

THE

Starduster

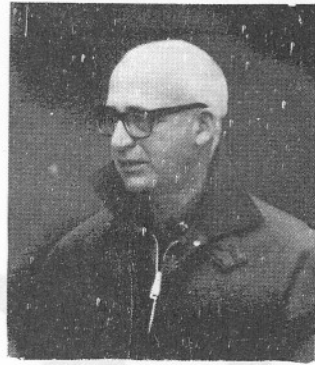
APRIL 1976

PAGE ONE

MAGAZINE

DEDICATED TO THE ACTIVE HOMEBUILDER





PAGE ONE

When we started this magazine 1 1/2 years ago, we hoped to have a Starduster clearinghouse journal, wherein ideas from builders could be presented, evaluated, criticised, and exchanged.

This issue, for the first time, we are beginning to approach our original ideas. Major John Morrissey has an excellent article on how to deal with the problem of containing battery acid in an Aerobatic airplane. His design seems simple and logical, and we are happy to pass it on to our readers.

Also, we would like to commend Dick Cutler on his fine article on how he cured a rough running Lycoming Engine. He persevered until he solved a difficult problem. Then he was thoughtful enough to write in detail an excellent article about his trial and tribulation, and share the solution with us all. We appreciate that.

We wish to extend our thanks to both of these gentlemen for their excellent contributions to this magazine. Perhaps their efforts will inspire you to emulate them. If you have had a successfully solved unusual problem, or an unusual solution to a common old garden variety problem, why don't you consider becoming a published Author. Writing a good article about your achievement can be every bit as creative (and satisfying) as solving the original problem.

If you can't find the time to write a technical article yourself, then perhaps you could express an opinion or what type of articles we should write. In the January issue of "Starduster" magazine, Pete Anthony asked for an article on weight and balance, pertaining to a Starduster Too. We were happy to oblige. In this issue, Pete, you will find your article. We hope you find it useful, and also enjoyable.

Let us have your help and participation in making this an enjoyable and useful magazine.

Jim Osborne

April 1976

THE STARDUSTER MAGAZINE - Dedicated to the proposition that the ultimate in sport aircraft was reached with the design & development of the biplane, open cockpit tail dragger-and that everything has been downhill ever since-

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The Starduster Magazine is a quarterly publication, published in January, April, July, and October of each year - Subscription rate -- \$5.00/year. Published by Stolp Starduster Corporation. 4301 Twining, Riverside, Ca 92509.
Telephone (714) 686-7943

Front cover
Antique Aero - Jim & Zona Appleby proprietors

Back cover Nieuport 28c-1
The Nieuport 28C-1, Span 26'3"; Length 20'4"; Wing area 215 sq.ft;
Empty weight 1172 lbs; Gross weight 1,625 lbs; High speed 122 MPH

In order to do our bit to fight inflation, we have instituted the following policies.

- 1- We give 3-5# of short lengths of 4130 tubing free, with each substantial tubing order. All you have to do is ask for it. This tubing is primarily suitable for welding practice, although an occasional short piece may be useful in construction. No size selections will be made.
- 2- A 10% discount will be given to customers who walk in & select their tubing themselves from our short lengths rack, provided no cutting is done. If cutting is provided, the regular price will prevail.

STARDUSTER OPEN HOUSE

Ilse Shilling

Anyone walking into the hangar of Stolp Starduster on Sunday, the 28th of March, would have been surprised hearing popular melodies from "the forties", wondering what it was all about. Jim and Hanako Osborne had their first Open House Party, and it turned out to be a great success. Over 150 people attended and 14 airplanes were flown in for this event. Everyone was treated to good food, coffee and soft drinks.

I kept looking over to the lady who sold airplane magazines and books. She really enjoyed herself, sitting right next to the loud-speakers and tapping her feet to the music. She told me later, she wished someone had asked to dance with her.

An old Airforce film of Chennaults Flying Tigers, the 14th Airforce and pictures of the Hump were obtained from the San Diego Museum and shown by Eric in the back part of the hangar. We saw some exciting camera gun scenes, that were taken during combat missions. Most of us who watched the movie were not aware how very difficult it was, to bring all the necessary supplies into China. We cannot even imagine the hardships the Chinese people endured, building runways with their bare hands.

Eric also showed many color slides he had taken, when he was flying over snow capped Himalaya mountains, and also pictures of many different kinds of airplanes he has flown during his career.

At the close of the party we were treated to a spectacular fly by, which some of the people missed, because they left already. Three Starduster "Too's", the Acroduster and one Pitts Special had their smokesystems on during a low pass. It was a beautiful sight to see!

Next time there is a Hanger Party, be sure to come and bring your wives or sweethearts along too. Why not ask the foot tapping lady to dance, I would'nt mind dancing either.

Airplanes & drivers in attendance:

Starduster Too	N1468	Lee Dorrance
"	N19235	Vern Reynolds
"	N357C	Ken Cox
"	N2091	Dale Neuman
"	N2428	Leonard Pascuzzo
"	N1484	Bud Sitz
(Nostalgia)	N7X	Wil Neubert
Starduster One	N325H	Roger Rourke
Starlet	N2756	W.G. Barron
Jungster II	6665	Phil Cline
Emeraude	62884	Howard McFeely
RV3	31120	Dix Mackey
M2	2226	Ray Allen
Pitts	N9BB	Mike Penketh

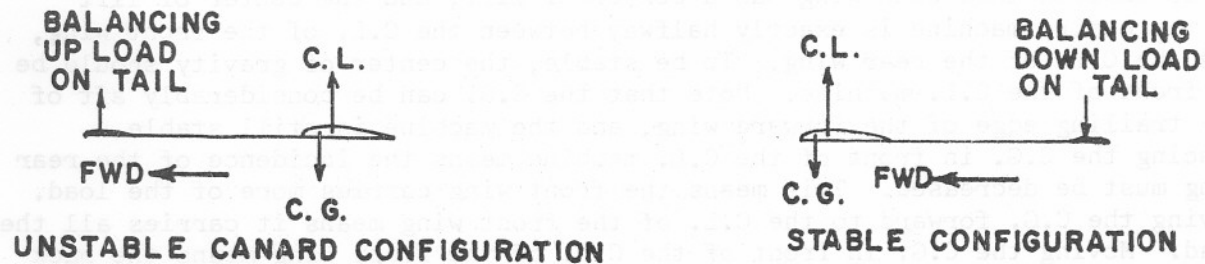
YE OLDE WEIGHT AND BALANCE

Jim Osborne

In the beginning there were the brothers Wright, both Wilbur and Orville. And they did look about them and see that the air was vacant of manmade flying machines. And they said one to another, "Lo, this is not good. Let us make parts of wood and cloth and attach them one to another and power this device with an engine which burneth gasoline. And with this device let us ascend into the air and go from one place to another."

And so it came to pass that the first flying machine was created, and the brothers Wright looked upon it and pronounced it good. And this machine did resemble a two wing turkey, with the tail in front. For the machine flew fitfully and erratically, darting first up and then down, as the operator tried to stay level by moving the tail in front, which configuration came to be called Canard.

And there arose other wise men and prophets who said, "Yea, verily, this configuration called Canard is no good. For the wing is the lifting surface, and the horizontal tail is the balancing surface." And they drew pictures and graphs to show how the configuration called canard was unstable.



And the gospel of these wise men spread throuth the land and everyone said, "Yea verily, the prophets have spoken. With the balancing tail in back, our flying machines are stable. With the balancing tail in front, our machines become possessed of demons and dart about erratically, perhaps cracking up, and killing people. And this gospel was proclaimed throuth the land, even from those founts of wisdom called "Colleges", and "Universities".

And in the latter years there arose the young prophet called "Rutan". He abided in the desert. And from there he proclaimed, "The old gospel is false. It is not true that the canard configuration is possessed of demons. Lo and behold. I have created the machine called Variveggen. And it flies in a stable manner". And this prophet did gather followers and did challenge the sacred words of the older prophets. And he further created another flying machine called "Varieze". And this machine flew wondrous well. So that the prophet Rutan received acclaim from far and near. And the wise men in "Colleges" and "Universities" were forced to reexamine their beliefs.

The beliefs, ideas, and opinions, concerning weight and balance, of one not-so-wise man called Jim Osborne are now presented. Examine them critically. They may, or may not be correct. Your opinions and criticisms would be appreciated.

It seems apparent that the ideas held by so many people for so many years concerning Canard instability are false. After several years of thinking and studying about the matter, I now hold the following opinions:

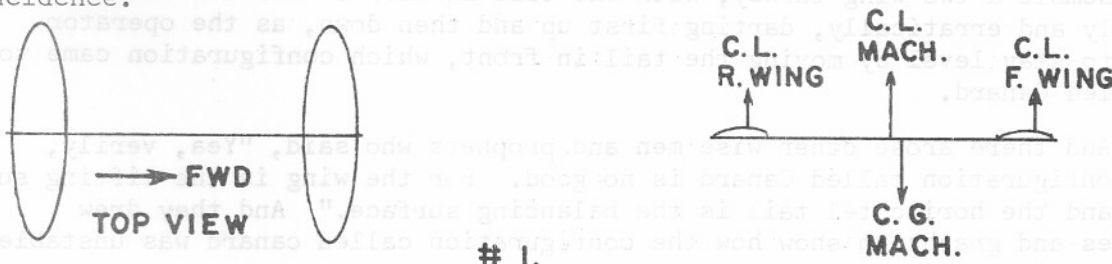
- (1) All structure presenting a horizontal surface to the wind functions as an airfoil. It may lift, depress, or be neutral.

(2) All airfoil surface should be considered, and a center of lift for the whole machine should be determined. This conflicts with the old idea that the wing only should be considered in determining the center of lift.

(3) As a practical matter, the wing and horizontal tail only, can be considered in determining the center of lift.

(4) For a stable machine, the center of gravity should always be in front of the center of lift of the machine, not just the wing.

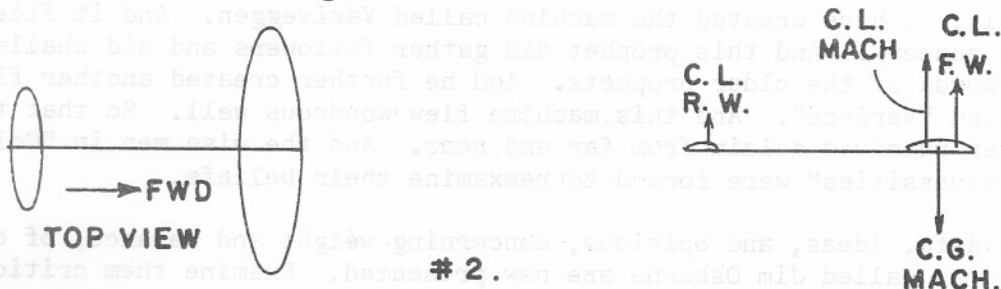
Consider the following theoretical machine. Postulate two wings, identical, in size and shape, connected by a line, both wings with the same amount of incidence.



1.

It is obvious that each wing has a center of lift, and the center of lift of the entire machine is exactly halfway between the C.L. of the front wing, and the C.L. of the rear wing. To be stable, the center of gravity should be in front of the C.L. machine. Note that the C.G. can be considerably aft of the trailing edge of the forward wing, and the machine is still stable. Placing the C.G. in front of the C.L. machine means the incidence of the rear wing must be decreased. This means the front wing carries more of the load. Moving the C.G. forward to the C.L. of the front wing means it carries all the load. Moving the C.G. in front of the C.L. of the front wing means the back wing has negative lift. The front wing carries more than the weight of the airplane in level flight. It must support the download of the back wing as well as the weight of the airplane. This is the way many horizontal tails function. It is obvious that the farther the C.G. is moved forward, the faster the stall speed, the slower the climb, and the slower the cruise speed. For max performance the C.G. should be right on the C.L. for the entire machine. This will make the airplane tend to porpoise in level flight, and is a good reason for keeping the C.G. slightly forward.

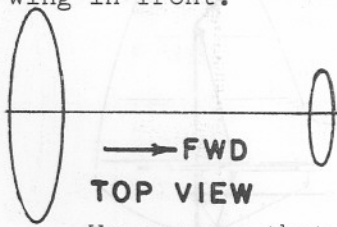
Now postulate a conventional configuration. The front wing is considerably larger than the rear wing.



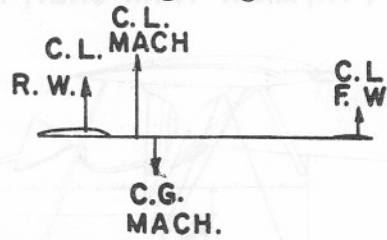
2.

We can see that, with equal incidence, the C.L. of the machine is still behind the C.L. of the main wing. Putting the C.G. in front of the C.L. of the machine requires the rear (small) wing to have less incidence and less lift. Putting the C.G. in front of the C.L. of the main wing again requires negative lift from the small rear wing. Again, performance suffers, although not as much as in the first situation.

Let us now consider a canard situation. Big wing in the rear, little wing in front.



#3.



We can see that the C.L. of the machine is now forward of the leading edge of the main wing. Putting the C.G. forward of the C.L. MACH means we have a weight and balance situation which appears drastically different from situation #2. If we consider only the main wing, in each case, it appears that a canard must be much more nose heavy than a conventional airplane. However, when we determine the C.L. of the machine, in each case, the most desirable location for the C.G. is just slightly forward of the C.L. machine. In each case, the incidence of the rear wing must be less than the incidence of the front wing for a stable configuration. And as the C.G. shifts around, the incidence of the moveable wing must change, to maintain a level flying attitude.

Conclusions that we may now draw, are as follows.

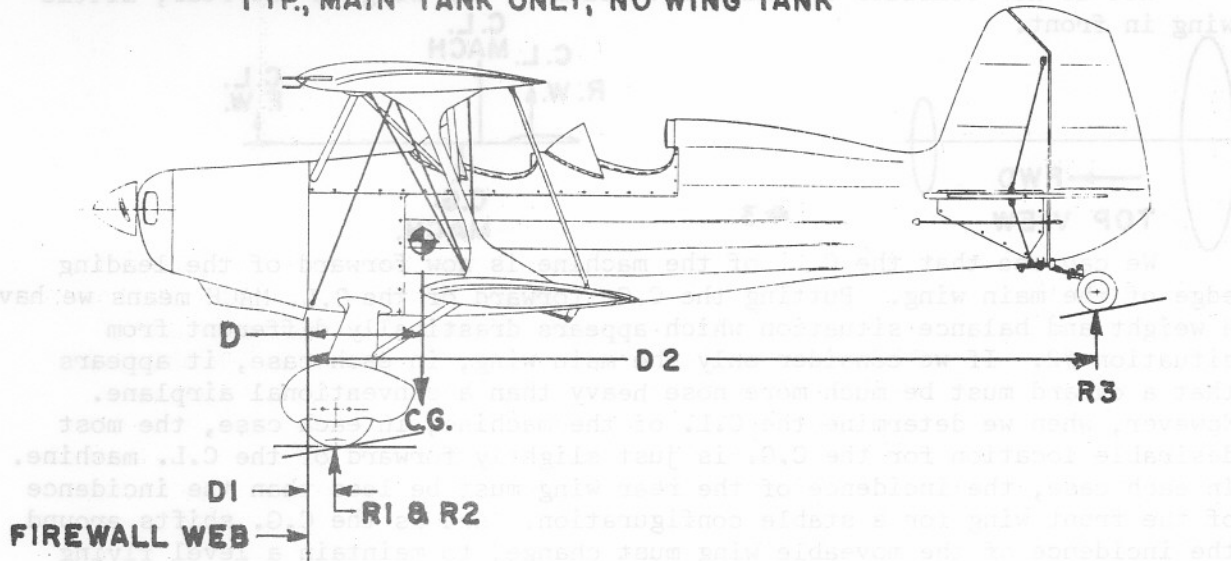
- 1- In order to fly straight and level, the C.L. and the C.G. of all machines, must coincide, when in flight.
- 2- In order to make the C.L. & C.G. coincide, incidence must be adjusted, in either the front or rear wing.
- 3- In order to be stable in pitch, the front wing must have more incidence than the rear wing, when in level flight.
- 4- The greater the difference in incidence between the front & rear wing, the more performance suffers.
- 5- The allowable C.G. range is from the aft limit, which may border on instability to the forward limit, which is as far forward as you can go and still be able to get the tail down for landing.
- 6- The desirable C.G. position is just forward of the C.L. of the machine.

Now, let us run a weight and balance on a Starduster Too. We will use the firewall as our Vertical reference, and the top longerons as our Horizontal reference.

With the plane in an absolutely level attitude, weight the main wheels, and the tail wheel. Three scales may be used, or one. If one is used, it must be shifted to the three locations, and each wheel weighed one at a time.

Drop a plumb bob from the firewall. Measure the distance from the fire wall web to the main wheels and to the tail wheel. Plug these weights and measurements into the formulas given below, and you can determine the exact C.G. location of your bird. The closer you are to the Aft C.G. limits, the better your bird will perform. Approach the forward C.G. limit and you will have a very stable machine. Make your first flight with the horizontal tail level with the top longerons, and the trim tab in neutral. If you have to hold forward stick, increase the incidence in the horizontal tail. Decrease the incidence if stick back pressure is required for level flight.

**STARDUSTER TOO SA300
WEIGHT & BALANCE
TYP, MAIN TANK ONLY, NO WING TANK**



HORIZ. DATUM: TOP LONGERON - SHOULD BE LEVEL

VERT. DATUM: FIREWALL WEB

FWD C.G. LIMIT: 18.0

AFT C.G. LIMIT: 27.0

EMPTY WEIGHT C. G. (INCLUDES ENGINE OIL)

<u>WEIGHING POINT</u>	<u>WEIGHT</u>
RIGHT (R1)	474
LEFT (R2)	476
REAR (R3)	50
	<u>1000</u>

$$D = \frac{D1(R1+R2) + D2(R3)}{R1+R2+R3} = \frac{7.63(474+476) + 181(50)}{1000} = 16.22$$

MAX. FORWARD C. G.

	<u>WEIGHT</u>	<u>ARM</u>	<u>MOMENT</u>
AIRCRAFT EMPTY WEIGHT	1000	16.22	16220
PILOT	175	70	12250
FUEL, MAIN TANK	<u>180</u>	9	<u>1620</u>
	1355		30090

$$\frac{TM}{TW} = \frac{30090}{1355} = 22.2$$

MAX. AFT C. G.

	<u>WEIGHT</u>	<u>ARM</u>	<u>MOMENT</u>
AIRCRAFT EMPTY WEIGHT	1000	16.22	16220
PILOT	175	70	12250
PASSENGER	175	42	7350
BAGGAGE	<u>10</u>	90	<u>900</u>
	1360		36720

$$\frac{TM}{TW} = \frac{36720}{1360} = 27$$

NEW PRODUCTS

We are proud to represent following products.

WHELEN		10% off list
SENENICH	propellers	20% off list
HARTZE	propellers	
	governors	20% off list
	spinners	
LYCOMING	engines	10% off list

We are now stocking special purpose bearings.

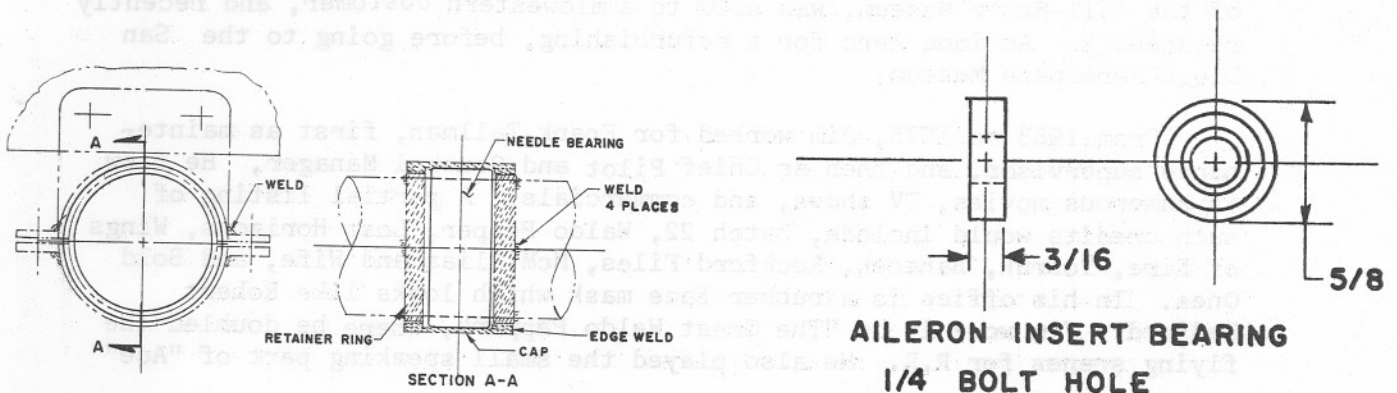
AILERON BEARING INSERTS: (see illustration)

The aileron bearing can be used in place of the oil-lite bearings now shown on the plans.

NEEDLE BEARINGS FOR CONTROL TORQUE TUBE: (see illustration)

This bearings is a slip fit over the present 1 5/8" Torque Tube. Both bearings are slid on prior to welding. The saddles as well as the 4 retaining rings (1 3/4" x 3/8" x .058). These retaining rings are tack welded only in 4 places. Each to prevent overheating the needle bearings and prevent distortion. These of course are welded in place after determining their correct position when matched to the fuselage.

The pillow block is made from 2" x .058 x 1 1/2" with 3/8" rings welded to the inside of the tube at its ends and around the ends. (1 7/8" x .058 x 1/4"). The cap has a mounting bracket welded on as illustrated as well as 2 ears. These ears are from bushing stock, drilled for 1/4" bolts. The cap is split.



**AILERON INSERT BEARING
1/4 BOLT HOLE**

ANTIQUE AERO - FLABOB AIRPORTS TIME CAPSULE

If you come to Flabob Airport and go due west until you run out of runway, you pass back in time to 1918. All around is grass, farm fences and houses, and a period type hangar with "Antique Aero" in big letters over the sliding doors. (see our front cover.) With a little bit of imagination, the smog (blown in from Los Angeles) doubles as fog, and gives the whole scene an early morning, dawn patrol, patina. You could easily be on the French front, 1918, or thereabouts.

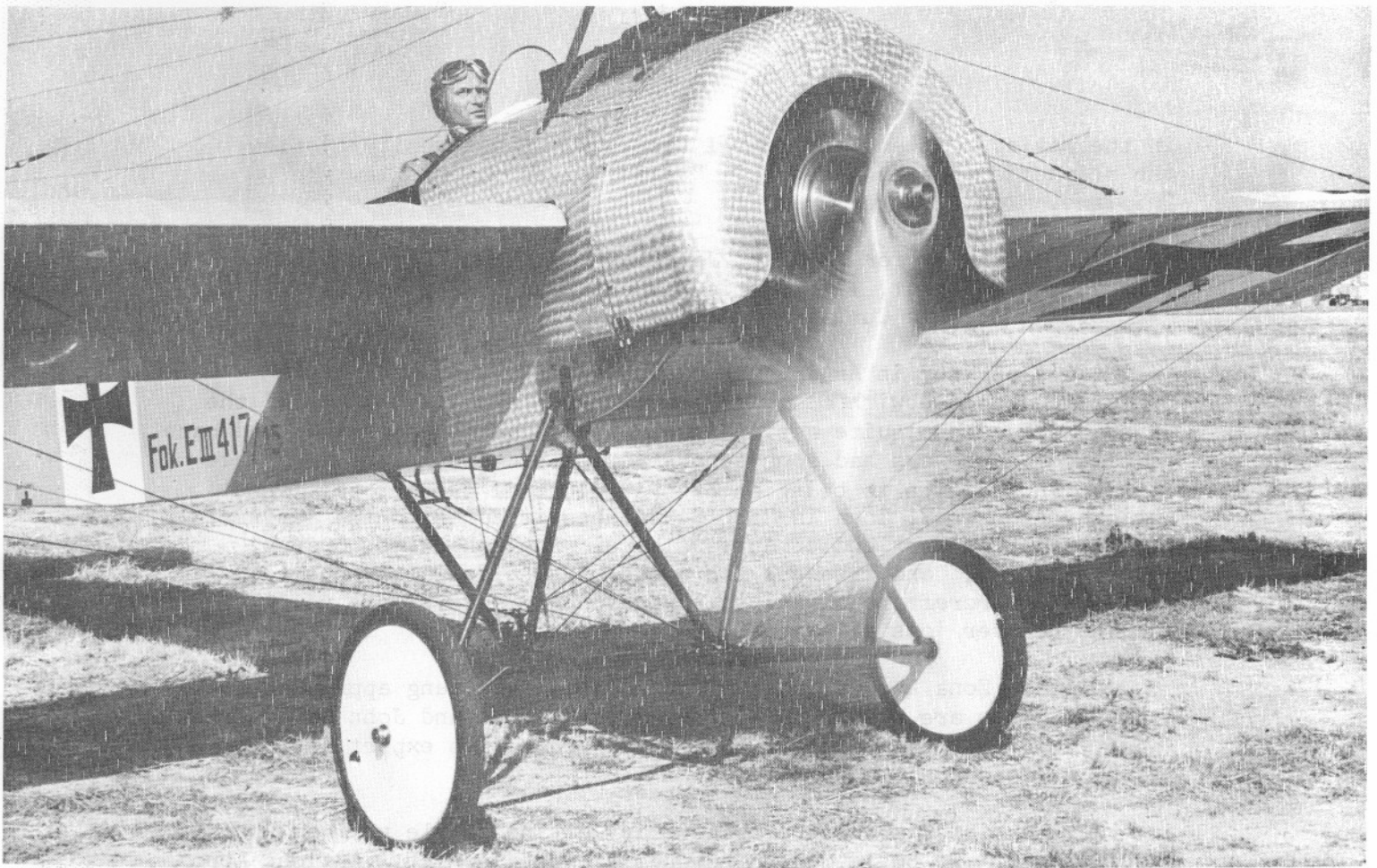
You might see a Fokker Triplane, or a Nieuport 28 parked in front of the Hangar. Across the hanger entrance there is a "keep out" sign. This is necessary so that genial Jim Appleby and his lovely wife Zona can get some work done. Prior to the posting of this sign, about 7 hours out of 8 were spent talking to visitors.

Inside the hanger you may find bits and pieces of various WW I fighters going together, both flying and non flying. In a corner are two rotary engines. Overhead, in the loft, is the fuselage and tail feathers of an albatross. Various wicked looking Spandau and Vickers machine guns peek out from under tables, and in a cabinet is a hand formed aluminum framed windshield for a Nieuport 28.

The proprietors of this little bit of Antique Heaven, Jim and Zona Appleby, are two people who are "doing their thing", and making a living at it. It would be hard to find two people who are nicer, or better qualified to run a business/avocation of this type. Jim is retired Major, USAF, who became a civilian in 1963. During his 20 years with Uncle Sam, his career highlights were somewhat as follows: WW II-C47 pilot, towing gliders for the 9th A.F. over "Fortress Europe." He qualified as a fighter pilot in P-51's, flew in the Berlin airlift, became a whirlybird jockey and served as such in Korea, and, after Korea, checked out in most of the fighter and heavy airplanes of the USAF. His ground duties, during this time, were as maintenance and chief maintenance officer.

From 1955 to 1962, Jim's spare time was occupied in building a near perfect replica of a Fokker Eindecker. This little 1915 gem was fitted with an original rotary engine, instruments, and machine gun. Jim built it in 8 states and two continents. This Fokker became a part of the Tall-Mantz Museum, was sold to a midwestern customer, and recently returned to Antique Aero for a refurbishing, before going to the San Diego Aerospace Museum.

From 1965 to 1973, Jim worked for Frank Tallman, first as maintenance supervisor, and then as Chief Pilot and General Manager. He flew in numerous movies, TV shows, and commercials. A partial listing of such credits would include, Catch 22, Waldo Pepper, Lost Horizons, Wings of Fire, Tobruk, Banacek, Rockford Files, McMillian and Wife, and Bold Ones. In his office is a rubber face mask which looks like Robert Redford. Jim wore it in "The Great Waldo Pepper", where he doubled the flying scenes for R.R. He also played the small speaking part of "Ace"



...twice engine. Consequently, when we decided to build a Newport 28,
we contacted with him and took to him a picture of a
...the vertical



in the movie. Jim and Art Scholl (another Flabob resident) flew the climactic dog fight scene in "Waldo Pepper". Art flew the Triplane. Jim flew the Camel.

While working for Tallman, Jim flew most WW 1 fighters (both sides), 1909 Blériot, 1910 Curtis Pusher, B-25's, B-26's, B-17's, P-40's, P-51's, and Corsairs.

Jim's partner in Antique Aero is his wife Zona. She has a Commercial License with close to 1000 Hours. She is a member of the 99's, and has been quite active in past years on the technical and race committees. She has had some aerobatic instruction in the two place Pitts. In addition to being an experienced tail dragger pilot and Antique enthusiast, Zona is "THE MAN" when it comes to the administrative and paperwork end of Antique Aero. She schedules, orders, pays, deposits, and answers the phone. She also is an expert in recovering aircraft, but will only work on Antiques. Take your mundane recover jobs elsewhere.

Jim and Zona are assisted by three talented young apprentice A & P's. They are Mike Kuffleitner, Scott Smith, and John Gradishar. These young gentlemen are all benefitting from Jim's expert instruction and high standards.

We, here at Starduster, believe in letting people work at what they do best. We build modern homebuilt type aircraft. Antique Aero builds antiques. Consequently, when we decided to build a Nieuport 28, we contracted with Jim and Zona to build it for us. A picture of a genuine 1918 uncovered Nieuport 28 is on our back cover. The replica from Antique Aero is almost a spitting image. It differs from the original in that our Nieuport will have a Warner radial in place of the rotary, brakes on the wheels, and steel tube in place of wood fuselage. Oh yes, and our machine guns are plastic. (This was a big disappointment, as now I won't be able to shoot down airplanes that cut me off in the traffic pattern.)

Our plane is scheduled to roll out around the first of July. About that time I expect to padlock Eric Shilling to his desk, lock my office and go fly for a couple of days. Complete with a WW 1 flying suit, and a long white scarf. (Who says men are only grown up boys.)

As the fame of Antique Aero grows, they will probably get busier and busier. If you want a WW 1 airplane, do me a favor, will you? Contact someone else to do your work. You see, I have always dreamed of owning a Nieuport and a Fokker D VII. The Nieuport is coming up. The Fokker, maybe, can be gotten next year?

CONTROL THE ACID!

BY JOHN MORRISSEY

For the past two years, I have been working on the problem of battery acid control in aerobatic aircraft. The problem is especially critical to me as my Starduster has the battery located on the firewall, and any acid spillage requires multiple inspections of engine mounts, engine control cables, fuel lines, etc. I also became quite proficient at belly panel repainting.

The first "fix" I attempted was to work on an effective method of sealing the battery box. This method was discarded after several attempts because it just isn't feasible--if acid leaks from the battery, it seems to find a way out of the box other than the vent line.

I then noticed that even with the aircraft type vent plugs in the battery, my electrolite level would require topping off every 6 to 8 hours of aerobatic flight. By using a dead battery and water as a mock up, I found that the acid was not leaking during inverted flight but in vertical maneuvers or slow rolls where the vent caps were at zero G in their vertical axis. This method of experimentation led me to the conclusion that a vented cap battery would never be a completely satisfactory solution for aerobatic flight--not only because of the acid spill during zero G but because the battery will pressurize in inverted flight if the generator is inadvertently left on during aerobatics. This pressurization continues after upright normal flight is restored as the vent plugs are still forced in the up (sealed) position by pressure resulting from the charging process. Subsequent flight in this situation with the generator on could cause a battery case crack and a serious acid spill.

If the vented cap battery were to be discarded, it seemed there were three additional options--the enclosed vented cap (factory Pitts type), the NICAD, or manifolded batteries. I ruled out the enclosed vented cap because of cost (approximately \$200.00), size, weight, and the vent cap problems previously discussed. The NICAD was discarded because of cost and the "runaway" heat problem associated with the NICADS. I have personally watched two F-105's burn on the ramp due to NICAD heat runaway, hence my distaste for that method. That left the manifolded battery to explore.

My first installation was a partial success and I believe superior to the vented cap battery. I installed an Exide AC-54M manifolded battery on the firewall in a WAG aero marline battery box. The manifolded battery has solid filler caps and vents through two ports located on the battery top. These ports vent an internal manifold. One of these ports was sealed in accordance with an Exide STC and a flexible neoprene tube was installed over the other port, run through a hole cut directly above it in the battery box top, and then routed down the left gear leg and vented below the wheel pant.

This installation worked fairly well, but had the following drawbacks--electrolite still need to be replaced about every 6 hours of aerobatic flight, the AC-54M port being used for venting developed a crack (with subsequent acid spillage) after 80 hours of use, and the vented acid would eventually make contact with the underside of the wing, tail, or belly resulting in marred finish.

I felt the manifold battery was still the best solution, so a further modification, the acid holding tank, was added to the system. Here is how it works. First, the venting port of the manifolded battery was reinforced with an aircraft epoxy as show in Figure 1. The firewall installation using the marline battery box

BY JOHN MORRISSEY

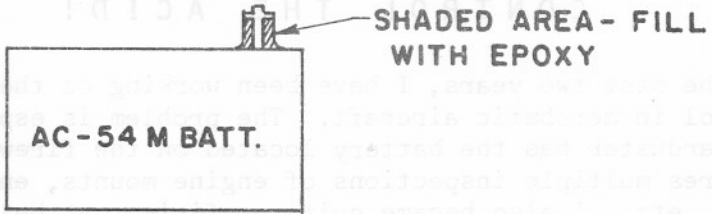


FIG. 1

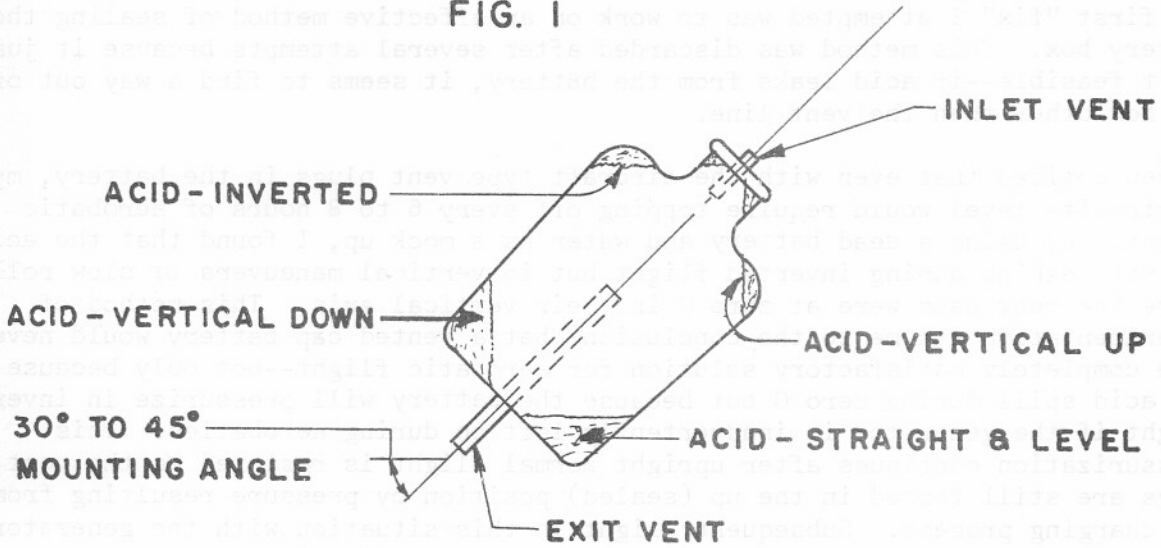
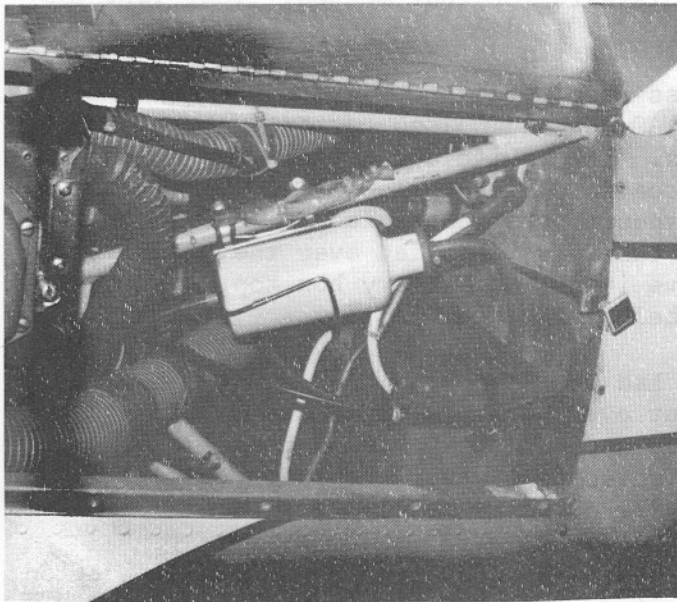
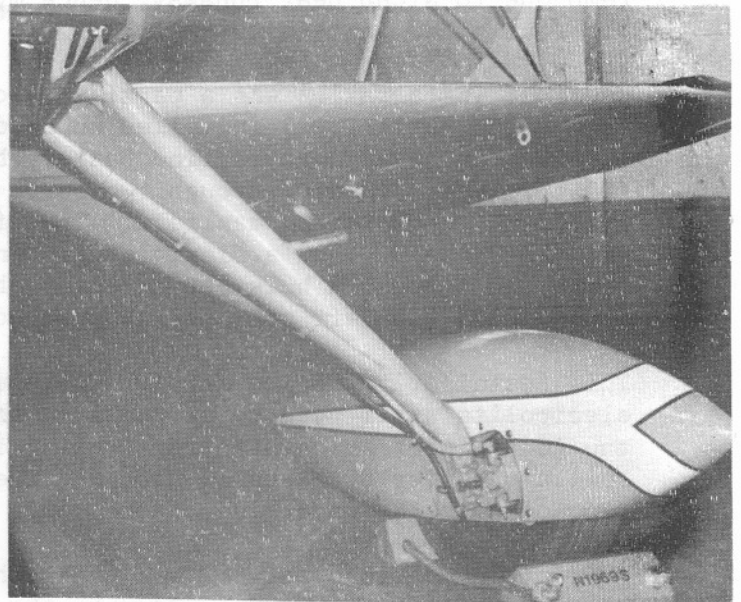


FIG. 2



Engine compartment installation



Over Board Vent

was retained. Instead of venting the battery directly overboard, the vent tube runs from the venting port to a plastic container. The container was a small plastic water bottle used on long distance bicycles and are easily found at camping goods stores. The exit vent for the container is installed in its center bottom and connected to a plastic tube that runs halfway up the inside cinder of the container (Figure 2). The containers sell for \$3.09 and come with a chrome steel mounting rack which installs nicely on the engine mount and positions the container 40° to the battery (Photo 1). A neoprene tube is then connected to the container exit port and vented overboard by a neoprene tube which runs down the rear of the left landing gear inner brace (Photo 2).

The system works well and has the following advantages. There is no acid spill outside the aircraft. Acid that does drain out during aerobatic flight is trapped in the holding tank, thus the amount of acid spilled into the holding tank can be determined during preflight. At that point, acid can be returned to the battery by detaching the exit tube vent line, loosening the battery filler caps, removing the holding tank from its rack, holding it top down over the battery, and letting the acid drain back into the cells. Since it's a manifolded battery, the acid (already charged) drains equally into the six cells. Its not a perfect system, but its inexpensive, relatively light, keeps acid off the paint, its preflightable, and it works. If it has a weak link, I believe it will be the durability of the battery venting post.

A few final points on the battery problem. Even though this system should not require replenishment of electrolyte, if you have to replace battery acid lost due to aerobatic flight, replace it with acid, not water. The only precaution is to keep the specific gravity below 1.280. If it gets above that figure, add some distilled water. I have also found that acid proof paint is more of a myth than fact. I have used wordak black acid resistant paint around the battery box and found it was more susceptible to acid stain than ordinary enamel. If I may be of any assistance, please call me at 913-684-2253.

TABLE OF REQUIRED ITEMS

<u>NO.</u>	<u>ITEM</u>	<u>MER</u>
1	Manifold type battery	Excide
1	Plastic Water Bottle/Mounting Rack	T.A. (French) Camping equip. stores.
1	Marline Battery Box 7 3/4 x 5 1/8 x 7 5/16	Wag-Aero
6'	3/8" Neoprene Tubing	Hardware Store
3"	1/8" Plastic Tubing	Hardware Store
1 tube	Aircraft quality Epoxy Bond	A/C Supply House
2	3/4" Aircraft Type Mounting Clamps/Rubber Lined	A/C Supply House
3	Plastic "tie offs". For sealing neoprene hose to battery vent port and holding tank inlet and exit ports.	

ROUGH ENGINE ENIGMA ---RESOLVED

Dick Cutler

Solving the problem of a rough running Lycoming I.O. 360 200 HP fuel injected engine is a tough nut to crack when it only occurs just as you break ground and lasts an eternity of about 40 seconds before it all smooths out again. All further full power attempts in the air or statically on the ground produced a smooth running engine. Sure I warmed the engine up properly, I used clean fuel and I went through all the normal checks. I installed a new ignition harness, rebuilt my old magnetos, performed air leakage checks, replaced the plugs, had the fuel injector overhauled and flow checked, installed new cylinder fuel injectors, blew out all fuel lines and checked the A.D. note on the fuel distributor. What's left?

According to the "Lycoming Flyer" I even checked the dry tappet clearance and did find one exhaust push rod too long and replaced it to get within the recommended tolerance but every so often the problem returned. On my Starduster Too I had installed four EGT probes with a selector switch and when "Lycoming's Legacy" returned to haunt me again I quickly swept the selector and attempted a read out, my attention being divided between the EGT indicator and gawking over the rim of the cockpit trying to locate a place to set it all down in case of total engine failure. Sometimes it was No. one cylinder that was cold, other times No. three cylinder was cold and only once both were cold and that time it was almost a bad scene. I was perplexed. Where to now? Then some "ramp rat" casually mentioned to call the Lycoming man. He suggested I replace both inner and outer exhaust valve springs on all cylinders and recheck all dry tappet clearances. I did, and all subsequent operation was normal-- Lycoming theorized that a harmonic was set up at a certain power regime which causes a weak valve spring to resonate and causes the valve or valves to float, resulting in a very rough engine. I used the following procedure for doing the job.

- 1) Remove the four lower or upper spark plugs, rocker box covers, rocker shaft covers, valve rocker pin, valve rocker, thrust washers push rod and push rod shrouds. Remember the placement of the seals, washers, and safety tension ring on the shrouds.
- 2) Remove the ball seat and hydraulic unit from the tappet body with a slight end bend of safety wire. Several attempts of slow easy pulls will remove it nicely. Clean and remove all oil from this hydraulic unit and air dry and set it aside. Keep the ball seat and hydraulic unit as a married assembly.
- 3) Obtain about three feet of 1/2 inch nylon rope, tie a big figure eight knot in one end and after rotating the prop to get the piston at it's lowest stroke, feed the rope into the spark plug hole. Be sure you leave the knot out of the cylinder. Now very carefully turn the prop till the piston rises to jam the rope against the valve. This method will not allow the valve to be depressed into the cylinder while you are using the valve spring depresser tool. Don't forget to remove the valve rotator. Remove the keepers and lift out the culprit valve springs. After replacing the new springs, I can only wish you good fortune in your attempt to replace those evasive, elusive, slippery little keepers.
- 4) After doing this "rope trick" and "spring thing" on all cylinders be sure to remove the rope and set any one piston on top dead center compression stroke. This guarantees the cam will be at it's lowest point. Now place the hydraulic unit and ball seat into the tappet body and install the push rod shroud and associated seals, washers, and safety tension ring correctly. Install the same push rod tube, rotator, valve rocker, valve rocker pin and thrust washer.

5) Now check the clearance between the rotator and the heel of the rocker. .028 - .080 on the intake and exhaust valves. If this clearance is too great remove the push rod and install a longer one. If the clearance is too small, install a shorter one. Three grooves represent a short rod and no grooves represent a long rod. The applicable parts catalogue can help locate the proper part number for a long or short rod.

6). Perform this task on all cylinders and be sure to replace the rocker shaft covers and rocker box covers with fresh dry gaskets. Install the four spark plugs and leads and carefully recheck your work.

If those obvious items as mentioned in the early part of this discussion are O.K. then the problem has been resolved.

Manx was a highly skilled pilot, and a tremendously fine person. He was talented as an artist and musician, as well as in the field of Aviation. He was modest and friendly at all times, and with a most engaging personality. He is sorely missed, by all who knew him. He leaves a brother, a wife, and five children in England.

DON DWIGGINS

3816 PASEO HIDALGO
MALIBU, CALIFORNIA 90265

(213) 456-8700

6 May 1976

Jim:

Can't tell you how sorry I was to hear about Manx and the A-1.

I still feel the Acroduster is one of the greatest ships I've ever flown, and look forward to a bright future for it.

Best wishes -

311.78	10
328.74	11
344.88	12
359.02	13
373.16	14
387.30	15
401.44	16
415.58	17
429.72	18
443.86	19
458.00	20
472.14	21
486.28	22
500.42	23
514.56	24
528.70	25
542.84	26
556.98	27
571.12	28
585.26	29
599.40	30
613.54	31
627.68	32
641.82	33
655.96	34
670.10	35
684.24	36
698.38	37
712.52	38
726.66	39
740.80	40
754.94	41
769.08	42
783.22	43
797.36	44
811.50	45
825.64	46
839.78	47
853.92	48
868.06	49
882.20	50
896.34	51
910.48	52
924.62	53
938.76	54
952.90	55
967.04	56
981.18	57
995.32	58
1009.46	59
1023.60	60
1037.74	61
1051.88	62
1066.02	63
1080.16	64
1094.30	65
1108.44	66
1122.58	67
1136.72	68
1150.86	69
1165.00	70
1179.14	71
1193.28	72
1207.42	73
1221.56	74
1235.70	75
1249.84	76
1263.98	77
1278.12	78
1292.26	79
1306.40	80
1320.54	81
1334.68	82
1348.82	83
1362.96	84
1377.10	85
1391.24	86
1405.38	87
1419.52	88
1433.66	89
1447.80	90
1461.94	91
1476.08	92
1490.22	93
1504.36	94
1518.50	95
1532.64	96
1546.78	97
1560.92	98
1575.06	99
1589.20	100

MANX KELLY DIES IN AIRSHOW CRASH

On May 1, 1976 at Corona, California, Manx Kelly, internationally known British Aerobatic and Airshow star, died in the crash of the original Acro-duster 1. After a slow roll on takeoff, he climbed to an altitude of 4000-5000 feet above field elevation. He did two turns of an inverted spin, and came out pointed straight down. The engine sounded like the throttle was wide open. At approximately 700-800 feet, he initiated a pull out. As he reached 10°-15° from the vertical down line, the tail flew off, the ailerons flew off, and the wings buckled, collapsed and flew off, in that order. Manx was instantly killed in the crash. He did not wear a parachute.

At the present time, the F.A.A. is conducting an investigation. The investigation has not been concluded, and so the results have not been released. When the results are available, they will be published in our magazine.

Weather conditions were clear, with a wind of 20-25 MPH. The wind was gusty, and could have contributed to the accident.

Manx was an internationally famous air show pilot. He was a veteran of the R.A.F., where he served 18 years, and became a squadron leader. He had about 4500 flying hours, in all types of aircraft, both propeller driven and jet. In 1971, he was The British National Aerobatic Champion. He organized and led both the British Rothman and Canadian Carling Aerobatic teams. He was a Pitts dealer in England, and used Pitts aircraft on his airshow teams.

Manx was a highly skilled pilot, and a tremendously fine person. He was talented as an artist and musician, as well as in the field of Aviation. He was modest and friendly at all times, and with a most engaging personality. He is sorely missed, by all who knew him. He leaves a brother, a wife, and five children in England.

Table of Velocities & "G" loads when aircraft is describing an Arc with a 500' radius. Based on the following formula for Centrifugal Force.

$$F = \frac{WV^2}{32.16R}, \quad \text{WHERE } F = \text{Centrifugal Force in lbs}$$

$W = \text{Weight in lbs}$
 $V = \text{Velocity in feet per second}$
 $R = \text{Radius of Arc} = 500'$

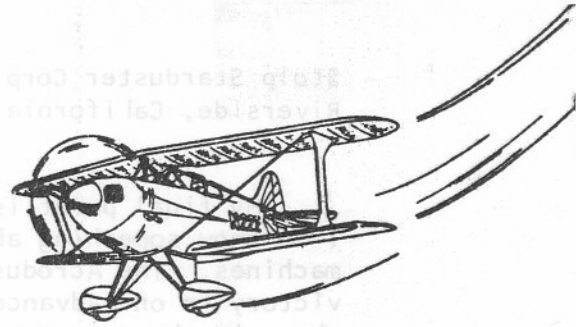
Then,

$$\frac{V^2}{32.16(500)} = \frac{F}{W} = \text{"g" loads} + 1 \text{ "g" for Vertical Pullout}$$

"g" Loads	V ('/s)	V (MPH)
5	253.6	172.90
6	283.5	193.29
7	310.6	211.76
8	335.5	228.74
9	358.7	244.56
10	380.4	259.35
11	401.0	273.40
12	420.6	286.76
13	439.3	299.51
14	457.2	311.71
15	474.5	323.51

Kansas City Aerobatic Club

IAC Chapter 15



President

T. J. Brown
492-7581

Vice-President

Ron Edwards
474-8378
Stolp Starduster Corp.
4301 Twining, Flabob Airport
Riverside, California 92509

Secretary

Sarah Edwards
474-8378

Treasurer

Bill Haynie
679-3375

May 5, 1976

Dear Jim:

I was very sorry to hear about the accident involving 181J and the death of Manx. Realizing the flood of telephone calls, etc. that must have followed, I have decided to write you in hopes of not contributing further to the mayhem which I am sure surrounds you now.


First of all, I would like to confirm my confidence in the structural integrity of the airplane. Being probably the most experienced Acroduster I driver around, I am sure that the plane will sustain "G" loads up to about +9 and -6 though I now rarely exceed +6 and -4 1/2 in my advanced sequences. However, I feel that, from the way the accident was related to me (third hand), the possibility of flutter being the primary culprit cannot be overlooked. From my years as a test pilot, I realize the insidious nature of flutter and its seriousness as well. If the airplane was flying vertically (down) in excess of 300 mph, I would expect tail group flutter to occur before aileron flutter, especially in the reflex wing Acroduster I. Also, I would guess that the "Q" loads would be such that wing attack points would be stressed beyond design limit, especially when loaded at the same time. In short, I would be very surprised if excessive "G" alone was the cause of the failure.

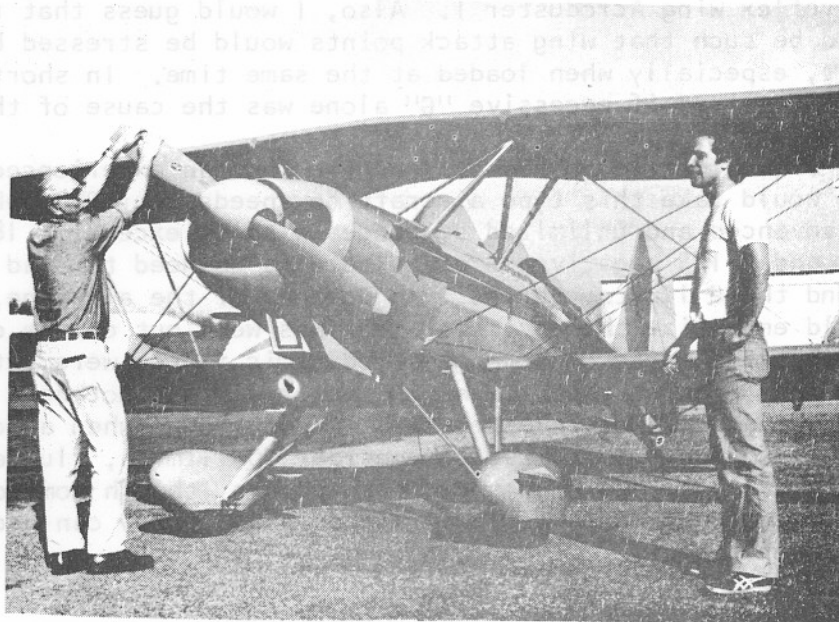
I am a little amazed at learning that an experienced pilot such as Manx would take this type aircraft to speeds over 200 mph. I can easily fly advanced and unlimited sequences without exceeding 185 mph or 6 positive and 4 1/5 negative "G's". There is no need to load the airplane beyond these limits, period. In defense of the airplane, I feel you should emphasize the fact that Manx was well out of the design envelope and that all sorts of strange aerodynamic forces were acting on the airplane, meaning that flight in that realm had not been contemplated and, therefore, not investigated. As you know, when aircraft begin to exceed 250 mph, its a must to consider "Q" limits, flutter, compressibility effects, and high speed drag polars (though some of these must be a point of concern at lower speeds also, they can become critical at higher speeds).

My final point is not meant to tell you how to run your business but I do know something about the people who fly unlimited type aerobatic machines. The Acroduster I would sell itself better by being flown to victory in one advanced/unlimited sanctioned contest than all the airshows in the country. The people who will build/buy and fly this machine are those found at contests, not the awe-stricken public found at airshows. From my own exposure to the plane, the reaction is one of "where can I get one" from aerobatic people to one of "I could never fly anything that hot" from the average sport pilot. In other words, facts notwithstanding, non-aerobatic people are awed by and afraid of any machine with such spectacular performance because they know it must be extremely difficult to fly. Your market is in the IAC membership and I intend to demonstrate this to the best of my ability this year.

Once again, I want to express my sorrow at the recent events and to let you know that I have lost no confidence in the plane. Every airplane made will bite you if you try to fly out of its envelope. I learned this myself the hard way in a jet fighter.

Very truly yours,


Timothy J. Brown



Bill Wick showing son Danny how it was done in the old days.

"BILL" WICK'S DREAM MACHINE

Occasionally, a very fine gentleman who has been involved in Aviation since the early '40's, (he is fast approaching middle age) brightens our day by showing up at "Starduster" to visit, and buy supplies for his Starduster Too project.

Murray "Bill" Wick, started flying in 1940 in a glider. In order to get a job as a flight instructor in 1942, he found it necessary to take a leave of absence from his job and cram in 200 hours at Blythe California. This is desert country, and for six weeks, Bill slept in a tent and flew every hour that the weather permitted.

After becoming a Certified Flight Instructor, Bill spent the next year training Army Pilots to fly in the Ryan PT-22. As the flight training program tapered off, he returned to work as an aircraft mechanic, for Ryan.

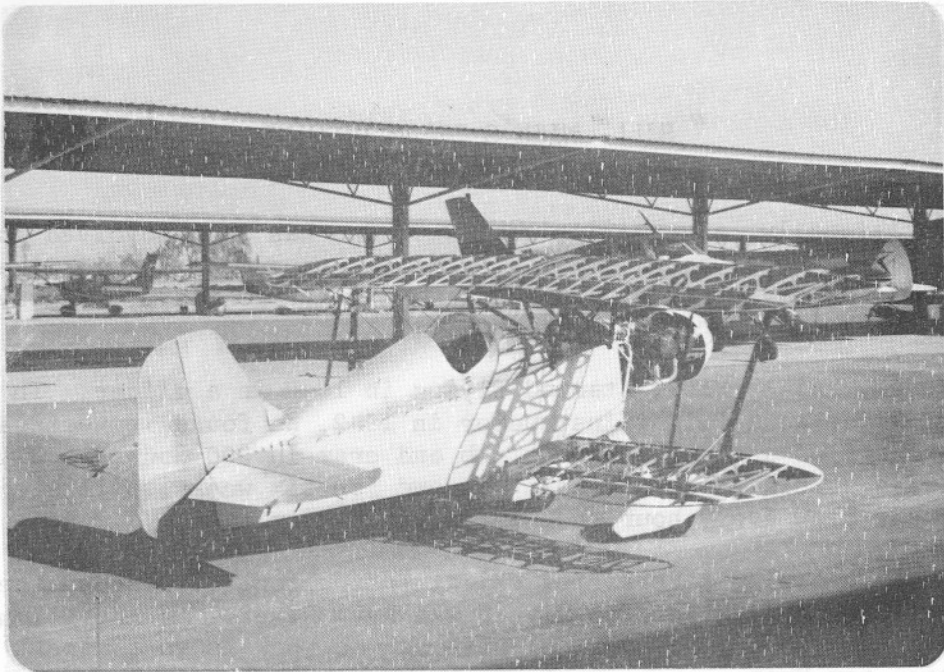
Bill progressed from being a shop mechanic to a string of experimental projects, and from these he became a manufacturing engineer in production planning. One of his most interesting jobs was as a contract estimator on the XC-142. This was a huge, tilt-wing, V/STOL transport.

Bill thinks that he has enjoyed the best of flying, both as a professional, instructing and flight testing commercial airplanes, and as a non professional, flying for fun, and becoming involved in the Amateur Field.

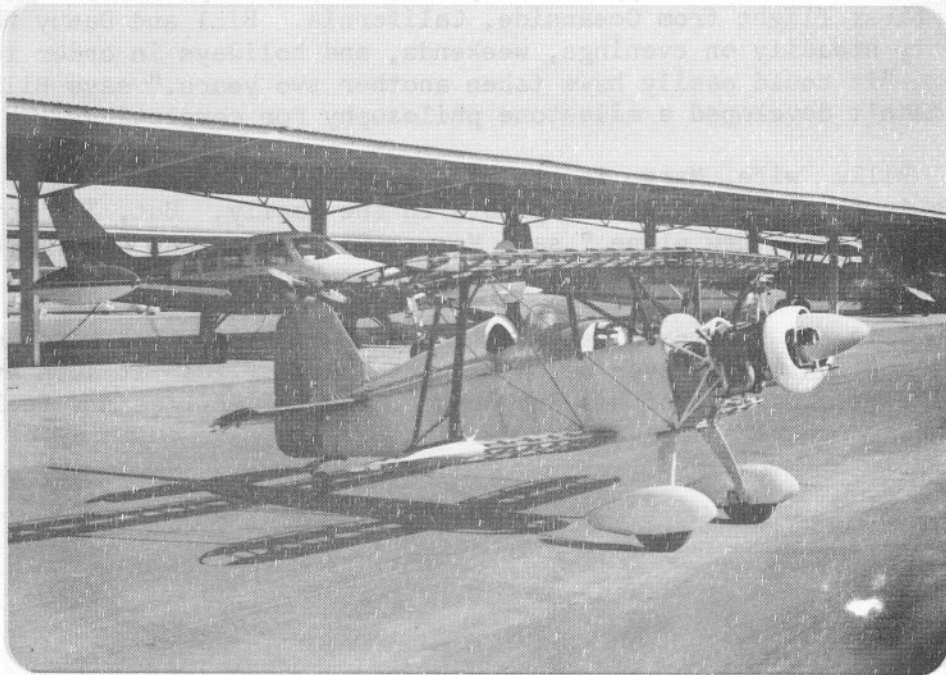
Bills assistant on his Starduster Too project, is his son Danny, who is 25 years old. Together, they have completed their project, and by the time this appears in print, they will probably have flown the first flight from Oceanside, California. Bill and Danny have worked pretty steadily on evenings, weekends, and holidays in order to fly by now. "It could easily have taken another two years." says Bill, "if we hadn't developed a milestone philosophy for completing it."

Bills wife, Mary, is one of his most enthusiastic fans. "I think it s just great, having two pilots in the family. But, I'm not going to ride in the new plane," says Mary. She notes that open cockpit flying in a sporty little biplane is not her "cup of tea".

Bill has witnessed many new airplane rollouts, and hundreds of maiden flights. However he still gets "butterflies" at such events. On the first flight of his Starduster, the butterflies may feel like fighting roosters.



Cliff Anderson's Acroduster 1 soon to fly. Cliff, well known aerobatic pilot, airshow performance and Grandfather. Soon to retire his Starduster 1 for the more nimble Acroduster 1.





EXPERIMENTAL AIRCRAFT ASSOCIATION

A Non-Profit Organization Dedicated To The Advancement Of Aviation Education, Homebuilt Aircraft And Private Aviation

EAA ORANGE COUNTY CHAPTER 92

February 17, 1976

Mr. Eric Schilling
Stolp Starduster Corp.
Flabob Airport
4301 Twining Rd.
Riverside, California 92509

Dear Eric,

Just a short note, Eric, to say how much I appreciate your coming and speaking to us. We had had a couple of disappointing programs for one reason or another-- so your presentation was just what the doctor ordered to keep the membership interested in attending the general meetings. I have had a lot of favorable comments about your talk and a few poor ones on the condition of Ted's projector! Win some... loose some.

You certainly have had some enviable experiences (and some not so enviable) and were generous to share them with us. Your handling of the detailed, technical questions from some of our "experts" was well done and puts you in the Diplomat class.

I wish you continued success with Stolp, one of the best. Thanks again!

Sincerely,

Guy D. Veasey
President

P.S. In the slight chance you haven't tried soaring, I'd be happy to introduce you to it.

A FLORIDA "DUSTER" IS ABOUT TO HATCH

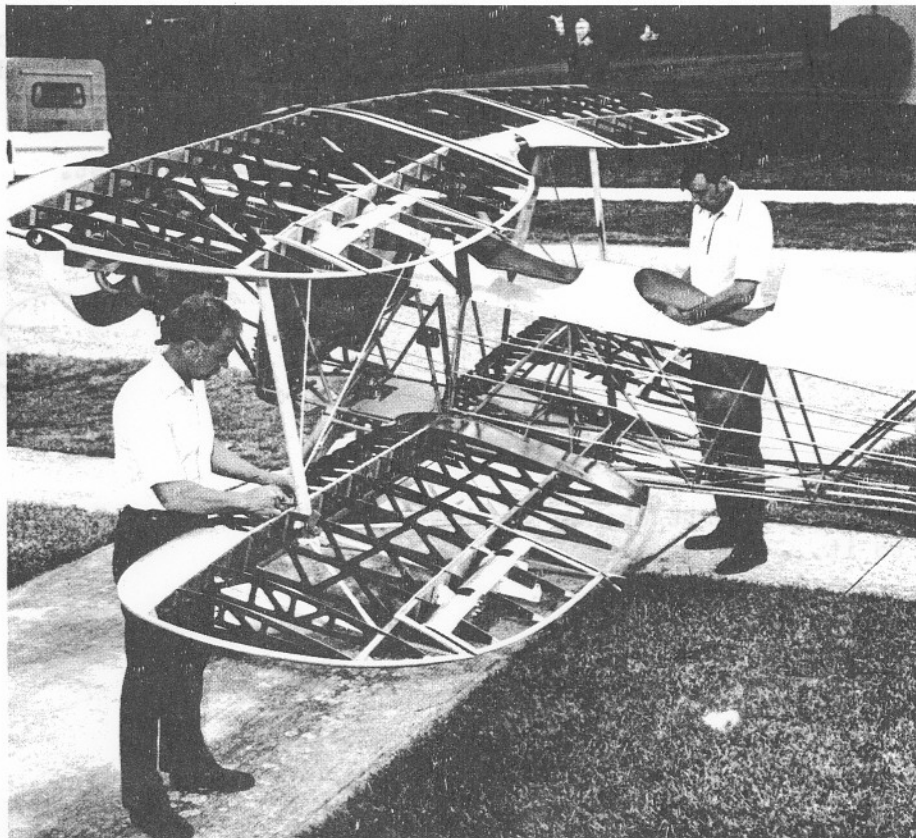
About the middle of this year, from the plush environs of Palm Beach Florida, the fruits of a "Labor of love" will take to the air, and another Starduster Too will be airborne.

Al Tomlinson and Neil Reyngoudt are the hardworking and deserving builders/owners. Their factory is Al Tomlinson's one car garage. Al says that makes for cramped quarters, and is a little like "building a boat in your attic". However, it can be done, and these two intrepid builders are doing it. Reyngoudt says, "All you need is an understanding wife". Tomlinson stores material and components (such as wing and tail assemblies) in his bedroom. He isn't married (as if you didn't know.)

Their Starduster Too is built from scratch with materials purchased from Stolp Starduster Corp. They are using a Lycoming 180 HP Four Ranger, and expect to be light enough for aerobatics. They have been working nights and weekends, on an irregular basis, for more than three years. They estimate that, by first flight time, they will have \$7,500 invested in the project. This includes \$3000 for the preowned engine. As this is being written, they are in the doping and painting stage. June or July should see the first flight.

Al and Neil both work for Pratt and Whitney Aircraft, Florida Research and Development Center. They work in the FT 4 Engineering Division. We understand that their "Too", is a model of fine workmanship, and that it will contribute to the reputation Starduster builders have, for always building excellent, beautiful aircraft.

Called a 'fun airplane' by builders Al Tomlinson, left, and Neil Reyngoudt, the Starduster Too is being constructed in a one-car garage. Mid-1976 is target for first flight.





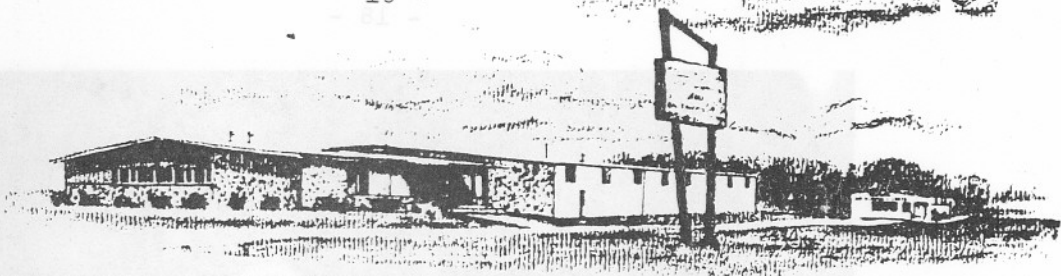
A beautiful SA300 - Green trimmed in white.
Built and flown by C.J. Civca over Sleepy
Holly, Dundee Ill.

I want to thank you very much for your kind donation of
Fokker D-VII plane to the EAA Museum.

We certainly appreciate it, and want you to know it will
be helpful to us. We also received a letter from Mr. Kelley,
and had likewise written answering my request for plans, ask-
ing if we would loan them or look at them. I have passed
the business relationship that exists between yourself and
Mr. Kelley. We certainly appreciate your kind donation to
the Museum. It is deeply appreciated.



Partners
Dave Mead - Curt Smith - Joe Refsner
The first engine run after installation.
FAA ok'd for cover next day.



EAA AIR MUSEUM FOUNDATION, INC.

A NON-PROFIT ORGANIZATION DEVOTED TO THE HISTORY AND DEVELOPMENT OF SPORT AVIATION

AIR EDUCATION MUSEUM: 11311 W. FOREST HOME AVE., FRANKLIN, WISCONSIN—PHONE: 414/425-4860

MAILING ADDRESS: BOX 229, HALES CORNERS, WISCONSIN 53130

March 31, 1976

Mr. Jim Osborne
 Stolp Starduster Corporation
 4301 Twining
 Flabob Airport
 Riverside, CA 92509

Dear Jim:

I want to thank you very much for your kind donation of Fokker D-VII plans to the EAA Museum.

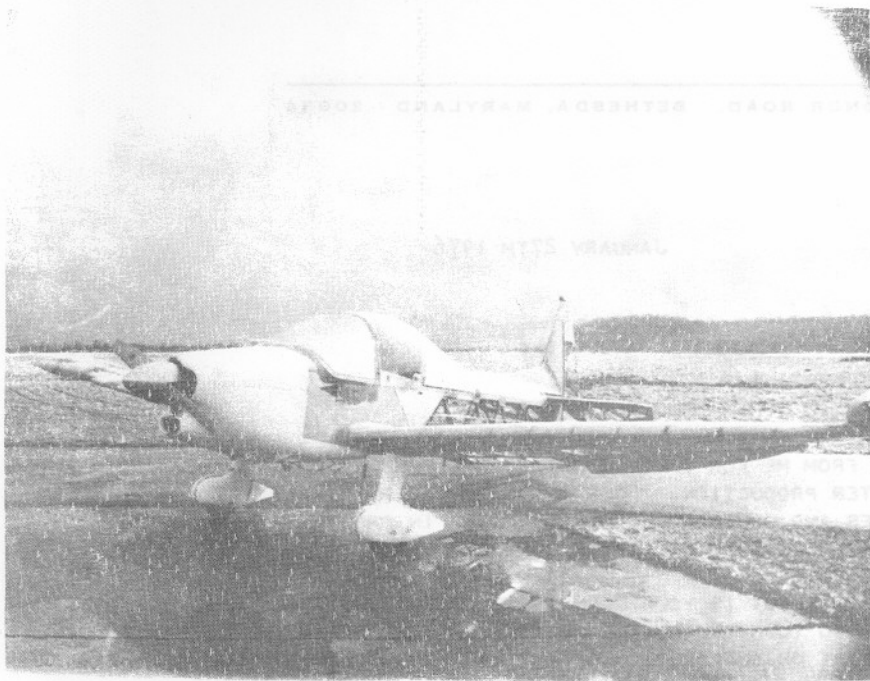
We certainly appreciate it, and want you to know it will be helpful to us. We also received a letter from Mr. Kelley, who had likewise written answering my request for plans, asking if we wanted them rolled or folded. I wasn't aware of the business relationship that exists between you and Mr. Kelley. We certainly do appreciate your fine donation to the Museum. It is deeply appreciated.

Sincerely,

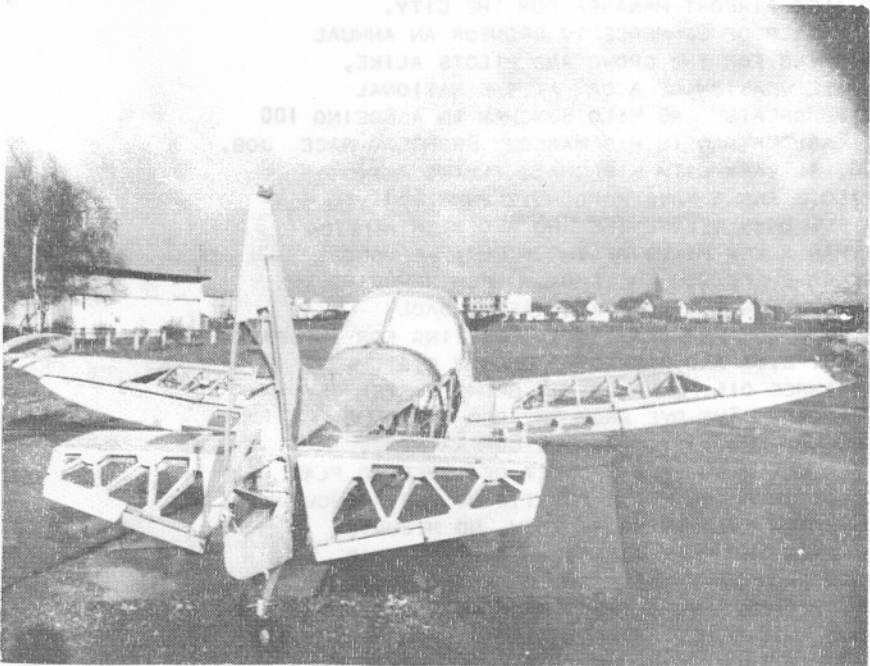
A handwritten signature in cursive that reads "Ben".

Ben Owen
 Executive Assistant

BO:jo



Pictures from Germany.
 Photos at left of Horst Beckers
 highly modified Emaude.
 Powered by 150 Lycoming.
 Horst lives in Offenbug,
 W. Germany. EAA No. 75765.
 Took 5 years of spare time.
 Relaxing from his job
 as architect.



Bob Kraig's Starlet.
 Flown in April for the
 first time.
 An unusual color scheme
 of various shades of
 Metallic Green.
 Quite attractive.



ARTHUR E. JENKS

7914 RADNOR ROAD, BETHESDA, MARYLAND 20034

JANUARY 27TH 1976

STOLP STARDUSTER CORP.
4301 TWINING
FLABOB AIRPORT
RIVERSIDE, CALIF.

DEAR JIM:

YOU HAVE NOT HEARD FROM ME FOR QUITE A WHILE, THE PAST YEAR HAS BEEN ROUGH ON MY STARDUSTER PRODUCTION. FOUR TRIPS TO THE HOSPITAL CATARACT OPERATIONS, BOTH EYES AND PLUMBING PROBLEMS. I AM IN PRETTY GOOD SHAPE NOW WITH 20/25 VISION IN BOTH EYES WITH CONTACT LENS SO I WONT GIVE UP.

WHAT I AM WRITING YOU ABOUT IS YOUR JULY ISSUE OF STARDUSTER. IT INDUCED A BIT OF NOSTALGIA TO YOUR TRULY, THE ARTICLE ON FLAT SPINS BY ERIC SHILLING AND YOUR REPORT ON THE REUNION OF THE AVG FLYING TIGERS. IN CHRONOLOGICAL ORDER- FLAT SPINS.

FROM 1936 TO 1940 I WAS A FBO AT MODESTO CALIF., MANAGER OF PATHFINDER FLYING SERVICE AND ALSO AIRPORT MANAGER FOR THE CITY. IN '38 AND '39 I INDUCED THE CHAMBER OF COMMERCE TO SPONSOR AN ANNUAL AIR SHOW AND TO MAKE IT INTERESTING FOR THE CROWD AND PILOTS ALIKE, I ARRANGED THE PROGRAM AS A SMALL VERSION OF A DAY AT THE NATIONAL AIR RACES. WE HAD SUCH OLD TIME "GREATS" AS MILO BURCHAM IN A BOEING 100 TEX RANKIN IN HIS GREAT LAKES, EARL ORTMAN IN HIS MARCOU BROMBERG RACE JOB. ALSO PAUL MANTZ IN A BOEING 100, AL LARY WITH HIS CRAZY FLYING ACT, SOME RACES FOR THE VISITING PILOTS AND A MASS PARACHUTE JUMP (3).

TEX RANKINFLEW IN A FEW DAYS BEFORE THE SHO AND BLEW A PISTON IN THE MENASCO WHEN HE WAS WITHIN A FEW MILES OF THE FIELD, HE LANDED AND ASKED ME TO GET HIS ENGINE IN SHAPE FOR THE SHOW. UPON REMOVING THE UPPER HALF OF THE CRANKCASE I FOUND #4 CYLINDER AND PISTON BADLY DAMAGED AND ORDERED NEW PARTS FROM LOS ANGELES. WHILE WAITING FOR THE PARTS I WENT OVER THE ENGINE FISHING OUT BITS AND PIECES OF BROKEN PISTON FROM ALL THE INNARDS. TEX HAD THREE OIL PUMPS ON HIS SMOKE SYSTEM FURNISHING RED WHITE AND BLUE SMOKE. THE DYE FROM THE RED AND BLUE SYSTEMS SURE MADE A MESS OF THE AFT END OF THE ENGINE COMPARTMENT.

HAVING DINNER WITH TEX ONE NIGHT THE SUBJECT OF INVERTED FLAT SPINS CAME UP. HE SAID HE HAD GOT INTO ONE WHILE PRACTISING FOR A SHOW AND AFTER ABOUT TEN TURNS AND TRYING EVERYTHING HE KNEW, NO RESULTS, FINALLY BY HOLDING OPPOSITE AILERON THE NOSE CAME DOWN AND THE SHIP WENT INTO A NORMAL INVERTED SPIN FROM WHICH HE RECOVERED. TO PROVE TO HIMSELF THAT THIS FACT AND NOT BY CHANCE HE CLIMBED BACK TO ABOUT TEN THOUSAND FEET AND DID IT AGAIN. THIS TIME, AFTER THE FLAT SPIN HAD DEVELOPED HE WAS ABLE TO RECOVER IN ABOUT FOUR OR FIVE TURNS USING THE AILERON AS BEFORE.

ACCORDING TO MY LOG BOOK I HAD THE OPPORTUNITY TO FLY TEX'S SHIP AFTER ENGINE REPAIR, IT READS, 10/27/38, GREAT LAKES, MENASCO 84S, NX315Y, #:30 MINUTES, ENGINE TEST. I HAD A LOT OF FUN, IT WAS MY FIRST WITH A PROFESSIONAL ACROBATIC AIRPLANE. THE SHIP WAS RIGGED FLAT AND REQUIRED CONSTANT ATTENTION LATERALLY (TEX CLAIMED THIS GAVE BETTER STABILITY INVERTED) BUT I DID PLAY AROUND WITH A FEW MILD MANEUVERS.

NOW ABOUT THE AVG FLYING TIGERS. IN 1940 I RECEIVED AN APPOINTMENT WITH THE CAA AS AN AERONAUTICAL INSPECTOR (12/9/40). AFTER TWO MONTHS OF INDOCTRINATION IN WASHINGTON AND PASSING AN ACROBATICS TEST IN PT 19S I WAS ASSIGNED TO THE ROOSEVELT FIELD OFFICE IN MINEOLA, NY.

IN MIDSUMMER OF 1941 SIX YOUNG MEN IN CIVVIES CAME INTO THE OFFICE THEY HAD MILITARY DISCHARGE PAPERS AND THEIR LOG BOOKS SHOWED MOSTLY P40 TIME. THEY WERE FROM MITCHEL FIELD (ADJACENT TO ROOSEVELT FIELD) AND THEY ASKED THEM IF THEY BE GIVEN COMMERCIAL LICENSES. AS THERE WAS NO PRECEDENT FOR THIS PROCEDURE AT THAT TIME THE REGIONAL OFFICE AT LA GUARDIA WAS CALLED. THE ANSWER WAS, GIVE THEM COMMERCIAL LICENSES AND DONT ASK QUESTIONS. THIS WAS ACCOMPLISHED AND THEY VOLUNTEERED THE INFORMATION THAT THEY WERE GOING TO CHINA TO FLY FOR CHENNAULT. I WONDER IF ANY OF THESE SIX MEN WERE PRESENT AT THE REUNION, I HOPE THEY ALL WERE.

WELL JIM I HAVE POUNDED THIS ANCIENT CONTRAPTION LONG ENOUGH AND I AM ENCLOSING A PRESS FLYER OUT OF MY FILES SO THAT YOU CAN SEE I AM NOT TRYING TO HAND YOU A LINE. THERE SEEMS TO BE A LOT OF EXPERTS AROUND THESE DAYS PARTICULARLY HERE IN WASHINGTON. THE FLAP ABOUT THE CONCORDE MAKES ME SICK. ITS A TREMENDOUS TECHNICAL ACHIEVEMENT AND NOT TO LET IT INTO THIS COUNTRY COULD HAVE SERIOUS POLITICAL RESULTS AND AS TO THE OZONE LAYER THE MILITARY HAVE MORE HIGH ALTITUDE JET EFFLUX THAN THE WHOLE CONCORDE FLEET COULD MAKE. AS TO NOISE THE ENVIRONMENTALIST'S SHOULD HAVE THE AIR FORCE PUT OUT ABOUT FOURTEEN YEARS AGO EXPLAINING THAT THE SONIC BOOM FROM A B58 WAS THE SOUND OF FREEDOM!

Arthur E. Jenks
ARTHUR E. JENKS

My partner and I, Jim Braden, have been building our Starduster Too for the last 3 1/2 years. We are working on the last wing at present. The only major thing left will be the ailerons as we have the fuselage on the gear complete with tail feathers.

However we still have to modify the gear to the rear 4" which we will do when we move it to the airport from Jim's garage. The wings have been built in my upstairs den with a 1 1/2" clearance to get the wings down the stairs. We have our 180 Lyc 0360 A3A Engine with all new parts with crank shaft rods & cam shaft being the only old parts being used.

Jim and I used to build models together prior to WW 2, so we have finally realized our dream and built our bi-plane. There are several Stardusters, in the Mid So. area and three flying we know about and three under construction in Memphis alone. When there all flying we hope to form a Starduster sqdn and call it the Rebel Sqdn, and I hope to send you a pictures of them in Stairstep formation.

Regards

Bob Knox
Suite 720
Exchange Bldg
Memphis, Tenn 38103

7814 WASHOR ROAD, BETHESDA, MARYLAND 20814

NOW ABOUT THE AVG FLYING TIGERS. IN 1980 I RECEIVED AN

ARRANGEMENT WITH THE CAR AS AN AIRCRAFT. THE CAR WAS IN THE MIDDLE OF THE MONTH OF INVESTIGATION IN BETHESDA AND PARKING IN

IN MIDDLE OF 1981 SIX YEARS WITH IN CIVILIAN INTO THE SPACE

THEY HAD MILITARY DISCHARGE PAPERS AND THEIR LOG BOOKS MOSTLY

THEY WERE FROM WHEEL FIELDS (PARASITIC TO ROBERTS FIELD)

AND THEY ASKED THEM THAT BE CIVILIAN LICENSES. AS THERE WAS

NO PROBLEM FOR THIS PROCEEDURE AT THAT TIME THE MEDICAL OFFICE AT

SA DENTON HAS CALLED. THE NUMBER WAS THE CIVILIAN LICENSE

AND DON'T ASK QUESTIONS. THIS WAS ACCOMPLISHED AND THEY VOLUNTEERED THE

INFORMATION THAT THEY WERE GOING TO BE IN THE AIR FOR CIVILIAN

I WOULD BE ONE OF THESE SIX MONTHS PRIOR AT THE SCHOOL. I WOULD

BEYOND ALL THIS.

BEYOND ALL THIS I HAVE TO ASK THE MEDICAL OFFICE

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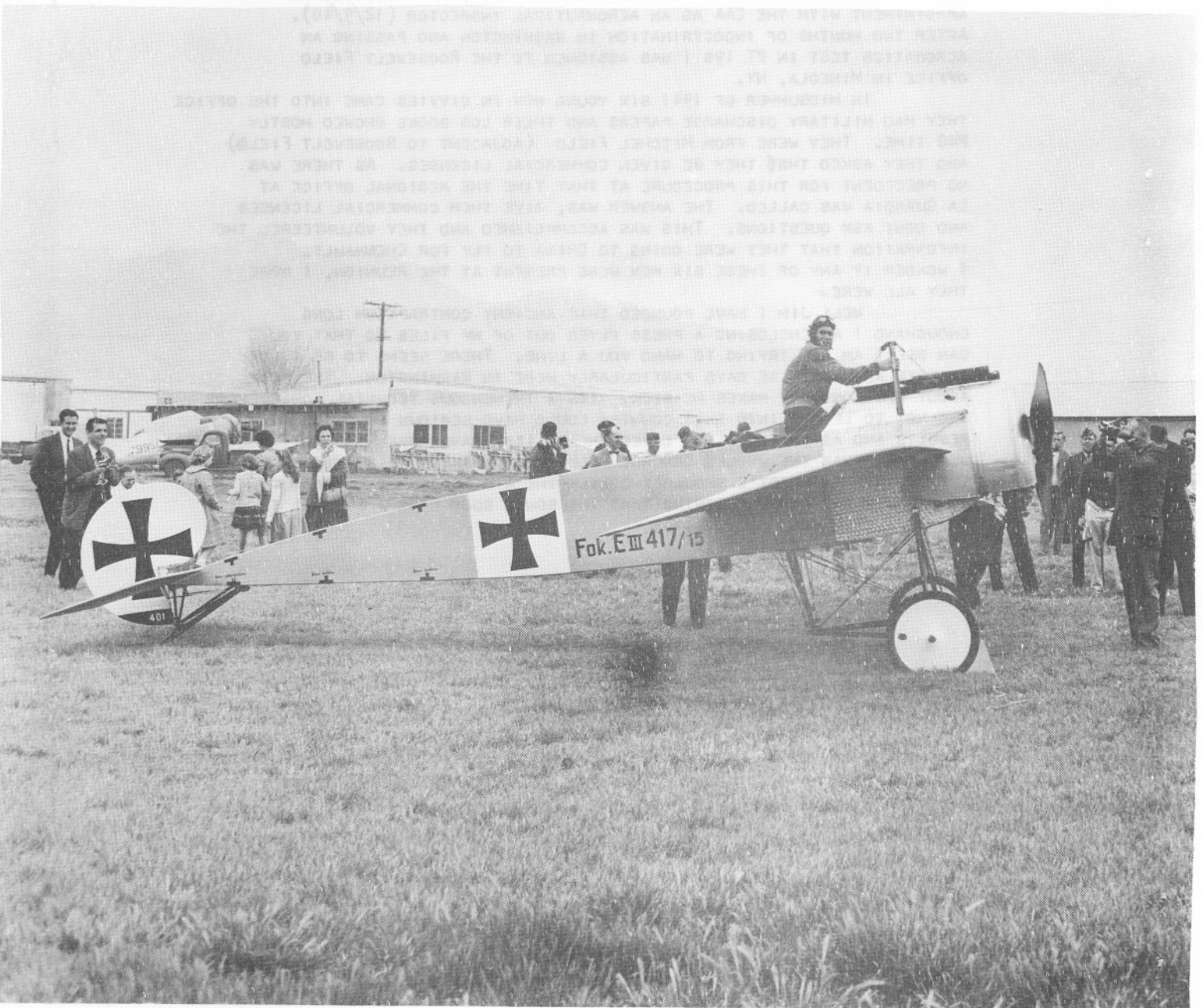
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April 2, 1962 after 1st flight. Jim Appleby getting out of Fokker Eindecker. When contacted for comment about the picture, Jim said, "One that would be appropriate would be, where's the restroom?" Cruise speed 80 MPH. Top speed 120 MPH. Stall speed 37 MPH.

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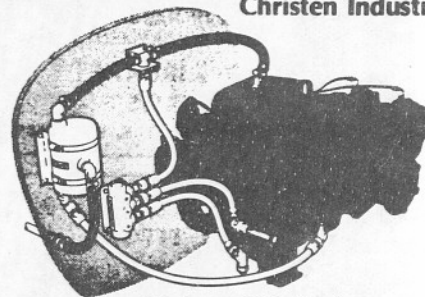
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