased from Ken and then split, widen & rewelded to fit your application. which would still be easier than making the whole piece. The pricing looked in line. - Spud

DRAGONFLY
BUILDERS & FLYERS
NEWSLETTER



SKIP LAWRENCE'S DRAGONFLY

Dear Spud and Dragonfly enthusiasts,

Here is a picture (on the back cover) of my modified Mark 1 Dragonfly. I first became aware of Dragonfly aircraft when I met Bob Meador and his Dragonfly project in Hamilton, Ohio. My curiosity about the strange looking design lead to one question after another. Bob soon began to describe some of the problems builders were having with the landing gear configuration of the aircraft. This motivated me to research the production of a durable replacement landing gear for the Dragonfly.

After six months of research and correspondence with fellow Dragonflyers and several composite experts, I designed and produced a composite gear strut. The strut is fuselage mounted and can be positioned for tri-gear or conventional tailwheel configuration.

In order to prove the integrity and utility of my design I acquired a Mark 1 project. Knowing that I intended to make my design available to all Dragonflyers, the need to develop installation procedures and recommendations further justified the investment. The actual conversion was completed in approximately 3 weeks. Since the aircraft had sustained substantial damage as a Mark 1 prior to purchase in a landing accident, it took nearly one year to return it to airworthy condition. During this time I also assisted Bob Meador with the installation of this same gear conversion on his Dragonfly. His conversion was completed in 2 weeks. We both also installed Cleveland wheels and brakes to eliminate fading problems.

Currently, I am flying the aircraft nearly every day. I have accumulated 110 Hrs. since repairs have been completed. The gear strut has proven itself beyond expectations in both handling and durability. The aircraft is powered by a 60 HP. Volkswagen engine and a Great American 52-42 Propeller. Prior to the installation of Vortex Generators on the canard, power off stall speed was 65+ MPH (I'm convinced I have a rough canard and the airfoil is not to plans specs).

Landing distance was 2500 to 3000 feet at Gross Weight. Approach speed crossing the fence was no less than 90 MPH. After the installation of Vortex Generators, stall speed with or without bugs is 50 MPH. Actual in-flight rain tests resulted in minor airspeed loss. (Note: I strongly believe that a perfectly formed canard would not have these airflow separation problems) Landing distance without obstacles is now 800 to 1000 Ft. using short field techniques. Normal landing distance is 1500 Ft. or less. Empty weight is 639 LB., but I intend to add a Loran and wheel pants.

During initial taxi and flight tests the Volkswagen engine

persisted with some minor problems. After considerable tweaking and tuning, I now have it purring like a Kitten. I have been using 90 MPH in climbs and maintaining 165 Deg. oil temp. and 250 Deg. CHT. Cruising and at 3000 RPM I have 135 MPH Indicated with 155 Deg. Oil Temp. and 210 Deg. CHT.

I would like to conclude with a few personal comments. I have been an aviation enthusiast since childhood. I hold a CFI with II and MEI ratings, I am also an A&P/IA. My flight experience is thousands of hours in aircraft ranging from J-3s to DC-3s. Until recently I strongly disproved of Homebuilt aircraft particularly composites. However, through the years I have watched their evolution with growing interest. I now truly believe when built with proper materials and techniques, with attention to detail, Homebuilts are very safe and there performance is unparalleled by any production aircraft.

I am very happy with my Dragonfly and am having a BLAST flying it. I look forward to seeing fellow Dragonflyers at the Kansas Swarming and airshows this coming summer.

Thank You.

Skip Lawrence

The shop address is:

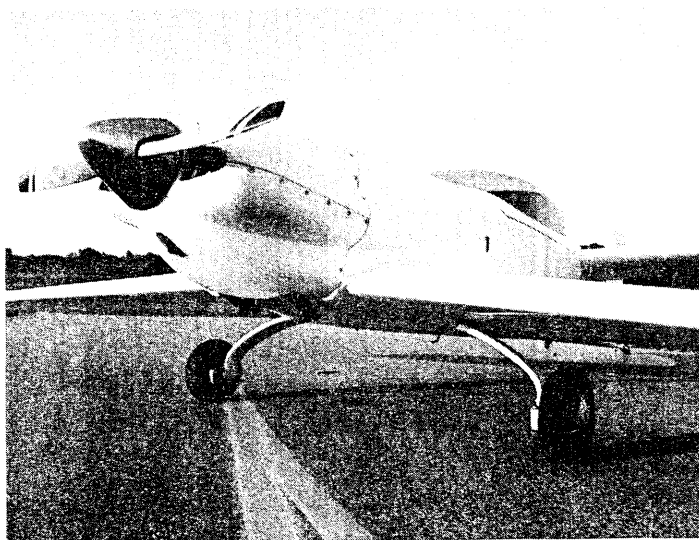
Vernair

Miami University Airport

7101 Fairfield Rd.

Oxford, Ohio 45056

Skip is selling these kits. For those of you that don't want to build you own gear I suggest you contact skip for additional information. His ads are back in the classifieds. - Spud



THE ENGINE SHOP

Engine choices for the Dragonfly

I've received quite a few calls and letters this last year from current or new builders about the Dragonfly. The number one question is, "What engine can or should I use in my Dragonfly". We are going to talk about that in this installment of "The Engine Shop". My intentions are not to suggest any particular application but to give you "food for thought" so you can make the best choice for your Dragonfly. I claim not to be any kind of expert in this area, but what is to follow is some of the gathered information I've collected in analyzing choices for my Dragonfly.

The first thing you have ask yourself is what do you want to do with your DF or do you have a particular problem to over come. Some of the questions you need to ask your self are; Do I want to go fast? Do I want economy? Is my DF going to be on the heavy side? Myself, I've got to confess, I'm a hot rodder at heart and like to GO FAST. One big misconception quite a few of the builders have is that "Bigger is better and/or faster" not necessarily true and you'll see this later on in the article.

Basic engines choices

1. Air cooled automotive engine conversion (direct drive VW)
2. Water cooled automotive engine with a reduction drive
3. Air cooled certified aircraft engine (Continental & Lycoming)

The air cooled VW conversion.

The VW is what the Dragonfly was originally designed around. This will always be your simplest installation. Engine horsepower ranges are available from 60 to 80 hp from Limbach, Great Plains and Mosler. Great Plains Aircraft now offers a 96 hp VW Type IV engine which is slightly heavier and is a real contender for the Dragonfly.

Don't sell the VW engine to short. It's still a excellent choice for the DF. Yes, everyone got a little spooked a few years back when Hapi had some crankshafts break on the big 82 hp Magnum and then a valve guide problems on their split (Scat) head used on 75 & 82 hp motors. We need to give credit to the hundreds of 60 to 70 hp 1835 & 2180cc VW produced by Hapi, Great Plains and Mosler that are flying in Dragonflies, KR2's, Sonerai's without any problems at all.

An engine that so far everyone is really missing the boat on is the Great Plains Aircraft 96 HP 2600cc Type IV engine. Most everyone that I talk to about this engine thinks its a much bigger version (physically) of the 2180 and won't

work in their DF, WRONG! Dimensionally it is very close. To start with, the case is all aluminum instead of the magnesium, this is a big plus because the Type I magnesium work hardens where the Type IV will not at all. It also has thru bolts instead of studs. It has a bigger crank than even the big Magnum motors. It comes standard from the VW factory with hydraulic lifters, spin on oil filter, side mounted mechanical fuel pump, so none of these items have to be machined in to work on our planes, it has all been designed in at the factory. I like the idea of a mechanical fuel pump and the magneto for the back up. The type IV only weighs 22 to 24 more lbs. than the typical 75 & 82 hp motors and will be much lighter than any water cooled or certified aircraft engine will ever be. Of all the different types on engines that are available the Type IV engine will require the least amount of C.G. adjustments and little or no cowling changes. This engine set-up with hydraulic lifters, oil filter, mechanical fuel pump, their 40 amp alternator, 1 electronic ignition and 1 magneto is going to be incredibly hard to beat. It's the best of both worlds. Gene Evans with his 89 hp Type I is the fastest Dragonfly that I know about to date at 180+ mph TAS. Because there is only a slight increase in weight over the type I as compared to the certified and water cooled engines that are coming, the first one to put one of these type IV 2600cc in their Dragonfly will probably become the new "Top Speed King" and should climb like a "Home sick Angel".

The water cooled automotive engine with a reduction.

There are several all aluminum automotive engine that are light enough and produce sufficient horsepower to be a candidate for the DF, but because of the tapering nose profile of the DF the "up right" engine choices like the Honda's and Suzuki's are to tall. These engines would work if someone would develop a reduction that would allow the engine to be tilted over on its sides to fit the Dragonfly's nose profile. The best water cooled candidate for the Dragonfly is the Subaru family of engine because they are all "pancake style" flat four cylinder engines.

A few things that the builders haven't been taking into consideration about the watercooled/reduction (Subaru) engines when they entertain installing them in their Dragonflies are as follows: They figure the labeled horsepower as real horsepower. This is far from true. 1st, the factory rated horsepower are best case scenario, on the dyno, perfectly tuned and their rated horsepower is at 4800, 5400 and 5600 rpm. Most people will choose not to turn their engines at these higher rpm's. A good example here is Justin Mace of Tucson, AZ Legacy powered Dragonfly. Its rated at 130 hp at 5600 rpm. He runs his engine at 4600 rpm. How much horsepower is it producing now? 100hp? 105hp? 110hp? 115 hp? Remember before you start guessing that a 4 cylinder power curve can be very peaky as compared to a 6 or 8 cylinder. It can drop off very fast.

The reduction units are not free in the horsepower department either. Let's take an example; 1984 Subaru 1800cc OHV (pushrod motor), 73 hp at 4800 rpm in stock condition. First, we won't reduce the factory horsepower of this application because 4800 rpm is not that excessive. Next reduce the horsepower by 5% to 70 hp because all the my years in the performance industry and around engine dyno rooms I have never seen a factory motor come close to their rated horsepower. Next, you need to take in consideration the horsepower it takes to run the reduction unit which ranges from 4 to 6% depending on the type of drive (Gear, belted, chain/gear or planetary). So let's use 5% for drive loss. Now we are down to 67 hp "at the prop". We need to be fair here and mention that this is a "Stock" engine and it can be modified to 90+hp at the prop. If we apply this to Justin's, lets say 110hp less 5% brings us down to 104.5 hp "At the prop".

Next thing to think about is your total engine/reduction weight. The original Hapi 60 hp VW version with with alternator weighs in at 155 to 160 lbs dry and the 75-82 hp engines weighing in at 165 to 170 lbs. dry (no oil), no prop or mount. The Subaru 1800cc OHV (Overhead valve pushrod motor) with a Ross reduction is 185 lbs dry, The Subaru 1800cc OHC (overhead cam) with Ross drive weighs in at 218 lbs. dry. The Cam 100 Honda is advertised at 224 lbs. dry with reduction. We need to remember what things weigh, gas is 6 lbs a gallon, oil is 7.5 lbs a gallon and water 8 lbs a gallon. The average cooling system assuming you will have the radiators close to the engine will need approx. 2 gallons of water/coolant. 2 gallons X 8 lbs. = 16 lbs. Justin Mace with His 2200cc 130 hp Subaru Legacy installation weighs in at 295 lbs.. His initial radiator installation placed his radiators aft of the wing to keep his C.G. in line. He used 1 1/4" aluminum tubing to transfer his coolant from the engine compartment back to his

radiator. When you calculate the length of the both feed and return lines. He has 18 lbs of coolant just to fill these lines. So if we take the 1800 OHV pushrod motor with a Ross reduction it comes in at 192 lbs with oil, add 16 lbs (2 gallons) for coolant, 18 lbs. for radiator, filler/surge tank, bracketry. We now end up with 226 lbs. Chuck Kaplan of Walpole, Mass who is installing a Continental O-200 in his Dragonfly has weighed his engine assembly as it will go into his plane and it comes in at 229 lbs.

Some of the advantages of the Watercooled engine are. Cooling stability. With an air-cooled engine if you where to make a fast power reduction with a fast decent you have the possibility of cooling shock the engine. This is where one part of the engine cools faster than a other part of the engine. This has been particularly true with the VW conversion with it's one piece head over the two individual cylinders. The problem that arises is losing the cylinder to head seal, loss of compression in the cylinder. With disciplined engine management this problem can be avoided. With the water cooled engine you have the luxury of a thermostat controlled water temperature that will keep it even at what ever power setting your at.

Another advantage of the water cooled and VW engine is after your initial setup dollars, is the maintenance of the engine. The engine replacement components are much more economical (read that as Bunches cheaper!) than buying certified aircraft engine pieces.

Turbocharging. Controlled turbocharging has its advantages. The main one being that you would be able to maintain sea level horsepower up to and maintain at altitude (10-12K ft.). One must also take in consideration loss of prop effeincy at altitude. One of the original problems on the early turbocharged VW engines (Revmaster) was they had difficulty getting rid of the heat that the engine and the

<u>AIRCRAFT</u>	<u>Type I VW</u> <u>75 hp</u>	<u>Great Plains A/C</u> <u>Type IV 96 hp</u>	<u>Subaru 1800cc</u> <u>OHV 85 hp</u>	<u>Subaru 1800cc</u> <u>OHC 95 hp</u>	<u>Subaru 1800 OHC</u> <u>Turbo'd 110 hp</u>	<u>Justin's Legacy</u> <u>110 hp</u>	<u>Cont. O-200</u> <u>100 hp</u>	<u>Cont. O-200</u> <u>120 hp</u>	<u>Lyc. O-235</u> <u>108 hp</u>	<u>Lyc. O-235</u> <u>128 hp</u>
<u>EMPTY WEIGHT</u>	695 lbs.	717 lbs.	746 lbs.	779 lbs.	810 lbs.	825 lbs (less tool kit)	760 lbs.	760 lbs.	781 lbs	781 lbs.
<u>GROSS WEIGHT</u> <i>empty wt. +500</i>	1195 lbs.	1217 lbs.	1246 lbs.	1279 lbs.	1310 lbs.	1325 lbs.	1260 lbs.	1260 lbs.	1281 lbs.	1281 lbs.
<u>HORSEPOWER</u> <i>at the prop</i>	75 hp	96 hp	85 hp	95 hp	110 hp	110 hp	100 hp	120 hp	108 hp	128 hp
<u>WING LOADING</u> <i>psf=lbs. per sq. ft.</i>	11.72 psf	11.93 lbs. psf	12.22 lbs. psf	12.54 lbs. psf	12.84 lbs. psf	12.99 psf	12.35 psf	12.35 psf	12.56 psf	12.56 psf
<u>POWER LOADING</u>	15.93 # per hp	12.68 # per hp	14.66 per hp	13.46 per hp	11.91 per hp	12.05 # per hp	12.60 # per hp	10.50 # per hp	11.86 # per hp	10.01 # per hp
<u>COMBINED & RANKING</u>	27.65 (#10)	24.61 (#4)	26.88 (#9)	26.00 (#8)	11.91 (#5)	25.04 (#7)	24.95 (#6)	22.85 (#2)	24.42 (#3)	22.57 (#1)

turbocharger developed in a boost condition. Another problem with the Revmaster is that it did not have a wastegate (boost control valve), they had a real over boost problem. Turbocharging is a very complex application and is beyond this article. If there is a interest in this area we can dwell on it in a future article.

Are used water cooled automotive engine will be more economical?

The watercooled option is not always a lot cheaper. Here's a example using a Ross reduction; it will run from \$3600 to \$4000.00+ if you "do-it-yourself". Also don't forget to take in consideration you won't be buying a \$350.00 prop. You should expect to pay \$750.00 & up.

Here is one example;

The reduction unit \$2500

Used 1800CC OHV (pushrod) core engine \$350

Rebuild engine with performance cam "do it your self" - \$750

Manifold mod \$100

Back-up ignition \$150

Cooling system \$150

Carburetion or fuel injection unit \$500

Total \$4500

Justin Mace has \$7000.00 invested his engine and drive combination.

Justin has definitely proven that a Dragonfly will fly heavy. Justin's engine/reduction/cooling system is almost 300 lbs.. Which is much heavier than the certified or the VW's would be. His empty weight is 842 lbs. (with his tool kit) you add 400 lbs. to this figure for pilot & passengers and 100 lbs for fuel (16.5 gallons) you are now at 1342 lbs.!

Air cooled certified aircraft engines.

These engine choices include Continental C-75, C-85, C-90, O-200 and Lycoming O-235. Some of the draw backs of these dependable engines is that they are on the heavier side which will use up your pay load allowance if you maintain the 1150 lb. gross. If you choose to install the Continental O-200 or especially the Lycoming O-235 plan on doing quite a bit of redesigning/relocating things to strengthen the airframe, engine mounting areas and for C.G. considerations also. It will not be a easy project.

The Continental C-75 will weigh in at 190 lbs., the C-85 & 90 205 lbs, The O-200 weighs 228 lbs. and the Lyc. O-235 weighs in at 261 lbs.

One of the big assets of the certified engines is the years of history of dependability and there is no substitute for "Cubic Inches". The Subaru 1.8 motors are actually 1735cc which equals 104 cubic inches and the 2.2 Legacy equates

out 134 cubic inches. The Type IV at 2600cc equals out to 159 inches. The major negative of the certified engines is availability, Initial cost of the complete engine, cost of parts and labor if you have the work done.

In the chart on the bottom of page 7. I took a Dragonfly with a Hapi 75 hp 1835cc of 695 lbs. as the base airplane. I came up with this weight based upon the flying Dragonfly survey that I took a couple a years ago and the average weight was 695 lbs. with a typical 75 hp engine installation. From that point I added the engine weight differential including cooling systems and/or reduction units that it would take to allow the engine to operate it in the plane, this is where the empty weight comes from. The next category is gross weight. We add 500 lbs. as a "constant" worst case scenario for pilot, passengers, fuel and to show where the gross weight can actually end up. Next is Horsepower, This figure is based upon horsepower "At the Prop". The water cooled figures are based upon a happy medium between mild to wild in regards to modifying these motors and are very realistic unless you want to really increase the engine rpm's above 5400 & up. Justin's figure is based on his estimate, he doesn't turn his engine over 4600 rpm. You'll see two horsepower ratings for the Continentals and Lycomings. We modify the hell out of the VW's and the Subaru's to increase horsepower. To be fair we need to allow for the same modifications to be made on the Continentals and Lycomings. These horsepower increases are easily obtained with slight camshaft changes and 300 to 400 rpm increase. Next wing loading, this is to show you where your wing loading is going. It's interesting even looking at Justin's which is the heaviest of all, his is still only 12.99 to 1. This still is way lighter than most other homebuilts. Here's some comparisons; Long-EZ is 15.0 to 1, RV-6 14.56 to 1, Q-200 16.4 to 1, Cozy IV 20.0 to 1, Sonerai 13.7 to 1, Lancair 235 18.42 to 1, KIS TD 15.9 to 1. Now this doesn't mean you can go out and get yourself 180hp IO-360 and put it in your Dragonfly. The plane is no where stressed for that kind of weight. Next is the combined factor and ranking. The combined total is a combination of wing loading and the power loading. A lower number is most desirable for best all around performance. Number #1 being the 128 hp Lyc.O-235 and #10 and last being the 75 hp 1835CC VW. We need to remember that our plane is grossed at 1150 lbs.!

In conclusion: The results are surprising. When you look for the smaller combined factor with the lighter gross weight the Type IV 2600cc 96hp is an excellent choice. The water cooled application are good choices, but you shouldn't expect a strong performance and you need to feel comfortable with the higher gross. Each one of these engine families has their good points and bad points. So pick out the engine combination that will work for you and let's go flying! - Spud Spornitz

Vacuum Bagging Tips

Dear Spud:

I thought you would be interested in a phase of my Dragonfly construction. After talking to several people and reading the past news letters I felt that tri-ply was the way to go in wing and canard construction. I also felt that to achieve optimal cloth to resin ratio I would have to vacuum bag the wing and canard. This is what I have learned about vacuum bagging wings and canards.

The first problem arises in that you cannot glue the wing into any jigs. The wing must fit perfectly in the jig blocks by itself. To accomplish this the joining of the foam blocks must be done in the jigs. The line drawn on the table is not satisfactory.

With the wing you only need to glue the BL18 and BL63 blocks to the table. Make sure the block are aligned as stated in the plans. Use the similar section in the plans for the canard. When the jig blocks are properly aligned then you can join the foam blocks and they will be true.

You then glass the sheer web as outlined in the plans. Be careful that the sheer web is straight as there is no opportunity for alignment adjustment later. Place the foam with the sheer web lay up back in the jig blocks after you complete the knife trim. This will allow you to make small adjustments in alignment before the layup fully cures. You should not have to make any adjustment if you did it correctly the first time. Let the sheer web cure for at least 3 days.

Now you are ready to attach the rest of the foam for the wing or complete the layup for the canard. The wing requires attachment to the outboard panels and the wing tips. Continue as the plans specify. When you are ready for the spar cap and skin layup you must fill any major dings in the foam before the layup. The pressure from the vacuum will push the micro out of the dings. The best way is to hot have any dings in the first place.

Proceed with the layup as outlined in the plans. You can fill small deep holes (nail holes) at the beginning of the layup but the larger bruises should be already filled. With vacuum bagging the layup you will have no chance for a knife trim. You must scissor trim the cloth when you finish the layup. Get the scissor trim as close as you can. When you finish the layup you are now ready to vacuum bag the wing or canard. The vacuum bagging starter kit from Alexander Aeroplane has enough material to bag one side of the wing. The proper amount is 8 yards of peel ply, bleeder ply and plastic bag. The kit has 10 yards of this material.

Carefully unroll the plastic bag and place it under the wing

or canard by gently lifting the wing or canard out of the jig blocks. The bag must be loose to conform around the lift fittings and the change in wing where the aileron cutouts occur at BL63. Place peel ply over the entire layup followed by the bleeder ply. Place about 4 layers of bleeder ply in the area where the ailerons will go (between BL63). This is where the vacuum fittings will go. The bleeder ply is needed to conduct the vacuum from the wing. This will also prevent the connections from pressing down on the wing and making a depression.

Seal the bag with the sealing tape, making sure that there are no wrinkles on the tape and no holes. Try not to move the wing in the jigs as this can put holes in the bag. Leave a small opening in the bag for a vacuum cleaner hose. A vacuum cleaner works well to start drawing the vacuum as it is a high volume low vacuum pump. A vacuum cleaner can only draw about 2 inches of vacuum and you will need about 15 inches to properly do the job.

When the vacuum bag has most of the air removed, then you can remove the vacuum cleaner and attach the vacuum pump. An automotive air conditioner pump WILL NOT WORK. It does not have enough volume to properly draw the bag down. I used a converted Chrysler air conditioner compressor. Alexander Aeroplane sells a good pump so you have several choices. Draw a vacuum on the bag of about 15 inches. If the needle of your gauge vibrates you have a leak. Check all of the seal of the bag for leaks. You can also check for leaks by pinching off the vacuum pump and watching the gauge. If it does not maintain the vacuum, you have a leak. I could not get all of the leaks out, however the AC compressor/pump was sufficient to maintain a 20 in vacuum, which was more than enough.

Leave the vacuum on the wing or canard for at least 6 hours or until all heat from the layup is gone. This means that you have removed all of the excess epoxy. Do not unbag the structure until the next day. One word of caution, if you got bleeder ply on the structure without peel ply you have some sanding ahead of you.

Now you can turn your structure over and follow the plans for the second side. The vacuum bagging for the second side is the same as the first, and you will need another 8 yards of bagging supplies.

Now you say, what will all of this extra work and cost get me (about \$100 for a wing or canard). First, if you used tri-ply it will reduce the weight of your layup by about 17% (you gave me this number, Spud). I am assuming that you had an optimal cloth to resin ratio before you started. If you did not your reduction will be more. I calculated that the amount of excess resin removed from 1 side of the wing to be about 3 to 4 pounds. This does not seem like much but remember there are 4 sides. That weight reduction translates into being able to add a full gyro panel or some other such foolishness.

Secondly, if you did it right you have optimal bonding between the foam, carbon, and cloth with NO BUBBLES. You should have no high spots as everything is pushed down. This should make your filling much easier.

This procedure is some extra work, however I am satisfied with re results. If you or anyone has any question give me a call.

Regards,

George Gaston

(504) 785-0959

MULTICOM

CONTINUED FROM PAGE 2

I need these by January 25th. I have 80 flying Dragonflies on the roster that take the newsletter. So why don't some of you guys get off your Butts (yes, this means you) and get these in NOW! I WANT SOME HELP ON THIS! If you do not understand, call me (913)764-5118.

Gene Divincenzo Gear up-date

The material that Gene used for his gear is E-glass not S-glass. The material is call Roving Glass 3' wide, .025 thick, 22 ozs. per sq yard. part number is #1600-3. See page 22 of the latest Wicks catalog. He also used Safety Poxo II for the epoxy.

More on gap seals!!!

I have had some additional opportunities to fly my Dragonfly in the rain since installing the gap seal. I noticed something else about the canard in the rain. There isn't any pitch down any more when I fly in the rain. The only way I can tell if its raining is to look at the canopy - Reg Clarke - Alberta, Canada. *I would be very interested in hearing from other people having the same results - Spud*

Static Port location

I had a open static system to the inside of the plane. I installed dual static port holes of the fuselage 15" ahead of the wing and 1/2 way down the side of the fuselage. Indicated speed is down 5 knots and is much more closer to being correct than before. - Reg Clarke - Alberta, Canada

Justin Mace checking - In

I am still in the process of making a spinner to fit the new monster prop. I am enjoying just flying when I want to. I am due for another oil change. I now have a total of 150 hrs. on the engine/gearbox. I have had NO, repeat NO maintenance or any work on the engine. Justin "Holly-wood" Mace

THE CLASSIFIEDS

For Sale: Brand new unassembled 2167cc VW engine, split port heads (Scat), Revmaster accessory case, exhaust manifolds and prop. \$4400.00 invested in 1986 dollars, have receipts. \$2500.00 for everything. Call Chuck Kaplan - Walpole, Mass. (508) 668-4784

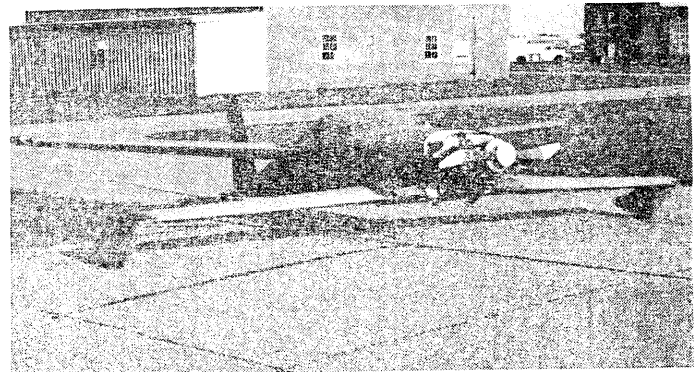
For Sale: New Viking Mark II gear legs, Hapi wheels and brakes with Lamb tires \$400.00 Chuck Kaplan - Walpole, Mass (508) 668-4784

For Sale: Mark I Dragonfly 825 hrs.TT, 510 hrs on 80hp Limbach, Cleveland brakes, aileron reflexor, Vortex generators, Quality workmanship. \$11,000.00 less radios, intercom and lights. Call Robb (407)-395-9267

For Sale: Ken Brock Dragonfly hardware package, 52 pieces in all, for center stick. copy of original invoice included, original cost was \$612.00. I'll sell for \$458.00 including shipping. Frank Cabanillas - Aiken, SC (803)642-6406 after 6:00 EST.

For Sale: Quickie Q-1, completed, no airworthiness. Onan industrial eng. 18 hp, 24 hours logged. central U.S. Always hangared. Spec's and pictures available (402) 463-2588

For Sale: Dragonfly Mark I 95% complete. Primed, not painted. Always hangared. Hapi 602DM engine, New. Located in central US. Specs and pictures available. (402)463-2588. ↘



For Sale: Limbach 2000DD engine with everything you need. Engine is ready to fly. Dual Mags, suction pump, fuel pump, electronic tach, engine mount for DF. All related wiring. 0 hours since new. Nearest to \$8500.00 US funds will get it. Hans Graesser, Marktstr. 56, 7057 Winnenden, Germany

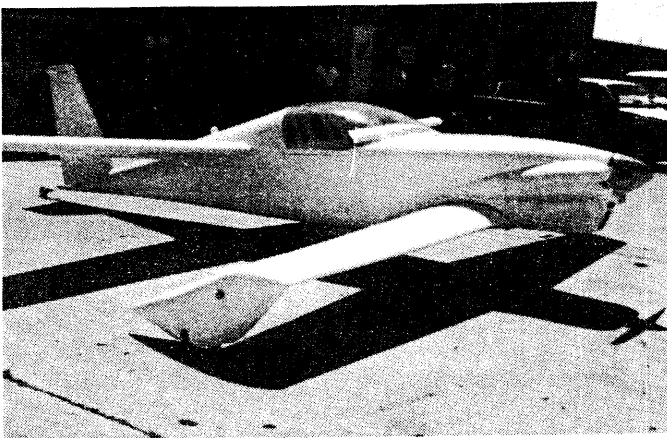
For Sale: 100HP Subaru 1800cc OHC engine with Ross Aero reduction, 3 blade Warp Drive HP prop. dual module distributor, Ellison injection, aluminum radiator and other trinkets. \$4000.00 Alpha plastics cowl \$100.00, I pair of Viking Mark II gear legs \$200.00 (604)743-4916 Dean Cramb RR#1, Cobble Hill, British Columbia, Canada V0R 1L0

For Sale: Dragonfly fuselage and engine cowling. Plans built, all bulkheads, seat and tank installed. Plans included. Can be inspected no filling or priming done. Excellent workmanship. In Wisconsin - \$1000.00 contact Phil (414)367-0181 (2)

For Sale: Zero time VW engine in San Diego. Single ignition, Posa carb, Alternator, Intake manifold. \$1000.00 Contact Phil (414)367-01819 (2)

For Sale: 1835cc VW firewall forward, includes motor mount, starter, charging system, intake manifold & exhaust pipes, no carb \$1400.00 Reg Clarke Westaskiwin, Alberta, Canada (403) 352-5001

For Sale: Dragonfly Mark I, Revmaster 2100D Turbo (10hrs), A/C has been flown but id currently undergoing Mark II Mod. Have gear legs and plans, Excellent acrylic enamel paint job. Instruments incld. Compass, T&B, AS, ROC, 4Cyl CHT, EGT, Man pres., Basic eng. gauges, Dual control. Access panels over canard & wing \$7500.00 Contact Harry Kemp (512) 398 5643 (PHOTO) ↴

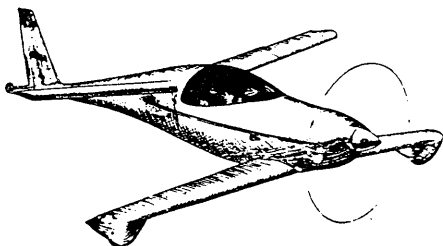


For Sale: Quit stalling around! Vortex Generators available for your Dragonfly. Info Pack \$10.00 (Applicable to purchase). Call: 513-868-9736.

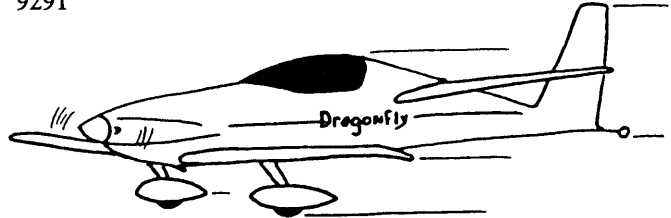
For Sale: New Gear! Relieve the stress on you and your Dragonfly. An all composite Gear Strut will solve ground handling problems in your Dragonfly. Info video and price sheet \$25.00(Applicable to purchase). Call: 513-868-9736

FOR SALE: "SNAP" core Mark 1 canard, all layups complete, unfinished for your inspection. Wheel Fairings installed. Excellent workmanship. Control surfaces and mounting hardware included. Call: 513-353-4557

For sale: Task Dragonfly engine cowling, "beautiful piece" \$300.00. 12" fiberglass spinner shells, 8 oz. \$75.00 ask for Stan (714) 843-4992



For Sale: 1pr. of 1835cc single port, dual plug (dual ignition) Hapi cylinder heads - \$150.00. Hapi hydraulic brakes and wheel (shoe type) assemblies (2) with 2 master cylinders, Lamb tires & tubes - \$150.00. New Azusa wheel and brake assemblies (2) with tires - \$75.00 Wayne Ulvestad Volga, SD. Eve- (605)-627-5365 Days (605)627-9291



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