

The *Starduster* Magazine

Vol. 29, No. 2, April 1999

Published for the biplane builder, the biplane owner, and the aviation enthusiast



In This issue –

- A Chevy Engine in a 'Duster Too? –6
- Nolan Getsinger Tells It Like It Was –15
- Do Your Ribs Match? –23
- The Scoop On Starduster Wings –24

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The *Starduster* Magazine

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Table of contents

Front Cover

Oscar Bayer's Starduster Too N490B in Flight

3 Editorial

4 19th Annual Starduster Openhouse and Fly-in

6 A Chevy Engine in a Starduster Too?

12 Flash!!—New Oshkosh/Wautoma Accomodations
Schedule of Coming Events

Correspondence

13 Letters from—

■ Gary Thomas ■ Bob Wampler ■ Scott Chambers

■ Leonard Sebulsky ■ Buck Rado ■ Oscar Bayer

■ Gary Solmi ■ Fred Myers ■ Rick Matson ■ Robert Engkvist

15 Nolan Getsinger— From Dream to Reality

19 Photos of Outsanding Airplanes

21 A Home Away From Home

Tech Tips

23 Do your rib drawings match the plans?

Stardusters Continue to Grace the Pages of *Sport Aviation*

24 Why Starduster Wings Are Better

Safety

27 Are you competent? How do you know?

Check out. Who me?

28 GA Safety trends

29 Don't stall around

32 News from the Net

35 Classifieds

38 Order Forms

Inside Back Cover —

Les Homan in his Super Starduster, N9116Y, heading for a pylon at the Sept. 1998 Reno Air Races.

This magazine uses material submitted by its readers. The articles printed do not necessarily represent the views or opinions of *The Stolp Starduster Corp.* or *The Starduster Magazine*. The Corporation and the Magazine assume no responsibility nor liability for the accuracy of the printed material.

Editorial

H. Clay Gorton

We appreciate the many kind words that have been sent in about the appearance and content of the *Starduster Magazine*. But we must be quick to point out that the *Starduster Magazine* is very much a group effort. The magazine is *for* Starduster owners and enthusiasts *by* Starduster owners and enthusiasts. It is a reflection of the activity and the interests of many people with something very special in common. There seems to be something akin to a brotherhood among those who fly, but somehow that brotherhood is magnified and intensified by those who share the fraternity of nostalgia associated with flying a tail-dragging, wind-in-the-face, tube and rag biplane.

We attempt to assemble, organize and print out what you folks send in. As each of you enjoys reading about the projects and the experiences of other Starduster owners/builders, they are equally interested in your own activities. Those activities don't need to be startling, exciting or outstanding; status reports on where we are in construction and what we're doing in the air are of interest to all. So we encourage you to share yourself with the fraternity.

Since our reach is rather limited, and we are only two (Glen Olsen and myself), we have enlisted the support of a number of others, strategically situated in various parts of the country and abroad, who are willing to help out in gathering information and preparing articles that will be of interest to those subscribing to the magazine. They are:

—Oscar Bayer, 250 Stanton Street, Arroyo Grande, CA 93420

—Max Bennett, 123 Berkley Rd., Buffalo NY 14221

—Bob Dwyer, 2941 Rio Verde, Tucson AZ 85715-3544

—Charles Glackman, 10127 S.E. Browning Rd., Evansville IN 47711

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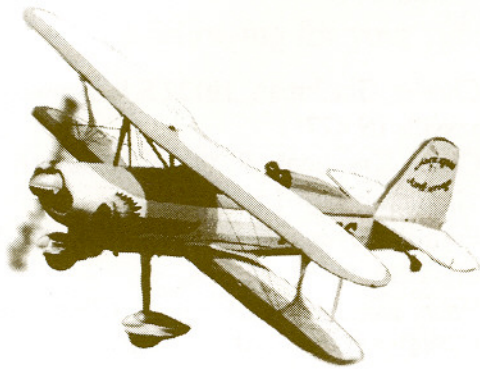
—Fred R. Myers, 1638 Cherry Hill Lane, S.W., Conyers GA 30094

—Harry Mackintosh, 8 Savona Close, Wimbledon SW194HT England

Their names and phone numbers appear in the Table of Contents, page 2.

As an advanced notice, we would like to feature in the July issue of the magazine the contributions that Starduster pilots are making to the EAA Young Eagles program. We're all acquainted with the thrill of first flight. But that thrill is enhanced to its maximum when that first flight is in a Starduster. We're sure that there are a number of very interesting accounts of Young Eagles in Stardusters and some wonderful photos of kids who can't wipe that smile off their face after getting back on the ground again. We would appreciate all the contributions we can get to make the July issue an important and memorable record of Stardusters and Young Eagles.

We feel that the color centerfold is an interesting and important segment of the Magazine, but we can't print pictures if we don't have any. We need at least eight, and could use twelve, in order to fill out the four-page sheet. So, if you like that section, send in your photos! Also, the Magazine is mostly made up of contributions—letters and articles—from the subscribers; we try to fill in with safety articles and tech tips when there is a dearth of submitted material. So, keep those cards and letters coming, and let's keep the Magazine vital to the interests of the subscribers!



19TH ANNUAL STARDUSTER OPEN HOUSE & FLY-IN

May 14, 15 & 16, 1999
Oroville Municipal Airport (OVE)
Oroville, California

*Come join us for a weekend of fun and good fellowship.
All airplanes welcome, especially biplanes and other homebuilts*

- ★ Houseboat Cruise Friday
- ★ Pancake Breakfast Sat. & Sun.
- ★ BBQ Friday & Saturday Nights

Hosted by

EAA "City of Gold" Chapter 1112
Stolp Starduster Corporation

Information or Reservations Contact:

George Frazier or Ken Nowell
Phone 530.534-7434
FAX 530.534-7451
E-mail: takeoff@starduster.com

OROVILLE- Oroville Municipal (OVE).

Location: 3 mi. SW of city.

Coordinates: N39-29.26; W121-37.32.

Mag var: 16E. **Nav aids:** MYV 110.8 338
23.4. **Telephone:** 530/533-1313, 530/538-

2420. **Hours:** 8 am to 5 pm daily **Eleva-**

tion: 192. **Pattern altitudes:** 999 MSL light

aircraft; 1402 MSL heavy aircraft. **Runways:** 1-19

6,000 x 100, asphalt; lights PCL/ 12-30 3,540 x

100, asphalt; road ry 30, lights PCL. **Lights:** SS to

SR, 122.8 (5 clicks in 5 sec, med intensity); bea-

con. **Obstructions:** 46' Doplar radar tower 3000' W

of ry 12-30. **Fees:** hangar, tiedown. **Approaches:**

GPS RNAV, NBD 212, VOR. **FSS:** Rancho Murie-

ta 123.6, 122.4. **Com freq:** APP Sacra-

mento/125.4; UNICOM/CTAF 122.8. **Charts:** San

Francisco; L2. **Noise abatement;** No straight-in
apch, make left pat.

Let us know if you will be attending

Please contact—

- Ken Nowell, Starduster Corp., or
- George Frazier, EAA chapter 1112, at
530.534-7434, phone
530.534.7451, FAX

Friday, May 14, 1999

10:00 a.m. Registration opens
11:00 a.m. - 1:00 p.m. Sack lunches & beverages available
2:00 p.m. Leave airport for Houseboat Cruise
2:30 - 5:00 p.m. Houseboat Cruise (incl. drinks & hors d'oeuvres)
5:30 p.m. Social time - Oroville Airport
7:00 p.m. Cowboy Chicken & Ribs Dinner - Oroville Airport

Saturday, May 15, 1999

5:45 a.m. Briefing for Dawn Patrol
6:00 a.m. Depart for Willows for breakfast
8:00 - 10:00 a.m. Pancake Breakfast - Oroville Airport
10:00 a.m. - ? Local flying, rides, and flight over Lake Oroville
11:00 a.m. - 1:00 p.m. Sack lunches & beverages available
12:00 p.m. Oroville area tours available
5:30 p.m. Social time - Oroville Airport
7:00 p.m. Tri-Tip Dinner & Awards - Oroville Airport

Sunday, May 16, 1999

8:00 a.m. - 11:00 a.m. Pancake Breakfast - Oroville Airport
8:00 a.m. - ? Local flying & departures

Call for Hotel Reservations in advance:

Best Inn & Suites	800-626-1900; 530-533-9673; Fax 530-533-5862
Travelodge	800-578-7878; 530-533-7070; Fax 530-532-0402
Villa Court Motel (AAA)	530-533-3930
Motel 6	530-532-9400; Fax 530-534-7653
Days Inn	800-329-7466; 530-533-3297; Fax 530-533-4809

Call for Information & Registration:

Stolp Starduster Corporation	EAA "City of Gold" Chapter 1112
Ken Nowell	George Frazier, Chairman
530-534-7434	530-534-7434
530-534-7451	Fax 530-534-7451 Fax

The Continuing Saga of 4226Y

Les Homan, President, Starduster Corp.

Last year you may have heard a rumor that we were working on a Chevy powered Starduster. Well the story is true, dates and engine size have changed but we are getting close. When I first became interested in building my own airplane I had two memories. The first airplane book I ever remember had two airplanes in it, one powered by a motor cycle engine and the other powered by a model A Ford engine. I did not know a lot about aviation but the people I talked to advised me to use a Lycoming or a Continental. I read an article about someone installing a Corvaire engine but decided this was not the way to go. Of course by this time I had made the decision to build a Starduster Too. I started building in 1978 and found a Lycoming IO-360C1C of 200 horsepower. I bought the engine in pieces and had it all checked and yellow tagged. I assembled it myself and even if I do say so myself, it has performed well. I performed a top overhaul about 1400 hours ago and finally shut the plane down for a complete rebuild after a total of 2,614 hours. These stretched from California to Kitty hawk, from Arlington, Washington to Mulege, Mexico. It took me 3½ years to build the plane and first fly it. In April it will be 3 years to just rebuild. Reasoning here is when first built there was not another plane to fly, now there is the Super Starduster SA101.

Thinking about alternative engines came in bits and pieces and after attending an EAA Oshkosh forum several years ago on how to choose which home-built to build, (Look out on the flight line, if it ain't there, don't build it.) Note: This was the only tent left to get into during a major rain storm. About six years ago Dave Baxter and I flew from Oshkosh to Southeast Kansas with Bob Nealy and his Ford 302 cubic inch V-8 powered Starduster

Too. Several things impressed me, including but not limited to ease of starting, heater that really worked, same performance as the 180 hp on Dave's Starduster Too and reduced fuel usage. This must have started the ball rolling because in the years since then I have been looking at the increase in automotive powered aircraft.

The problem I have had and one of the reasons I have not ventured into this further relates to several considerations.

Design Concepts: Automotive engines are designed for a purpose. Designers are good and make a very good engine for the use it was designed for. Automotive and aircraft engine use are considerably different. Since you would not take your 200 horsepower Lycoming and place it in your car, what makes the world think you can just do the reverse.

I have observed the various types of engines, engine modifications and various drives. With several years of observation I have noticed if you want approximately 100 horsepower the choices are wide. In the 200 horsepower range the options are more limited. Conversions include those that appear to be a one of a kind for local flying with lots of tinkering, to those that appear quite reliable. Power is rated in more than one way and I have seen little data comparing results on a one to one basis. I had talked to many people who's conversion looked like maybe 150 to 160 horsepower, maybe, but claimed 250 or more.

Drives: In the 200 to 250 horsepower ranges I have decided the belt is by far the best way to go using the keep-it-simple-and-reliable approach.

Engine RPM: Back in the late 60's and early 70's cars used in street drag racing used to turn 3,500 to 3,700 RPM running down the road all the time. It concerns me when you

exceed about 4,000 RPM in an automotive engine for extended periods of time. As I understand, marine use is very close to aircraft-type use and they exceed these RPM's. When was the last time you saw a boat at 8,000 feet over the mountains and no place to set down safely for 50 miles? I am told it does not compare, but when I down-shift my truck to 4,000 RPM and think about operating in this manner across 150 miles of rock and desert it does not turn me on.

I had given up and was waiting on something to come along when in February 1998 I was at the Corona airport and had some time to pass. A visit to one proud P6E builder changed things. I had read the Sport Aviation article in the January issue about the P6E and was duly impressed. I like to ask questions; some are strange until I understand. He answered every question with thoughtfulness and it showed he had investigated the subject. This was the first automotive engine drive that really excited me. The Starduster was large enough to install the Chevy 350 and all the concepts used could be transplanted. I started thinking and laying out what would be needed to fit it into the Starduster. The two items which slowed me down were the direct drive location at bottom of engine, off end of crankshaft as it related to ground clearance and overall weight. Among the things that I liked the best were a stock engine and RPM in the 2,700 to 2,900 range.

This got me to thinking big time. I don't remember exactly what led me to Belted Air Power but after reading their literature and talking to Jess Meyers I had to know more. The idea of a Chevy V-6 developing 180 horsepower with the prop at 2,450 RPM and the engine RPM at 3,500 sounded great. As I understand at 4,000 engine RPM and 2,700 prop RPM about 200 horsepower is available and the installed weight is approximately 50 pounds heavier than the 200 horse Lycoming.

In early December I had to go up to

Lancaster, California to look at a project so we took a couple of days off and visited Jess Meyers in Las Vegas. When I saw the V-6 setting on the bench I was hooked. This is a very small, neat well developed package and fitting it to a Starduster Too just looked natural. After talking to Jess for several hours we went out to the airport and saw the unit installed in an RV-6A. This was the cleanest auto conversion I have seen anywhere. Jess took me up for a flight to experience the engine in operation. I had a bit of a problem here, my first ride in an RV and it is not a biplane, and to make matters worse what I was really concentrating on was the engine. I imagined it to be an aluminum biplane with a clear covered upper wing with spars made of clear plexiglass. This allowed me to tune the plane out. I guess it was OK though. Jess told me he sold more RV's than drives. I wanted the drive.

To give you an idea what Jess has done with the drive and engine we first have to note he has been involved in auto engine conversions for more than 15 years. He started with the 215 cubic inch aluminum Oldsmobile engine. At one time this engine was readily available and at a reasonable price. The engine went out of production in the US and has shifted to Great Britain. It is still available but not as a low dollar item. The Ford V-6 was looked at and as I understand is a good engine, but there are so many changes over the years it is very difficult to fit drives to engines with any certainty. The Chevy 4.3 Liter, 90 Degree V-6 was then investigated and was used for development. This engine takes many features from the small block Chevy which has been virtually unchanged since 1955. There is one pattern for the bell housing to bolt to and only two different crankshaft flywheel flanges. Jess has been through a lot of development with the drive and the engine and I believe this is the second upgrade on the drive. It is the basic drive he started with.

While in the shop I asked Jess all the questions I had written down and which came to me as we talked. The engine is an even fire, 4.3 Liter, 90 degree V-6. It is no longer in production but there are lots of them available. The best engine from a metallurgical standpoint is an engine where the block and heads have been used and allowed to set. If you talk to Chevy or an engine rebuilder they will tell you it has hardened seats. What they do not tell you is they are flame hardened and to run both auto fuel and 100 LL you need to go to hardened inserts. The cam gets changed to lower the horsepower/torque curve and max it out in the 3,500 to 4,000 RPM range. A double roller timing gear set is installed and EGT sensors are used in all six exhausts. Jess uses a special exhaust heater and radiator for the RV-6A.

There are lots of trick items you can add—aluminum oil pans, aluminum intake manifolds, aluminum heads, aluminum water pump pulleys, aluminum water pumps. Most of these items are great but in the interest of a solid, reliable power plant are not used.

Aluminum heads save about 40 pounds but introduce problems if the engine is not warmed up properly and if distilled water and anti-freeze are not changed yearly, and head gaskets can take a dump. They are in use but I decided 40 pounds and the cost of aluminum heads were not worth it. Ignition is by a standard, aftermarket points-type system. Points are set up to have two points, each opening and closing at the same time. There are two standard ignition coils with a high voltage diode. The main battery and a small emergency battery allow for complete redundancy in the ignition system down to the distributor cap and rotor. If one plug was to fail you would still have enough to get to an airport. Carburation is by a two-barrel Holly unit with a mixture control block added. This provides for mixture control as in your standard aircraft engine.

Some one is going to ask, why don't you use fuel injection and electronic ignition? I did. The answer is one I agree with. Point type ignition at 4,000 RPM is still working without problems and will continue to do so for long periods of time. If points are wearing down you will notice a change in performance and operation prior to a sudden failure. The carburetor is a simple device, rarely if ever fails without some type of warning, easy to install and simple for the average mechanic. I have driven many hundreds of thousands of miles with electronic ignition and fuel injection. The only failures I have had are either intermittent or sudden. I do not want either of these in the air. Keep it simple.

An answer most surprising was about maintenance. Jess tells me complacency is a real problem. You start out checking the engine just as in a regular aircraft engine. After checking time after time and the oil has not gone down, no leaks, no problems, it becomes far too easy to let it slide this one time.

After observing the quality of engine and drive parts in the shop I was completely at ease with the prospect of the first flight. The first thing I noticed was two water temperature gauges. One is for the block with second one for radiator. This shows how the thermostat is working and how much capacity is available in the cooling system. You watch the block temperature rise and at thermostat set point the radiator temperature rises. Block temperature remains fairly constant while the radiator temperature fluctuates. Other gauges include an electric tach showing engine RPM, manifold pressure, oil temperature, oil pressure and fuel pressure. There is no oil cooler used on this installation and fuel pressure is assured by use of two electric fuel pumps.

I need to put a plug in here for the Starduster Too. Getting into the RV was like getting into the baggage compartment of your average Starduster Too. We have them beat here big time. Engine startup was like your

average carbureted car, pump a little gas, turn switch and away it goes. Sound inside the RV was very low, maybe the aluminum fuselage does provide a quieter environment than the rag and tube, but real men (and women) fly open cockpit, rag and tube. They just talk louder at the end of the day. We taxied out and by the time we reached the runway engine block temperatures were up. Jess uses and recommends the warp drive propellor. This unit is three blades and ground adjustable. It allows tuning the prop to the aircraft better and has the unusual characteristic of running static RPM at same as full power, level flight. The run-up was completed with gauges, sounds and vibrations in the green. We pulled onto the runway and went flying. I cannot compare accelerations or climb as this was the first RV I had flown in. I was very intensely watching the gauges, listening to the engine and feeling vibrations. Once we reached altitude Jess throttled back to cruise at 3,500 engine, 2,450 RPM at the prop. I was very impressed. At full power 4,000 on the engine the noise level picked up slightly and speed picked up. All engine gauges and my senses said this is something to be carried to the next step. Jess tells me he likes to cruise cross country at about 3,500, but at 4,000 it would hang in there. My impression was at 3,500 rpm it felt like my IO-360, 200 horsepower Lycoming at about 2,500 and at 4,000 similar to 2,700. I need to let you know this is comparing my Too before the Super Starduster and its pumped up engine. 2,700 RPM in it is where you throttle back for fuel savings or on the way back in after a good workout.

As I have researched drive systems in the last several years and settled on the belt type drive, several things have been overheard. As one of them goes, it is just a piece of aluminum, some bearings and a shaft. You can get the sprockets and belts and build your own. I have several disagreements with this reasoning. First and foremost, everything about an

aircraft is designed to accomplish one thing—to fly. Flying includes being in places where everything in and on board must be working. In aviation there is allowance for zero errors, breakdowns, etc. You may make an error, have a breakdown or a major dumb spell and get by with it. You were lucky—do not count on luck. The structure of the drive has many factors to consider—vibration, twisting, tension, compression, bending and forces from many directions in varying magnitudes. This can be designed and tested by trial and error, by the latest computer-aided design methods, tested by flight time and lots of hours of operation. That first method, trial and error, remember the allowance for mistakes or errors.

Things like what types of materials to use for prop drives, thickness, attachment methods, fit tolerances are but a few of the things to consider here. Bearings are not a simple 'select one and go.' Life of bearings, loads on bearings, radial loads, mounting blocks, loads on mounting blocks, along with many other considerations, have to be input. Belts and sheaves are similar. The short of this is, yes, you can build a belt drive, but you have just become a tester for the product for the life of it or you. Go with a belted drive that has been designed, tested and field tested. You can then enjoy flying and become part of a team. As time builds up information can be shared and knowledge gained.

The next step included ordering a Belted Air Power Drive assembly and exhaust system. A quick investigation found there are many Chevy V-6 engines, two basic types— either a 90 degree or a 60 degree, cubic inches from 229 to 262. Talking to various people involved in Chevies netted me lots of information, some of it a little strange—you mean they make this engine in a four bolt main, 4,000 RPM? That is a very high RPM, I don't think it will last very long, (from one of the Bay Area's largest hot rod parts outlets) and it

is exactly like the 305; No, the 350; No, it is not like any other Chevy. I acquired an engine from the folks at my local Chevy Dealer along with a book on their engines. It was a long block 4.3 liter V-6, even fire and did not include things like heads, valve covers, oil pan, those minor items. SURE, Mary said.

Now somewhere about here I need to explain that this took place in December 1998 and My Starduster Too will fly in March 1999. What this means is I do not have time to search the papers and junk yards, find the right engine and get it rebuilt. Another fact to mention, I have always been a Ford man. Some people might consider a person unbalanced for putting an auto engine on the front of a perfectly good airplane. I always thought that one shoe was heavier. My goal was to take the guidance from someone who had been there and done that, Jess, and apply to the Starduster Too.

Jess has a list of components to use for the engine. We found most of these parts without trouble. I ordered many parts through PAW. I had two noticeable problems. I ordered the flex plate in January, it still has not come in. Jess recommends the heavy duty flex plate. The other item was a roller timing chain set. The first arrival was not a double roller and did not fit the end of the cam shaft. Hole patterns were smaller on the cam. Talked to PAW, return one, received another, definitely a double roller but hole patterns still did not fit. Next step was to go to my local auto parts/off road vehicle parts store, hope they never find out how far off road. Those bumps sure send me soaring. Talked the situation over, will have part next day. Next day wrong part, next day right hole pattern finally but not a double roller, next day, right part, time to celebrate. Heads were removed and hardened seats were installed along with high lift springs for the cam. The rocker studs were removed and screw-in type were installed.

The make-up of the Starduster Too as

compared to the RV-6A allows for engine placement further forward of the fire wall. I had an 18" engine mount on my Starduster and wanted to move to the longer mount to improve CG for aerobatics and when fully loaded with passengers, baggage and fuel. I started by weighing everything from firewall forward. I will provide full data when the project is completed and in the air. I then weighed the new engine, drive and all related components. I set up a spread sheet and determined CG of old and new engines and relations to CG. By moving the CG to where I wanted it the crankshaft flange is only about 2" forward of where old one was. The new engine is more compact and the CG of the unit is forward of the CG of the Lycoming. I used the same mounting heights and locations as the original engine.

I wanted to use the same tuned exhaust system Jess used on the RV to maintain the same or similar power results. I wanted to use a bed mount but it would be in the way of the exhaust system. I used a similar design as Jess uses on the RV to attach engine to airframe. This resulted in some support tubes splitting and going around exhaust system pipes. Main engine mounts were a specific point in cost, \$4.95 each, nuts and bolts totaling approximately \$1.50 more and a little work. The radiator is a standard off-the-shelf aluminum unit and mounts between the engine and fire wall. I will exit radiator air out the side gills and exhaust air out the bottom opening. Modifying the distributor included a little welding and drilling. In the interest of redundancy two ignition coils were chosen, one an oil filled type and the other an epoxy type. I don't like the idea of getting two of the same manufacture and model numbers where redundancy is concerned.

Fuel is supplied by two electric pumps. I have two batteries, a gel cell and a small motorcycle battery. Charging for the small battery is through a diode to prevent anything

from happening to the main system and affecting the small system. I have the ability to power either ignition system and either fuel pump from both batteries. Both fuel pumps can be operated at once if required. Another fun item was the small, high torque, light-weight starter. An engine mount was in the way, so I had to disassemble and rotate the starter and gear drive on the mounting block. Finding a metric tap and proper drill bit proved exciting on a Saturday afternoon.

EGT probes are installed in each exhaust as well as an old CHT probe adjacent to the carburetor and in the oil pan area. There is not carburetor heat and as I understand, Jess has had no problems. I get to play test pilot on this one. I tried to save some money and visited the local junk yard and picked up some water pump drive pulleys. Cheap at \$5.00 each, I have a total of \$25.00 invested and the final choices are 1/8" out of round on water pump and 3/8" out of round on dampener side. I find, even here, it does not pay to try short-cuts. In the end you always spend more. Don't tell Mary I said that, she may get the idea it would have been better to stick with the Lycoming.

On Saturday, March 13, we took a drill and built up oil pressure in the engine, checked everything twice and cranked the engine to life. Howard Fairbank was on hand to witness the event, a reward for the many hours he had put in to make it happen. If you ever dreamed of a biplane with the sound of a high power engine, similar to a drag racer getting ready to launch, this is it. I, the Ford man, have to admit this is the easiest engine to start for the first time that I have ever been around. Our initial timing had to be reset, it was at 12 and we moved it to 6 BTDC. Adjusted the mixture control on carburetor, worked just like normal mixture control. We shut it down and restarted it just like in a car. Wow, double wow, if all else does not live up to expectations, there is no questioning the starting. On running up the

engine it was noticed at about 2,500 to 2,800 RPM sparks flew and noise was made in the general area of the starter drive. Upon investigation it was determined the flex plate was hitting the starter drive gear. A good 1/8" clearance exists when the engine is off. Talked to Jess on Monday and he is trying to get me the heavy duty flex plate. He tells me the standard flex plate will also crack in short order. Is that before or after the end of the starter drive gear is eaten up? Another lesson learned the hard way.

The landing gear on my Starduster Too was back 13.5" behind the fire wall. We modified it and brought it to 8" behind the fire wall. Main battery is located at the top center of fire wall. It will have a separator between it and radiator discharge air. Gascolator and fuel pumps will be mounted in front of the firewall in a separate cavity with outside cooling. The three hole nose bowl will not work in my particular situation because of using the tuned exhaust system. It is too wide with width down low. I am using a nose bowl that has a lowered and more squared look in bottom corners. If this all works out we will design a bed mount and build a tuned exhaust system. This will allow a narrower nose bowl than the standard.

We are working towards flying by the end of the month and if warm weather prevails we should make it. Changes include removing the aluminum leading edges and going to wooden, moving the aileron slave struts to forward of aileron spar and redoing the rear instrument panel for new engine instruments.

One question asked of Jess was aerobatics. The carburetor allows for positive maneuvers only. Another area of concern is steep climbs, no oil in pan, it is in back of engine. Jess tells me if you are upside down and go negative the carburetor will first let the engine die and as oil pressure goes away the gas from carburetor vent fills intake and engine takes off. I will have to adjust my aerobatics to keep it

positive—loops, barrel rolls, clover leaves, split S's, etc .

Originally I was hoping to have the flying side of this adventure here but will have to save for next issue. Asked the other day what was to be gained by installing an auto engine in a Starduster Too. Answers include, how about a \$10,000 forward package including prop, drive, engine, radiator, exhaust system, nose bowl, cowling, engine mount, throttle linkages and fuel system. Another answer relates to using auto fuel for local flying and switching to 100LL for cross country. A lot of Starduster Too's are flown within a 100 to 200 mile radius of the airport. Someone on a limited budget could continue flying with

savings in fuel and maintenance costs. What happens when they decide to quit making 100LL.

A couple of notes— it looks like the weight difference between my 200 HP Lycoming with metal prop and the V-6 with a Warp drive prop will come out in the 50 to 70 pound range. Will have exact figures in the next issue. The same drive mounts to a stock Chevy 350 and provides in stock condition about 240 horsepower and can be pumped up to 300 hp. Weight as compared to an IO-540 is about equal, comparing a constant speed prop to a fixed pitch, warp drive. Auto parts are cheaper than aircraft parts but do not have the testing aircraft parts have. How this plays out is to be seen.

Flash!!—New Oshkosh/Wautoma Accomodations

Going to the **Oshkosh/Wautoma Airventure** this year? And you don't have hotel reservations? Not to worry! A new travel plaza in Wautoma is now up and running. A new hotel (an American Inn) in that plaza will be opening in May. The opening has not yet

been announced, so it may be possible to get reservations there if you act promptly.

Exclusive to *Starduster Magazine* subscribers—The Wautoma phone number is 920.787-5050, and the national reservations number is 800. 634-3444.

Schedule of Coming Events

Sun 'n Fun '99—April 11-17

Oroville Open House,—May 14-16

National Biplane Convention and Expo.

Bartlesville, Oklahoma—June 5-6

Starduster Alaska Adventure—June 7-21

Chuck Krabbenhoft's Starduster Fly-in,

Sabin, MN—June 12

Phone No. 218.789-7250

NW EAA Arlington, WA Fly-in—July 8-12

Oshkosh '99—July 28-Aug. 3

Correspondence

To: cgorton@burgoyne.com
Subject: Starduster Magazine—Jan Issue

Just wanted to drop you a note to tell you how much I enjoy your magazine. I am interested in purchasing a Starduster, and was surprised when the Jan. issue didn't have any ads in the back like usual. Have you discontinued the ad, or where they left out? Thanks again.

Gary Thomas, Navarre, FL

Dear Clay,

I see the 1/99 issue listed on the web site for the Starduster Magazine but I haven't received mine yet. I know I paid my subscription (unless it was lost in the mail—bring back the mail bi-planes!!) but since my last name starts with "W", it may have not yet arrived. I hope you can double check for me, as I'm going through withdrawals until I get my biplane fix!

Keep up the good work Clay and Glen!

Bob Wampler, Portland, OR

Clay,

I decided to check out the Starduster web site and saw what Les and Ken have been doing. It is a good looking site and easy to find your way around. The cover of the latest magazine sure looks nice. I hope this web site helps increase the number of subscriptions. I also will look forward to having more information from the magazines available on the site. Good Job!

Scott Chambers, Carr Printing Company, Bountiful, UT

Hi Gang:

I have enclosed some photos of my Acro II project. This spring I gathered up all the bits and pieces I made over the last four and half years, and began assembling them. To my surprise everything fit perfectly when I was done. . . . an airplane emerged! Goes to show that with a lot of patience, a few swears, and a bit of luck, even I can build an airplane.

My Acroduster II has the following equipment:

IO-360A1A Lyc., Harzell c/s Aerobatic prop, Christen inverted system and wobble pump, GOS locking tail wheel, two-place canopy, Hooker harness, Cleveland wheels and brakes with Flite Custom low profile tires, B&C light weight alternator, Mark Londell light weight starter; Ceconite cover, Airtech paint system finish.

I have brackets for an I-Com hand-held radio and a Lawrence hand-held GPS. I still have to make the wing fairings, fuel flow test, weight and balance, and then final inspection.

Leonard Sebulsky, Sheho Saskatchewan, Canada,
(See photo page 19)

Dear Clay and Glen,

Enclosed is a check for the Starduster magazine and a snapshot of my SA-300. I will send a write-up and construction photos soon, but thought you may like to see a photo of it now. The new magazine is sure great, nice job. Thanks again and a super magazine you are producing.

Sincerely,

Buck Rado, Navarre, FL, (See photo page 19)

Dear Clay,

Wanted to drop you a line to let you know status of the upset Starduster here at San Luis Obispo. The owner, Scott Simpson, has decided to repair the damage, or rather, have some of us locals do the work on the airframe. The left wing panel had five broken ribs and the front spar, all ordered from Starduster Corp., and the center section had hidden damage to most of the nose ribs, and the fuel tank is also under repair. The fuselage welding is done and work proceeding on the vertical stabilizer and rudder. We will recover the fuselage and all the upper wing panels.

The enclosed picture of the best looking Starduster II alive is approved for use on the cover of the next issue of the Starduster Magazine.

Regards,

Oscar Bayer, San Luis Obispo,
(See photo on cover)

Hi,
Thanks for sending the magazines so promptly. I saw Eric Shilling on PBS while watching a story about flying tigers. Eric tested my starduster back in 1977. I'm wondering how he is. He would be around 80 now. Would you have his phone number.? Thanks for any info.

Gary Solmi

Hello Clay,

Following 2 years of communication with the wonderful folks at the Starduster Corporation, I was rewarded with a visit by "Mr. Starduster" himself, Bill Clouse. Accompanying Bill was Kenny Ware, also a Starduster pilot, builder and owner of "Lady Jane" N311JK. It was a bit cool that day in December, but that didn't hinder our fellowship and a brief aerobatic flight to follow. Bill was visiting Kenny Ware who recently relocated to Milledgeville, Georgia. I was very honored having the opportunity to meet Bill and I am very thankful to Kenny for bringing Bill by to see my Acroduster II. Bill's next stop was Penscola in the panhandle of Florida. Good luck to you in your travels and I look forward to our next visit. Planes, People going Places.

Fred Myers, Morrow, GA (See photo, page 21)

Hey guys,

You printed a great picture of my Starduster One, N156S, in the last mag. but you printed the wrong name under the flick. The only fitting punishment will be to reprint it as the cover photo in the future. Haha. Seriously, the plane is outstanding and the magazine is wonderful! Keep the Co. going and we'll see you at Sun 'n Fun, I hope.

Rick Matson, Warrenton, VA

Ed. Note: We proffer our abject apologies for getting the wrong name on your beautiful 'Duster One. You're on for a cover picture if you can get us a hot aerial shot.

HCG

Dear Les & Dave,

Wow! The middle of Feb. and I realize I have not renewed my subscription. It has been a very busy fall and winter. My SA-300 wings are done for the most part and the fuselage tube kit I got from you last spring is still waiting for me. I do have two good reasons for the lack of buildijg time— 1) On Nov. 12 our first baby arrived. His name is Gannon and what a great experiecne it is to be a dad! 2) We made the decision to quit farming. Having an A&P certificate gave me the opportunity to go to work for a new company in nearby Devils Lake, MD (40 mi.).

You may have heard about Dakota Aero Manufacturers. The company is in the process of developing the STC for adapting the 600 hp Orenda to the 685 series Twin Commander. We will be completely rebuilding them all the way from installation of a new wing spar cap, new orendas, new interior, avionics and paint. Along with that we just got a 401 Air Tractor in the hangar today to start the Orenda STC on. It is very interesting work and a great experience. I had the opportunity to be involved in some of the test flying of the Orenda-powered 685, I got to sit right seat and monitor engine gauges and watch for traffic, etc. Very impressive performance so far. 3500 fpm climb at take-off and around 2500 fpm at around 7500 feet. If all goes well they are hoping to have final STC approval by mid to late summer and if all goes well it looks like it will be a great employment opportunity.

So, between new baby and new job, the Starduster has had to take a back seat. I do want to know when the new plans are done though so I can get a copy.

If you ever plan on coming through North Dakota and would like to see my project or get a tour of Dakota Aero, give me a call. 701. 249-342. Thanks.

Robert Engkvist, Esmond, ND

From Dream To Reality

by Nolan Getsinger, Idaho Falls, Idaho

I have lived in Idaho for my entire life, the oldest of six kids. With parents from the depression era we were afforded few extravagances. However, my father growing up during this time and exposed to the flying times of Tail Spin Tommy and others as well as the modern flight technology and military spin-offs hitting the covers of Science and Mechanics, Mechanix Illustrated, Flying and other magazines which he never ever discarded. These magazines have been guarded like technical manuals and passed down through the generations. I remember thumbing through the pages and asking my dad why he didn't buy one of these cheap Piper Cubs advertised for around \$2000.00 because I knew that our neighbor bought a brand new Chevrolet that cost them \$2,700. So an airplane for over \$700 less than a new car sounded like a good deal. Dad told me that when that airplane was advertised you could buy a new car for about \$1200 to \$1500 and even that was an impossible figure for him. Dad couldn't afford an airplane but he could buy an occasional magazine. We never went out to eat at restaurants but we would pack a picnic lunch and on weekends go to the local airport, sit on the grass and watch the airplanes take off and land. I remember seeing J-3s, Porterfields and shiny Electras or Beach 18s, I don't know which, but I remember they looked like the babies of the DC-3s that came in on a less frequent schedule.

Sometimes for my birthday or Christmas dad would get a model airplane and help me put it together. I think it was for him as much as for me. He would always tell me the history of the type of plane we would be gluing and painting. I don't remember ever building a plane with less than two wings before I was 14 years old. Most of the collection was WWI stock representing all countries. Dad loved them all and knew the strengths and weaknesses of most of them and saw designed beauty in almost anything that could fly. This is the influence that I believe was the seed that later would nag me until I would learn to fly while suffering from my mid-life crisis. I had turned thirty-one and now I was really in my thirties, my life

was half over and I had not done many things. I had not flown anything bigger than a radio controlled model, though I had ridden in a C-206 and a friend's P-51, but knowing that it requires royal blood or a rocket scientist's degree, I had not thought it possible to do more than dream of piloting a plane myself. Oh, but dream I did. From my earliest recollections I dreamed of flying over houses, mountain peaks and through the white puffy clouds.

An instructor in our area advertised a ground school for \$85.00. I called her and found that she was going to start the ground school soon and that she had three airplanes and would be able to take me all the way to pilothood. She was a grandmother and other than for her grandchildren she lived to fly. For about six years she did my biannual flight reviews and check rides for the state and FAA Wings safety programs. Then I came across an instructor and PA12, So I struck a deal to trade work, hamburgers and of course some cash to get quality stick time in a tail dragger. He was bored with the pavement pounding so we went to the back country to practice on some emergency strips. This was a ball and gave me an appetite for some of Idaho's less accessible airstrips. I have purchased several aircraft projects, starting with a KR-2 before I learned to fly, and a Baby Great Lakes biplane while I was learning to fly. The Baby Great Lakes was a must after going for a ride with a friend in his Citabria. A couple of loops, a hammerhead turn and a barrel roll convinced me that I had to have something that could change my attitude to unusual. I bought the Baby Lakes as a bare fuselage spot-welded with no landing gear and the wings started but missing some minor parts like a main spar, leading edge, covering, fittings, etc.

I joined the local chapter and national EAA at this time because I was now going to be an airplane builder, and my friend Vaun Bross told me that to build an airplane without the Sport Aviation Magazine and the tech manuals would be like trying to eat without any arms! It can be done but it isn't going to be pretty. Vaun built one of the

cleanest and most detailed W.A.R. Folkwolf 190s I ever looked at and he had boxes of these tech manuals from about five years of membership. He did lend me some, until my manuals started coming in the mail. Of course being friends, Vaun let me read the manuals with only the title to my truck as security.

While in the local chapter I served as President two different terms, Vice President for two terms and Newsletter editor for two different terms. Each of the terms are two years. I have been the Young Eagles coordinator for the past year. All of the positions have been enjoyable but the Young Eagles is one of the most satisfying.

I could not tell you when I first met Don Knauts but I can tell you that it was at an EAA Chapter meeting and it was sometime in the mid 1980s. I took note because he was building a biplane and he spoke of it with knowledge and passion, and I knew that he and I shared the same feelings for the bi-winged type of aircraft. At this time I did not know or appreciate the unique lines and distinctive wing form of this plane called Starduster. I had seen adds in magazines about the Starduster newsletters being the newsletter for any one building a biplane of any make. It was not for several years that I got my hands on one of Don's Starduster Newsletters, written by Dave Baxter. I liked it and borrowed others with Bill Clouse writing the letter. Some of the pictures were not bad, but the copying in black and white lost a lot of the detail and the beauty of the planes' lines often was lost. The articles and stories helped keep it all together and this newsletter was something that I felt I would need to subscribe to when I got active in my building project. My project was kept on the rear burner for a long time and Don would always ask how it was coming along. Of course I would say, "nothing done." Or maybe, "next year." I had to get the engine overhauled this winter and it set me back \$11,000. Don would say we have to get you going so we can fly a dawn patrol next spring. I did not get going on my plane but I did get over to Don's house and helped stitch wing covers, tape and glue other things that an unskilled such as myself could help with. Soon, well OK, not so soon, but eventually it was time to watch this butterfly-like creature, flex and dry its wings as it

taxied up and down the runway, first into the wind then with it until it looked as though it was flying and just touching now and then. Then I heard from Don, and he said it flew and we have pictures!! It was so graceful and beautiful. I could not wait until Don got the time flown off so that I could go for a ride. Don fine tuned the plane for weeks. He left it at a small airport 25 miles north of us for a week or so because he was worried about a vibration and the shop at that location had a dynamic balancer and a pilot-mechanic that had built and flown a Starduster Too. This pilot-mechanic gave it a clean bill of health and put about eight hours on it checking it out and checking the aerobatic stability. Don flew the plane for some time, then decided to change the landing gear from the Cessna type to the bungee type. I had some time so I offered to help Don with the gear change. I really liked the look of the new gear on the Starduster Too. I like the old classic style pants and fared landing gear. It fits the Starduster lines and curvaceous wings perfectly. The only thing that could improve this classic look would be a round engine out front with an old Hamilton constant speed prop hanging out there. But I do like the performance and reliability of the flat engine, and the clean thin front lines that it allows are attractive as well. I just have to get a sound system that can play shaky jake over a loud speaker when I do fly-byes. Anyway, I digress, sorry.

I had probably mentioned to Don on some occasions that I would love to have a Starduster some day. Well, some day came along when I was at work and a phone call came in for me. Don was a couple of months away from retirement when he called me, I think in August or September and said, "Are you serious about wanting the Starduster?" It caught me off guard. I did not have the slightest idea he was going to sell this child of labor. He had worked on the plane for nine-plus years; it had lived in his basement and garage for the longest time until it could get out on its own at a nice little hangar at the airport. I must have stammered a bit. He asked me again

I said, "Sure Don, I would love to buy the Starduster, but I didn't bring my checkbook with me." I told him that I would have to talk to my wife and banker as well as some one at my lending

institution.

He said, "Just let me know if you're serious about the Starduster." I said that I would call him as soon as I could. I called my wife and she said, "Sure, that sounds like a fun thing. How much money will it cost?" I said, "I don't know, I would guess about fifteen thousand dollars or so." She said, "Oh yaaa, have you got the checkbook?"

I said, "No, but I called the credit union and they said 'no problem' as long as I could talk him down to three hundred dollars or less." I had not talked to the credit union yet, but after getting a concerned nod from the wife and a discussion of what I might sell in order to position myself for a purchase of this magnitude, I called the credit union and talked to the loan manager. I found that a deal could be done if I followed a strict payment

schedule to clear some other loans that were pending. The only problem with this was it would be about three months before this could happen. So I called Don back and told him that I would not be able to get the money for the plane. He said that he had a person contact

him at the airport that wanted the plane. He had taken the person out for a flight and the man loved the plane and wanted it on the spot and he had a handful of large bills." Don said that he told the man that he had a friend that had expressed an interest in the plane before and he had to talk to him before he would sell the plane. The friend was me. He was asking me again. I had not asked the price before and now thought I had better before this went any further

Don just said, "It will be fair." I said, "But I have to give a figure to the loan officer." He said, "It will be affordable."

I thought to myself, "Don, you probably don't know how deep I'm in." I asked how much money the other guy was offering and he said, "twenty-five thousand dollars." you really want to sell the plane you should sell it to him as you can use the money when you retire, and I couldn't come up with that kind of money in a reasonable amount of time." Don followed with, "it won't cost you that much, I'll sell it to you for what it cost me to build." I asked him how much that would be and he said that he did not know but it would be close to nineteen thousand, but he would get the figure to me. I got back to the credit manager and was advised that it would be three to four months before I could clear enough debt to get the loan. Don told me that he would hold the plane for six months if I needed him to. I decided to pay up the hangar rent

bill from the time we had made the deal until Don was payed in full. This seemed a small gesture in light of what Don had done to help me get into the Starduster. Don had planned to retire to Oregon and I told him that I would bring the Starduster over to have him help



with the annual every year and that I would leave the plane with him for a couple of weeks so he could fly it.

He later decided to stay put and I thought this to be a better idea, so he could fly it more often. Well, I have not succeeded in getting him in the plane for a ride let alone getting him to fly it. He said that he does not like the cold and enjoys flying in his 172 strait tail where he can hear and get heat to his bones. He has supervised the annuals and has done a major portion of the rebuild that is required after a gear failure on an emergency strip in Montana.

I flew the Starduster for two years and in the spring of the third season had made three cross country trips with only a couple of sweat producing moments. My wife and I were going to breakfast with a group of EAA Chapter 407 pilots, friends and family. On landing the plane (we were the last plane to arrive) the plane started to shake violently, I thought I might have blown a tire. The plane wanted to move to the right side of the runway, our landing speed was about sixty miles an hour on the strip at an elevation of fifty seven hundred feet and about eighty degrees F. As the plane started to slow to about fifty MPH I was holding full left rudder and the plane was slowly moving to the left side of the runway and instinctively I let off of the left rudder to apply some right rudder, but did not get on the right rudder because as soon as I let off of the rudder the plane swerved to the right and lifted up on to the left wing tip and the left landing gear folded under and came up through the floor in the front passenger compartment. My wife has short legs and the gear did not compromise her foot room. We skidded off the runway at the expense of the lower left wing tip, and came to rest in the sage brush facing down wind—the engine still running with just the leading edge corners of the prop curled slightly. It was found that the loss of control was due to a cold weld on the rear landing gear strut-to-longeron failing and allowing the left gear to change tracking and swerve back and forth until it skidded sideways and the front fitting failed and tucked under. I felt good about keeping the plane right side up and no one was injured. I was sick about having to tell Don what had happened to his plane.

Don was back east flying the EAA's B-17 Aluminum Overcast and was due back any time. My weekend was filled with turmoil and frustration as I wondered what I would or could say to him. Don is like a dad that seems to know every thing that happens while he is away. You know, when your dad came home from a weekend away and asked where you went with his car, and you took so much care in re-parking it back in its original place. How does he know? Ya, I was at the airport early Monday morning. I saw Don and thought he had just got back in town. He drove up to the FBO and I walked out to meet him and his first words were, "Well, what happened?" I told him the story and he nodded with his chin in his hand. I felt so bad I did not know what else I could say.

He must have heard the story from someone the night before and he had indicated that he had stopped in and seen the plane the night before. He was trying to blame himself for the failure and I explained to him that I looked at it as a non-preventable incident. The short of it is that we both accept responsibility and are working to get N123DK back on the flight line .

I know that you will think I am kidding when I tell you that this story has been generalized and some details have been omitted to keep it short, but it's the truth. And as I said at the start you can trim it as you see fit. General aircraft, description N123DK—construction started 1982, completed 1990. First Flight—May 16. Engine—180 horse Lycoming. Prop—Sensenich. Empty weight—1143 lbs. Gross weight—1800 lbs. (See Photo, p. 20)



SA100 C-GBYC Leonard Sebuly, Sheho, Saskatchewan, Canada

SA300 N88HH Buck Rado, Navarre, Illinois





SA300 N123DK Nolan Getsinger, Idaho Falls, Idaho

SA300 N54GM Galen Michael, Edwardsburg, Michigan





SA300 N529FM Fred K. Meyers, with Bill Clouse & Kenny Ware

SA100 Wayne Ensey, Albany, Oregon



A Home Away From Home

At the Oshkosh/Wautoma AirVenture, here's where the Stardusters congregate. Note the wide grass strip just beyond the hangars/ramp, and a hard-surfaced runway in the background of the Wautoma Municipal Airport.

(There are a lot of Stardusters here, but they're almost all in the air!)



Tech Tips

Wing Ribs—Copy of a Copy of a Copy

by Les Homan

In the last three months several rib related findings have occurred. We have full size rib templates used for routing out ribs on the SA750 and the SA300. One of the SA750 wing builders was checking his routed rib kit and called to ask why the parts did not fit the plans. We went through a check of the templates as compared to the drawings as compared to the original tracings. Findings show three of the drawings did not match the original tracings and several of the templates did not match drawings or tracings. The drawings in question have been updated and templates have been rebuilt or modified to match.

The Starduster Too Rib templates did not match the drawings. Original tracings were found and compared to drawings and templates. Templates match the tracings but drawings do not match the tracings. We had to redo the auto cad drawings involved with the ribs and have a match there. We will be putting dimensions and

references on drawings so you can measure to assure drawings are accurate. Another finding is that there are several airplanes out there which have been built from plans copied from plans.

There are several types of reproduced drawings. Several types that involve rollers make excellent copies; that is, if you do not check scales. In the past two months we have found that drawings copied by various methods and at different times on the same machine can result in elongations and/or height changes. Ribs may be the right length and may be 1/2" thicker, the right height and 2" longer or combinations thereof. This is not a new problem; there are many aircraft flying with various rib changes. In other words if we all disassembled our airplanes and put the ribs in a stack they would not necessarily match. We have the new auto cad drawings available and are shipping them out for the Starduster Too.

Stardusters Continue to Grace the Pages of *Sport Aviation*

Richard Miles' beautiful Starduster Too was awarded the best plans built custom at the Mid-Eastern Regional Fly-in (MERFI) held in Marion, Ohio, Sept. 12-13, 1998. It is shown on page 72 of the Jan. 1999 issue of *Sport Aviation*. *Sport Aviation*, however, is just a year behind the times. Richard's Too, along with a striking quarter-scale model, was featured on the cover the *Starduster Magazine* in Jan. 1998.

In the section on "What Our Members Are Building/Restoring" on page 126 of the Jan. 1999 issue is a picture of the Starduster Too restored by Jeff Chambliss, Livermore, CA. He brought it to Livermore on a truck after a ground loop in Arizona. He changed out the 180 hp engine for a 300

hp IO-540 with a three-bladed Hartzell prop, and reports that "it goes like crazy."

No, you're not seeing double. The Starduster Too shown on page 123 of the Feb. 1999 issue of *Sport Aviation*, is **not** a repetition of the Richard Miles' N7301R, reported on above. You can't tell the difference by looking—except for a slightly different shape to the broad red stripe over the center section of the upper wing—and a different tail number, N6191A. This beautiful 'Duster was started in 1970, and acquired in 1992 by Gid Sway, Ron Boomhower, Wayne Rumble and Kenneth F. Williams, Jr., and has been flying since July 1997. Congratulations to these four guys on another showpiece Starduster.

Why "Starduster" Wings Are Better

By Jim Osborne

From *The Starduster Magazine*, January, 1978

The word that comes first to mind when describing wings from Starduster is the beauty. The elliptical shape makes them stand out from any other wings produced today. Some owners have been known to wax lyrical when describing them, and have gone so far as to call them "sensuous."

However, many builders stop short at appreciating their beautiful lines, and do not realize that these wings are also more efficient aerodynamically. In fact, I have heard it argued that, for small airplanes, rectangular wings are more efficient.

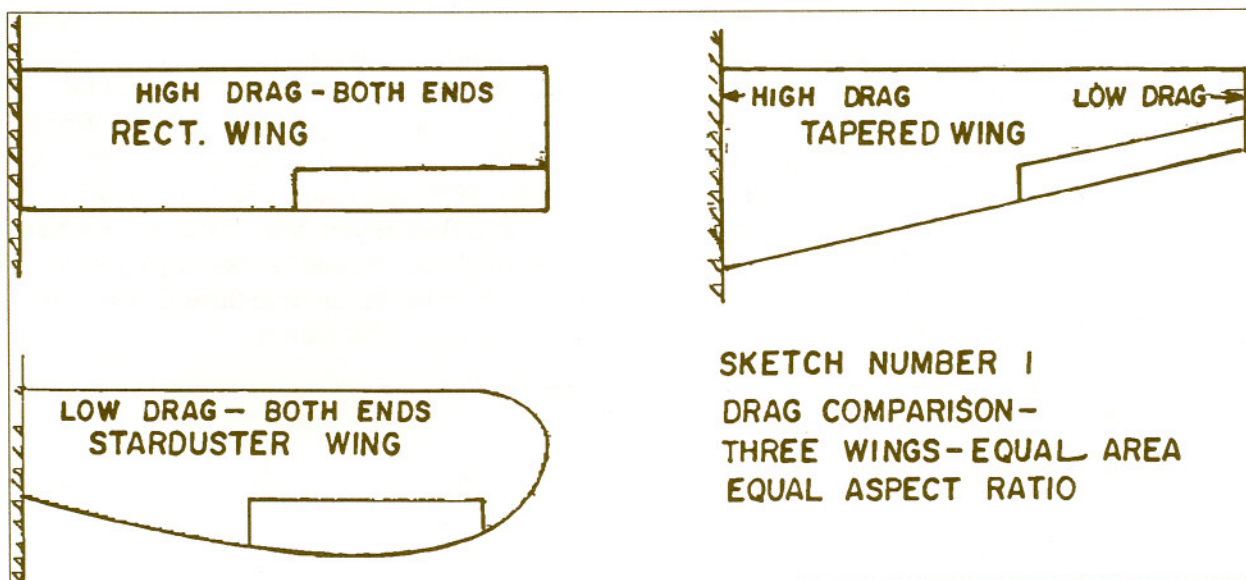
The facts are as follows:

1. There are two areas of high drag on any airplane wing. These are the wing tip and the wing-to-fuselage (or wing-to-cabane) junction. The wing tip normally has higher drag than does the wing/fuselage junction.
2. A tapered wing cuts down on tip drag, while increasing wing/fuselage drag. Since tip drag is normally greater than wing/fuselage drag, the result is a net decrease in drag.
3. A Starduster type elliptical wing has both a small tip and a small wing/fuselage junction. Drag is therefore near a practical minimum (See sketch 1.)

4. Lateral center of pressure moves outboard. This means that more of the lift enters directly into the flying wires (top wing), and I strut (bottom wing). There is, therefore, less bending load on the spar (See sketch 2).

5. Due to the wings being widest where the ailerons are, it is possible to have larger ailerons with this type wing than with the rectangular type. If the ailerons are aerodynamically balanced, the result is very fast roll rate and light aileron control pressures (See sketch 3).

6. Due to the wings being widest where the ailerons are, the Reynolds¹ number is also highest where the ailerons are. This widest part of the wing will normally be the last part of the wing to stall. Result: good aileron control through a stall. There is no need to incorporate twist or slots in order to get good stall characteristics, as is required for so many tapered wings. In addition to the structural advantage inherent in the outboard lateral center of pressure, (see Para. 4) the Starduster wing design has other unique structural advantages.
¹ (Editor's note: The Reynolds number is defined as the ratio of flow rate of the air over the wing to the viscosity of air.)



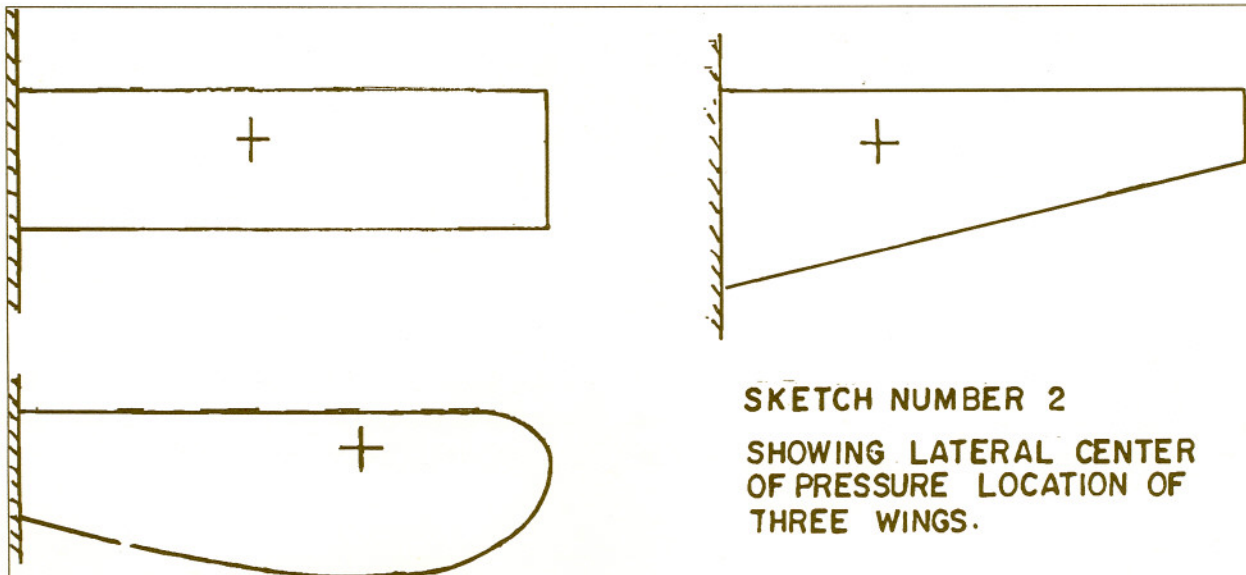
7. Our top wings are made in either two or three pieces. Where the wing sections join, we have only one bolt, which acts as a pin bolt. Most other biplanes have the top wing in one piece. This means that under high "g" loads, the wires stretch, and the top wing spars bend around the Cabane struts. In our wings, with pin bolts, bending is impossible. With no bending loads transmitted across the attaching bolts, Starduster owners enjoy an extra measure of strength and security.

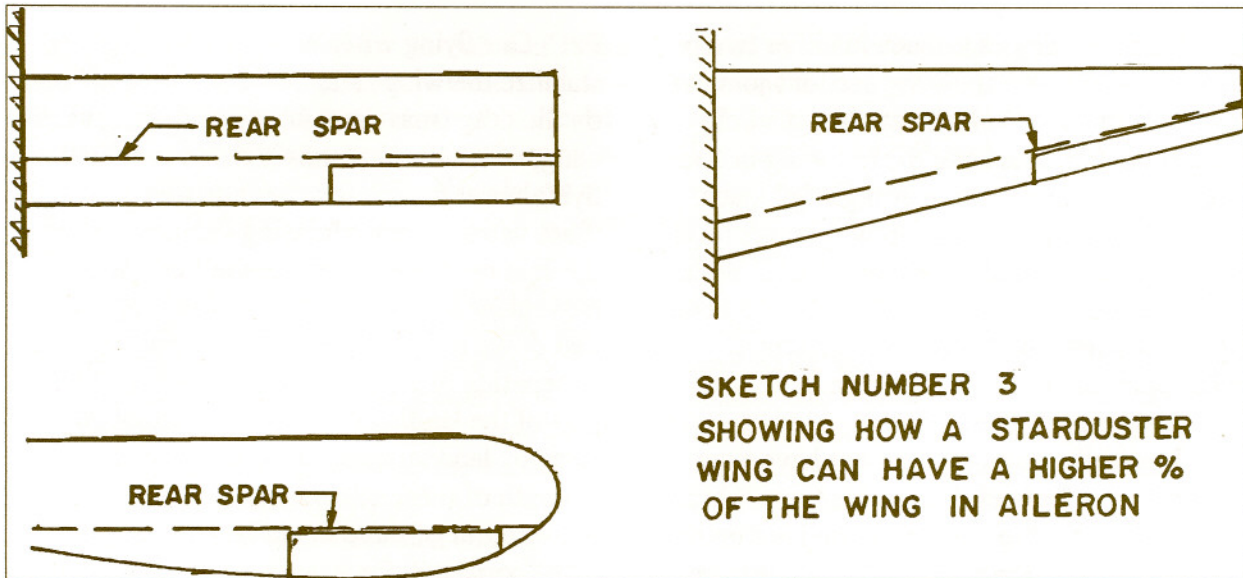
8. Internally, our wings do not have drag and anti-drag crossed wires. This type of bracing puts a rather high compression load on the spars, right from the start. Add this compression load to the compression load the flying wires put on the spars in a high "g" pull-out, and the total is very high. Also, the crossed wires generally have cut threads. These pose an extra hazard in that they are more likely to develop a crack and break than the type bracing we use. In addition, the tension of the wires varies with temperature. What might be an acceptable tension in winter might be loose enough to induce wing flutter in hot weather. Our wings have either steel or aluminum tube diagonal-type bracing. This type bracing has no cut threads to pose a potential problem. There are no unnecessary compression loads placed on the spars. And the stiffness of the wings is not compromised with temperature changes.

9. Our flying wires are installed so as to stabilize the wings and avoid putting any loads on the drag truss assembly. The front spar, top wing, of all our airplanes is tied down by two flying wires, which form an inverted V. As these wires stretch, the wing can only move up. It is restrained from forward or backward movement by the inverted V. The rear spar is tied down by one wire. All our flying wires go to separate fittings. These fittings are NOT part of the landing gear, and so cannot be injured by landing gear shock loads. The strength of these wires and fittings is such that any two out of three could fail, and the airplane could still fly.

10. Our landing wires are doubled for safety. Each wire has its own fitting. One wire could fail, and the other would still get you home. On the Starduster Too, one landing wire slants forward and attaches to the front spar, center section. The other attaches to the aft spar, center section. Drag loads are counteracted by the forward leaning wire. On the Acroduster, both landing wires go to the rear spar, center section. Under high negative "g" loads it was felt that the forward leaning wire might put too much of a forward load on the bottom wing. Further study has indicated that it is pretty much of a trade-off.

11. Due to the two or three piece top wings of our airplanes, handling, building, storage,





assembly and rigging are all simplified. Any of you who have struggled with all these factors in a one-piece top wing understand the advantages.

Many observers have commented on the supposed hardship of having each rib different, and the supposed difficulties of building such a wing. They might have a case if each customer

built all pieces of his wing from scratch. But almost all our builders buy a wing kit and go from there. And a wing kit has all the ribs cut out, and the trailing edge is furnished ready made. With this work done, putting together one of our wings is no harder than building an ordinary wing.

So, why not build the best?

Safety

Oldies But Goodies, from the Starduster Magazine, July 1983

Competency

Bill Clouse, President

The definition of competence is the state of being competent, adequate, answering all the requirements, suitable—we could go on.

As pilots it is the intent of instructors and the FAA that we demonstrate a level of competency before our first solo, more so as we attain additional ratings. CFI's are usually more "proficient" than the average pilot because of continued exposure and number of hours. Proficiency and competency should go hand in glove, but in many cases they do not.

Question—Would you trust a local CFI to test your new Starduster or Acroduster? The logical answer is No, unless he has time in your type of airplane. Your airplane (Starduster/Acroduster) is considered by many to be a conventional aircraft with two wings. They couldn't be more wrong.

Your airplane is as individual as you are.

The same principal applies to being taught aerobatics in your aircraft. For a pilot to teach aerobatics he/she must be very intimate with the machine and the background of the student.

A personal experience of mine, while demonstrating an Acroduster Too to a foreign CAP 10 pilot with aerobatic experience—First maneuver - Loop - result; inside snap half way up. Second maneuver - Hammerhead - result; inverted spin.

Recovery was fast in both cases. The cause? Over-control because the Acroduster loads are very light—CAP 10, heavy.

What I am saying is a competent instructor would not agree to teach you without knowing your airplane.

Check Out! Who Me?

Hank Schmel, Stolp Starduster Corp.

Now, I have tail dragger time . . . I can handle it . . . Why, I have over 900 hours in a 150 . . . Hell, I'm a jet jockey on a L1011, I can handle this small thing. I have 20 hours Acro in a Citabria. They go on and on, for what reason I know not.

A biplane is not a jet, it is not a Citabria, it cares not about the hours in a log book. Really, what is so bad about a check ride anyway? The point of this whole story is, know the plane you are about to fly, know the numbers, know the peculiarities of it's performance. I know a few pilots who injured their bodies, pride and an airplane, and then there were a few who didn't make it, just because ego was master.

There is no greater joy in flying than to be asked by an "ol' timer" for a check ride in his new Starduster, Acroduster, Pitts, and so on. This man

has sense—that's why he is still around. We all know the saying, "There are old pilots and there are bold pilots, but there are no old, bold pilots." How well this statement serves this lesson on check outs.

If you just bought or are planning to get a new or another plane, find out how the thing handles if you don't already know. Talk to several people who flew the model you have or want. I've been flying since 1945 and by golly, I'm still picking up information on craft that I fly and I'll continue to seek information, as we all should about planes we fly.

Don't, please don't, refuse a check out ride. If you think you can fly better than your check pilot, go anyway—you may find you weren't as smart as you thought you were. Fly safe!

AOPA Air Safety Foundation's 1998 Nall Report details general aviation safety trends

Mar 2— Recently released National Transportation Safety Board statistics show that 1998 was the safest year yet for General Aviation. But those preliminary 1998 numbers paint only a broad picture. The AOPA Air Safety Foundation's 1998 *Nall Report*, a comprehensive examination of all accidents in 1997 involving fixed-wing GA aircraft under 12,500 pounds, documents areas of persistent safety problems. More than 85% of 1997 accident data was final by the time of publication.

"As in previous years, the leading causes of 1997 fatalities were continued VFR flight into instrument conditions and low-level maneuvering flight," said Bruce Landsberg, ASF executive director. "These 'accidents' should more properly be called 'judgment failures.'"

VFR into IMC remains a major safety problem

In 1997, 74% of all accidents and 71% of *fatal* accidents resulted from pilot-related causes. Weather-related accidents comprised 19.5% of all fatal pilot-related accidents. According to the *Nall Report*, weather accidents were more likely to be fatal than accidents attributable to any other cause. VFR flight into instrument meteorological conditions (IMC) continued to be one of the most frequent causes of fatal accidents. More than 82% of fatal weather-related accidents involved VFR into IMC. "Unfortunately, these are predictable accidents," said Landsberg. "Take a VFR pilot, add in IMC conditions, and you have a lethal combination."

Maneuvering flight

The *Nall Report* also quantified that maneuvering flight in single-engine airplanes continues as one of the largest risk areas for fatal accidents. More than one-quarter of all fatal accidents in-

volved maneuvering flight, and almost half of *fatal* maneuvering accidents occurred "during low, slow, flight." Some of these accidents happened during legitimate activities such as aerial application and banner towing, but 63.5% occurred during personal flights. "Many of these accidents involved 'buzzing' or low-level aerobatics," said Landsberg. "No increase in proficiency can prevent those accidents. Only a change in *attitude* can."

Pilot incapacitation

Seven GA accidents in 1997—0.4%—involved pilot incapacitation. Three accidents resulted from heart attack or stroke. Two were from carbon monoxide poisoning (See *Starduster Magazine*, Jan. 1999, p. 29). Seventeen accidents were attributable to drug or alcohol abuse in 1997—1.0% of all fixed-wing General Aviation accidents.

Mechanical Causes and Fuel Management

Mechanical and maintenance issues accounted for 14.1% of all accidents. Fuel mis-management accounted for 10.3% of accidents; more than three accidents per week occurred because the pilot ran out of fuel (fuel exhaustion) or failed to get fuel from the tank to the engine (fuel starvation).

Business flying, flight instruction have better safety records.

Business flying continued to enjoy a much better safety record than personal flying. Flights for business by people not paid as pilots accounted for 14.5% of all GA activity but only 3.8% of accidents. Personal flights comprised 41.8% of all GA flights but a sobering 63.9% of accidents.

Flight instruction remained very safe, constituting 20.4% of flight hours but only 14.1% of accidents and only 5.7% of fatal accidents.

Understanding The Stall

By Howard Fried

Stall entry and recovery is one of the most discussed—and cursed—portions of a flight training syllabus. Yet, AVweb's Howard Fried believes that stalls remain one of the most misunderstood aspects of safe and knowledgeable flying. His dissection of stalls, spin entry and maneuvering speed in this Eye of Experience is a must-read for students, instructors and grizzled veterans alike.

Recognition

Flight schools and flight instructors are doing it all wrong. We are teaching our students how to make a stall and recover from it when what we should be teaching is stall recognition. Ask 100 pilots what makes an airplane stall and at least 70 of them will tell you it got too slow. The majority of the remainder will tell you that the nose was pitched up too high. And a very few will say the airflow over the wing separated, so the wing quit flying and an aerodynamic stall resulted. Possibly one, or even two, will give you the correct answer. An airplane stalls for one reason and one reason only. **It has exceeded its critical angle of attack (AOA), period.** That's all she wrote. Exceed that angle and the airplane will stall. Don't exceed it and it can't stall. Very few pilots, and this includes air carrier airplane drivers as well as general aviation people, really understand AOA, what it really is, and how it is affected by airplane configuration. Reduced to its simplest terms, the AOA is the angular difference between where the airplane is pointing and where it is going. An angle, any angle, is formed by the intersection of two lines and the two lines that form the AOA are the mean aerodynamic chord (MAC) of the wing and the relative wind. Normally, wind is thought of as air in motion, but in this case, it is the motion of the airplane through the air that creates what we call "relative wind." The AOA at which any given airplane will stall is a built-in, fixed number (usually around 16 to 18 degrees) and when that number is exceeded, the airflow over the wing separates and the stall occurs. This concept of gearing our thinking to AOA seems to be particularly difficult to get across to students, perhaps because we can't see the two lines that form the angle of attack.

Speed

Where pilots, particularly student pilots, are being misled is in the fact that airplane manuals publish "stall speeds." Somehow the pilot gets it in his or her head that as long as the airplane is above that speed, then it won't stall. Of course, nothing could be further from the truth. The airplane can and will stall when going faster than the published stalling speed, a great deal faster. This is why "accelerated maneuver" stalls are demonstrated and practiced during training. Even so, what many pilots fail to realize, occasionally with rather severe consequences, is that the published stalling speed is valid only under a very narrowly-prescribed set of circumstances, including configuration, weight, airplane attitude and others. The only effect that speed has on the stall is in the fact that at a reduced speed a high angle of attack results. I do wish, therefore, that those involved in aviation education would quit teaching stalls as being related to speed. This approach seems to firmly plant in the student's head the idea that if he/she just keeps the airplane going above the published stalling speed, it simply will not stall, when, of course, it can and will. I believe that more emphasis should be placed on the so-called "accelerated maneuver" stall, although this has more to do with weight than speed.

Corporate jets and air carrier airplanes have angle of attack indicators, but we in general aviation have to struggle along without them. Although the trigger for the stall warning device is really a sort of angle of attack indicator, we still relate the stall to the factor of speed. I do wish the general aviation fleet was equipped with AOA indicators. They're cheap, simple, and they give us really useful information. If our airplanes were so equipped, it would be a lot easier to teach our students to think of AOA rather than speed as being related to stalls.

Power

Even less understood by many pilots is the effect of power on AOA. If an airplane's pitch attitude does not change, an increase in power will always result in a reduction in the angle of attack. Think about this for a moment. The best way to visualize AOA is to think in terms of the relative wind striking the bottom of the wing rather than crawling over the top of the wing. Visualize yourself on final approach maintaining a level attitude with reduced power and the airplane is descending. The relative wind is striking the bottom of the wing at a fairly high angle. Now, without changing the pitch attitude of the airplane, add power. What happens? You are now driving the airplane straight ahead, no longer descending, the relative wind has aligned itself with the direction of flight and you have zeroed out the angle of attack. *"It is a lot easier and more practical to think of the relative wind striking the bottom of the wing rather than crawling over the top of the wing."*

Now try this: In level flight, at a nice, safe altitude, reduce the power. The airplane will tend to pitch down, but don't let it do this. With the application of up elevator, maintain level flight. The airplane will slow down and will ultimately stall (the angle of attack has gone beyond the critical point). When the stall occurs, the airplane will want to pitch down. Do not permit it to do this. Hold the same attitude with elevator pressure. Add power. The airplane will want to pitch up. Again do not permit it to do this. Hold the same attitude with elevator pressure. What do you think will happen? The airplane will recover from the stall without ever lowering the nose! Don't get me wrong. I'm not advocating this as the way to recover from an inadvertent stall, but merely using it as a means of demonstrating the effect of power on angle of attack. To recover from a stall you still want to lower the nose, keep the wings level, and add all available power.

Names

To paraphrase Gertrude Stein, a stall is a stall, is a stall. Anytime the critical AOA is exceeded the airplane will stall; don't exceed that critical AOA and it can't stall. However, over the years, we have put a bunch of fancy names on the stall series for training purposes, all of which are really meaning-

less if we can get our students to think in terms of angle of attack. It is a lot easier and more practical to think of the relative wind striking the bottom of the wing rather than crawling over the top of the wing. When I was trained, we had what we called the approach to a stall, now known as the imminent stall. We had the stall out of a climbing turn, which we call today the takeoff-and-departure stall, and the stall out of a gliding turn which today is called the approach-to-landing stall. Back then, the accelerated maneuver stall was called a loaded-up stall or a high-speed stall. The bottom line is still, anytime the critical angle of attack is exceeded, the airplane will stall.

Rarely taught anymore, but extremely useful, is the "delayed recovery" stall. It is accomplished like this: At a good, safe altitude and after carefully clearing the area to determine that there is no traffic around, the power is reduced and the pitch increased until the airplane stalls. The stick (or yoke) is held fully back against the stop. When the stall break occurs, **the wings must be kept level**, and the nose pointed straight with the rudder. The airplane will pitch down, recover itself, pitch down and recover itself all the way to the ground (if permitted). This exercise is a great confidence builder.

Maneuvering Speed

It is not marked on the airspeed indicator (although it may be placarded on the panel) but one of the most important speeds for the pilot to know and be aware of at all times is maneuvering speed (V_a). The definition of maneuvering speed is the fastest speed at which an abrupt full control deflection will not engender structural damage. By "abrupt control deflection" is meant all the controls, but it is the elevator on which the emphasis is placed. Visualize this situation: You are charging through the air above V_a and you suddenly reach out and give the stick (or yoke) a hard yank, right to the stop. What happens? The airplane will attempt to stand on its tail and go straight up. But the forward momentum, opposing the attempt to go vertical, will exert so much force that the wings will bend or break. And we all know that airplanes don't fly very well when the wings fall off!

Now let's cruise along at or below maneuvering speed. Again, brutally haul back on the yoke

(or stick) right to the stop. What happens this time? The airplane will zoom up until it runs out of poop and then stall. In other words, maneuvering speed (or below) is the speed at which an airplane will stall before it bends or breaks. What would you rather do, recover from a stall, or try to fly an airplane from which the wings have just departed? Simple question, simple answer.

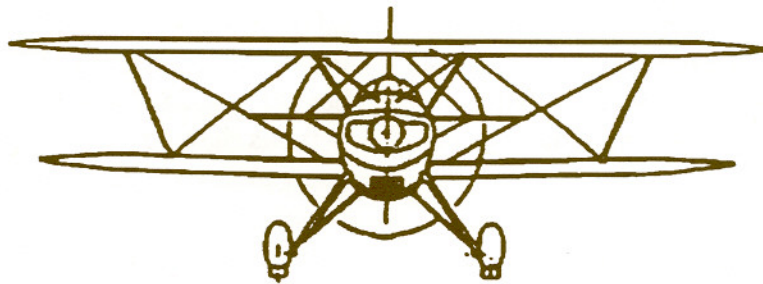
I knew an old instructor who taught maneuvering speed by comparing it to an automobile driving down a road and encountering a rough railroad track crossing the road. If the driver fails to slow down, he/she might very well damage the car as it bounces over the tracks. But if the car is slowed to a moderate speed before crossing the rough tracks, it will ride right over them taking the bumps in stride. This is why we instantly go to maneuvering speed when we encounter rough air. In heavy chop with vertical gusts, the air can be striking the underside of the wing with considerable force. If this happens while the airplane is progressing at a very high speed (above maneuvering speed), this force could bend or break the wings. However, if such an updraft is encountered at or below V_a , the airplane will have exceeded its critical AOA and stall instead of bending or breaking. In this case, the stall is so brief, so transitory, that recovery technique is not required. If you have ever been flying along in light to moderate turbulence in an airplane with an aural stall warning device, you have heard it occasionally going beep, beep, beep. What it is telling you is that the relative wind has momen-

tarily struck the bottom of the wing at an angle above the critical AOA. Did you apply recovery technique? No. It wasn't necessary because the airplane flew right out before a stall could fully develop.

Spins

For an airplane to spin, two elements must be present: a) it must be stalled and, b) a yaw moment must be introduced. It follows, therefore, that if an airplane is not permitted to stall, it can't spin. And if we recognize an incipient stall before it happens, we can prevent it from happening, and we have a whole bunch of cues to make us aware of this situation. This brings us back to the angle of attack. If we are constantly aware of the difference between where we're going and where we're pointing, we have a pretty fair grasp of the angle at which the wing is meeting the relative wind.

As far as the second element in the formation of the spin is concerned, the yaw is almost invariably the result of misusing the rudder. On a tight turn from base to final, we have increased the load factor on the wing drastically, thus increasing the speed at which the critical angle of attack will be reached. (There we go again, thinking about speed.) Simultaneously, we are holding a lot of back pressure on the elevator control, and if we have not properly coordinated rudder with the bank, we are inviting a disastrous spin, because we are low and close to the ground, with little or no space for recovery. And this is a situation we must seek to avoid at all costs.



News From The Net (AVflash@a1.ipcc.com)

Jan. 11, 1999

... The Plot Thickens

Inspection of the 34 other 1998 Skyhawks in the ERAU fleet revealed that ALL had piston pin plug wear that ERAU mechanics considered abnormal. ERAU decided to replace all 272 of the plugs with an older-style part, and Lycoming agreed to furnish the replacement plugs under warranty. Curiously, none of ERAU's fifteen 1997 Skyhawks showed abnormal wear, nor did any of the eight 1998 Skyhawk SPs at ERAU's Prescott, Ariz., campus. The problem appeared to be confined to ERAU's 1998 Skyhawks, and those 38 aircraft all had serial numbers within a 70-number range.

Jan. 11, 1999

... Lycoming Has a Different View

Lycoming engineering guru Rick Moffett told AVweb that Lycoming has been aware for some time of an increasing incidence of abnormal piston pin plug wear across many different engine models, ranging from mild-mannered O-320s to fire-breathing TIO-541s. The accelerated wear appears to have started at least as early as 1996 and possibly even 1994, according to Lycoming data. Lycoming has a test program to reproduce this problem, isolate its cause, and come up with a fix, Moffett told us, but so far, there are lots of theories but no real answers. Following the ERAU situation in November, Lycoming issued Service Instruction 1492A urging operators to perform regular oil filter inspections and spectrographic oil analysis, and to contact Lycoming if either shows abnormally high aluminum or iron content.

Jan. 11, 1999

... Something Old, Something New

Piston pin plug wear has been a problem with Lycoming engines for decades, but what used

to be an infrequent problem now seems to be occurring more frequently. But nobody's sure how much more frequently, when the escalation began, or what's causing it. So far, Lycoming denies having any evidence to suggest that the piston pin plug wear problem has gotten much worse in 1998. But, we find the ERAU findings too significant to ignore. Considering only the four trashed or contaminated engines that Lycoming replaced under warranty, that's still more than TEN PERCENT of ERAU's 1998 Cessna 172R fleet! So, why isn't Lycoming, Cessna or the FAA looking at all of the non-ERAU Cessna 172Rs within the 172806xx serial number block into which all 38 affected ERAU Skyhawks fell? What about all of the other engines that came off Lycoming's assembly line about the same time? Lycoming's answer is that the filter inspections and oil analysis per S.I. 1492A will catch any problems before they become serious. But, the entire ERAU fleet was on a program of oil filter inspections and oil analysis, yet one of those engines came apart in flight. That's not particularly reassuring.

Jan. 11, 1999

... So What's an Owner to Do?

Until Lycoming comes up with an explanation and a fix, operators should be alert to signs of increased aluminum or iron during oil filter inspections and oil analysis, and those who have not been cutting open filters or sending oil to the lab should start doing so. Certainly, if we owned a Cessna 172R with a serial number in the 172806xx range, we'd be mighty nervous right now. The same probably should apply to anyone who took delivery of a new, reman, or factory-overhauled Lycoming engine or who installed new Lycoming cylinder kits since about spring of 1998. While AV web is not suggesting that operators preemptively yank all cylinders the way ERAU did,

prudence certainly suggests keeping a watchful eye on oil analysis and oil filter inspections—and perhaps even doubling the frequency of such inspections. At the first sign of elevated aluminum or iron, a borescope inspection and a call to Textron Lycoming Product Support at 1-570-323-6181 would certainly be in order.

Jan. 11, 1999

... Marking Your Calendar Through 2008:

Never let it be said that the EAA doesn't plan ahead. Here are the EAA AirVenture "Oshkosh" dates through the year 2008: July 28 - August 3, 1999; July 26 - August 1, 2000; July 25 - July 31, 2001; July 24 - July 30, 2002; July 23 - July 29, 2003; July 28 - August 3, 2004; July 27 - August 2, 2005; July 26 - August 1, 2006; July 25 - July 31, 2007; and July 23 - July 29, 2008. Whew!

Jan. 18, 1999

... Challenges to GA: AOPA Fights Closing of Hawthorne, Calif. Airport

Which do we need more, shopping malls or airports? Like AVweb, AOPA thinks we have enough malls and is asking Hawthorne's city fathers to rethink a plan to close their airport and build a retail mall on the site. Hawthorne (HHR) is the closest reliever airport to LAX and allows general aviation access to the area's industries and businesses without forcing the use of the busy airline hub. So far, letters to the city council by AOPA and other organizations may have postponed the decision. AOPA has also asked the FAA to express its concern about any effort by the city of Hawthorne to close this important SoCal reliever airport.

Jan. 18, 1999

... AOPA Protests NOAA's WAC-ky Idea
Here we go again. In 1992, the National Oceanic and Atmospheric Administration (NOAA) proposed eliminating the World Aeronautical

Chart for budget reasons. Now, according to the AOPA, this idea has raised its ugly head again, as the charting agency says it is facing a \$5.2 million shortfall. To make up for what the AOPA calls "bureaucratic inattention," the NOAA plans to discontinue WACs and to increase the prices of its other chart products by six percent. The proposal attempts to address the latest in a continuing series of budget problems at the NOAA.

Jan. 18, 1999

... Arkansas Airports Attract Attention
AVweb readers may recall the opening of the new \$109 million Northwest Arkansas Regional airport last November. No real surprise here, but it looks like the President's home state is having no problems getting AIP funds. U.S. Secretary of Transportation Rodney E. Slater traveled to his home state last week to announce to its legislature the awarding of \$1.5 million in grants for improvements at six airports in the state.

Feb. 1, 1999

... Study Recommends GPS for Primary Aircraft Navigation

A long-anticipated report by the Johns Hopkins University Applied Physics Laboratory summarizing a six-month "risk assessment" of GPS as the sole means of navigation was released last week. The lengthy report concludes that GPS can be "the only navigation system installed in the aircraft and the only navigation service provided by the FAA," but that augmentation is needed to achieve this status. The FAA, AOPA, and the Air Transport Association (ATA) cosponsored the study. Both the AOPA and ATA called for rapid implementation of WAAS and two additional signals.

Feb. 1, 1999

... Lycoming Piston Pin Plug Update
The Cessna Pilots Association last week up

dated its members on the Lycoming piston plug mystery reported by AVweb three weeks ago. An eight-member FAA team returned from Lycoming's Williamsport, Pa., facility with more information but no fix. Reports of 55 piston pin plug failures have been uncovered. Failures have involved parts with as few as 20 hours time-in-service and as many as 700. Also, the failure rate on engines and cylinder assemblies manufactured since June 1997 is up. Lycoming has discontinued use of the piloted piston pin plug and returned to using an aluminum/bronze non-piloted plug.

Feb. 1, 1999

... San Diego Class B Airspace Changes Revealed

The FAA last week released its final rule modifying San Diego, Calif.'s Class B airspace. The new configuration is effective July 15, 1999, and includes lowering the top from 12,500 ft/msl to 10,000 ft/msl, expanding its eastern and western boundaries and aligning the southern boundary with a VORTAC

March 1, 1999

... Do They Take Mastercard, Visa or Am. Express? (Note: Alaska-bound Stardusters)
If you fly an aircraft weighing over 1,323 lbs. in Canada, pull out the plastic and get ready to start paying the piper, er, controller, beginning today. As of March 1, NavCanada, Canada's air navigation services provider, is implementing its system of user fees on operations using its facilities. The fees apply to all flights within Canadian airspace and are based on aircraft size, weight and use.

March 8, 1999

... Westward Ho, but Go Quietly
Beautiful Santa Fe, N.M., has developed a noise ordinance that AOPA claims isn't pretty. AOPA says both the ordinance and the way Santa Fe determined it is needed are unfair. The association says that the city simply asked

residents to guess whether an aircraft was above or below 1,000 feet AGL and whether the noise level was either "very loud" or "acceptable." Using those results, the city wants pilots to fly in corridors to and from the airport, avoid residential areas, refrain from using high RPM settings in the pattern, reduce power on takeoff as soon as safe and practical and limit touch-and-goes to the hours between 9 a.m. and 5 p.m.

March 8, 1999

... But, So What If We Don't?

The tower manager will be compelled to write up any pilot who fails to comply with the myriad of rules and those pilots could be fined \$100 for the first offense, \$200 for the second, and \$500 for each additional violation within five years. AOPA says Santa Fe can't do what it's seeking to do because it's a violation of federal law. A public hearing on the proposed ordinance is scheduled for March 31.

March 8, 1999

... '97 Was a Good Year for People and Planes

1997 is over and gone, but AOPA remembers it fondly. The organization's annual Nall Report found that '97 was the safest year yet for GA. The numbers were not altogether surprising, as pilots were found once again to be their own worst enemies. In fact, 74% of all accidents were the result of pilot-related errors, from continued VFR into IMC to fuel exhaustion.

March 8, 1999

... While Early Numbers Show '98 Safer as Well

Preliminary numbers announced by the NTSB show that 1998 may turn out to be even safer than 1997. The estimated total accident rate for GA was at a historic low, 7.12 per 100,000 flight hours, a 2.3% improvement from '97. Only personal flying accidents went up, by 9.8%.

CLASSIFIEDS

ADVERTISING CLOSING DATES: MARCH 1, JUNE 1, SEPTEMBER 1 AND DECEMBER 1.
CLASSIFIED ADVERTISING RATES \$5.00 PER COLUMN INCH, MINIMUM CHARGE \$5.00.
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Acroduster Too project. Prefer welded or tacked fuselage in the Southwest. Call Jim, 602.935-0963. 982

FOR SALE

Starduster TOO. Completed 1989. 455 TT, 355 SMOH on 200 HP Lyc. IO360A1A, 355 since new on Hartzell CS aerobatic prop. King KT-76A Transponder/Mode C & KLX-135A Comm/GPS/Intercom. Clevelands, Hooker harnesses, Scott tail wheel, ACK ELT. Always hangered. Full inverted fuel and oil. A&P built. Stitts fabric. Open cockpit. \$28,000 (Firm). 318-949-3707 or email 71612.3110@compuserve.com. 992

1972 Starduster Too, Continental E185-3 (205HP), 627 TT airframe, 332 TTSN engine. PS5C pressure carb. KX145 Comm, Mode C transponder, ELT, full canopy, aux. Fuel tank. \$25,000. Call 520-219-5930. 984

Acroduster I (SA700) 72 hrs TTAE Lyc. O-360, fixed pitch prop, smoke, fully inverted, Ellison carb, Christen oil system, symmetrical wing, four ailerons. White, blue trim, beautiful appearance, a delight to fly. Aricraft was completed at Flabob and test flown by Bill Clouse. Buyer must have 500 hours and 50 hours tail dragger time. (See photo, page 22) \$24,500. Lee Holcomb, 916.933-7743. 984

Starduster Too. Completed 1989. 435 TT, 320 SMOH on 200 HP Lyc. IO-360A1A, 320 SN on Hartzell CS aerobatic prop. King KT-76A Transponder/Mode C & KLX-135A Comm/GPS/-Intercom. Clevelands, Hooker harnesses, Scott tail wheel, ACK ELT. Always hangered. Full inverted fuel and oil. A&P built. Stitts fabric. Open cockpit. \$34,000. 602-580-8044 or email 71612.3110-@compuserve.com 984

Starduster Too SA300, 573 TTSN A/C, engine & prop. Lyc IO-360 (200 hp), Hartzell CS prop, Navcom, Xponder w/encoder, intercom, dual controls, always hangered. 409.774-4454. 983

Starduster Too, Low time AF, Lyc.O-360, Sensenich, Clevelands, Spring gear. \$32,000. Hezter. 503.399-0809. 983

1996 Starduster SA300. 90 TTAF, 90 TTE, IO-360-A1A, 220+ hp. C/S prop. New canopy, Terra pkg. w/encoder. Christen inverted system. Everything new. \$39,500 or trade for cross-country airplane. Joe. 304.245-8858. 983

1970 Stolp Starduster Too, disassembled for recovering. 500 TT. Set-up for O-470. Newer wings. Complete except engine. \$14,500, obo. 513.539-9362. 983

Starduster Too biplane project. On gear, close to completion. Majority of parts to finish. \$8,500. 208.452-3149. 983

Starduster Too, O-360-1AD. 450 SMOH. C/S prop, canopy, Xponder w/encoder, Narco Navcom. Heat. \$33,000. 717.938-1307. 983

Starduster Too, 337 TT. Lyc. O-435 190 hp, Hartzell prop. Spring steel landing gear. Ceconite cover. \$25,000. SE Ohio. 740.984-4222. 983

Starduster Too, 210 TT. 150 hp, inverted fuel & oil. Narco Com 810. Garman GPS 90. Tape player. Recent paint, leather interior. Over \$10K spent on beautiful refurbish. Absolutely nice, no-excuse airplane. \$34,500. Don at 319.582-1293, after 6 pm, 608.763-2707. 983

Acroduster Too, 1981. Factory welded fuselage. IO-540, 260 hp Lyc. Full inverted system. 300

TTAF, 900 TTE. KX-125 Collins Xponder, Mode C, NAT. Intercom. D/C headsets, helmets, security parachutes. Built w/ Oshkosh award-winning expertise. Always hangared & always loved. \$42,000. 760.434-0923. 983

1973 Starduster Too. 650 TT, 53 SFREman, IO-360A4M. Inverted fuel & oil. New Airflow Performance FWF. New 1996 spring gear, Hookers. Beautiful airplane. 904.760-2524. 983
Starduster SA100. 60 TTAF since complete rebuild. O-290D Lyc. Full electric. Seat pack chute. Asking \$17,000. Gene 931.635-2325. 983

'80 Starduster V-Star SA900 biplane. Lyc. O-290D 125 hp, 3" G-meter. EGT, CHT, vernier throttle, full electric, Maul tailwheel, new radio, new prop. 2-98 annual. 450 TT. 450 SMOH. Very nice. \$16,000. 203.756-0340. Call after 6 pm EST. 983

Starduster Too. 69 TT. 200 hp IO-360. Hartzell prop. Com. Xponder, encoder & lights. \$42,000. 503.838-2021. 983

Acroduster Too aerobatic biplane. IO-360 Lyc. 250 TTA&E. Damaged right gear & lower wing. Must be trailered. \$20,000 as is. Call Fred 817.535-5130. Texas. 983

Starduster Too. 870 TTAF SMOH. Lyc. IO-360, 180 hp. C/S prop. Inverted fuel & oil. KX-155 Navcom. KT76 Xponder w/encoder. Instruments front & rear. Stereo intercom /tape player. New nav lights and landing lights. 40 gal. fuel. Spades, electric trim, Cleveland wheels & brakes. Maul 3200 tailwheel. Sliding canopy. \$38,000. 615.774-3311 days. 615.774-3387 evenings. 983

'77 Starduster Too. 489 TT. 90 SMOH. Lyc. O-360 A3A. Hartzell C/S. KX 197. Canopy. Helmets w/headsets. \$22,500. 206.363-5941. 983

Starduster Too, totaled. Parts available. Center section w/tank \$800. Cabane struts \$400. Some parts slight damage. 607.669-4401. 983

Starduster Too, beautiful aircraft. Completed 1985. 762 TT. O-360. \$30,500. 501.372-3131, or 835-6703. 983

Starduster Too. Basic fuselage with seats and cabanes welded. \$2500. Call Cap, 760.947-2414. 982

STOLP Starlet airframe with complete empennage, professionally welded, no damage, early model designed for VW or 65-75 HP Continental engine.
Steal it for \$600.00 206-431-9732 982

STOLP Starlet project, complete airplane with damaged fuselage, includes completed wings thru Silver, both tanks, gear with wheels and brakes, wing lift struts, everything you need. Repair fuselage, put together and fly. \$1,900.00 Also have available zero time OH'd Lyc. O-235 machined for dynafocal mount. Engine will cost you extra. 206-431-9732 982

Canopy for Starduster II \$200.00. Frank Johnson 805.239-3124. 982

1983 Starduster SA300, 220 TTA, 220 SMOH on 180 hp Lyc. O-360-A1A with fixed pitch prop. Looks like Pitts S2A. Recent KY197A Com, Magellan GPS. Hangared aircraft. Offers. Call Joel, 941.643-2500. 982

1981 Starduster Too. 420 TTAF. Fresh annual, 200 hp Lyc. injected engine, fresh OH, new constant speed Hartzell prop, inverted fuel/oil, full canopy, intercom w/stick switch, KY197, Nav-12, portable GPS, ELT, IFR, full panels front/rear, new lights & beacon, prize winning paint, aux. tank, 3 new tires, \$42,250. Call Gordon 440.238-3053. 982

Stolp Starlet Kit, 49% complete w/factory new 60 hp Franklin certified engine, fuselage, tail feathers, gear & struts all welded. Wings & center section wood assembled. Cleveland wheels & brakes. No dope or fabric. Custom Sensenich prop. \$8500. 909.734-2046. 982

FROM THE INTERNET

For Sale. Starduster Too. Completed 1989. 455 TT. 355 SMOH on certified 200 HP Lycoming IO360-A1A. 355 since NEW on Hartzell aerobatic constant speed propeller. King KT-76A Transponder/Mode C & King KLX-135 Comm/GPS/Intercom with moving map display. ACK ELT. Cleveland Brakes, Hooker Harnesses, Scott tail wheel. Both cockpits open. Full inverted fuel and oil. A & P built. Stitts fabric. Airplane is at DVT. March 1998 annual. \$28,000 (FIRM). Call 318-949-3707

1998 StardusterII 30 tt A&E O-360 lyc, 50 gal fuel, new sen. prop fixed pitch, all acc. o/h when built, all AD's complied with, stits red and white, excellent workmanship, intercom, GPS/COM 190 handheld, clevelands, scott T/W, open cokpits, basic flight inst. both cockpits, eng. inst. rear only. BEAUTIFUL A/C \$33,000.00 918-256-1999 or 918-605-3953 please leave message.

I have an sa-750 acroduster II project for sale. It is approximately 75% complete the fuselage is on gear needs plumbing, wiring, instruments and cover, wings 75% done, both fuel tanks, cleveland wheels and brakes, eng mount

for O-540, flying wires and most materials to finish. I am asking \$9500.00 I can be reached evenings 520-567-3608 or thru E-mail at vintaero@sedona.net

For Sale: 1993 STARDUSTER TOO MULTIPLE AWARD WINNER, 290 Hours TTOA, 500 SMOH ON LYC. IO-360/180 HP., Inverted Fuel System, Christien Smoke System, King KX-125 NAV/COM, KT76 TXP, 2 Place Intercom, Fuselage and Wing Tanks (Total 40+ Gal.) \$37,500 obo. MUST SELL Call: Travis Foss (805)688-0245 Home (805)686-3795 Pager (805)686-9979 Hanger E-mail: lfoss@cilcom.com

Starduster Too Wants Good Home. On February 2nd, I move to Louisiana from Phoenix. I have no hanger there and would like to sell my Starduster if possible for a reasonable price. It will be on a where is as is basis. Please phone. Do not email as I do not have time to answer you. If not sold as a complete flying airplane I will disassemble and sell the individual parts if necessary as I may have to disassemble the airplane anyway for storage. Phone 602-580-8044. After February 2nd Phone 318-949-3707.



Wings and a Propeller

TAKE OFF TO THE RENO AIR RACES, WHERE
CRAZY PILOTS STREAK BY IN LOW-FLEETING
HOT RODS. BY MICHAEL KAPLAN
— Photographs by Geoff Samuels —

FLY LOW
FLY FAST
TURN LEFT

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