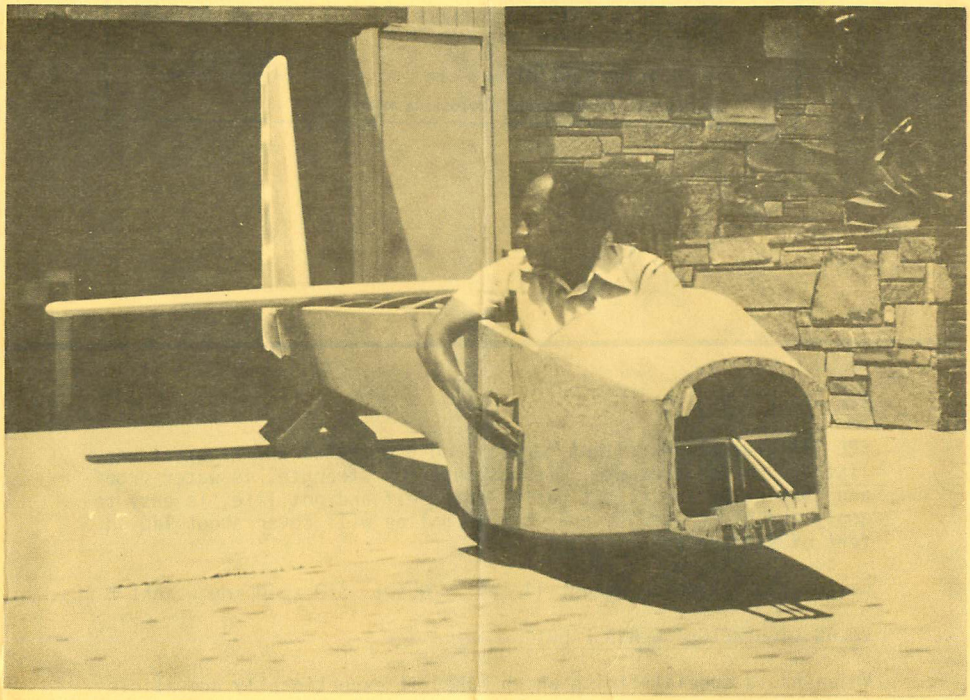
THE DUST RAG



THE OFFICIAL JOURNAL OF THE DUSTER SAILPLANE ASSOCIATION

JUNE 1979

FPL-16A EPOXY GLUE

FPL-16A glue has excellent gap-filling properties and requires very little clamping pressure. It has superior strength, is water proof and chemically inert. It has a long shelf and pot life, is easy to apply and gives good coverage. One gallon will cover about 140 sq. feet of surface area.

Gallon $32 shipping weight 14 lbs. Quart $12 shipping weight 5 lbs.

VOLAN LIGHTWEIGHT GLASS FABRIC

Volan has a special finish which makes it exceptionally compatible for use with polyester resin. It has good strength properties and extremely rapid wet-out. Lightweight glass fabric and polyester resin is a particularly good covering for all-wood aircraft. It is water proof and weathers very well for out door storage.

1.01 oz.	38" wide	50 yards	$75
1.45 oz.	38" wide	50 yards	$75

Glass fabic is shipped prepaid. Please add UPS charges for FPL-16A glue.

SAILCRAFT
3058 Bernina Drive, Salt Lake City, Utah 84118

Published by

George & Kathy Taylor
719 Middle Road
Bayport, New York 11705 U.S.A.
Phone (516) 472-1518

Subscription rate
$3.00 per Year for
6 Issues or $5.00
Outside North American Continent.

FROM THE EDITORS

Kathy and I were contacted by Doug Bell of Carrollton, Texas who asked to take over the publication of the Dust Rag. We decided not to stand in the way of progress so this will be the last issue to be published by the Taylors. Thank you all for your articles and financial support during the past five years. Volume I # 1 was dated "Winter" '73 and we put out our first copy in April 1974 (Vol.ii, # 1) after Bob & Ching Walters announced that they had to leave for Iran.

Meanwhile it's back to the drawing board, or in this case, workshop, for me. Shortly after I let out the news of my accident, Bill Merritt of Norristown, PA contacted me with an offer of a partially finished Duster fuselage, assorted hardware, spar blanks and lumber. I had already completed a new set of fuselage bulkheads for the new ship but this time-saving opportunity was too good to pass up. Shortly afterwards I appeared at Bill's door with cash in hand and trailer in tow and in one day I was back onto the road to Duster ownership.

COVER PHOTO

Plan #293 is coming down to the wire. I have completed everything except installation of the wheel and instrument panel. I have built all but the trailing section (drag spar to trailing edge) of the outer wings.

I have not yet purchaced the metal for the outer spars. I left the leading edge where I must drill the spar to accomodate the outer panel fittings. It is all set to be spliced on later.

I must construct the ailerons and finish and cover the outer wing and dive brakes. I am sending for some trailer plans now. I also would like to devise a way to make assembly and disassembly and storage a one man operation.

I have begun my soaring training at Pearblossom and hope to complete is sometime this summer well ahead of the completion of #293.

I hope all Duster builders can continue their enthusiasm and that the model will continue to be sold and constructed. A closer bond of fellowship with the notion to upgrade the craft and to facilitate the construction of new craft by new recruits should be our primary objectives. Our plane should surpass that other famous plane in popularity and numbers in the near future.

Ralph W. Isaacs

Los Angeles CA

LETTERS

Featuring empty threats, execrable puns, and advice to the pubescent.

Receiving the latest issue of the Dust Rag made me realize just how long it's been since I wrote to you. The last 2 1/2 years, since I started in the motel business have been so totally busy that I literally have only time to sleep and sometimes hardly that. I've never gotten beyond a couple of paragraphs without an interruption before. Perhaps this time I will succeed in putting a few thoughts on paper.

When I opened the newsletter I was shocked to see the picture of your destroyed Duster and my first thought was "Oh no, not again!" so if you'll excuse me I must say it was with some relief that I read you had tried to land blindfolded! For the sake of everybody's peace of mind, especially mine, let's hope that the tail flutter problem has been put to rest once and for all. I feel certain the tail mod has accomplished that. I'm truly sympathetic to your tough luck, George. If it makes you feel any better I can tell you that once I stuck an L-Spatz through a haystack on an outlanding in Sweden with similar if less catastrophic results.

Now about engine pods - I believe I may have written on that subject in one of the earliest Dust Rags. I did some test flying with the Rockwell engine that DSK (Barnhart) installed according to my original designs. From that experience I concluded : (a.) that at that time there was no suitable powerplant available which would allow the Duster to be truly self-launching. The Rockwell did the job, but was too heavy, turned too fast for good prop efficiency without a belt reduction unit (more weight), vibrated horribly, and was very sensitive to mixture changes due to altitude: (b.) that perhaps the Duster was too light to be used in a power-mode. The pod-mounted engine which was some 3-ft. from the center of mass of the sailplane had an enormous effect on the dynamics of the aircraft. The effect became particularly noticeable during power-off flight. It felt as though one were sitting on a ball-bearing both in pitch and roll. The drag of the uncowled pod was surprising- it nearly doubled the rate of sink. The high rate of sink coupled with the inertia effects of the pod made power-off approaches less than comfortable! The consequence of those conclusions was to discontinue further efforts to power the Duster, since I couldn't conceive of any viable options to the power pod short of a jet unit! For those who insist on using a power package I would suggest the following: Keep the engine as low as possible, maybe right on top of the wing with a pod for the prop only, using a Morse-belt RPM reduction system. The Rockwell pod turned the Duster into a powerplane, pure and simple. If one were to use the pod only when powered flight was intended I suppose it might make sense, but the Duster is not a powered sailplane, I'm sorry to say.

George, I would like to thank you for the great effort you are devoting to the publication of the Dust Rag. When I think of how hard it is for me just to write a letter I realize how much credit you deserve.

The plan sales of the Duster slowed to a trickle months ago, and with John Sinclair too busy now to handle the sales for me, I've decided it's time to pull the plans off the market. The state-of-the-art points toward new materials and methods. Perhaps "Monerai" is the answer- time will tell. Ultimately soaring performance will be the measure whereby it is judged- it always is. I want all the registered plan holders to know that I will continue to monitor their progress and provide support when needed. I hope the Dust Rag will continue to be the primary tool in that regard. I can be reached by writing to:

905 Westmorland Drive
Wenatchee, WA 98801

I think if everyone continues to keep their craftsmanship on a high level the Duster will remain a very good investment. John S. informs me that a well-built Duster is commanding a fine price in the sailplane market.

Please advise if you are able to get enough 100-hr. affidavits signed for Mr. Dunn from Australia. I can sign one for N2319B if necessary, and I think Jim Maupin, John Sinclair, Tom Protheroe and Bob Walters as well as you, George, have 100 hours on a Duster.

Doug Bell called me from Texas a few nights ago and mentioned that he might assume the Dust Rag publication duties while you concentrate on re-building your broken bird. By the way, I received your post card today. Kathy, you are of course included in my appreciation for your efforts on behalf of the Dusters.

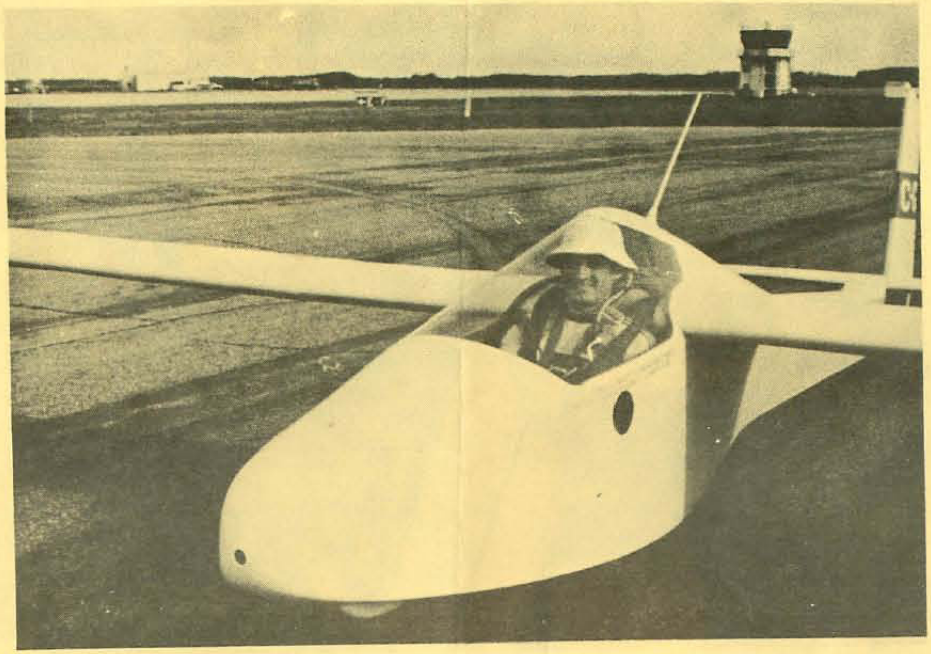
Hank Thor
Wenatchee, WA

Enclosed is a check to continue my subscription to the Dust Rag. It ran out some time ago and I've been so busy it has taken me up to now to renew it. I enjoy it very much and only wish I got them more often.

I'm plan holder #330 and started building in December of '77 so I'm a year and a half into building. I'm building from a DSK kit which was a good kit (if I had only gotten all my parts). I have all components and parts built, lined up and attached. I've just finished running all controls and getting ready for the FAA inspection.It's quite a thrill to put it together and see a plane sitting there instead of a pile of wood (of course except without the top skins.) I suppose if I got it on I could be in the air by late fall but this isn't going to happen. My wife is pregnant and is expecting in August. So I've been busy taking care of her and the household, cooking, washing etc.. So as you can expect work on #330 has slowed to a crawl and by August it will come to a halt, I suppose. But I'll have all winter to build and by next spring I think I'll be flying.

There are a couple of things I'd like to mention before I close. I'm using Chem-Tech products. Their T-88 epoxy glue is excellent and easy to work with. I've used their L-26 thinned down to coat the inside and will use it over the 1 oz. cloth to finish the the outside. Far superior to fiberglass (lighter and adheres to wood plus stronger and more flexible). And the other thing is I'd like to thank Bob Warren from Tulsa Oklahoma for stopping by when he was here in phoenix. It was a very enjoyable evening and he was very encouraging. I only wish I had more time to spend with him.

John Klimosewski
Phoenix, AZ



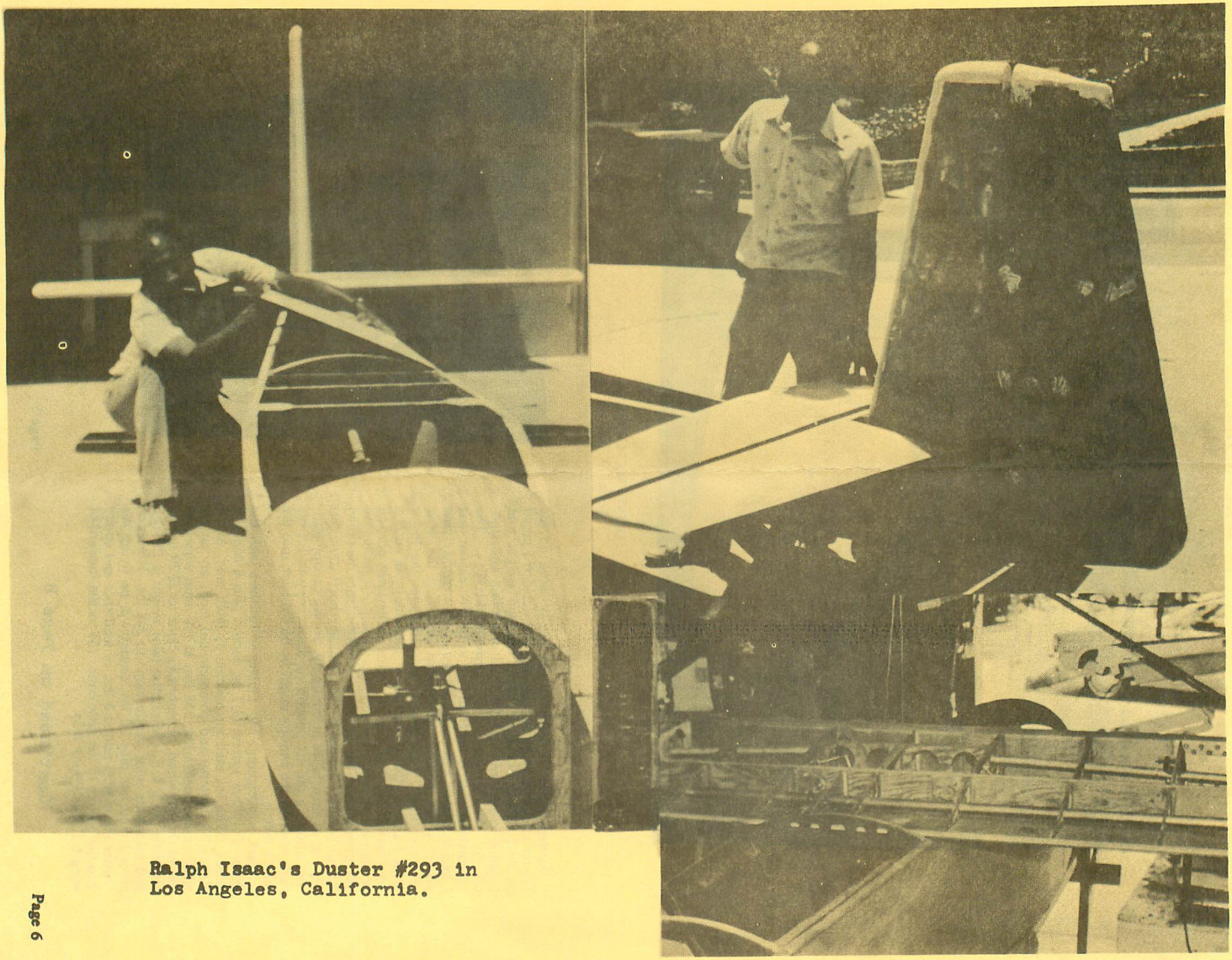
DUSTER C-GDFB
Serial # 100

In September '78 I finally ran out of work on my Duster after five years of building, so I decided I might as well fly it. But first, there was the weight and balance to perform and the final inspection and sign-off by the Ministry of Transport (MOT). The airworthiness inspector found all to be OK, except that I had to design and install a special little pylon/latch assembly just behind the cockpit cutout in the wing centre section. This special latch engages the lower cross frame on the aft section of the canopy in such a way that in event of canopy jettison, the front portion of the canopy must rise well into the slip stream before the aft portion of the canopy disengages from the (new) latch. Without this latch, the existing (short) studs can slip out of their holes prematurely, during canopy jettison, allowing the aft portion of the canopy to lift off first, whereby the canopy might be blown back into the pilot's face.

Back to weighing. My Duster is finished with the Stitts Polyfibre system (1.7 oz dacron plus 8 coats of dope). With my instruments,canopy latch mod, Alpha 100 radio, battery, and complete tail mod, my empty weight came to 402 lbs; 358 lbs. at the main wheel, 44 lbs. at the tail wheel. Empty CG came to 22.29 inches aft of the wing L.E.. Minimum pilot weight is 157 lbs. and maximum pilot weight came to 218 lbs. However, since I (160 lbs. plus 20 lbs. chute) will be flying the Duster the most, I added 8 lbs. of lead shot and epoxy into the bottom of the nose cone. (56 inches forward of wing L.E. See Photo #3).

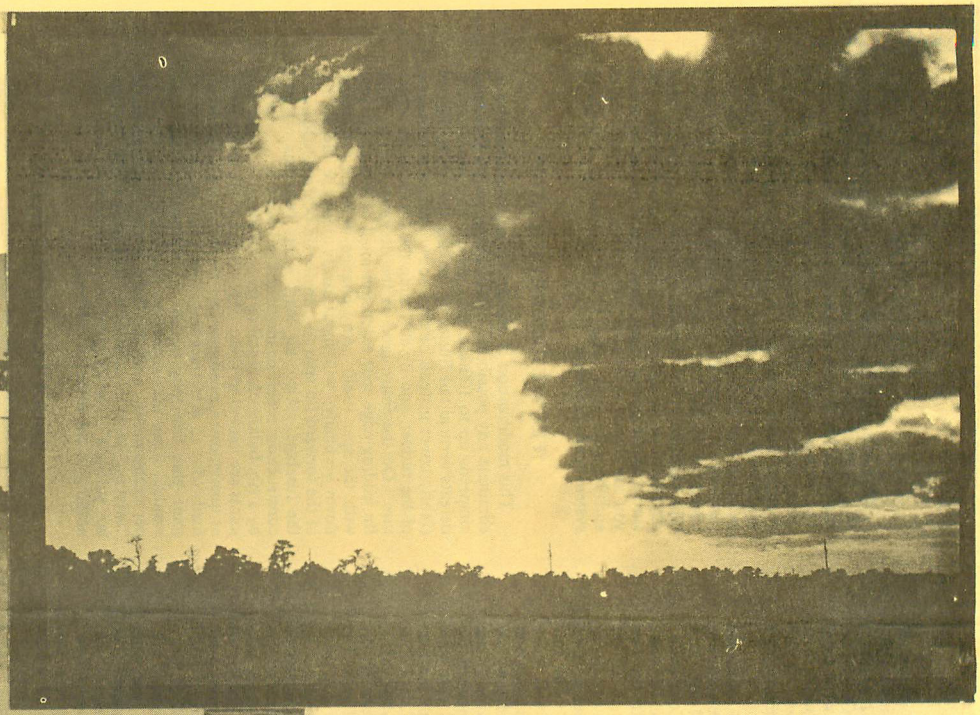
Continued on Page 8

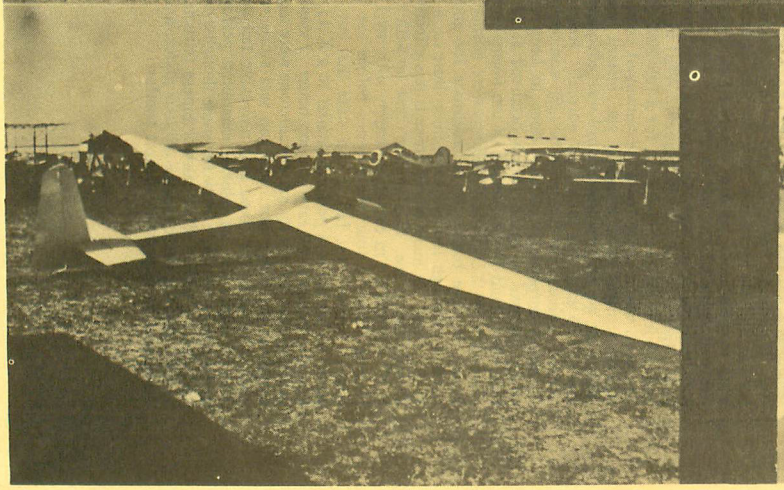
Photo #3- Ballast in Botton
Of Nose Cone

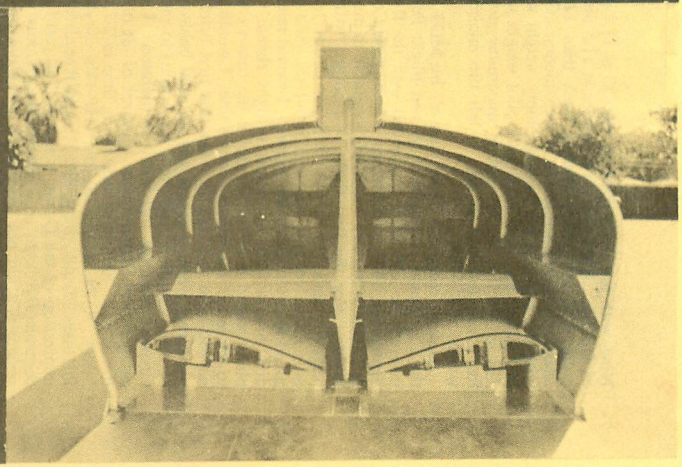


Ralph Isaac's Duster #293 in
Los Angeles, California.

Clockwise from top right: Long Island, NY, sea breeze front; Ted Lesher's trailer with Duster #186 in place; #186 at the Merced Antique Fly-In; Outside view of Ted's trailer (more details in a future Dust Rag).







Now, with me in the Duster, the CG is 11.8 inches aft of the L.E. Hank Thor recommends 11.5 inches optimum, and avoid any further back than 12 inches. Maximum permissable aft is 13.5 inches. Of course, with the added 8 lbs ballast, empty weight went from 402 to 410 lbs., and maximum pilot weight went from 218 to 210 lbs. to stay within maximum gross of 620 lbs. - not too bad at all. I left the minimum pilot weight at 157 lbs.

Having completed final sign off by MOT, obtained the Certificate of Registration and Flight Permit, and insured the aircraft, I proceeded with the flying on 4 September, 1978, at Canadian Forces Base Cold Lake. A 12,600 ft. runway was made available to me for these flights. For the first flight, I arranged with the tow pilot (flying a 115 hp PA-12 Super Cruiser) to lift off only a few feet and maintain 50 KIAS. At a pre-designated location down the runway, I would release, open dive brakes fully and land straight ahead. The tow plane would land further down the runway and move to the left of the runway centre line. I would clear him on the right if I had to. On this first brief tow, my objectives were to assess any unusual behavior or out of trim condition, and (very important) to monitor the airspeed readings. All went as planned. I can state categorically that from the moment of lift off (and on the basis of 400 hours total flying time in 2-22's, 2-33's, 1-26's, K-7's, K-7's, K-13's, HP-14's, Skylark III's, Pilatuses, Blanik, Bergfalke III and Rhonlerche II) my impression of the Duster is that it "felt just fine". The controls felt light and responsive, it was not pitch sensitive, it did not tend to fly sideways, or one wing low. Dive brake operation and performance appeared normal, and the approach, flare out (no tendency for a wing to drop) and landing (3-point tail dragger attitude) all appeared and felt normal. Also, I confirmed with the tow pilot that my airspeed indications were within five knots of the tow plane's. What more could you ask for! So away we went for a full 2000 ft. tow. The wind was straight down the runway at about 5 kts. Aileron control was effective the instant the wing runner let go, and rudder control was adequate. The tow (52-55 kts) was easy and normal. Release was normal. I found the Duster to be light and responsive. I needed surprisingly little rudder to keep the yaw string centered in turns. Stalls occurred at 33 KIAS. Side slips could be performed in the normal manner. Approach (48 KIAS) and landings were normal, and I found the dive brakes to be adequate for glide path control, although less effective than those on a K-7 or K-13. Also, the main wheel brake is less effective than I would like to see. Has anyone come up with a fix for this? All in all, I'm extremely happy with my Duster. Having flown it four more times before the ground turned "white" last fall, I can state that my Duster seems to handle and perform similar to a K-13, except that the Duster's roll rate is much better. I should also mention that for my flights, the ailerons were taped full length at the hinge line, and gap seal strips were installed between the fixed and moveable tail surfaces. This is important to achieve maximum performance and maneuvreability. Now for some thoughts on "do's and don't's which affect airworthiness (structural integrity) and/or performance of your glider, and some discussion on improving cockpit comfort.

ON FLUTTER

Do not exceed V_{NE} (100 KTS). At airspeeds beyond V_{NE} there is risk of airframe flutter. This can be done inadvertantly if your airspeed indicator reads too low. For instance, my airspeed indicator reads 5 kts low using nose cone static ports, and "right on" using cockpit static pressure. Airspeed comparisons were made with a PA-12 Super Cruiser, and with a Motorfalke (motor glider) which paced my Duster for this purpose. It is important that when flying to any higher speed (up to 100 kts. max) for the first time, to have a type certified power aircraft along side at pre arranged airspeeds, or as agreed via radio communication. Be sure that the power plane pilot signals or radios you if you are about to exceed 100 KIAS. Compare notes and be sure that your Duster's airspeed indicating system reads correctly.

FIN/RUDDER MODIFICATION

This modification is *mandatory*, and was designed to eliminate any possibility of tail flutter in the Duster at airspeeds up to 100 kts. maximum. This modification defeats vertical tail flutter by making the rudder lighter (fabric cover instead of plywood) 100% mass balance of the rudder, and by stiffening the fin/fuselage structure. Do the entire mod as the designer directs. The fin leading edge spar extension must be straight in line with the spar itself. Any change in angle (i.e. going down vertically) will significantly decrease the ability of the forward fin spar to transfer fin bearing loads into the fuselage. Also, all scarf joints (whether original construction, repair or modification) must be supported by a rib, bulkhead, framing member etc. to ensure such joints are loaded in shear only. Scarf joints in plywood at unsupported positions can be subjected to bending loads (due to skin buckling) which can destroy a scarf joint glue line long before an equivalent shear load would. Also, the inspection hole must be lowered as per instructions, and the hole cover must be made "twist on" so as to contribute structually to the fuselage tail stiffness. The original metal inspection cover did nothing to enhance tail stiffness.

RUDDER CABLE EXIT HOLES

The size and location of these holes was not specified in my plans. However, these should be kept as small as possible, and must be reinforced as per tail mod. instructions. I added external fairing (stiffening) blocks ($\frac{1}{2}$" ply) at the rudder cable exit slots to reinforce the internal "donut" doublers called for in the fin/rudder mod. (See Photo #4)

KEEP CONTROL SURFACES LIGHT

The designer specified $\frac{1}{16}$" ply covering for the ailerons and elevators, and fabric covering for the rudder (tail mod) rather than $\frac{3}{32}$" ply, as ensurance against flutter. One therefore does not use $\frac{3}{32}$" ply to cover ailerons, etc. (some have!) Also, do not be tempted to lay several "good strong coatings" of fiberglass on control surfaces. This could make them critically heavy from a flutter point of view.

Continued on Page 10

ALTERNATE TAIL WHEEL

I felt tail skids had several disadvantages so I decided to build a tail wheel onto my Duster, which is still under construction. I think it's also a good idea to have a fuselage dolly with a pneumatic tire. It makes ground handling easier and saves side loads on the tail wheel.

There are several dictating factors- namely I didn't want to alter the spruce keel, it had to be shock mounted, had to be reasonably resistant to side loads, should not be any heavier than necessary and had to receive a fairing.

Hank Thor, in past literature, stressed the importance of a shock or spring mount for a tail wheel so the loads going into the fuselage are absorbed somewhat. I didn't want a "springy" up and down feeling and decided to use a rubber donut shock mount. I really designed my system around a flat donut-shaped piece of rubber I had been moving from place to place in the garage for years, but you can cut the same shape. I may ultimately have to go with a slightly softer piece, but you don't want it to "bottom out". Use your own judgement but remember it's a shock mount and doesn't have to be too springy.

I was going to add a plywood piece under the skid and hold the skid on with screws so severe side loads would break the plywood and not damage the the keel as John Sinclair has suggested. With this in mind I carefully kept track of the weights of the skid agangement and my tail wheel set-up and found the wheel to be slightly lighter than the skid and wood block. With the fairing the total was about 1 oz. over the skid. If desired $\frac{1}{4}$" holes could be drilled through the solid rubber wheel to lighten it.

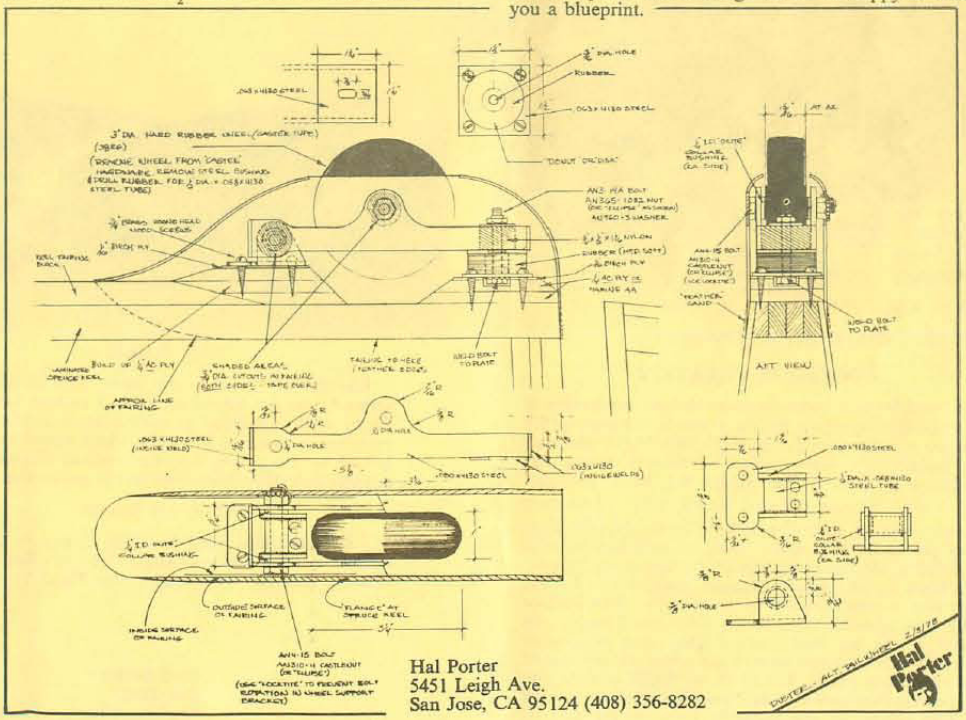
I bought the 3" wheel in a caster set-up and took it apart. I pulled out the bushing, re-drilled the hole in the rubber and inserted a $\frac{1}{2}$" dia. X .058 X 4130 tube to take the oilite bushings. I suggest using a drill press and locking the wheel in place after you've made sure the hole is in the exact center.

My "donut" piece of rubber already had a center hole in it larger than $\frac{3}{16}$" so I used the round head screws to help hold it in place. The nut is tightened down on the bolt so the end of the wheel support bracket is snug on the rubber. When you drill the hole in the donut just make it $\frac{3}{16}$". The nylon piece should be snug in the bracket and will provide some resistance to side loads from the aft end.

As I recall the fairing was done with 6 or 8 oz. cloth, so use your own judgement. I used 4 pieces of cloth, one on each side and a strip at the front and back in a way that they overlapped the side pieces by about $\frac{1}{2}$". This double layer added greatly to the strength. I show 4 holes for bolts and nuts, but since have decided to screw the fairing on at front and back and tape the edges, so this eliminates the need for holes on one side. It's possible with ellipse nuts, instead of castle nuts and the bolt filed to an edge of the nut, the fairing will just slip over. Try it and see. If you need holes, just put a round tape patch over it and you should just have a small bump.

After I mounted the hardware to the fuselage (upside down) I glued in foam pieces and made a plug from which I made a female mold. This may take a little bit longer but I think it's well worth it, as you can pop another fairing out when ever you need one. I made my main gear fairing the same way and have made two fairings from each mold, one to use and one that will be painted up and carried as a spare. If a spare has to go on then you can make a new spare when you get home.

If anyone feels they would like a print of the plans, which are drawn up full size, please just send me 2.00 to cover prints and mailing and I'll be happy to send you a blueprint.



Hal Porter
5451 Leigh Ave.
San Jose, CA 95124 (408) 356-8282

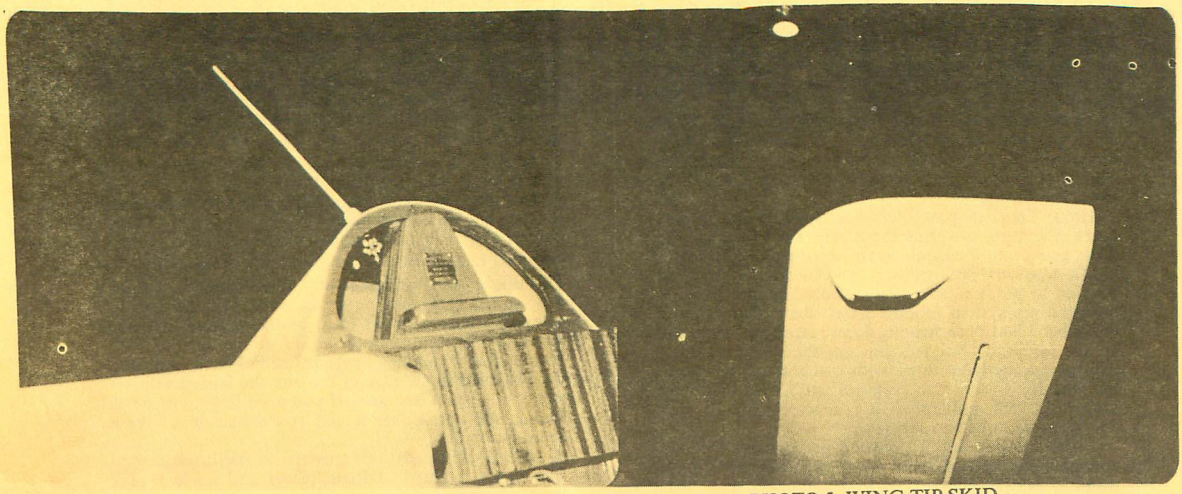
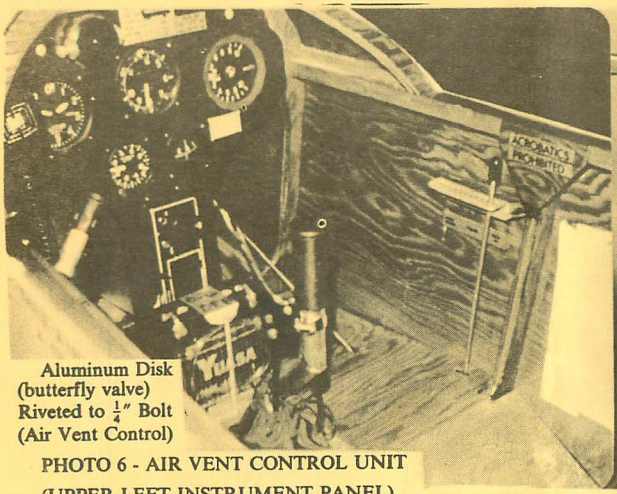


Photo #2- Special Pylon/Latch Installation for Canopy

PHOTO 5- WING TIP SKID



Aluminum Disk (butterfly valve) Riveted to $\frac{1}{4}$" Bolt (Air Vent Control)

PHOTO 6 - AIR VENT CONTROL UNIT (UPPER LEFT INSTRUMENT PANEL)

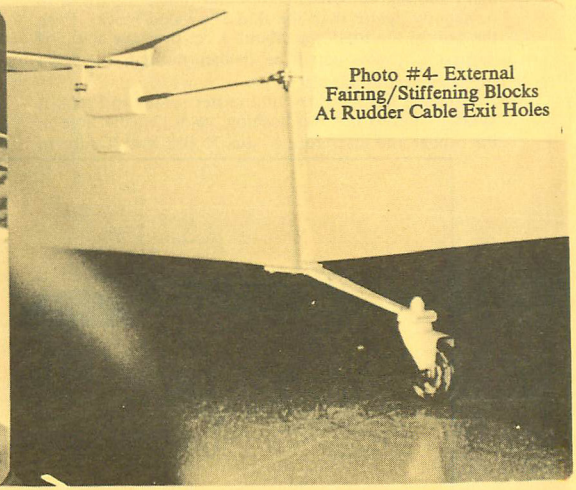


Photo #4- External Fairing/Stiffening Blocks At Rudder Cable Exit Holes

COCKPIT VENTILATION

I consider that some form of cockpit ventilation is essential for cooling on hot days, and for de-misting the canopy on cold days (or at high altitudes). I designed and installed a canopy de-mist/ventilation system that functions quite well. (See Figure #2, Photo #3 and Photo #6). Basically, I used standard $4\frac{1}{4}$"ID vacuum cleaner hose to duct the airflow from the fiberglass pitot pot in the nose cone to an air vent control unit installed in the upper portion of the instrument panel. In Photo 3, the vacuum cleaner (cockpit ventilation) hose can be seen attached to the pitot pot, then leading back and upward towards the instrument panel. In Photo 6, the air vent control unit (with adjustable butterfly valve) can be seen at the upper left portion of the instrument panel. On all of my flights to date, the airspeed indications have not been discernably affected by any setting of the butterfly valve in the airvent control unit.

TAIL WHEEL

Use the tail spring as per plans. This installation is safest by far for absorbing ground impact loads. (See Photo #4) I welded a steel adapter saddle (home-made) to a standard 3" castor wheel assembly. When bolted to the tail spring, the vertical flanges of the adapter hold the wheel fixed to the tail spring.

WING TIP SKIDS

I have installed wing tip skids similar to those described by John Sinclair (August '75 Dust Rag). In my opinion, these are a necessity. (See Photo 5)

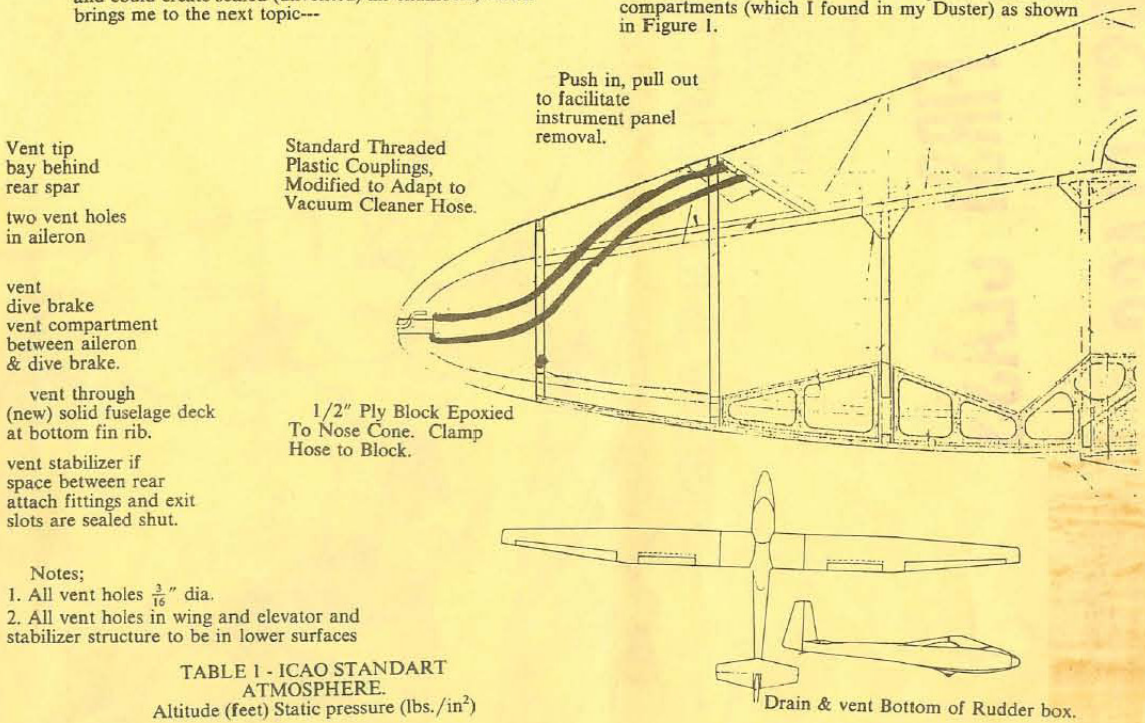
Fred Becker
Box 2898
Medley, Alberta, Canada
T0A 2M0

ON TAKING SHORT CUTS

Do not be tempted to leave ribs solid i.e. in tail (I know one builder who did this on another type of homebuilt glider). This adds weight (danger of flutter), and could create sealed (unvented) air chambers, which brings me to the next topic---

VENTING THE AIRFRAME STRUCTURE

If for some reason you overlooked the requirement to insure that all bays of the wing structure have facilities for drainage, then look for possible sealed air compartments (which I found in my Duster) as shown in Figure 1.



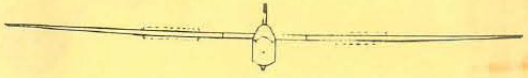
Notes;
1. All vent holes $\frac{3}{16}$" dia.
2. All vent holes in wing and elevator and stabilizer structure to be in lower surfaces

Figure 1- Venting of Sealed Compartments.

TABLE 1 - ICAO STANDART ATMOSPHERE.
Altitude (feet) Static pressure (lbs./in^2)

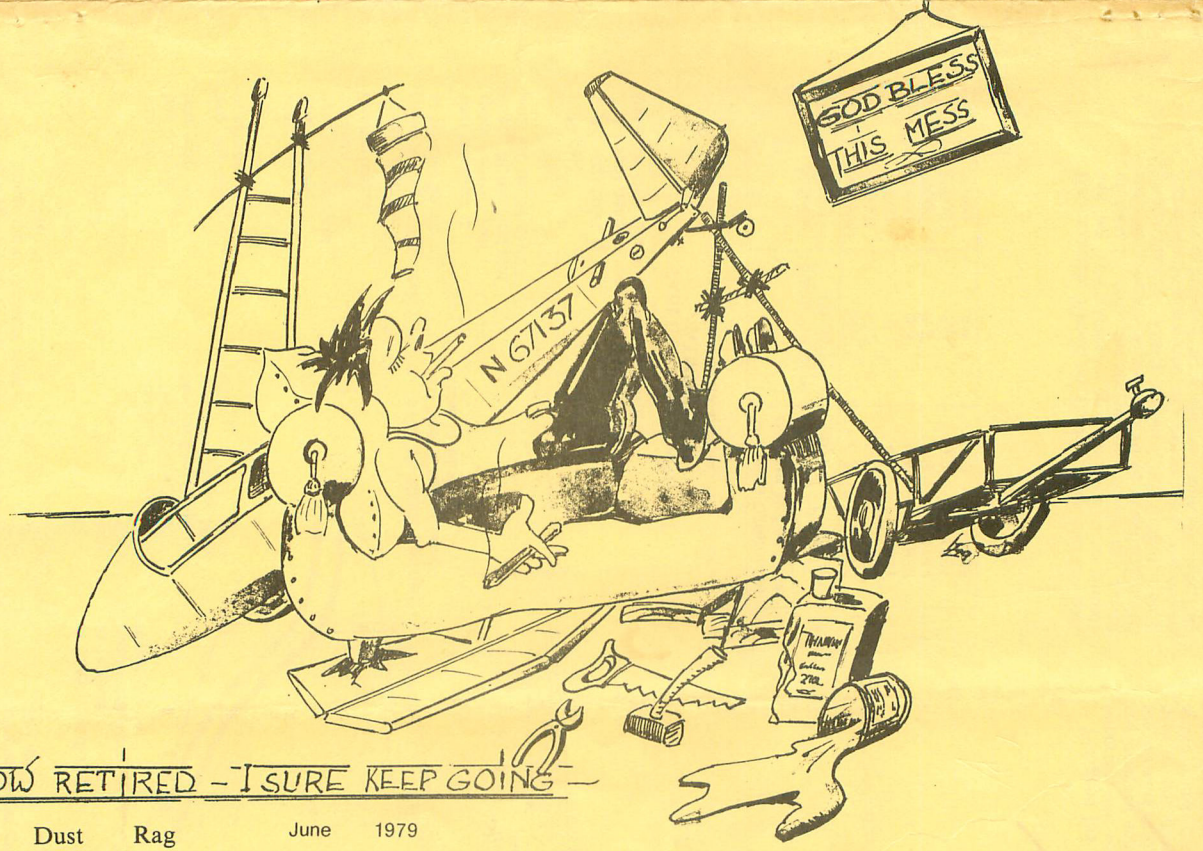
Altitude (feet)	Static Pressure (lb/in^2)	Pressure Differential Relative To Sea Level	
		(lb/in^2)	(lb/ft^2)
Sea Level	14.7	0.0	0.0
5000	12.2	2.5	355
1000	10.1	4.6	661
15000	8.3	6.4	922
20000	6.8	7.9	1144
25000	5.5	9.2	1331
30000	4.4	10.3	1488

If for example, I build my glider at a sea level location, and flew it (or trailered it up a mountain) to an altitude of 5000 ft. ASL, the air pressure inside any sealed airframe structure would tend to be about 355 lb/ft^2 greater than the outside pressure (See Table 1). Such forces would place not only severe shear stresses on glue areas between skins and airframe structure, but would tend to peel the skin cover away from the framing structure by the outward bulging of the skin cover. Moving on up to an altitude of 30,000 ft. ASL (i.e. in a wave) the pressure inside a sealed airframe compartment relative to outside pressure would tend to be about four times greater than that at 5000 ft. ASL. Well, enough said.



ON WING/FUSELAGE JUNCTIONS

For good low speed performance (min. sink) it is important that wing root/fuselage junctions are properly designed and faired, and that the airflow over the top surfaces of the wing centre section/canopy/turtle deck is not disturbed. Those optional power pod attach fittings protrude an inch or so into the airflow above the wing/fuselage junction at the worst possible location in this critical area. I had purchased the "power pod" spar fittings, but cut off the top ends prior to attaching to the centre section main spar since I do not intend to make a motor glider out of my Duster. I also omitted the (now unnecessary) special rear spar power pod fittings to save weight.



NOW RETIRED - I SURE KEEP GOING

The Dust Rag
719 Middle Road
Bayport, N. Y. 11705

June 1979

Volume 7, Number 2

FIRST CLASS

FIRST CLASS

PRINTED IN U.S.A.