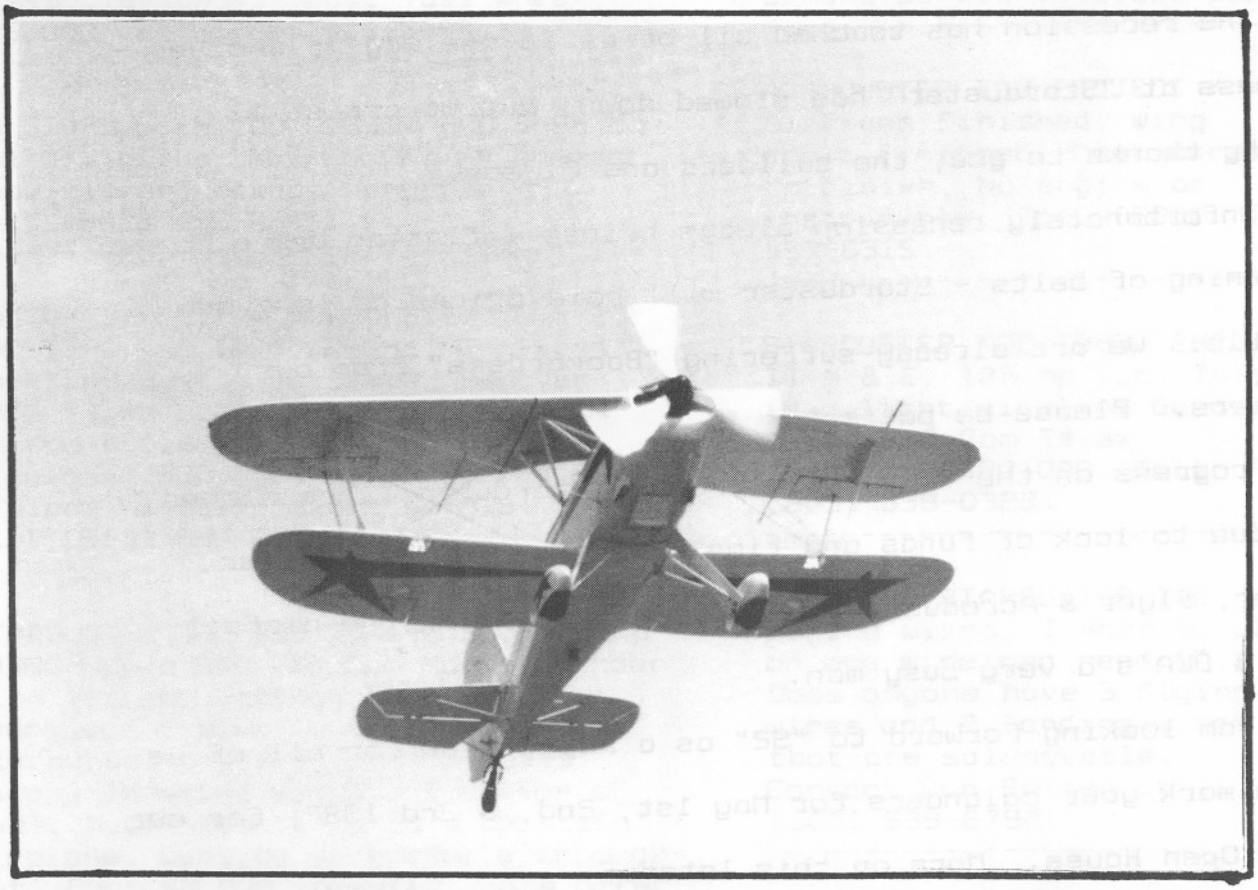
Starduster

MAGAZINE



Dedicated to the
ACTIVE Homebuilders

January 1992

STOLP STARDUSTER CORPORATION 4301 Twining, Flabob Airport, Riverside, California 92509 / (714) 686-7943

January 1992

Hope 1991 was a happy and fruitful one for our readers, builders and flyers.

The recession has touched all of us in one way or another - business at "Starduster" has slowed down, but we are still healthy thanks to you, the builders and flyers.

Unfortunately recession always brings inflation and a tightening of belts - Starduster will hold prices as long as possible. We are already suffering "Backorders" from our suppliers. Please be patient.

Progress on the "Executive", Cabin Starduster, has slowed down due to lack of funds and time. Rob Harris, Starduster builder, flyer & Acroduster Too builder, is doing the airfoil MOD's & DWA's a very busy man.

I am looking forward to "92" as a happy year for all of us. Please mark your calanders for May 1st, 2nd, & 3rd 1992, for our annual Open House. More on this later.

Till next time.
"BC"

Stolp Starduster Corp.

4301 TWINING
RIVERSIDE, CA 92509
(714) 686-7943
FAX (714) 784-0072
WATS 1-800-833-9102
HOMEBUILT AIRPLANE PLANS
SUPPLIES • COMPONENTS • MATERIALS

BILL CLOUSE President

JANUARY 1992

THIS MAGAZINE USES MATERIAL SUBMITTED BY IT'S READERS. SOME ARTICLES OR STATEMENTS MAY NOT BE IN AGREEMENT WITH STOLP STARDUSTER CORPORATION OR IT'S EDITOR. INFORMATION AND ARTICLES USED ARE AT THE READERS RISK AND STARDUSTER MAGAZINE ASSUMES NO LIABILITY.

TABLE OF CONTENTS

We would like to thank all of this issues contributers and respond to one and all for some interesting information and photos.

FRONT COVER - N96ST A beautiful tan and brown Starduster Too, owned and built by Jim Stothers 7035 Willow Tree Drive, Ranch Palos Verdes, California 90274. Powered by an IO360 Continental. Picture was taken during his departure from the Flabob Open House.

REAR COVER - N75RB Originally built by Ray Branson and now owned by Dick Stonehouse 1496 Kenmore Rd., Pasadena, California 91106. Colors are white with yellow and black trim. Also a beautiful airplane, and powered by an IO360 200hp Lycoming.

NOTE! SUBSCRIBE TO STARDUSTER MAGAZINE. PUBLISHED FOR PEOPLE BUILDING OUR AIRPLANES. TECHNICAL INFORMATION, NEWS AND PICTURES. PUBLISHED FOUR TIMES A YEAR. SUBSCRIPTION RATE IS $12.00 PER YEAR, $18.00 PER YEAR OVERSEAS MAILING (EXCLUDING CANADA). NOTE!

THE EDITOR IS ALWAYS LOOKING FOR TECHNICAL AND EDITORIAL CONTRIBUTIONS TO THIS MAGAZINE, WHICH IS DEDICATED TO THE HOME BUILDER AND SPORT CRAFT ENTHUSIAST. PLEASE INCLUDE YOUR NAME, ADDRESS, TELEPHONE NUMBER AND YOUR "N" NUMBER ALONG WITH ARTICLES SUBMITTED.

Note : For information requests regarding Starduster aircraft please include postage.

ODDS & ENDS FROM YOUR EDITOR

As usual flying safety is my main topic. So please read this article and promise yourself not to do any of these things that will bring your Starduster down until you intend for it to make a safe landing.

From 1982 thru 1988 there were approximately 16,000 fixed wing aircraft accidents, 77% were pilot related, maintenance and mechanical failures were only 13% and unavoidable accidents accounted for less than 10%.

The break down of the 77% is as follows : 18% take-off; 22% taxi, climb, decent, go around, manuvering and other; 19% occured during cruise; 8% during approach; and 33% during landing. So, it doesn't take a rocket scientist to see that over 50% of all accidents occur during cruise flight or landing.

The main cause for accidents during cruise is due to either fuel starvation or flying in deteriorating weather. Both of these should be easily avoidable with our type of aircraft. Most Stardusters carry 45 gallons of fuel or more and at 10 GPH round numbers should give one at least a 4 hours in the air with some reserve. I do not know of any Starduster Too pilot that would enjoy setting in one of these airplanes for over 4 hours. I myself have made several flights over 3 hours, mostly due to head winds, and not knowing exactly where we were. I typically plan for 2 hour hops.

As for weather related accidents our airplanes do not make very good instrument platforms. But IFR flight can be done if the pilot is rated and the aircraft is equipped. This type of airplane is rarely involved in weather related accidents, but if you fly your airplane often enough it could happen.

By far your greatest chance of being involved in an accident is during the landing phase. Over 30% of all these accidents occur during landings. Several of these were caused from loss of directional control due to crosswinds. The first thing to add to your landing checklist is : Do I have to land no matter what? Can I go around? Can I go somewhere else? Do not suffer from "Get Downitis", especially after a long cross-country flight. Check the area for other traffic, especially Twins on the long straight in approaches, as they often like to do this.

Fly a stabilized approach, line up with the center line, get your feet up off the floor and sit up in your seat. Above all be ready for anything. Such as being cut out of the pattern by someone else, or having an airplane pull-out and start its take-off roll when you are on short final or possibly having a faster aircraft over take you on final approach. I have had all these things happen to me, never be afraid to put the power on and go around, this should be as second nature to you as making a good landing. But more than anything else trust your instincts, if something doesn't feel right at any time during the approach don't hesitate to go around.

EDITOR

* NOTE * : Your Editor is looking for pictures or negatives of aircraft construction, during the early stages, fuselage, landing gear, tail surfaces, cabane struts, wings and center section or Boxing the fuselage, cutting and fitting the tubing, laying out the wing, making wing ribs, wing fittings, fitting the wing ribs to the spars and building ailerons or any early construction pictures. I will trade Starduster pictures and information for what have you.

EDITOR

New Service Bulletins

MANUFACTURER	BULLETIN NO.	DATE	SUBJECT
Avco Lycoming	S.L. L201	5-4-84	Recommended time between overhauls (TBO), all models.
	S.L. L202	5-4-84	Inspection of prop flanges, aerobatic engines (all models).
	S.L. L203	5-4-84	Lubricating oil recommendations (all models).
	S.I. 1428	5-4-84	Carburetor modification for richer operation, L/O-360-A1G6D & O-360-A4K
	S.I. 1430	5-4-84	Phase-out of P/N 73111 exhaust valve, IO-360, IO-540, GO-435, and GO-480 series (plus others).

ACCELERRATOR PUMP DOES IT'S JOB TO WELL

An incident happened to me that applies to many homebuilts that I'd like to pass along. Upon return from Oshkosh this year I attempted to throttle back for a descent at my homeport. The throttle was stuck so I left it alone and continued down with power to pattern altitutude and got on downwind before I attempted to force anything. It might have come back and stayed I thought. So, on downwind, I did apply force and got the throttle back to about 1800 RPM. To much to land an RV as you know so after a funny pattern and lineup I killed the engine with mixture and landed with no trouble. Now for the problem. The MA4SPA carb and others like it have a small brass pipe which squirts the pump charge into the carb when the throttle lever is moved. This small pipe is at the bottom of the carb as viewed from the ground. It comes out of the wall of the carb and turns 90 degress to deliver the fuel from the accelerator pump up into the center of the carb. Well this small pipe came out of its place and was sucked into the carb, but was stopped by the butterfly resulting in the stuck throttle.

Now for the clincher. This occurrence is not unknown to induction people and the cure is to epoxy this pipe in place even on certified aircraft. As these carbs have aged this pipe is coming loose more often and the pipe should be fastened in place before something happens to you. This pipe could go all the way into the cylinder and ruin your day. Hope this note saves someone else from the same trouble.

By Charlie Calivas

The above mentioned article is reprinted courtesy of the local RV Builders Group.

<CR> TO CONTINUE OR <Q> TO RETURN TO MENU :

Communication ready. *1* BOYAN 4.01 *1* 0:06:26: FAA Experimental B

SYSTEM : C RECORD # : 300
DATE :890608
AIRCRAFT MODEL : STARDUSTR300
ENGINE MAKE/MODEL :
PROPELLER MAKE/MODEL :
COMPONENT MAKE/MODEL :
PARTNAME : ATTACH BRACKET PARTNUMBER :
PART LOCATION : LT AFT RUDDER PEDAL PART CONDITION : BROKEN
REMARKS :
RUDDER CABLE ATTACH BRACKET BROKE OFF OF LEFT AFT RUDDER PEDAL. THIS BRACKET WAS FOUND DURING AN INVESTIGATION OF AN ACCIDENT IN WHICH THE PILOT WENT INTO A RIGHT SPIN AND WAS UNABLE TO RECOVER. AN EXAMINATION OF THE BRACKET REVEALED THAT THE WELDS WERE NOT TIED INTO THE BRACKET. THE BRACKET WAS WELDED TO THE RUDDER PEDAL IN TWO PLACES, HORIZONTALLY AT THE TOP AND BOTTOM OF THE BRACKET. THE LOWER WELD APPEARS TO HAVE BEEN BROKEN FOR SOME TIME WITH THE BRACKET RUBBING THE WELD. THE UPPER WELD APPEARS TO HAVE BEEN BROKEN TWO-THIRDS OF THE WAY THROUGH FOR SOME TIME WITH A FRESH BREAK ON THE REMAINING ONE-THIRD OF THE WELD. SUBMITTER RECOMMENDS ALL OWNERS OF STARDUSTER AIRCRAFT INSPECT THESE BRACKETS.

<CR> TO CONTINUE OR <Q> TO RETURN TO MENU :

Communication ready. *1* BOYAN 4.01 *1* 0:09:28: FAA Experimental B

SYSTEM : F RECORD # : 301
DATE :850613
AIRCRAFT MODEL : STARDUSTR300
ENGINE MAKE/MODEL : CONT IO470K
PROPELLER MAKE/MODEL :
COMPONENT MAKE/MODEL :
PARTNAME : PICK-UP TUBE PARTNUMBER :
PART LOCATION : TANK PART CONDITION : HUNG
REMARKS :
FOUND THE FUEL PICK-UP FLOP TUBE HUNG IN THE UP POSITION ABOVE THE FUEL LEVEL.

<CR> TO CONTINUE OR <Q> TO RETURN TO MENU :

Communication ready. *1* BOYAN 4.01 *1* 0:09:55: FAA Experimental B

FIRST CLASS SPRING FLIGHT

An aircraft sitting for long periods of time during the winter months deserves a first class pre-flight by the most conscientious pilot possible, you.

Recharging the battery with a slow charge should be the first order of business. A check for cracks or leaks, along with a maximum of 1.5 amps during the charging phase. Battery connections should be checked and cleaned.

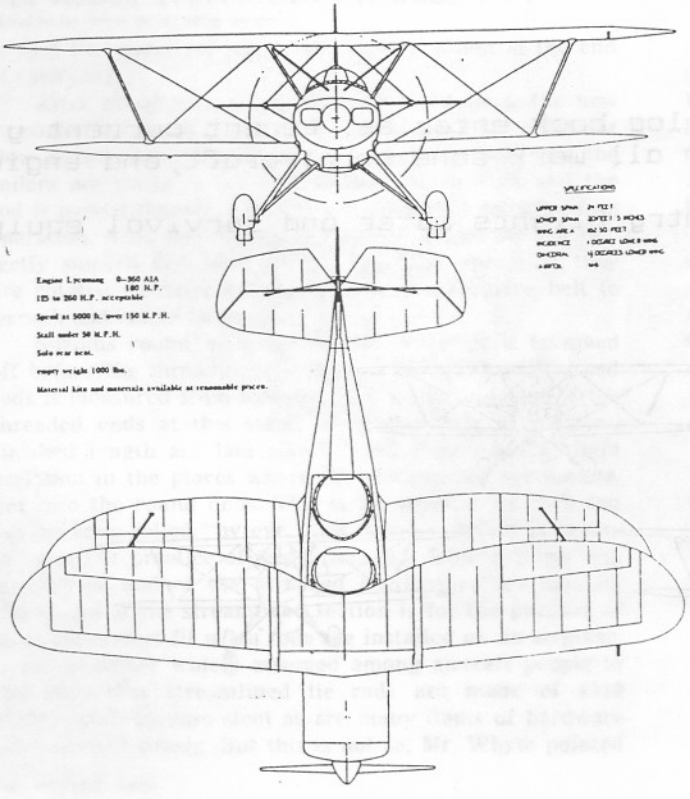
Inspecting the cockpit should be next on your list. Check seatbelts for good condition, and proper operation, placards and certificates, the old standard ARROW : airworthiness certificate, registration, radio license, operating limitations and weight & balance. Check and excercise circuit breakers, fuel shut-off valve, throttle & mixture for control travel, and secure connections at carborator. Inspect radio & navigation equipment, lighting, ELT for operation and battery expiration. You should also check antennas, radio & ELT, trim TAB, look for bird or rodent nests, check all controls for travel and ease of movement, examine the landing gear, wheels and tail wheel for air pressure and steering cables and weather checking, hydraulic fluid in master cylinders. Check wings, ailerons, flying wires, piot A/S static sources.

Next you should drain at least a gallon of fuel out of each tank, then vigorously rock the airplane and repeat procedure. Check all vents closely, use low air pressure to make sure they are clear.

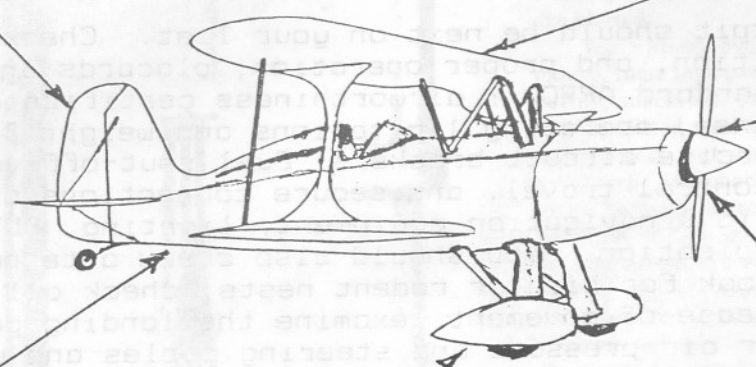
Every year there are a number of airplane accidents that are attributed to water in the fuel. Small amounts are not a problem, but if you get water from the firewall strainer or several ounces of water from a tank sump you've got big problems. By draining a few more ounces until the water stops just isn't enough. When a large quantity of water gets into the system, a large quantity of fuel must be drained in order to completely purge the system.

So it is important to remember to drain lots of fuel, especially after long periods of inactivity or during the winter months. Besides you can always put it back in, if there is no water.

EDITOR



AFTER WINTER PRE-FLIGHT



Empennage
ELT & Battery
Lights
Tailwheel
Trim Tab

Wing
Fuel Vents
Rigging Flying Wires
Ailerons

Battery
Recharge at
1.5 amps
Leaks & Cracks

Cockpits
Seatbelts
Instuments
Controls
Placards
Circuit Breakers
Fire Extinguisher

Landing Gear
Wheels & Brakes Tires
Shock Cords
Wheel Covers
Gear Fairings
Hydraulic Fluid
Master Cylinder

Engine
Engine Mounts
Fuel Lines
Cracks Nips & Chips
In Prop Spinner
Filter
Hoses

IN AIRCRAFT

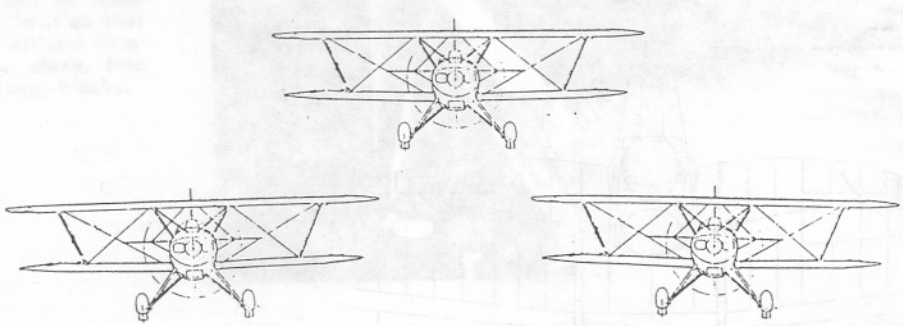
A - Airworthiness Certificate
R - Registration For Aircraft
R - Radio License for Aircraft
O - Operating Limitations
W - Weight & Balance

IN PILOTS POSSESSION

P - Pilots License
M - Medical Current
R - Radio License

Also required, accurate log book enteries, recent current y pilot, and appropriate enteries for all work done on aircraft, and engine.

NOTE : For long Cross-Country flights water and survival equipment should be included.



STARDUSTER HISTORY

N1300S
The Second Prototype Starduster Too

This airplane N1300S, the second prototype Starduster Too built entirely by Lou Stolp and Starduster Employees during late 1967. This airplane is probably the single most important airplane that ever flew. The airplane appeared on the cover of Sport Aviation in February 1968, as well as in several other aviation publications over the next several years.

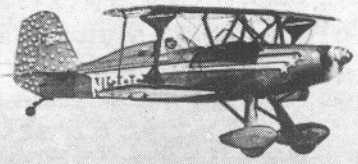
It was the first two-place design that really appealed to the homebuilder, it was in the right place at the right time, and the plans by those days standards were excellent. The materials and prices were reasonable. But the thing that really set it off was its overall beautiful appearance which inspired many airplanes to be built.

As I remember, Lou Stolp had talked George Rice out of the wings he had completed, so that they would have a headstart. The rest of the fuselage, landing gear, tail and cabanes were completed in less than four months. The engine installation, plumbing, and wiring along with covering and painting were completed over the next month and a half. Having aquired the completed set of wings from George and with the entire crew working on the airplane it was completed and flown for the first time in less than six months. Somewhat of a record I suppose, but you have to understand that most of the people who worked on the airplane had perviously worked on N9450S the very first Starduster Too. I remember coming to work in the morning and finding Glen Beets asleep under the airplane with the lights on and the doors unlocked. This happened on more than one occasion. So you can see that with everyone working on the airplane night and day it should be no surprise that it was completed in such a short period of time.

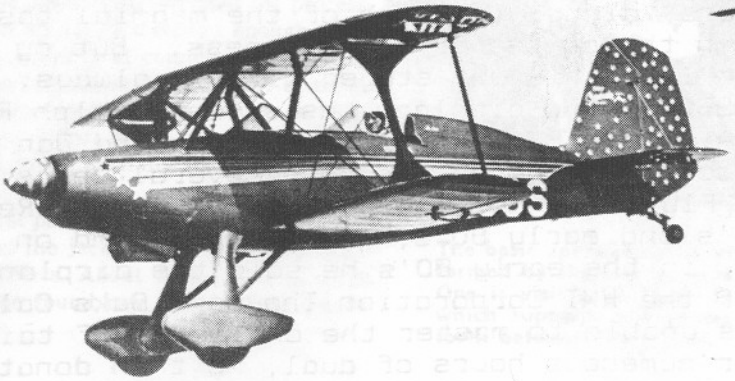
N1300S serial number #13 was powered by an O470 Continental 230hp with a constant speed propeller. I don't remember the empty weight but I would suspect it to be around 1350lbs and it was very spartan; its cruise speed was about 150mph at 22 inches square. Lou Stolp and George Rice flew the airplane to Rockford Illinois during the summer of 1968. Glen Beets also accompanied them with the single place Starduster N2314C, it was quite a trip.

This airplane was completed during the period of time I worked for Lou Stolp and in my opinion was one of the most beautiful Stardusters ever built, it really impressed me and was one of the reasons I painted my airplane a lot like the original. I also painted it this way as a tribute to Lou Stolp. I myself did not do anywork on this airplane as I was busy welding and filling tubing orders, along with much of the meanial tasks that needed to be done in the course of the business. But my desire to own a Starduster like this one stayed with me always.

In the late 1960's, the airplane was sold to Ralph Rina a young Continental Airlines First Officer. Ralph and Dan Cary flew the airplane to Oshkosh over the next several years along with several other Fly-ins. Ralph also raced T-6's at Reno during the late 70's and early 80's, finishing second on numerous occasions, in the early 80's he sold the airplane to John Erwin owner of the HNT Corporation Thousand Oaks California. Apparently John was unable to master the challenge of tail wheel landings even after numerous hours of dual, he then donated the aircraft to a Warbird Museum in Chino California, apparently as a



N1300S
and
N2314C



tax right off. The museum had it for a year or so and not fully understanding the historical signifigance of this airplane and being warbird oriented offered it for sale. By then the aircrafts condition had deteriorated considerably. It was then purchased by Jack Mattison in early 1988.

Jack readied the airplane for flight, and during the takeoff run control was lost and the airplane ground looped causing the gear to collapse resulting in damage to the right wing and propeller. The cause was determined to be due to poor brakes along with no tail wheel steering; apparently during its stay at the warbird museum the Scott tail wheel was modified by museum personel to full swivel rendering it unsteerable, and Jack was obviously unaware of this condition.

He had also borrowed a large sum of money to purchase the airplane from Jack Winer a realestate investor from Orange California. Jack of course was not a pilot but ended up with the airplane. He then contacted Bill Clouse from Starduster Corporation who put him onto George Rice, George repaired the gear, wing tip and installed another prop. Then flew the airplane to Corona with the intention to restore it to its original condition. Unfortunately George has since moved to Utah and Jack Winer has had business and cash problems that have not allowed him to restore the airplane.

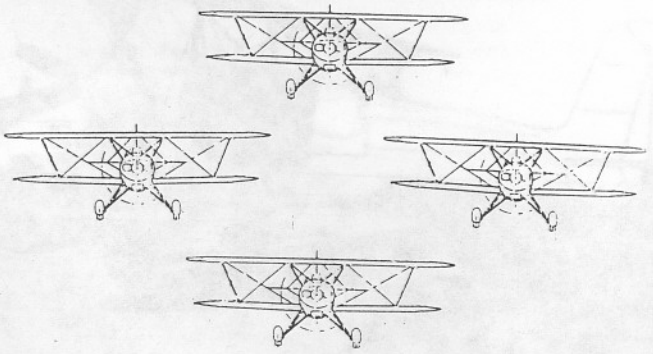
I have talked to Jack recently and have encouaged him to pursue restoration of this airplane either for Airshows or to be donated to the EAA Museum in Oshkosh as this is the place it should be. He assures me that in the future either could happen. The airplane is currenly in storage in Corona California awaiting its future. This is the saga of N1300S the second prototype Starduster Too.

David C. Baxter
Starduster History

* EDITORS NOTE *

I am currently looking for pictures of this airplane (N1300S) at Flabob, Rockford, Oshkosh or any other fly-in. I would prefer color, but will accept any pictures of the airplane. Thanks to Lee Darrah Las Vegas Nevada, and Don Knauts Idaho Falls, who supplied me with black & white pictures of that era. If you have negatives or prints, I can copy and return either.

D.C.B. Editor



The Super Super Starduster Too

Dear Dave,

The Starduster Too I completed recently was purchased as a project from Dick Russnell in East Jordan Mi. The airframe was completely built and covered with the exception of the fuselage and landing gear. I completed the panels, front and back, added a front control quadrant and finished out electrical, hydraulic, fuel, and system plumbing for instruments. The engine is firewall forward from a 1980 Cessna Ag-Husky. The prop is from a Cessna Turbo 206. Engine model is TSIO-520-T. The horsepower is pushed to 325 h.p. at 40 inches of manifold pressure at 2750 r.p.m.

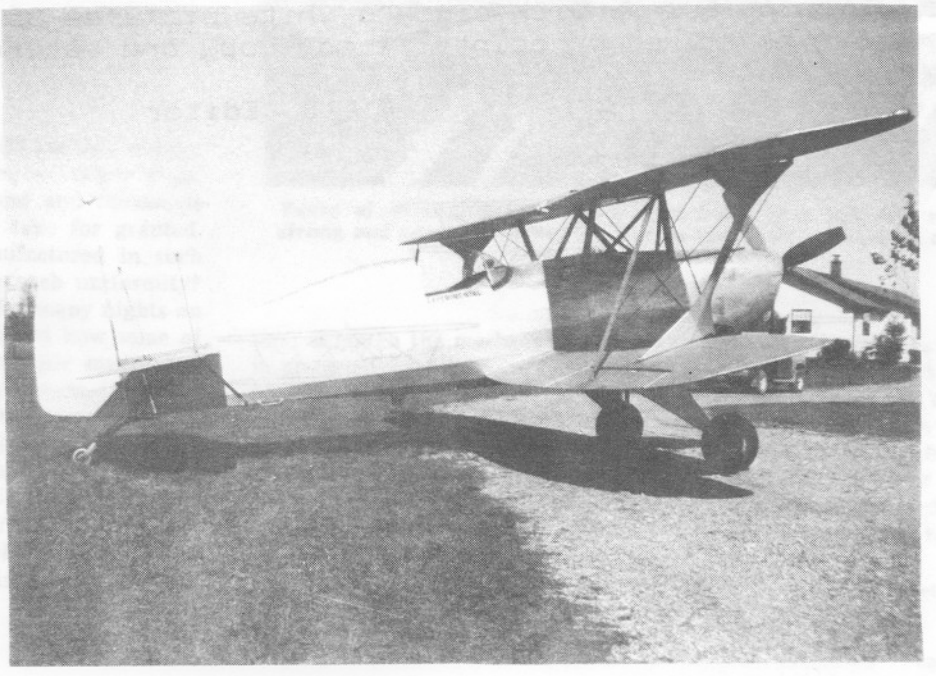
The first test hop was quite a ride! I really didn't use all the power and the rate of climb was indicating around 4000 ft/min. The following flights consisted of trimming the plane out and trying various power settings. The engine is turbine smooth. It only has 105hrs time since new but had to have another crank installed and cylinders chromed since it was in storage following a wreck for eight years.

The plane is covered with Stits process and will be painted red with black trim shortly. I plan to sell the Starduster for another business venture. The plane is really exciting to fly and approach speeds are higher than usual due to the 1450 lb empty weight. Thanks for your interest and call if you have any questions.

Sincerely,

Frank Voshell
11422 76th Street
Clarksville, MI 48815
(616) 868-6544

P.S Modified Cessna 172 Cowling has been installed.



November 6, 1991

David C. Baxter
5725 S.W. McEwan Rd.
Lake Oswego, OR 97035

Dear David:

I want to thank you for the time you spent with me on the phone last week answering questions about the Starduster Too. It was extremely refreshing to learn that not only are there other people actively building the Starduster but that there was a such an outstanding newsletter published!

Though I am just starting my project I was smitten by the Starduster Too since I first saw one when I was a line boy, age 16, at Boulder Municipal Airport in Boulder, Colorado. Right then and there I knew that I would build that airplane. Well 18 years later my basement workshop is finally complete, spars, material for wing fittings, wood for ribs, trailing edges and other goodies are awaiting my attention.

I talked to Bob Dwyer in Tucson Arizona on your recommendation and he was most helpful. Obviously the caliber of people involved with this airplane is outstanding.

After hanging up the phone I realized that I forgot to ask you how I would go about acquiring information such as plan updates, tech tips and historical background i.e. pictures. Any information on this subject would be greatly appreciated.

Before closing I thought I would share some things that I have learned so far on my project.

1.) Cats increase in volume approximately 50% when subjected to sudden noises such as band saws and routers.

2.) The by products from disc sanding a plywood rib stick quite readily to laundry fresh from the dryer.

3.) Blood makes for an excellent wood stain.

Thanks again for all your help and I look forward to talking to you in the future.

Sincerely,
Vance Franks

Vance Franks
16766 E. Kent Dr.
Aurora, CO 80013
(303) 766-0295

STOLP STARDUSTER CORPORATION
4301 TWINING
RIVERSIDE, CALIFORNIA
92509

Howdy Bill, 20 AUGUST, 1991

Experimental Two Echo Delta FLIES ! I've got about ten hours in it to date, expecting to have my 25 hours flown off before the end of September. At that time, I intend to christen her "The "E" Ticket Ride" and apply nose art.

The airplane performs as advertised, and required no rigging changes after the first flight. Below are some specs you can show potential customers:

Aircraft Empty Weight: 1030 Lbs.
Powerplant: Lycoming IO 360 A1B...200 H.P. @ 2700 RPM
Propeller: Hartzell Constant Speed Aerobatic, 74".
Empty Weight C.G.: 16.28 inches aft of firewall web.
(Required no ballast)

Ambient Temperature: 90°F.
Fuel On Board: 23 US Gallons (100 LL)
Crew: 175# pilot w/15# 'chute
160# mechanic w/15# chute
Takeoff Weight: 1533#
Takeoff C.G.: 24.5 inches aft of firewall web.
Takeoff Power: 30" manf. Press., 2700 RPM.
Best Rate of Climb: 1800 Ft. per Min. @ 95 MPH Indicated.
Power off stall: 62 MPH Indicated.
Good warning buffet and control mush.
Excellent spin resistance, ailerons effective in full stall.
Full Power Stall: 59 MPH Indicated. Good warning buffet.
Excellent spin resistance.
Top Speed (level flight, 1000 ft): 160 MPH Indicated @ 2500 RPM.
Final approach speed: 100-105 MPH Indicated.
Touchdown Speed: 72 MPH indicated, Three Point Attitude.
Ground Handling Characteristics: CREAM-PUFF !

So far, the airframe has been stressed to +6, -4 G's, have done loops (inside & outside), spins (upright 5 turns, inverted 2 turns), Cuban eights, hammerheads, inverted turns, inside snap rolls, inverted stalls, accelerated stalls (up to 4 G's), and about 100 landings, primarily Three Point, but Wheel Landings have been demonstrated with excellent results.

I have had two different instructors fly with me so far. One instructs aerobatics in a Pitts S2-A, and he really likes the Acroduster Too. This is the first open cockpit craft he's flown, and I'm sure that has something to do with his enjoyment of the airplane. This is the first time I've had a CFI pester me about my schedule ! Compared to the Pitts S2-A, he says the Acroduster Too is far superior in ground handling and takeoff/landing, and significantly lighter on the controls (he's having trouble with what he perceives as a lack of elevator feedback, but I have no such problem.) He's also flown Christen Eagles on occasion, and prefers the Acroduster Too for its visibility and landing characteristics. He claims performance is about equal between the Acroduster Too and the Eagle II.

The other CFI is an Eagle II owner, and has a better appreciation for the subtle differences: the Acroduster Too takes off, lands, spins snaps and rolls better than his Eagle II, but he believes the Eagle II has better vertical penetration and better handling inverted. It should be noted, however, that he flies his Eagle mostly solo, and has not flown the Acroduster Too solo. We'll see whether his opinion changes when I decide to let him fly it solo soon.

Anyhow, as far as I'm concerned, this is a truly wonderful biplane, and I wouldn't trade it for either an Eagle or a Pitts. I've got equivalent aerobatic performance, MUCH better landing characteristics, and a better looking airplane. And the girls love the happy colors and open cockpits. (The line forms at the back of the hangar please. Women and Children first. Passengers are requested to wait patiently until the aircraft is 25 hours old).

I finally got you some photographs (enclosed). More available at your request. Tell me what views you want, and I'll try to accommodate. In flight photos should be available before year end.

I really want to thank you, Bill, for the advice and moral support you've given over the course of this project, as well as the accurate and timely shipment of the parts I ordered from you. I will begin planning a trip to the west coast soon. I'm trying to set up something for the spring of 92, but a lot can happen between now and then. If you get near Houston, be sure to call. I can probably get a day off on short notice to fly with you. I really want you to see this one. I'm immensely satisfied and so damned proud of myself that if it weren't for the possibility of a free ride, all of my friends would have abandoned me ! Thanks again, and hope to hear from you soon,

Jim "Flyboy" Stoy

JIM STOY
2822 MANION DRIVE
MISSOURI CITY, TEXAS
77459

PHONE: HOME (713)835-9443
OFC. (713)432-2678

"CONGRATS" Jim "B.C." Prez

LETTERS

January 18,1988

Dear Bill,

I guess I better get a letter off to you and let you know how things are going with my Starduster Too N18YB. Here is a small article on the making of my airplane.

In December of 1979 I wanted to build an airplane. I studied several designs, I even bought the plans for a KR2, but in the end the Starduster Too was my choice.

In January of 1980 I ordered my material for the fuselage and started building, thinking in three years I'll be flying. As the year passed the fuselage started to take shape, but I wasn't doing any flying. So I bought a 1947 Stinson Voyager 108-1 to fly while building. You know how the story goes. On December 24th I decided to restore the Stinson and hung the Starduster on the wall in the garage. The next six months were devoted to the Stinson, completely stripping it down to bare bones and restoring it, except for the engine. I flew it for the rest of 1981, with the Starduster still gathering dust. That winter it was time to major the engine, another six months slipped away.

In February 1983, we moved to Sheridan Wyoming where I resumed work on the Starduster. I rented a garage and finished building the fuselage. Time to move again. My three years were adding up.

We bought a home in the country with no garage, so I had to build one. A 28 x 40 foot garage was built, big enough for my wife's car and the construction of an airplane. At last I could get back to the Starduster. The wings, tail feathers, and I-Struts were built then the covering, which went very well.

Next came the engine, a 232 cu.in. Ford V6 with a Javelin re-drive. It fits real well but the battery had to be placed behind the pilots seat to balance the airplane. The engine cowling was built out of fiberglass.

In November 1987 the Starduster was ready for inspection. On the 24th the inspection was completed and okayed for 40 hours of flight in a 50 mile radius.

With all the cold weather the test flight was not until December 27th. Boy what a treat! The first flight was for 30 minutes in 35 degree air so the fun was short. The plane flew real nice except for a slight roll to the left. A small adjustment on the lower left wing took care of that. I flew again January 14th and 16th. I have two hours and five minutes on it, boy can't wait for warm weather.

Here are a few pictures of the airplane. It is a good design and I am sure going to enjoy it.

Sincerely,

Charlie Boson
Sheridan Wyoming

* EDITORS NOTE *

The preceeding letter from Charles Boson was sent to me by Bill Clouse and was dated January 1988. Bill has considerable corespondence from 1987 thru 1990 when Starduster Magazine was not published, and thought that some of this information should be passed on.

It always interests me when people attempt to install automotive engines in aircraft. At first glance it seems like it would be cheaper and easier, but this is very seldom the case. Very few automotive installations have been successful and those that have been are done by people with good engineering and machine shop skills, along with money spent to equal current Lycoming prices. It has been said that Lycoming and Continental engines are modern day antiques, there is a lot of truth to this statement; but they also work, produce rated horsepower and are reliable. Accident statistics show us that very few accidents are caused by mechanical failure.

So your editor did some research on this particular airplane N18YB and discovered it was flown very little over the next several years, and in August of 1990 the airplane made a forced landing due to engine failure. It had been sold to Robert Norris of Pinedale Wyoming (he was the pilot during the forced landing) and I doubt that during the time of the accident the airplane had over 40hrs total time. The point is that I more than anyone else would like to see a cheaper and more reliable power plant available to the home builder. But by the time you successfully convert the automobile engine, you have as much if not more invested than if you would have bought a Lycoming or Continental in the first place, and those if properly maintained work right out of the box.

This airplane has since been purchased by Bart Dalton, who bought it less the firewall forward; and has recently purchased a IO540 Lycoming to install in same. The airplane is of beautiful workmanship, and with the installation of this engine should make it a great performer along with being reliable, as well as increasing the value of the airplane at least three times.

By the way Bart Dalton is a pilot for Southwest Airlines and has previously owned both a Starduster Too, an Acroduster Too. He has also recently become the owner and manufacturer of lightweight high torque starters for the big horsepower and hi-compression Lycomings. So if anyone is interested in one of these units they should contact him at the address listed below.

Bart Dalton
16262 East 81st Ct.North
Owassa, Oklahoma 74055
(918) 272-8551

P.S. There was an airplane in the Florida area with the same engine set up as this and the owner of it was not happy with the results either.

EDITOR - D.C.B.

LETTERS

Dear Mr.Clouse,

I have found a person who builds quality Aerobatic engines (Lycomings). He has done this for several years. I purchased a modified IO540 for $5,500 outright. This was built to my specs. An O360 or IO360 would run somewhere close to this depending upon accessories. These are good fresh engines not junk. He also has a modified IO540 Airbox for forward mounting injectors ($200.00). He has or builds up O235's through IO540's.

His name is : Dan Brown
3823 E 11th Place
Tulsa, Oklahoma
(918) 834-0791

Sincerely,

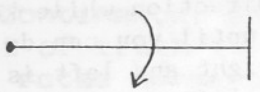
Bart Dalton
16262 East 81st Ct N
Owassa, Oklahoma 74055
(918) 272-8551

EDITORS NOTE

I called and talked with Dan Brown regarding lycoming engine overhaul, parts availability and out right purchase. He seemed to be very knowledgable, honest and sincere person. He can supply Lycoming parts at a reasonable price, and some engines. He is not set up to deliver large quantities of engines, and can only deliver good buys on engines that he is able to aquire at equally good buys. However if you are interested in a particular engine, part, or information, I think it would be worth your time to give him a call.

D.C.B.

During the past several months N2HC and I have competed in 2 contests at the intermediate level. My scores have been in the high 70's (78 and 79%) so far which qualifies me for the lower half of the queue! I believe that with more practice and less down time for repairs, the Starduster could be extremely competitive. Before the season started I changed my elevator deflection to spec 25 degrees up and 25 degrees down which helped inverted performance and made the elevators as hard to move as the ailerons! Gap sealing the rudder and elevator with silicone tape (Chief Auto) helped to decrease stick force and smooth out the airflow. Gap seals on the ailerons has proved ineffective however, so they were removed. So far, things are going o.k. as long as I can keep up with the maintenance on the plane. Aerobatics sure keeps the plane wearing out! on to this month's figure.



Hopefully all of you have had the good sense to prepare yourselves and your airplane with the practice of bungled maneuver recovery, parachutes and F.A.R. reading, double checked your dual belts and inverted systems and are ready to polish up those slow rolls.

Slow rolls, which really aren't that slow, (well maybe in a Starduster), actually mean that the plane rolls in a horizontal line with no change in pitch as if it were traveling on a string, which is what it should look like! Utilizing a combination of aileron, elevator and rudder horizontal stability is maintained throughout, here's how I do mine.

Step 1: After attaining sufficient altitude (2-3 thousand ft. agL min.), clear the area 2 slow 90 degree turns to make sure! Entry speed 120-150 mph. Level flight with a point on the horizon over the nose. Full left aileron perhaps with a bit of left rudder for the first 20-30 degrees of bank if you need it, quickly shifting to right rudder as much as needed to hold the nose on the point for the first knife edge.

Step 2: Continue full left aileron deflection pass the first knife edge begin coming off right rudder going to neutral when inverted at the same time coming in with as much forward elevator as needed to hold the nose up (do this smoothly or you will be experiencing -2 or -3 G's). Keep that nose on the point!

Step 3: Continue with full left aileron deflection as you pass inverted and put in more and more top or left rudder to hold up the nose for the second knife edge. Elevator at this point should be neutral again. Keep looking at the point!

INTERNATIONAL AEROBATIC CLUB PILOT PERFORMANCE AVERAGES
CONTEST YEAR 1990

Compiled By Sharon Heuer

— SPORTSMAN CATEGORY —

PILOT CITY/STATE/COUNTRY	AIRCRAFT		NUMBER OF CONTESTS FLOWN	TOTAL ACHIEVED Y-T-D	PERCENT Y-T-D
64. Johnny Therrell/Bellevue, WA	Eagle II		3	8,685.600	81.098
65. Pat Day/Midland, TX	Starduster	★	1	964.330	81.036
66. Dave Friedman/Van Nuys, CA	Eagle II		2	5,775.805	80.894
134. Martha Buckely/Des Plaines, IL	Decathlon		1	1,789.300	75.181
135. Gary Alpert/State College, PA	Acroduster II	★	2	4,471.061	75.144
136. Bill Wilson/Lexington, KY	Decathlon		3	5,362.165	75.100
198. Ted Ballou/Lighthouse Pt., FL	Decathlon		1	1,419.713	59.652
199. Steve Beaver/Cross Junction, VA	Starduster II	★	1	2,116.623	59.289
200. Tom Mabelitini/Akron, OH	Decathlon		2	2,815.100	59.141

— INTERMEDIATE CATEGORY —

PILOT CITY/STATE/COUNTRY	AIRCRAFT		NUMBER OF CONTESTS FLOWN	TOTAL ACHIEVED Y-T-D	PERCENT Y-T-D
1. Jill Leenerts/Laguna Hills, CA	Pitts S-1S		1	4,141.562	88.875
2. Bob Blackwood/Sonoma, CA	Pitts S-1S		4	16,248.583	87.783
3. Bill Finagin/Annapolis, MD	Pitts S-1T		7	28,388.763	87.189
4. Clyde Cable/Berthoud, CO	Eagle II		10	40,097.044	87.186
5. Ken Larson/Dallas, TX	Buecker		2	8,090.265	86.992
6. Bill Williamson/Apopka, FL	Pitts S-1S		4	16,218.841	86.964
7. Bruce Thalheimer/Naples, FL	Pitts S-2B		2	8,061.354	86.868
8. Roger Marshall/Mooresville, NC	Pitts S-1E		3	12,167.249	86.785
9. Marta Meyer/Quartz Hill, CA	Pitts S-1E		6	24,176.768	86.779
140. Les McInnis/Oakville, Ontario, Canada	Pitts S-2B		1	1,279.709	71.095
141. John Parsons/San Antonio, TX	Pitts S-2B		2	6,599.263	71.036
142. Walt Penn/Martinsville, VA	Acroduster II	★	2	6,653.100	70.929
143. George Eaton/Del Mar, CA	Pitts S-1T		2	6,461.275	70.615

Step 4: Continue full left aileron until upright and stop rotating briskly so this is a hard point (looks good that way). Rudder should be at neutral and elevator slightly back to compensate for lost airspeed.

Practice and Problems:

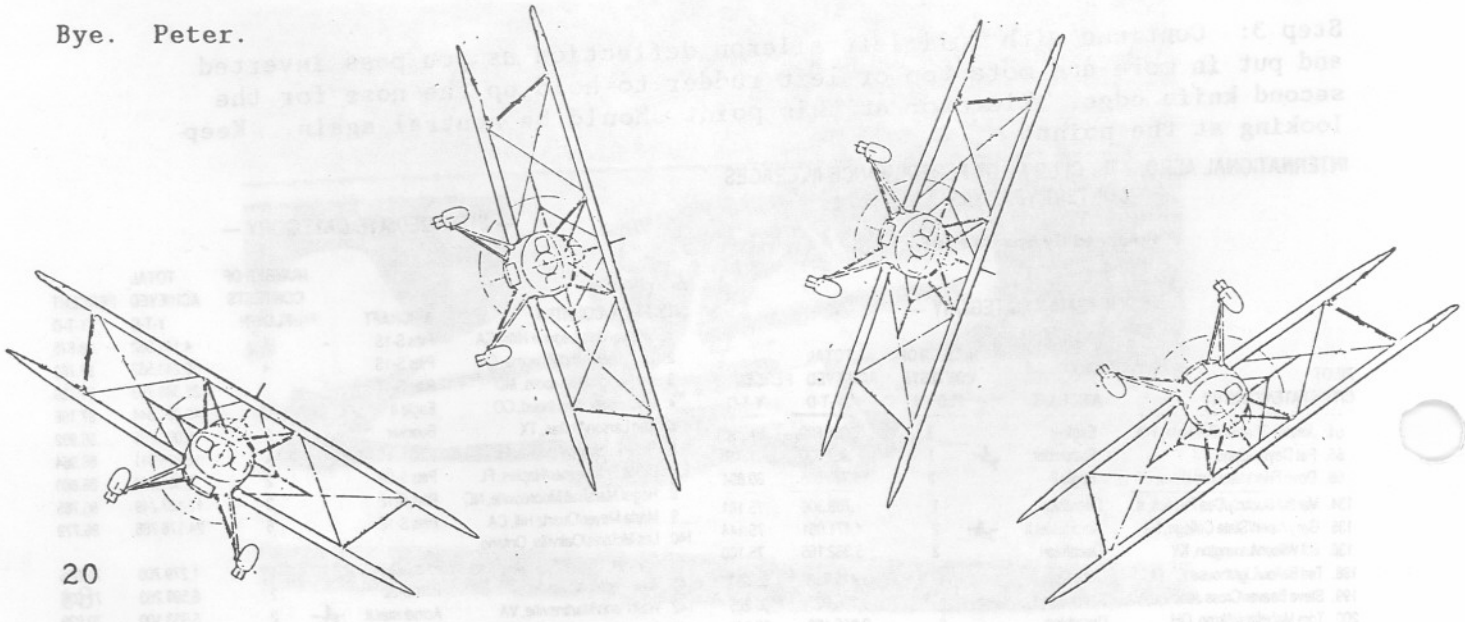
This slow roll is an important building block for all other compound figures and needs to be mastered before other figures can be combined with it. I think that the slow toll is best approached in segments. Practice each as its own maneuver and then when comfort and speed has built up, put them all together. Practice going from level flight to knife edge flight and back to level flight in both direction while keeping the nose on your previously picked point. Do this until you can do it perfectly. The reason to practice things to the right and left is to not become handed, that is, so we can do rolls to the left or right.

Practice going from level to inverted flight and back keeping the nose on the point (not that easy). When you get this right, you've almost got it, just put the 2 halves together and you're there.

IMPORTANT: If you fall out of the maneuver (we all do) DO NOT pull thru (split 'S'), roll to upright then pull, make sure wings are level then pull. Pulling thru while inverted will cause you to lose too much altitude and get your speed way past that red zone thing you probably have on your airspeed indicator. Pulling up with the wings not quite level will increase your "g" loading on your pull out once again going past the red mark on that 'G" meter you should have. A "G" meter is a good idea if you plan to do aerobatics so you can tell if you have overstressed your airplane, and to get a feel of what certain "G" forces feel like, besides most spam can, I mean metal airplane drivers probably have not often seen them, especially when they read +5, -4 when you land! Since my Starduster weighs in at a hefty 1397 lbs., I set my "G" limit at +5, -5, if your duster is much lighter, you could go up to +6, -6 but +5,-5 would be better.

In regard to (-) "G" all I can say is its interesting, nothing like having all the blood in your whole body try to come out your eyes, at least I know that no blood vessels in my head were ready to pop!

Bye. Peter.



Names and addresses of pilots who have flown considerable aerobatics with the Starduster Too.

N3011O	Al Pietch Box 14 Minot Airport Minot, ND 58701 (701) 852-8092	200 hp low empty weight sprayer duster F.B.O. pilot extensive airshow work, have video of this airplane doing aerobatics
N4908	Oscar Bayer 250 Stanton Street Arryo Grande, CA 93420 (805) 489-0915	200hp symetrical wing flight instructor and aerobatic pilot
N2MR	Roger Rourke Rourkes Roost Star Route Box 108 Mara Copa, CA 93252 (805) 766-2753 Wk (213) 390-1144 5616 Curryne Place Culver City, CA 90230	200 hp IAC member competed with single place Starduster and Pitts, raced at Reno sport biplanes, I don't think he competed with the Starduster Too but totaled it out while doing aerobatics
N333Q	Joe Hartung Waterloo Subdivsion 52 Robin Drive Ventrees, LA (504) 638-7719	260hp has performed extensive airshow aerobatics, I have some video of this airplane doing aerobatics at 1986 Starduster Fly-in. I think the the airplane is for sale.
N38PM	Maynard Ingalls 18385 Castle Ridge Morgan Hill CA 95037 (408) 778-5161	260hp has done some aerobatics with the bigger engined Stardusters, is proficient and is a super guy would be of some value to talk to him.
N2HC	Peter Cavallo 2021 Ocean Avenue #217 Santa Monica, CA 90405 Hm (213)396-2777 Wk (1-800-962-2999 Accelerated Spark Plugs	260 hp has flown I.A.C. competition aerobatics and writes articles Re:S/D Magazine Acro
N2HC	Bob Dwyer 2941 North Rio Verde Dr Tucson, AZ 85716-3544	Previous owner of N2HC ex marine corps F-4 pilot may be of some help, also a great guy
N610JB	Steve Beaver 201 Masters Drive Cross Junction,VA 22625 (703) 888-3920	180hp has also competed in I.A.C. contests competition Aerobatics.

— SPORTSMAN —

	PILOT CITY/STATE	AIRCRAFT N NUMBER	KNOWN	FREE	UNKNOWN	TOTAL	% OF POSSIBLE
	Dennis Yugo/San Rafael, CA	Pitts S2A/N33RS	1077.859	1082.995	1070.146	3231.001	90.5
	Robert Scherer/San Jose, CA	Eagle II/N118E	1040.197	1043.975	1038.544	3122.716	87.5
	Gene Griesel/Scottsdale, AZ	Pitts S2B/N6025L	1036.604	1069.629	1003.733	3109.966	87.1
	Gil Tellier/West Hills, CA	Decathlon/N5503H	1051.459	1027.187	1030.036	3108.682	87.1
	Bret Ebaugh/Ventura, CA	Decathlon/N2975D	1029.993	1052.084	1025.351	3107.428	87.0
	Buck Cobb/Plymouth, CA	Eagle II/N11CK	1026.240	1039.029	1037.201	3102.471	86.9
	Sture Devemark/Woodland Hills, CA	Pitts S2A/N31474	1026.025	1016.248	1005.625	3047.898	85.4
	Vickie Carlton-Byrne/Santa Paula, CA	Pitts S1D/N38ODS	930.531	1020.976	1025.299	2976.806	83.4
	Dwight Obenchain/Simi Valley, CA	Pitts S2D/N31465	1007.510	995.055	964.818	2967.383	83.1
	David Friedman/Woodland Hills, CA	Eagle II/N104HP	1017.375	919.951	999.967	2937.293	82.3
	Aaron Rogers/Ventura, CA	Decathlon/N2975D	978.557	993.214	964.956	2936.727	82.3
	Peter Cavallo/Santa Monica, CA	Starduster/N2HC ★	957.325	953.635	950.686	2861.646	80.2
	Douglas Hansmann/Irvine, CA	Great Lakes/N6220L	942.083	959.380	934.514	2835.977	79.4
	Edan Shalev/Los Angeles, CA	Decathlon/N2975D	995.626	932.518	853.383	2781.527	77.9
	Bill Jacobus/Newport Beach, CA	Decathlon/N50389	933.662	914.647	923.016	2771.325	77.6
	Doug Jardine/Murrieta, CA	Pitts/N129DJ	863.235	969.589	818.521	2651.345	74.3
	Ken Kranz/Palmdale, CA	Decathlon/N2975D	929.354	1018.326	—0—	1947.680	54.6
	Mark Matye/Ventura, CA	Pitts S1L/N12AA	811.383	504.621	—0—	1316.004	36.9

ITSMAN CHIEF JUDGE: Bruce Jones, San Francisco, CA — SPORTSMAN JUDGES: Chuck Alley, Mission Hills, CA; Mike Harris, Somona, CA; Ron Straub, Mesa, AZ; Jim Clapper, Phoenix, AZ; Fred , Tucson, AZ — SPORTSMAN ASSISTANTS: Don Kohorst, Ramona, CA; Jim Howell, Studio City, CA; Mark Posey, San Diego, CA; Bobbie Blackwood, Somona, CA; John Walkup, Chandler, AZ; Jon , Mesa, AZ.

Cam and Tappet Wear

The lobes of the camshaft and tappets which they continually operate against have always been subject to wear. Someone recently stated that in recent years there has been an unacceptable rise in the occurrence of spalling tappets and worn cam lobes. Is this a factual statment? Perhaps it may help if we take a look at one or two of the causes of wear on these parts. From this we may reach a conclusion about why this statment could possibly be true today.

Corrosion is a known cause of tappet and cam wear. The engines of aircraft that are not flown regularly may be extremely vulnerable to corrosion. When the film of oil drains from the interior parts of the engine after it has been run, those parts become prey to the chemical changes which are caused by moisture, acids, and oxygen. Tappets from engines which have not been operated for long periods have been closely examined. Under a microscope, it is not unusual to find microscopic pits on the face of the tappet. This is the begining of trouble. Starting with these very tiny pits, tiny particles of rust also affect the cam lobes. Once started, the process is not likely to stop until the wear reaches a point where these parts are doing an unacceptable job.

Some people might question the assertion that engines can attract unusually large amounts of moisture. Brief operating periods, low engine oil operating temperatures, and condensation all contribute. It may be very surprising to take an engine which has flown 15 to 25 hours over the course of four to six months and drain the oil into a clear container. The amount of water which settles to the bottom is likely to be more than one would expect. Also remember that combustion causes acids to collect in the oil. When these are not removed by regular oil changes, the acids as well as the moisture will promote the growth of microscopic pitting which eventually leads to excessively worn tappets and cam lobes.

Another factor in the unacceptable rise of tappet spalling in general aviation engines may be the product which is put into many of those engines at overhaul. To reduce the cost of overhaul, there is an increasing tendency to install reground camshafts and tappets into these engines. Although cam shafts may be reground, there is a very strict limit on the amount of grinding which can be tolerated. Grind to much and the hardened surface of the cam lobe is gone. After this kind of grinding, the cam may look great but it will be wearing on the soft metal which was once protected by a hardened surface. Textron Lycoming does not recommend the use of ground tappets under any circumstances, but many engines overhauled in the field today come back to the owner with reground tappets and camshaft. In some cases at least, these items are nothing more than good looking junk.

Becaused of the high percentage of refurbished parts which go into many overhauls, and the many airplanes which sit for long periods without being flown, there could be more tappet spalling today than in the past. These are some of the reasons why the statment that there has been an unacceptable rise in spalled tappets and worn cam lobes in

recent years might just be true. Ask about the parts which are going into your overhaul. It may be less expensive for new parts at the time of overhaul than it is to pay for replacing worn out parts before your engine has reached its expected TBO.

The above information was supplied by the April 1991 issue of the Lycoming Flyer.

EDITORS NOTE :

Along with this article I have now been advised by more than one source that an obscure Service Bulletin exisists relating to machining of valve spring recesses where the valve spring seats on the top of the cylinder head, apparently when you buy new valve springs and parts they supersede the old ones and require the machine work to take place. It is my understanding that if the new valve spring assembly is installed in a cylinder head without the machine work being performed, the valve spring will bottom out thus allowing excess cam and lifter wear. I do not know whether it happens on just the 0320 or the 0360 Lycoming engines as they have had problems with other Lycomings as well. How one source discovered this was after about 200hrs on a complete overhaul, metal was discovered in the screen. A second overhaul was completed after another 200 hours and again metal was found in the screen. After disassembly of the engine it was found that the exact same cam lobes and lifters were worn on identical cylinders that had occured prior to the first overhaul.

Apparently it is not very obvious during assembly of the cylinder and valve train to determine that the valve spring bottoms out. But it is certainly something to lok for.

Along with this article something should be said about the oil used in aircraft.

GA BILLINGS & SHIPMENTS DOWN

Both shipments and billings for general aviation aircraft declined in the first three quarters of 1991.

According to statistics released by the General Aviation Maufacturers Association, aircraft builders reported a 9.8 percent drop in billings and a 10.9 percent decline in the number of new aircraft delivered compared to the same period last year. Manufacturers shipped 749 airplanes worth $1.3 billion dollars, compared to 841 aircraft worth $1.5 billion in the first three quarters of last year. The bankruptcy of the Piper Aircraft Corp., products liability costs and concerns, and the stagnate economy all contributed to the lackluster performance, according to GAMA.

Shipments of new single-engine aircraft dropped by 4.7 percent, from 445 to 424. Piston twin deliveries were down by 50.6 percent, from 77 to 38. Turboprop shipments decreased from 201 to 167.

Only business jet shipments were up by two airplanes from 118 to 120, and increase of 1.7 percent. Sounds kind of bleak doesn't it?

James D. Gormely, president of GAMA, says the current state of affairs "sets the stage for improved performance during the better economic times predicted for the future."

AIRCRAFT OIL

In the begining we had only straight grade mineral oil, as it was the only thing available. Today we have numerous types of oils to choose from. The most common being ashless-(dispersant or AD), metalic ash, multi-viscosity, semi-synthetic and full synthetic.

Oil has three basic functions: to lubricate, to cool, and to help keep the engine clean. Of course lubrication is its most important function.

Another important thing to remember about oil is its viscosity, and by its defintion is, its resistance to flow. Hot and cold temperatures affect this ability. Aviation oils are classified with numbers of 80, 100, and 140, which denotes there approximate viscosity. The S.A.E system then divides these oils into seven groups, from S.A.E. 10 to 70 Wt.. Using 130 F degree or 210 F degree to determine its viscosity at these temperatures oil weight and viscosity should not be confused, as they are two different specs used as standards during the refining process.

(Straight Grade Mineral Oils) Worked well for many years, but had two main drawbacks. One of which was its tendency to oxidize at high temperatures. The other was its poor detergent qualities.

(Metalic Ash Oils) Was the first of the detergent oils and was used with mineral oil. It loosened up sludge and carbon which caused as much harm as it did good. This oil was never fully approved by engine manufacturers and has since disappeared from the market.

(Ad Ashless Dispersant) Is one of the most common oils in use today. It is approved by all engine manufacturers, and has great anti-sludge and carbon properties. It holds these deposits in suspension so that they can be caught by the filter or removed during oil changes. AD oils are so good that they are not used for new engine break in period as this is where straight mineral oil comes into use, and then the AD oil is used after break in.

(Synthetic and Semi-Synthetic Oils) Is becoming more popular and appears to be better than even AD oils. The wonderful things about synthetics is its ability to operate at extreme temperatures high or low, and it has been sucessfully operated at -40 degrees below zero (with no preheat). As a result of their high temperature stability, synthetics are less prone to oxidize or decompose to form sludge. They are also approved by engine manufacturers for use in their engines.

(Multi-Viscosity Oils) Are one of the newest and best things to happen in the field of aircooled aircraft engines, they also work at high and low temperatures and keep sludge, dirt and carbon suspended between oil changes.

So it looks like either synthetics or multigrade oils are the way to go. But before you change, you should make sure that these oils are compatible with your engine and past oil history.

As a mechanic for several years I have never been a believer of instant overhaul out of a can, but I am finding that some of our newer technology products are clearly superior. There is also some difference of opinion that multigrades and synthetics have a tendency to run off the cam and lifters much easier than do the straight grade oils. Especially on Lycomings. I also believe that if you fly your airplane regularly it will do more good than harm no matter what kind of oil you use.

Whatever decision you make, using a good quality oil and changing it regularly is the best advise I can give you. The choice is yours.

D.C.B. - Editor

The Annual Stardust er Open House's 12th Anniversary

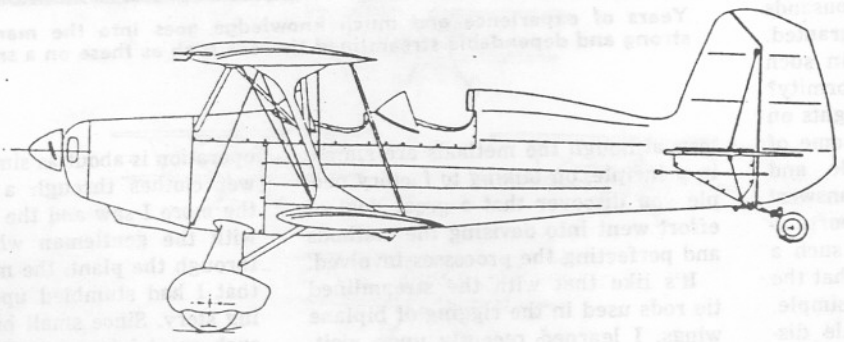
Mark
Your
Calenders
For

When = MAY 1st, 2nd, & 3rd 1992

Where = Flabob Airport, 4301 Twining
Riverside, California 92509

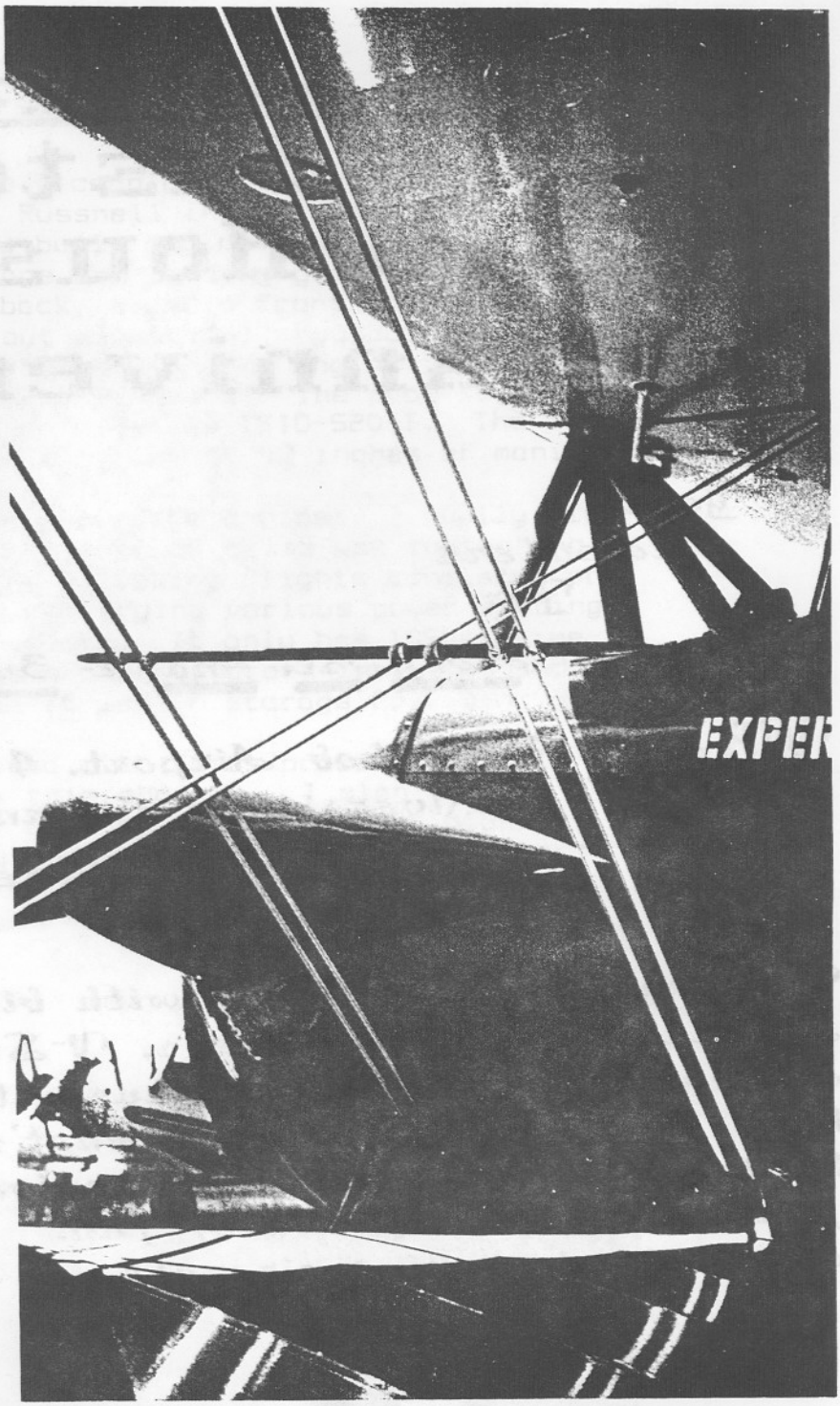
Why = Eat, Drink & Share Stories

We want to fill Flabob with biplanes, Stardust er's Aerodust er's, V-Star's, Starlet's or anyother homebuilt enthusiast. We want you here with your airplane. What's really happenings is its our 12th anniversary. Come join us for a weekend of fun. Trophies to be awarded to winning aircraft.



All About Streamline Tie Rods

By Bob Whittier, EAA 1234
Box 543, S. Duxbury, Mass.



Years of experience and much knowledge goes into the manufacture of strong and dependable streamlined tie rods such as these on a small biplane.

OUR DAILY LIVES are full of commonplace items — paper clips, sandpaper, steel wool and thousands of other things we take for granted. How are they manufactured in such quantities and with such uniformity? You can lie awake for many nights on end trying to figure out how some of these common items are made, and not come close to the correct answer!

Then when you have an opportunity to visit a factory in which such a product is made, you discover that the process used is basically very simple. So simple that you are a little disgusted with yourself for not having guessed at how it is done! Nevertheless, although the methods are simple in principle, on talking to factory people you discover that a great deal of effort went into devising the methods and perfecting the processes involved.

It's like that with the streamlined tie rods used in the rigging of biplane wings. I learned recently upon visiting the Macwhyte wire products factory in Kenosha, Wis. Basically the operation is about as simple as putting wet clothes through a wringer. But the more I saw and the more I talked with the gentleman who guided me through the plant, the more I realized that I had stumbled upon a fascinating story. Since small biplanes are of such great interest to EAA members, here it is!

(Continued on next page)

ALL ABOUT STREAMLINE TIE RODS . . .

(Continued from page 15)

About a dozen years ago, the manufacture of streamlined tie rods was in danger of slipping into the realm inhabited by the making of buggy whips and wooden automobile wheels. Nobody was manufacturing biplanes anymore and the business had dropped off to the point where there was only a small demand for short tie rods used to brace tail surfaces and sometimes wing tip floats on flying boats. The advent of the cantilever monoplane further reduced the market. The Macwhyte Company, a division of AMSTED Industries, was seriously considering phasing out the tie rod operation.

Fortunately at just about that time, Grumman came out with its AgCat crop dusting biplane and Macwhyte decided to hang on for a while longer. Then something else happened that nobody could really have foreseen — the biplane came to life again! Not factory-built ones, to be sure, but small ones built by individuals in their garages and basements for sport flying. More and more, the Macwhyte people found themselves receiving orders from all parts of the country for tie rod sets for a variety of popular small biplanes. It was the importance of streamlined tie rods to sport aviation that led me to visit this factory to see what tie rods are all about.

Kenosha is a medium-sized manufacturing city of 78,700 persons on the shore of Lake Michigan. The Macwhyte establishment consists of several buildings on both sides of 14th Ave. On the east side of the avenue are several large buildings which house the firm's wire rope manufacturing division — representing by far the largest bulk of their business. On the west side of the avenue and in the center of the block is the firm's office building, flanked by parking lots. I entered this and presented myself to the receptionist. I had an appointment with Robert B. Whyte, Jr., superintendent of the company's Fabricated Products Division.

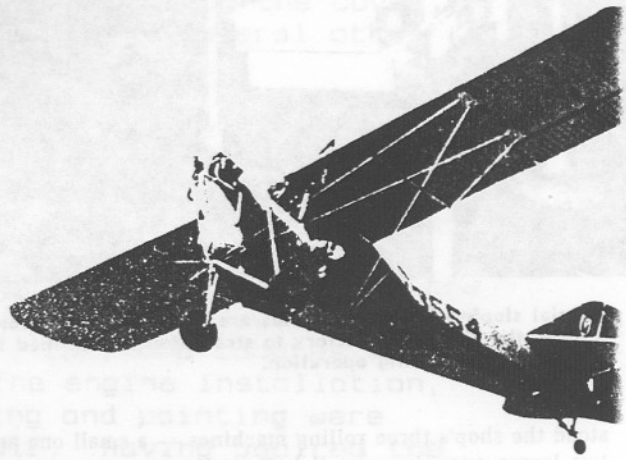
As Mr. Whyte and I walked one hundred yards south to a building on the corner of the block, I noticed the name "Macomber and Whyte Wire Rope Company" carved in the stone arch above the doorway to one of the wire rope buildings. To make small talk, I asked if the name "Macwhyte" was coined from those two. Mr. Whyte confirmed this and gave an interesting account of how the company was started and how it found itself in the business of making, among other things, streamlined tie rods.

According to him, streamlined tie rods were first made in Europe during World War I. In those days the European aircraft industry was somewhat ahead of our own, and when we got into the war, representatives of our aviation industry were sent over there to learn as much as they could in order to help increase the output and quality of warplanes we planned to build in large numbers. This state of affairs affected one member of the Macomber and Whyte staff.

Mr. Whyte explained that his uncle, George S. Whyte, came to this country in 1883 from Crossgates, Scotland, with his parents and seven younger brothers and sisters when he was 16 years old. By 1896 he was a young man and together with F. B. Macomber, founded a small sales agency for wire rope. The business grew and by 1901 they were manufacturing wire rope themselves. Macomber left the company in 1915, after which the firm name was changed to Macwhyte in 1920. When the United States entered the war, the company began selling wire rope to the booming aircraft industry.

The Whyte family had kept in contact with people back in Scotland, including persons associated with Bruntons, Ltd., a wire rope manufacturer in Musselburgh, Scotland. They learned that Bruntons had developed streamlined tie rods for British military aircraft.

Streamlined tie rods such as those bracing the wings of this Aeronca C-3 offer seven times less air resistance than stranded wire rope of equivalent strength.

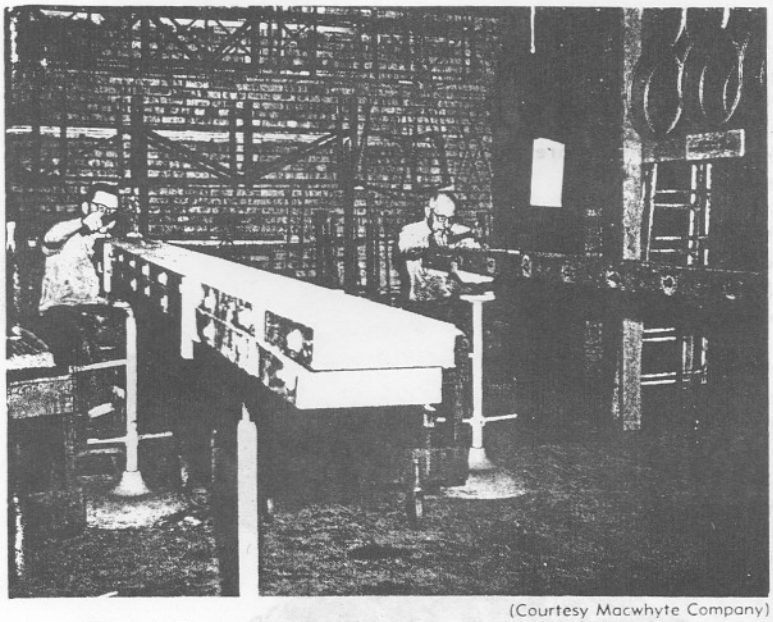


Realizing that such rods would be of great value t the fledgling U.S. aircraft industry, a brother, Robert Burn Whyte, Sr., went to Scotland in 1917 to see for himsel how this new product was made. Tests showed that streamlined tie rod had one-sixth the air drag of a roun one, and one-seventh that of a stranded cable. This reduc tion in drag could add as much as 10 percent to the spee of an airplane.

As an interesting historical sidelight, Mr. Whyt added, his father's notes showed that in the winter o 1917-18 the Brunton firm employed 77 men, 327 wome and 59 youths on streamlined tie rod production alon The elder Whyte brought back from Scotland not onl knowledge of how to make the rods, but also at least on of the three special rolling machines I was soon to see.

The building we presently entered was about the siz of a fairly large airplane hangar, and my first impressio on glancing around inside was that it looked a lot like general purpose machine shop. And in a way that is wha it is, for this part of the Fabricated Products Divisio makes many things, especially products using the wir rope made across the street. Products include contro cable assemblies with swaged terminals for the aircraf industry, stainless steel rigging cable for yachts, stream lined tie rods for mast stays on large racing sailboats, an a wide variety of harnesses, slings, operating cables an bracings for automotive, agricultural, mining and indus trial uses. Mr. Whyte stressed that aircraft tie rod produc tion is but a small part of the show here, and the com pany might not continue this operation indefinitely. There are factors such as overhead and specialized labor to b taken into consideration — much will depend on the trend of the demand for streamlined tie rods in coming years.

The side door through which we had entered put us right in the area of the building where streamlined tie rods are rolled. Within a score of feet of one another



(Courtesy Macwhyte Company)

Special sloping hardwood tables are used by skilled workmen in the Macwhyte factory to straighten streamlined tie rods after the rolling operation.

stood the shop's three rolling machines — a small one and two larger ones. In over-all bulk and appearance they reminded me of milling machines, but where the cutter and table of a milling machine would be, they had a pair of matched steel rollers.

Each pair of rollers, I quickly saw, had about six grooves cut in the highly polished surface. Imagine a pair of large size "Hawaiian Punch" tin cans that have stiffening grooves rolled in their sides. Transform these into solid steel and mount a pair of them like the rollers in a clothes wringer and you have the set-up visualized quite well.

The smaller machine has rollers 5 in. in diameter and 7 in. long, and the two bigger ones have rollers a few inches larger. Each of the grooves is of a size appropriate to the task of rolling raw material of various sizes into streamlined tie rods. The small machine handles raw stock to produce finished rods ranging in size from 6-32 to ¼ in. thread size, and the larger ones can handle raw material up to ¾ in. in diameter. In answer to my question, Mr. Whyte said, "Yes, it can truthfully be said that the single smaller machine has turned out an overwhelming majority of the streamlined tie rods used on small airplanes in this country from 1918 to this very day!"

Standing by the smaller machine, I saw electric motor controls which reminded me of those on an old-time electric streetcar, and assorted knobs and wheels which were used in raising and lowering the upper roller during the process. Reaching a dozen feet or more to each side of the rollers was a long, narrow table to support the rod material as it passed back and forth between the rollers.

One of the skilled workmen demonstrated the process. The upper roller is raised by its jack screws enough to allow the raw material — a length of round steel rod — to be inserted and positioned in the appropriate set of roller grooves. The roller is then lowered with enough force to pinch the rod a trifle. The rollers begin to revolve and the rod feeds between them, being partially flattened by their pressure.

At the end of the first pass the rollers are stopped and moved closer together by the jack screws. The rod is then fed back through the rollers. About four passes through the rollers transforms the round raw material into the familiar streamlined shape.

Simple enough — until some of the fine points of the operation are pointed out! Then the realization comes that a very substantial amount of experience and skill is required to manufacture streamlined tie rods.

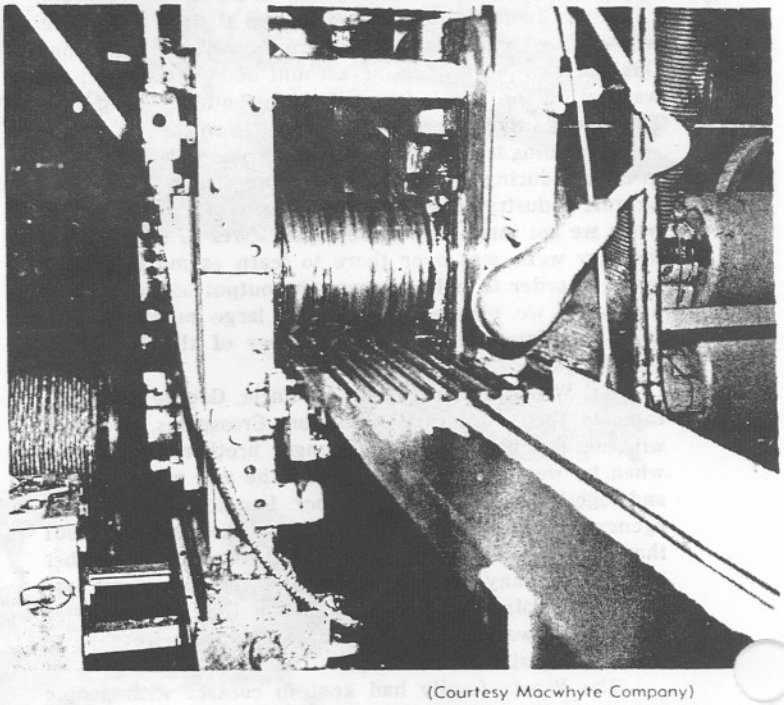
With each pass through the rollers, the rod becomes longer. Mr. Whyte explained that this feature of the process is both valuable and tricky. By the time the round rod has been given full streamlined shape, it has become about twice as long as it was in the beginning. Taking into account the unrolled sections at each end where terminals are threaded onto a finished rod, experience is needed to decide what length of raw material to start with so that after rolling, the tie rod length ordered by customers will be achieved.

The cold-working of the metal as a result of the rolling operation increases its tensile strength from approximately 150,000 lbs. per sq. in. to approximately 215,000 lbs. per sq. in. Technically speaking, it is a cold-working operation since no external heat is applied, but the metal does become quite hot as a result of internal friction that accompanies the rolling. As a rod passed back and forth in front of me, I could see wisps of smoke rise from it.

The upper roller has to be moved down an appropriate distance for each pass so that at the end of the usual number of passes, the two rollers will be in contact with each other and the grooves in them will have brought the rod metal down to finished size.

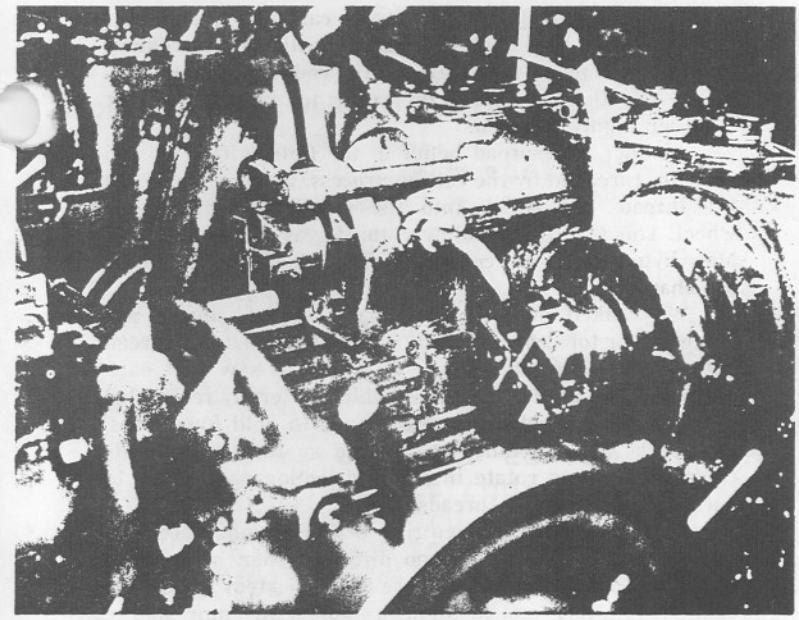
Operator skill is put to its most severe test in the matter of controlling the rotation of the rollers. The operator cannot slow down the rollers near the end of a pass and then rotate them bit by bit to the end of the pass, for to do so would leave roll marks in the metal. With each succeeding pass these would be worked into the metal and would constitute flaws. So it's like making a spot landing in an airplane with power off — you touch down just right the first time, or it's no go! The rod passes through the rollers at a speed that I judged to be comparable to the speed of clothing going through a wringer or perhaps a trifle faster. A nice eye and hand are needed

(Continued on next page)



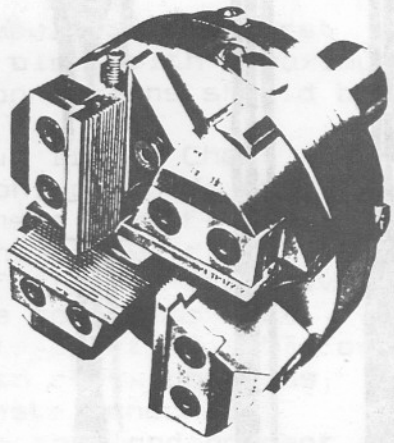
(Courtesy Macwhyte Company)

The basic operation in making streamlined tie rods is performed by the two grooved steel rollers in this machine. One is visible; its mate is below the level of the table which supports and guides rods as they pass back and forth between the rollers.



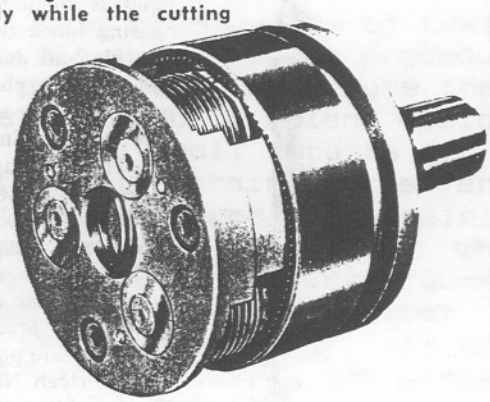
(Courtesy Macwhyte Company)

Close-up of the twin "heads" on a thread cutting machine used in the Macwhyte plant for threading streamlined tie rod ends. Lubricant flows copiously while the cutting operation is in process.



(Courtesy Landis Machine Company)

This "head" for a thread cutting machine is fitted with "chasing blocks." It is with a device like this that end threads are cut on Macwhyte streamlined tie rods. The smooth, gradual cutting action results in accurate and dependable threads.



(Courtesy Landis Machine Company)

Compare this thread-rolling "head" with the type used with chasing blocks. The three rollers press threads into the metal. Contrary to widespread belief, the threads on the ends of streamlined aircraft tie rods are not rolled, they are cut by the "chasing" method.

ALL ABOUT STREAMLINE TIE RODS . . .

(Continued from preceding page)

to shut the motor off just at the right moment at the end of each pass.

After about four passes through the rollers, the new streamlined tie rod is quite wavy as a result of molecular flow during the cold working. So after the last pass the rollers are raised a few thousandths of an inch and the rod is passed through again as a preliminary straightening operation. Also, the leading and trailing edges are not perfectly smooth and later in the finishing operation they are rotated by hand against a very fine abrasive belt to smooth and round them off.

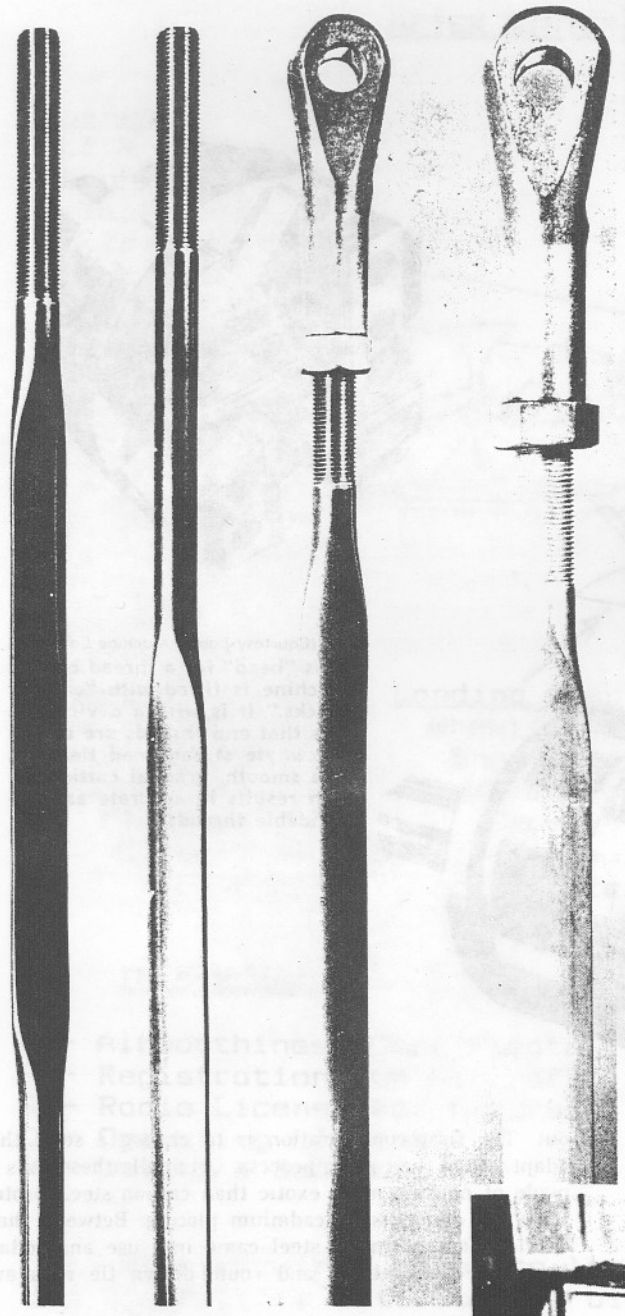
Surplus round material left on the ends is trimmed off before the threading operation. The length of finished rods is measured from extreme end to extreme end of the threaded ends at this stage. If several rods of identical finished length are laid side by side, you'll see a slight variation in the places where the streamlined sections taper into the round ends. This is an outcome of each rod having been rolled "by eye" and is not a defect in manufacture. The practice of measuring rods from extreme end to extreme end of the threaded portions rather than by the length of the streamlined section is for the purpose of assuring correct fit when rods are installed on an airplane.

It is rather widely assumed among aircraft people in the field that streamlined tie rods are made of 4130 chrome-molybdenum steel as are many items of hardware such as steel tubing. But this is not so, Mr. Whyte pointed out. The first consideration is to choose a steel that is adaptable to the rolling process. Originally these rods were made of nothing more exotic than carbon steel, protected from the elements by cadmium plating. Between the two World Wars, stainless steel came into use and today all Macwhyte streamlined and round-drawn tie rods are of this material.

Its better resistance to corrosion is valuable, of course, but in most cases exclusive use of stainless steel is because it is not economical to stock two kinds. Because stainless steel for tie rods is made to order to Macwhyte's specifications, it must be ordered directly from the steel mill. This requires that the volume must be large enough to be economically produced at the mill. Macwhyte orders as much raw stock as possible at one time for this reason, so it would not be feasible to split orders between carbon and stainless steel.

Material for streamlined tie rods is made for Macwhyte by Allegheny-Ludlum and is 18-8, type 316 stainless, developed for the purpose. The specifications assure proper ductility for the rolling process, good fatigue resistance, high tensile strength and certain stretching characteristics under prescribed loads.

The material's surface finish is very important, too, for any flaws would be rolled into tie rods and would create weak spots. In his business, Mr. Whyte noted, they are as particular about terminology as we are in aviation. The raw materal is referred to as **bars.** After the rolling process, they are called **rods.** This is because any material



(Courtesy Macwhyte Company)

Typical streamlined tie rods with and without their terminals. Long experience with materials and methods combined with skilled labor goes into their manufacture. Farthest left of these rods has a round section in it so that two such rods can cross without damaging one another. Note clean, fine threads produced by chasing blocks.

that is drawn through a die is correctly called a wire; anything that is rolled from billets is called rod, and bars are short rods that have been ground all over to remove all mill rolling marks. Aircraft tie rod raw material is therefore called bars, carefully ground to uniform diameter and then highly polished.

Another widespread belief in the field is that tie rod ends are threaded by the rolling process, by which is meant the threads are rolled into the metal with a suitable wheel. This is definitely untrue insofar as the widely used Macwhyte tie rods are concerned. Threads on these tie rods are **chased.**

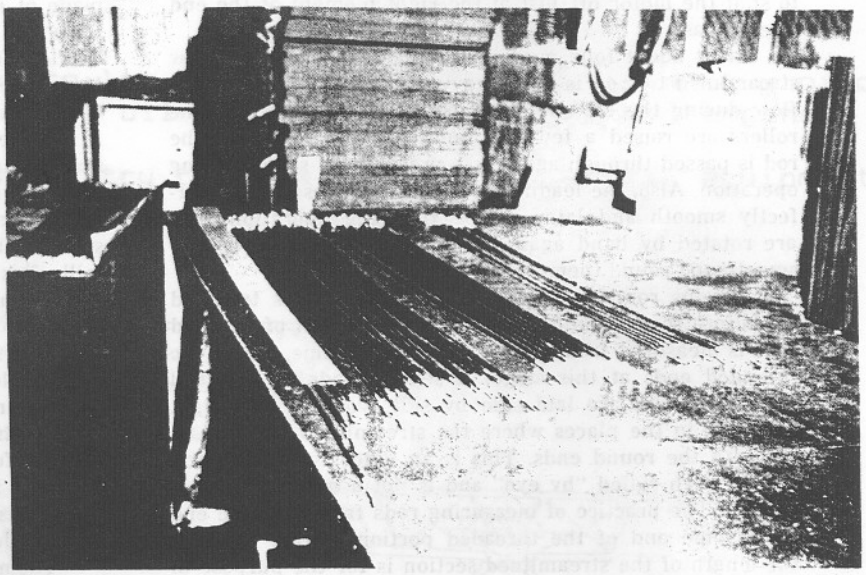
We walked over to a battery of squat, square machines, their tops covered with moving parts. Landis thread cutting machines, Mr. Whyte explained. I saw that each one was fitted with two "heads" which generally resembled lathe chucks, but which were designed to hold four "chasers" each. The machines are geared so that their heads could be made to rotate in either direction as desired, to cut right or left hand threads.

As far as the actual cutting action is concerned, the process called "chasing" is no different than using hand dies, but the equipment is more sophisticated. Photos accompanying this article show a Landis machine and a close-up of a head fitted with four chasing blocks. Each block is made of high grade steel and, for the task at hand, is about the size of a domino. On one side of each chasing block there are many parallel "V" grooves, each as wide and deep as the thread to be cut. The working end of each chasing block is ground to a blunt chisel point, the over-all effect being comparable to many miniature lathe cutting tools lined up and fused together.

The working ends are also ground with a slight rake as seen from the top, so that the first tiny cutting point to contact a tie rod end just "wipes" the rod's surface. The second cuts a trifle deeper, and so on. So instead of ripping a single large shaving out of the tie rod metal in one course cut, the chasing process cuts the thread a little at a time and produces a clean, vibration-resistant thread.

My guide pointed out that Macwhyte tie rods are given an American National Fine Thread, class three medium fit. To achieve this the chasing blocks have to be expertly adjusted in the heads to get the correct cut. While the

(Continued on next page)



(Courtesy Macwhyte Company)

Finished streamlined tie rods ready for shipment. Amateur airplane builders should be careful when ordering them to understand method of measurement thoroughly as given in manufacturer's catalog, as each set is custom-made and mistakes are costly.

ALL ABOUT STREAMLINE TIE RODS . . .

(Continued from page 19)

cutting operation is going on, lubricant flows copiously over the work.

The belief that tie rod threads are rolled is so widespread that this is an appropriate time to say something about that method. The Landis machine can perform many tasks and when desired can be fitted with thread-rolling heads. The working tools are three small steel rollers having the desired threads cut on their faces. As they press in on the work the threads on the rollers form the metal into threads in a manner that can be compared to the way a common tube cutter's wheel presses into copper tubing.

When threads are being rolled, some of the material being worked is displaced up into the grooves of the rollers. Thus the diameter of the resulting threads can be greater than that of the base stock. When for any reason it is desired to have rolled threads, it is necessary to start with stock of some specific smaller diameter, depending on the rolling process to bring the threads up to size to properly fit whatever standard thread diameter is used in the related nuts or terminals.

This would open the door to quality control and production problems in the case of streamlined tie rods. Without going into detail, it can be said that all things considered, Macwhyte has found the chasing process to be the better, more reliable way of threading streamlined tie rods. Rolling has its applications in other products, but you can take it from Mr. Whyte, who has been around tie rods all his life, that the threads on Macwhyte tie rods are **not** rolled — they are chased!

Here another point of confusion might well be cleared up. When assembling an airplane, many mechanics have wondered about the threads on the ends of streamlined tie rods. It looks as though they have taken material out of the rod material and thereby reduced its effective working diameter. I asked Mr. Whyte about this. He began his reply by asking me to remember how the raw material had been elongated when it passed through the grooved rollers that formed it to streamlined cross-section. This elongation quite understandably also reduces the cross-section of the streamlined section. This is compensated for by the increase in tensile strength that results from the cold working. The round ends which are threaded for terminals have somewhat greater cross-sectional area than the streamlined section, so even when threads are cut in them they still have ample metal left.

Mr. Whyte explained that published breaking strength figures for streamlined tie rods give the **minimum** breaking strength. If you were to test a batch of these rods, you would find that a majority of them would withstand more pull before breaking. Since there is a well-reasoned and proven safety margin here, all hands can stop worrying about streamlined tie rods breaking — at the threads or anywhere else! Use the correct size for the loads to be encountered and the airplane will be a safe one.

We watched one of the Landis machines in action. Its gears were set to rotate two heads in opposite directions. The operator fed the ends of two tie rods into clamps which held them securely. The whirring heads went to work and in a very short time left and right hand threads were put onto appropriate ends of two more tie rods.

At this stage, Mr. Whyte commented, basic forming and machining was finished. To show me remaining steps in the manufacture of the rods, he led me to a room on the far side of the main shop. There I saw the two strangest tables imagineable. Made of hardwood planks cross-bolted together, they were perhaps a foot wide and many feet long. One end of each was at eye level and the other end at waist level. On these tables final straightening work was done.

One of the workmen laid a streamlined tie rod on his table and squinted along its length. Observing a wave in it at a certain place, he walked along the table to that point and carefully tapped the wavy area with a bronze hammer. Then he squinted along the rod again and repeated the process. Once in a while he applied a special tool to the rod and gave it an expert twist to supplement the hammering. Bit by bit, he got the rod to lie flat and straight on the table.

The final step was polishing and finishing. As mentioned earlier, leading and trailing edges of the streamlined rods are smoothed off with a fine belt sander. Some nice wrist action was displayed by the man performing this operation! Nearby, two other men were running rods under some large cloth polishing wheels to impart the final, mirrorlike finish. Stainless steel tie rods are not chrome-plated; the brightness they exhibit is produced by this polishing operation. If an airplane owner wipes them with an oily cloth once in a while, they will stay that way for years.

Mr. Whyte also showed me how they make the type of small, round tie rods used for internal wing bracing and similar applications. The round rod which is the raw material is swaged to provide a starting place and a split die is clamped around it at this point. A powerful machine grips the rod by one end and pulls it through the die, reducing its diameter and at the same time cold-working the metal to increase its strength. When working around small airplanes you may notice quite a difference in tie rod diameter within the wings. It will usually turn out to be that the thin ones have been made this way, and they are quite comparable in strength to thicker, undrawn ones, in addition to being lighter.

I thought to ask Mr. Whyte about the matter of reconditioning rusted, kinked streamlined tie rods from antique airplanes in process of restoration. His reply was that he supposed some of those rods could be prettied up, but they don't do it, and for good reasons. They could not give a customer a firm cost estimate, for there is no way to tell how things will go until the work is actually being done. More important, there is no reliable way to tell how assorted kinks, scratches and rust spots might affect the strength and fatigue resistance of assorted rods. In fact, after being subjected to the necessary working-over, it could happen that a reconditioned rod would be less dependable than it was before being cleaned up. In view of all this, the sensible thing to do is to use a set of old rods as a guide for making up a new set, for a firm price and with assurance of dependability in flight.

By now it was quite clear to me that the manufacture of streamlined tie rods is a highly specialized form of custom machine work, requiring a high degree of skill and experience. As we walked toward the doorway, I saw a table on which were spread out several dozen shiny new streamlined tie rods, ready for shipment. Each set of rods was accompanied by a work order inside a protective frame, each order setting forth precisely what each customer wanted and having spaces for each operation to be checked off. On some of these work orders I recognized the names of people and companies familiar to everyone in EAA and I smiled, for I knew I would probably see those same rods again at a Rockford Fly-In!

I thanked Mr. Whyte for the most interesting tour he had given me, and all the way home my thoughts revolved around how many people, how much experience and what a variety of special materials are involved in the construction of safe airplanes!

REGARDING FLYING WIRE TENSION

It is my opinion that flying and landing wire tension on the Starduster Too is not critical as the airplane was never intended to be used for competition and most owners do not engage in anything other than mild aerobatics. Basically I believe that the tighness of the wires should be sufficent to prevent the wires from vibrating any excess tension just puts undo compression loads on the spar. I have never used a tensionmeter, but by tightening the wires just enough to avoid vibration, should insure safe flying under normal conditions.

However if you have a Starduster Too, Acroduster Too or any other biplane that is used extensively for aerobatics, flying wire tension can become critical.

D.C.B. Editor

* EDITORS NOTE *

The preceeding information is from several sources, and should help builders and owners in making correct flying wire adjustments depending on how their airplanes are to be used, and although this information is not specifically for the Starduster aircraft it can be used as a base comparison.

Determining Flying & Landing Wire Tensions

The following information idea comes from the Pitts Aviation Enterprises Inc. S-1 Assembly Manual. Their instructions state : "Hold a ruler or yardstick perpendicular to a wire at its midpoint which you have marked with tape. Hook the spring scale through a rope loop at the middle of the wire. A pull of 50 lbs. perpendicular to the flat side of the wire at its midpoint should deflect the wire 1 1/4 inch when the wire is tensioned correctly. Check all eight wires. Following these instructions (we used a thick piece of rope to pull on, tied around the wires so they would not be damaged or sharply bent), we checked a Pitts in the EAA Aviation Museum Foundation. Lo and behold six of the eight wires measured 1 1/4 inch deflection at 50lbs pull and the other two measured 1 3/8 inch. This was pretty remarkable! The Pitts tail "tie rods" are supposed to deflect 1 1/8" to 1 1/4" using the same test. Here we found that this particular Pitts measured very close to these also.

We then ran these same tests on the Acro Sport NIAC. It has slightly different geometry, longer wires, etc. This is what we came up with for the Acro Sport and the Super Acro Sport recommendations. (Use a fifty lb. pull at the wire midpoint, use a rope loop. Do not use wire or sharp objects around the tie rods.) What we used were to two 27 lb. fish scales in parallel. We pull them to 25 lbs. each to give a total pull of 50 lbs. These fisherman's "De-liar" are available in many fishing supply houses.

Tie Rod Location	Deflection at 50 lbs.
Front flying wires	1-3/4"
Rear flying wires	1-3/8"
Landing wires	1-1/4"
Tail wires - Upper	1-3/4"
Tail wires - Lower	1-1/4"
Roll wires	3/8"

For the engineering minded we have a friend who has an old World War II wire tensionmeter. The flying and landing wires measured a 750 lb. tension at the above deflection. This corresponds to a "dull thud". It is felt that the deflection method in getting the correct tension on Acro Sport, Pitts and other aircraft. You may have to work out the geometry for tensions for your own individual aircraft. It might be mentioned that obtaining a tensionmeter of the proper tension for flying wires is somewhat expensive. It is not necessary if one does use the above method of deflection.

Acro Sport II Landing Wire Tensions

The Acro Sport, the Acro Sport I and the Acro Sport II really aren't much different. The tail wires on the Acro I are about two inches shorter. The landing wires are also about 2 inches shorter. The cabane or roll wires are about five inches longer on the Acro II. The rear flying and front flying wires are just about ten inches longer on the Acro II than the Acro I. You should be able to get a pretty good idea by using Acro I information shown above.

Pitts Aerobatic, Box 547, Afton, Wyoming 83110 sells a tensionmeter for aerobatic aircraft.

Another picture of N6573E
Frank Voshells Super
Super Stardusher Inc

FLYING WIRE TENSIONS

Ever wondered how tight flying, landing, and tail wires should be on a small biplane? Now that a couple of biplanes are back in productio namely the Pitts S-1S and S-2, Headquarters gave the factory a call for their guidance.

Pitts Aviation engineer, Gene Dearing, gave us the following tension values, using a tensiometer:

Drag and Anti-Drag in the Wings:

200 lbs. minimum to 350 lbs. maximum

Flying and Landing Wires:

600 lbs. minimum to 750 lbs. maximum

Empennage Wires:

250 lbs. minimum to 325 lbs. maximum

FLYING WIRE TENSIONOMETER

PRICE: $250.00 Sent C.O.D.
ORDER FROM:
HOLLOWAY ENGINEERING
2883 Aiello Dr., #3 • San Jose, CA 95111
(408) 226-5514 • Fax No. 408-226-5929

Tensiometers are commercially available from companies such as Aircraft Components, Benton Harbor, Michigan and Wag-Aero, Lyons, Wisconsin but are rather expensive and it would probably be worthwhile for Chapters rather than individuals to purchase these tools.

January 1991 - **Structural Flying Wire Failures**

Reports have been received concerning the failure of flying wires during flight. The cause is fatigue cracks from small region of pitting corrosion on the wire leading edge. These wires conform to but are not limited to, AN-674 and AN-676. Fatigue cracks in flying wires can be started by such things as corrosion, nicks, cuts and bends, and any scratch deep enough to catch a fingernail. Once a discountinuity occurs, the strength of the flying wire is degraded and repair is almost impossible. It is very important that flying wires be cleaned and inspected on a regular basis. Inspection on every pre-flight basis is recommended. If any discontinuity is found the flying wires should be replaced before further flight. Coating wires with oil or wax will help prevent corrosion. For further information refer to AC43-4. Corrosion control for aircraft.

ACCIDENT REPORTS

◆◆◆

Pilot: 39; Private, SE Land; 248 hours, 39 in make and model.

Aircraft: Dreyer-Starduster SA-300 with 260-horsepower Lycoming GO-435 engine.

Place: Richlands, Virginia.

Narrative: After touchdown and during the landing roll, the aircraft veered sharply to the left. The pilot attempted to correct the action by applying right rudder, but the aircraft veered 45° to the right. The aircraft went off the right side of the runway and came to rest on an embankment of a river that crossed under the runway. The pilot was not injured, but the aircraft was damaged substantially.

Probable causes: Although a malfunction of the tail wheel locking mechanism was discovered following the accident, the NTSB still cited the pilot for not maintaining directional control. They classified the malfunctioning tail wheel lock as a related factor.

CLASSIFIEDS

ADVERTISING CLOSING DATES : DECEMBER 1, MARCH 1, JUNE 1 & SEPTEMBER 1
CLASSIFIED ADVERTISING RATE : $3.00 PER COLUMN INCH - MINIMUM $3.00
MAKE CHECKS PAYABLE TO STOLP STARDUSTER CORPORATION. THANK YOU

STARDUSTER TOO PROJECT - Complete airframe with wing panels. $6,000 OBO. Call (209) 562-1592 after 7pm.

STARDUSTER TOO 1990, 40 TT 180 Lyc. 500 SCTOH New Mags, Stits cover, KX145 Clevlands, Scott Tail Wheel. $25,000 call (208) 529-3858.

---

80 STARDUSTER TOO 185TT 600 SMOH on IO470F, 260hp, Nav/Com KT76A encoder Show winner, always hangered. Call (602) 396-6545.

FACTORY BUILT 78 ACRODUSTER TOO 740 TTAF & E IO360 200hp, Christen Inverted system complete, Recover 1990 Smoke bubble canopy, Intercom Chutes Radio xponder, Beautiful Airplane. $30,000 firm or trade for 4 place hi-perfotmance single. Call (513) 696-2119.

STARDUSTER TOO 239 TT 140 SMOH 200hp IO360 Narco 810 720 Com Narco Xponder with encoder itercom Loran, Pearlescent blue imron w/Light blue Starburst, polished prop Strobes Canopy Inverted system 45 gallon of fuel, Much more, this is a beautiful airplane. Quality workmanship through-out, Over 60,000 invested, make offer or trade, must sell, Pictures available. Ray Gannon (214) 495-8268, 3117 Fieldview, Garland, Texas 75044.

Buy Your Aircraft Needs from Starduster Corporation, much hardware and material. Bill Clouse a good guy to buy from. Visa is now excepted. Call (714) 686-7943 or or FAX : (714) 784-0072 or Call toll free 1-800-833-9102

SA 101 SUPER STARDUSTER One fully aerobatic Symetrical airfoil, Canopy One of a kind mixer controls, Built to compete against Pitts, 200hp Lyc 187 hrs TT, $35,000 Call Ormand Lavoie (406)961-3327

ACRODUSTER TOO PROJECT Airframe finished, Wing about finished, Most parts to finish, No engine or instruments. Call (602) 567-6315.

STARDUSTER TOO 1983, 280hrs TT A & E, 125 hp Lyc, This is a light airplane Genave Alpha 200 Com Telex Intercom. $20,000. Call (503) 838-0329.

WANTED : STARDUSTER TWO Flying wires, I have 5, all on one side and need 10. Does anyone have 3 flying wires and 2 landing wires that are salvageable. Contact Dan Baxter at (503) 639-8792.

STARDUSTER SA-100 0320 Lyc 2335 TT 1135 SCMOH By Mattituck, 290hrs TTAF Peter Merkel, P.O.Box 151 West Town, NY 10998 or call (914) 856-2427.

ACRODUSTER 1 PROJECT fuselage on gear wings ready for cover engine mount 150 to 200 hp $7,500 in parts asking $2,600 (914)986-4444 or (914)756-4440

****

AS ALWAYS YOUR ORDER WILL RECEIVE OUR PROMPT ATTENTION, QUALITY PRODUCTS AND WORKMANSHIP AT A COMPETITIVE PRICE.


WELDING
N75R