

CLASSIFIEDS

April '96



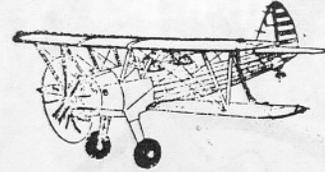
**Starduster**  
MAGAZINE



Dedicated to the  
ACTIVE Homebuilders

**April**  
**1996**

April "96"



Prez's Comments

1996 is starting off with Gusto! Brochures and plans are selling well - There is a lot of work here at the shop- so much that I've persuaded Charlie [Fritz] Eisenbeiser to come out from Connecticut to give me a talented hand and try to do some in House catching up.

April will be another fast month for Brenda & I. We'll be going to Sun & Fun, then a couple weeks of well earned vacation - return in time for May open house in OROVILLE CA.

Serious stuff - Think about it - We've had "3" three incidents that could easily been accidents and or fatalities - the center section fuel tank is for **level cruise flight only** - **No Pattern work!!!** Twice in the past three months I've received calls about the Engine Quitting while on c/s tank, one doing touch and goes the other a Fly by at or over a friends house. The third was a take off and the departure turn at level off resulted in engine fuel starvation.

There is a lot of Stardusters being sold. Because there is a big demand for them - I would like to think that ACFT Systems and fuel Management be a part of Aircraft "Portfolio". So new owners are aware and prepared - We could write a book on fuel systems in individual Stardusters and the reasons builders selected them. Most have their merits and pitfalls. Enough - Again think about it - If your a new owner, **Do You Know Your System?**

Weather permitting and it will, Ken Ware will be at open House with his New Starduster. Bryant from Utah and Mike Mattei with his Acro II. See you there - And hope you all have your reservations for Oshkosh Wautoma - 96.!!!

*Bill Clouse*

B.C. "Prez"      Bill Clouse      1-800-833-9102 Southern California. President Starduster Corp.  
Dave Baxter      503-639-8792 Oregon. Editor of Starduster Magazine.

P.S. Lee Holcomb should be at Oroville in his New Acro I. Maybe the Van Dykes - From Pleasant Grove?

# APRIL 1996

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.

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

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FRONT COVER - L to R: N80MM Jeff Chambliss of Byron, CA, N102E Bill Ewertz of Sonoma, CA and N94TM Tom Morris of Martinez, CA. Picture taken at Merced Fly-in June 1995.

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BACK COVER - L to R: N96576 Dave Baxter editor, N7989 Bob Pisani, San Mateo, CA, N42264 Les Homan, Livermore CA, N480B Oscar Bayer, Arroyo Grande, CA, N73R John Morgan, Napa, CA, N373BG Joe Wigant, San Francisco, CA and N292EP Dave Heal, Windsor, CA. Picture taken at Starduster Open House, Santa Rosa, CA, May 1995.

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### REMINDER : SUBSCRIPTION RENEWAL

Please mail your checks to Stolp Starduster Corporation. They are due by the first of January 1996. Subscriptions run from January to January of each year. Those who subscribe in the middle of the year will receive all four issues for that year. Current subscription rates for 1996 are still \$12.00 per year. I don't know how much longer we can do this, due to postage, printing and handling costs. By 1997 we will more than likely have to raise the cost of a subscription. Checks should be made out to STOLP STARDUSTER CORORATION, and sent to 4301 Twining St., Riverside, California 92509. Thanks.

D.C.B. Editor & B.C. Prez

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

## ODDS AND ENDS FROM YOUR EDITOR

Well guys, as most of you are probably aware, the weather in my part of the world has recently left a lot to be desired. Between the high winds in late December to the snow and freezing rain in the earlier part of January, followed by the pineapple express in February, which caused over 6 inches of rain to fall in a 24 hour period, resulting in serious flooding of all the major rivers in the area. This all adds up to having very little good flying weather. I was however, able to get in about 8 hrs over a 3 months period and other than having a bunch of trees go down in my back yard, I weathered these natural disasters intact and I hope you did like wise.

Has anyone noticed that on the cover of the February 3rd issue of Trade-A-Plane, there is a picture of Tom Macario's Antique Kinner powered Starduster Too, and Bill Clouse is his passenger. Photo by Rafe Tomsett:

Anyhow, we have several more first flights to report on. The first is Emmor Porter and Ron Menhorn in their Acroduster Too N513EP it flew for the first time late last year. Congratulations guys! Also in mid January of this year, Danny Miller's Starduster Too N20PD flew for its first time. Dan was also kind enough to send me some pictures and video of this event. So again congratulations are in order. Letters and pictures will be elsewhere in this issue.

Over the years several questions keep coming up and I try to answer them as best I can and have thought about writing an article to address each of these questions. But since I have copies of the letters, I thought I might just as well reprint them so that everyone who is interested can read my suggestions for whatever they are worth. The first letters are about weight and balance and goes right along with the tech tips that will help explain the problems and solutions pertaining to the Starduster Too.

The last letter is about getting started in the building process, and is my view of how to get a good start a little cheaper and easier than starting from scratch.

Regarding the landing gear problems on the Starduster Too, we have had several reports of landing gear failures this past year. There are three basic things that lead to gear failure. 1. Cold or poor welds 2. Gear not modified to the latest drawing 3. Damage due to a prior hard landing that has gone unnoticed. The gear generally fails in one of two situations. The first is by dropping the airplane in from about 3 feet or more. This will generally bend, stretch, or crack the gear, or bungee truss, and may not be obvious and could fail sometime later. The second is by letting the airplane get away from you during roll out. Such as in a ground loop or anytime the airplane gets sideways. This generally results in the gear collapsing under the airplane and failing at the diagonal stream line tubing under compression, and at the bungee tube and upper attach point on the main gear leg. and if you have the old style gear the results can be much worse Included in this issue is a copy of the latest gear modifications, along with my suggestions Also in this issue is an article by Jim Osborne regarding gear failure that talks about these very things.

I personally have flown this gear many hundreds of hours all over the United States in many unusual wind conditions and have had no problems. The secret is pilot proficiency and the airplane has to be somewhere close to the ground when it quits flying.

**Nov. 11 ♦ Ormond Beach, Fla.:** Witnesses saw a homebuilt Starduster SA-300 bank to the left after takeoff, pitch nose-down and crash. Both occupants were injured, the passenger seriously.

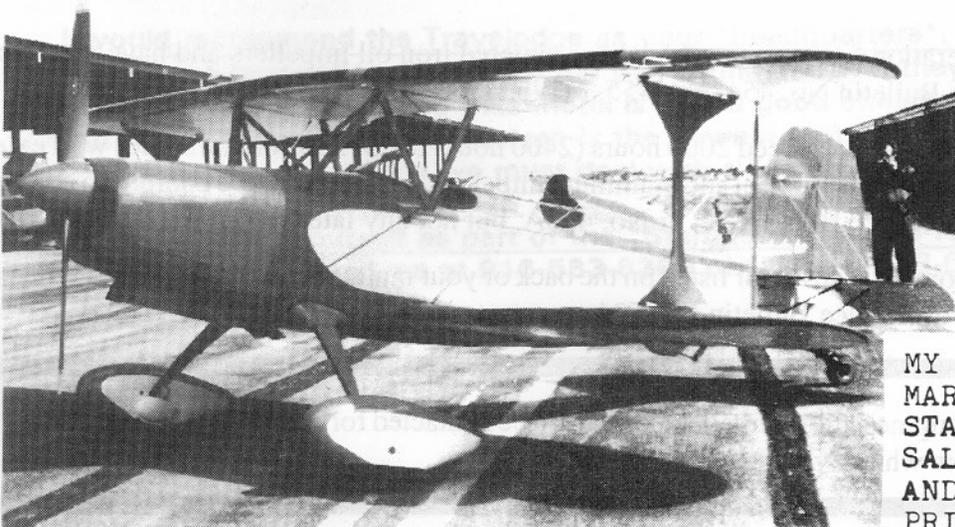
We have had reports of several recent accidents, one in Hawaii and one in Florida. Does anyone have any details, N# numbers or other information regarding these accidents? I don't think either one was fatal.

We have had one other recent occurrence that could have a far reaching affect on our ability to build aircraft at home in our garages. This happened in California which had been the leader in this type of legislation. These new laws are aimed at the drug war, but could effect home builders. If you buy, lease or rent a house and use the property or building to manufacture drugs, that property can be seized by law enforcement officials and sold at auction. The possibility exists that the owner could end up with nothing. The wording of this law could be interpreted to include many of the chemicals, glues, resins and paint used in the construction of home built aircraft. The local police, DEA, and customs officials have almost unlimited power in these areas. Thus could easily make a mistake, which could lead to a big problem.

Now for some pleasant news, your editor has the possibility to fly a Great Lakes Biplane back to Sun and Fun 14th thru the 20th of April. I have always wanted to attend this fly-in at lakeland florida and as it looks now I will probably be able to do so. My tentative route of flight depending on weather will be south to Southern California and then east through Arizona, New Mexico, Texas, Louisiana, Mississippi, Alabama, and into Florida. This should finally give me a chance to visit some of the owners and builders in the southeast. The tentative departure date is saturday the 13th of april hopefully you readers will have the magazine by then as i am looking for places to overnite along with any low and slow 100 MPH airplanes that would like to accompany me they would certainly be a welcome benefit.

And last, to end on a more pleasant note, some thoughts about the Starduster Open House. Please call and make reservations early. Also let Howard Fairbanks EAA VP Chapter 1112 know if you plan on attending the banquet and also if you want to do the house boat tour. This is a must, he can be reached at 916-533-8303. All indications are that this open house will be one of the best ones yet, with possibly the highest attendance. So please make every effort to attend. I am certainly looking forward to seeing you all there with your planes.

D.C.B. Editor



MY GOOD FRIEND IAN (RED)  
MARNOCH OF NAMPA IDAHO's  
STARDUSTER TOO IS FOR  
SALE IT's FRANKLIN POWERED  
AND A GOOD AIRPLANE  
PRICE IS \$27,500 HIS  
#208-467-6924 SEE ADS

# Owner Advisory

February 7, 1996

OA524

Dear Textron Lycoming Engine Owner:

Records obtained from the F.A.A. indicate that you are the registered owner of an engine model for which a Mandatory Service Bulletin has been issued.

This Owner Advisory is your notification to review the following information for relevance to your specific engine and comply with the Service Bulletin as required.

## I. Sintered Iron Impellers:

Textron Lycoming requires replacement of all sintered iron oil pump impellers within the next 25 hours of operation. Sintered iron impellers being replaced are P/N 77313, P/N 75832, P/N LW-12897, P/N LW-14038, P/N LW-14712 and P/N LW-15863. They can be identified by a porous surface finish on the impeller faces. Engines from List I in Service Bulletin No. 524 with sintered iron impellers which are not in compliance with any revisions to Service Bulletin No. 454, No. 455, or No. 456 must have kit, P/N 05K19423-S installed within next 25 hours of operation.

## II. Aluminum Oil Pump Impellers:

Textron Lycoming requires replacement of all aluminum oil pump impellers at the next recommended overhaul not to exceed 2000 hours of operation. The aluminum oil pump impellers being replaced are P/N 60747 (except on GO-435 and GO-480 engines) and P/N LW-13775. Engines from List II in Service Bulletin No. 524, engines with aluminum oil pump impellers installed in the field, and engines in compliance with Service Bulletin No. 455, No. 455A, No. 455B, No. 456, or No. 456A, but not with any later revisions, must install kit P/N 05K19423-S at the next recommended overhaul not to exceed 2000 hours.

Mandatory Service Bulletin No. 524 has been issued for all Textron Lycoming engines in List I and List II of attached sheets.

### Compliance is Mandatory:

Within next 25 hours of operation for engines which have sintered iron oil impellers and have not complied with any revisions to Service Bulletin No. 454, No. 455, or No. 456.

At next recommended overhaul not to exceed 2000 hours (2400 hours for O-235 series engines with extended TBO) of operation for engines which have steel and aluminum impellers installed or have complied with Service Bulletin No. 455, No. 455A, No. 455B, No. 456, or No. 456A, but not any later revisions.

Please contact a Textron Lycoming distributor listed on the back or your maintenance facility for detailed information and accomplishment of Service Bulletin No. 524.

For field overhauled engines, the overhaul facility must be contacted for information concerning the oil pump impellers which were installed.

ATTACHMENT - OA524

MODELS AFFECTED:

LIST I

All Textron Lycoming engines employing sintered iron impellers as follows:

NOTE

For the purpose of this Service Bulletin, disregard the 2 or 3 character suffix on the end of the serial numbers (i. e. -15 or -27A). Any engine which falls within the serial number range specified for the model, regardless of the suffix, is subject to this Service Bulletin.

O-235 series engines with serial numbers L-10287-15 thru L-13039-15 inclusive.

O-290 series engines with serial numbers L-8560-21 thru L-8565-21 inclusive.

O-320 series engines with serial numbers L-28444-27A thru L-47241-27A inclusive.

O-320 series engines with serial numbers L-6673-39A thru L-7118-39A inclusive.

IO-320 series engines with serial numbers L-4625-55A thru L-5521-55A inclusive.

AIO-320 series engines with serial numbers L-137-63A thru L-250-63A inclusive.

LIO-320 series engines with serial numbers L-101-66A thru L-304-66A inclusive.

\*O-360, HO-360 series engines with serial numbers L-15277-36A thru L-23384-36A inclusive.

\*IO-360, HIO-360-A, -B, -C series engines with serial numbers L-7274-51A thru L-17821-51A inclusive.

LIO-360 series engines with serial numbers L-101-67A thru L-1075-67A inclusive.

IVO-360 series engines with serial numbers L-232-58A thru L-233-58A inclusive.

\*\*O-540 series engines with serial numbers L-14227-40A thru L-18521-40A inclusive.

\*\*IO-540 series engines with serial numbers L-8771-48A thru L-16596-48A inclusive.

\*NOTE

All dual magneto 360 wide deck series engines that have complied with Service Bulletin No. 455C or Service Bulletin No. 455D are in compliance with this Service Bulletin.

\*\*NOTE

All dual magneto 540 wide deck series engines and all IO-540-P1A5, -R1A5, -SiA5 series engines were built with large capacity oil pumps. This Service Bulletin does not apply to these engines.

NOTE

Some of the models affected, regardless of serial numbers, that may still have sintered iron impellers are as follows:

1. All remanufactured engines shipped between April 6, 1970 thru April 1, 1981.

**ATTACHMENT - OA524**

**MODELS AFFECTED (CONT.):**

**LIST II**

**All Textron Lycoming engines employing aluminum oil pump impellers as follows:**

**NOTE**

For the purpose of this Service Bulletin, disregard the 2 or 3 character suffix on the end of the serial numbers (i.e. -15 or -27A). Any engine which falls within the serial number range specified for the model, regardless of the suffix, is subject to this Service Bulletin.

O-235 series engines with serial numbers up to and including L-10286-15, L-13040-15 thru L-24051-15 inclusive except the following: L-24033-15, L-24034-15, L-24035-15, L-24040-15 thru L-24049-15 inclusive.

O-290 series engines with serial numbers up to and including L-8559-21.

O-320 series engines with serial numbers up to and including L-28443-27A, L-47242-27A thru L-50133-27A inclusive.

O-320 series engines with serial numbers up to and including L-6672-39A, L-7119-39A thru L-13788-39A inclusive except for the following: L-13755-39A and L-13780-39A thru L-13783-39A.

IO-320 series engines with serial numbers up to and including L-4624-55A, L-5522-55A thru L-5897-55A inclusive.

AIO-320 series engines with serial numbers up to and including L-188-65A.

LIO-320 series engines with serial numbers up to and including L-100-66A, L-305-66A thru L-329-66A inclusive.

O-340 series engines with serial numbers up to and including L-345-30.

\*O-360, HO-360 series engines with serial numbers up to and including L-15276-36A, L-23385-36A thru L-31007-36A inclusive except for the following: L-30988-36A, L-30989-36A, L-30990-36A, L-30991-36A, L-31001-36A, L-31002-36A, L-31003-36A.

\*IO-360, HIO-360-A, -B, -C series engines with serial numbers up to and including L-7273-51A, L-17822-51A thru L-24033-51A inclusive except for the following: L-24020-51A, L-24029-51A, L-24030-51A, L-24031-51A.

HIO-360-D1A, -E1AD, -E1BD, -F1AD series engines with serial numbers up to and including L-22579-51A except for the following: L-22311-51A thru L-22313-51A, L-22396-51A, L-22397-51A, L-22416-51A, L-22546-51A thru L-22549-51A, L-22563-51A, L-22568-51A thru L-22571-51A inclusive.

LO-360 series engines with serial numbers up to and including L-544-71A.

LIO-360 series engines with serial numbers up to and including L-100-67A, L-1076-67A thru L-1113-67A inclusive.

AIO-360 series engines with serial numbers up to and including L-136-63A, L-251-63A thru L-258-63A inclusive.

NOTE

Some of the models affected, regardless of serial numbers, that may still have aluminum impellers are as follows:

1. All remanufactured engine models listed above shipped prior to March 31, 1985.
2. All engine models listed above that were overhauled in the field prior to March 31, 1985.

For field overhauled engines, the overhaul facility must be contacted for information concerning the oil pump impellers which were installed.

3. Any 360 dual magneto wide deck series engines that have complied with Service Buletin No. 455, No. 455A, No. 455B, but have not complied with Service Bulletin No. 455C or No. 455D.

2. All engines that were overhauled in the field using any of the following sintered iron impeller part numbers:

77313, 78532, LW-12897, LW-14038, LW-14712 and LW-15863.

These parts were available from Lycoming distributors between April 6, 1970 thru April 1, 1981.

For field overhauled engines, the overhaul facility must be contacted for information concerning the oil pump impellers which were installed.

3. All engines that have complied with Service Instructions No. 1230 and No. 1272; Service Bulletins No. 381 and No. 385.

## KERRVILLE Southwest EAA Regional Fly-In

CONGRATULATIONS TO  
GLEN FRELS OF EL CAMPO  
TEXAS FOR HIS RECIENT  
BEST BI-PLANE AWARD AT  
KERRVILLE TEXAS 95



Best Bi-Wing — Starduster II,  
N1011Z, Glenn Frels, El Campo, TX

# accident prevention program

U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION  
Washington, D.C.

FAA-P-8740-5  
AFS-800 0478

## WEIGHT AND BALANCE

### An Important Safety Consideration for Pilots

Aircraft performance and handling characteristics are affected by the gross weight and center of gravity limits. If every pilot were to understand and respect this fact, general aviation accidents could be reduced dramatically. An overloaded or improperly balanced aircraft will require more power and greater fuel consumption to maintain flight, and the stability and controllability will be seriously affected. Lack of appreciation for the effects of weight and balance on the performance of aircraft, particularly in combination with such performance-reducing factors as high density altitude, frost or ice on the wings, low engine power, severe or uncoordinated maneuvers, and emergency situations, is a prime factor in many accidents.

This review of the fundamentals of aircraft weight and balance is provided to acquaint pilots with the effects adverse loading can have on aircraft performance. Greater understanding of the problem should encourage caution.

#### AIRCRAFT WEIGHT

The lifting capability of an aircraft depends upon the airfoil design of the wing, the speed at which the wing moves through the air, and the density of the air. It is the design of the aircraft wing that limits the amount of available lift and it is the available power from the engine(s) that likewise limits the speed at which the wing can be made to move through the air. The efficiency of the engine/wing combination is reduced when air is less dense than the established standard day (barometric sea level pressure of 29.92 inches of mercury at a temperature of 59°F). Therefore, every pilot should ascertain during preflight preparation that the aircraft gross weight is within safe limits for the intended flight, considering the aircraft performance capabilities. The total weight of baggage, cargo, and fuel load should be adjusted accordingly to provide an adequate margin of safety.

Pilots must understand that in many general aviation aircraft it is not possible to fill all seats, load the baggage compartment to capacity, carry full fuel, and remain within approved weight and balance center of gravity (c.g.) limits. In many four-place and six-place airplanes, the fuel tanks may not be filled to capacity when a full complement of passengers and their baggage is carried. It will be necessary to reduce the number of passengers or baggage weight if the proposed flight distance requires a full fuel load.

The aircraft performance characteristics adversely affected by overweight are:

- Increased takeoff speed.
- Increased takeoff runway length.
- Rate of climb.
- Maximum altitude capability.
- Operational range.
- Maneuverability.
- Controllability.
- Stall speed.



- Approach speed.
- Landing distance.

Every pilot must consider how these characteristics would affect the aircraft in an emergency situation. Another consideration is high elevations, and/or hot and humid weather (density altitude) which is the subject of another publication in the Accident Prevention Program series.

#### AIRCRAFT BALANCE

Balance refers to the location of the c.g. along the longitudinal axis of the aircraft. This is of primary importance to safety of flight. There are forward and aft limits beyond which the c.g. should not be located for flight. These limits are established by the aircraft design engineers to assure proper predictable aircraft control about the horizontal, vertical, and lateral axis. The operational weight and balance limits for each aircraft are contained in the aircraft owners or flight manual. This information may also be obtained from the FAA Aircraft Specification or Data Sheets available at most aircraft maintenance facilities. The weight and balance information for each aircraft must be amended when repairs or alterations have been made that effect a change in the aircraft empty weight or c.g. location (reference FARs 43.5(a)(4) and 91.31 (b)). To assure aircraft controllability during flight, the aircraft must be loaded within the design weight and c.g. limits.

A forward c.g. limit is specified to assure that sufficient elevator deflection is available at minimum speed as for landing. The aft c.g. limit is the most critical during flight maneuvers or operation of the aircraft. Aircraft stability decreases as the c.g. moves aft, and the ability of the aircraft to right itself after maneuvering will be correspondingly decreased. The aircraft will be highly unstable in gusting or turbulent air, making attitude and directional control extremely difficult.

If, after the aircraft is loaded, the c.g. does not fall within the allowable limits, it will be necessary to shift loads before flight is attempted. The actual location of the c.g. is determined by a number of factors under control of the pilot:

- Placement of baggage and cargo.
- Assignment of seats to passengers according to each individual's weight.
- Fuel load. Selective use of fuel from various tank locations during flight may aid in maintaining safe balance conditions.

#### MANAGEMENT OF AIRCRAFT WEIGHT AND BALANCE CONTROL

All aircraft are delivered with the empty weight and c.g. data

FROM STARBUSTER HISTORY  
WEIGHT AND BALANCE

which shall remain with the aircraft records. The aircraft owner is responsible to ensure that maintenance personnel make appropriate entries in the aircraft records when repairs or alterations are made to the aircraft. Unless the aircraft flight manual is amended when the aircraft empty weight or c.g. changes, the pilot has no base line for loading calculations and decisions.

[REDACTED]

All pilots need to be familiar with the terms related to aircraft weight and balance. Some of the more common terms are:

**arm (moment arm)**—the horizontal distance, in inches, from the reference datum to the item. The algebraic sign is plus (+) if measured aft of the datum and minus (-) if measured forward of the datum;

**center of gravity (c.g.)**—the point about which an aircraft would balance if it were possible to suspend it at that point. It is the mass center of the aircraft or the theoretical point at which the entire weight of the aircraft is assumed to be concentrated;

**center of gravity limits**—the specified forward and aft points beyond which the c.g. must not be located during flight. The c.g. moment envelope is contained in the aircraft flight manual and FAA Aircraft Specifications or Data Sheets;

**center of gravity range**—the distance between the forward and aft c.g. limits;

**datum line**—an imaginary vertical plane or line from which all measurements of arm are taken. The datum is established by the manufacturer. After the datum is selected, all moment arms and the c.g. range must be computed with reference to that point;

**fuel load**—the expendable part of the aircraft load. Fuel load includes only usable fuel and not the fuel required to fill the lines or that which remains trapped in the tank sumps;

**moment**—the product of the weight of an item multiplied by its arm. Moments are expressed in inch pound (in.-lb.);

**total moment**—the weight of the aircraft multiplied by the distance between the datum and the c.g.;

**moment index**—the moment divided by a constant such as 100, 1,000, or 10,000. The purpose of using a moment index is to simplify computations of weight and balance on large aircraft where heavy items and long arms result in large, unmanageable numbers. It is simply a matter of reduction to the least common denominator;

**mean aerodynamic chord (MAC)**—the average distance from the leading edge to the trailing edge of the wing. The MAC is specified for the aircraft by determining the average chord of an imaginary wing which has the same aerodynamic characteristics of the actual wing. Center of gravity is usually located at or near the forward 25 percent of the chord;

**station**—a location in the aircraft which is identified by a number designating its distance in inches from the datum. The datum is, therefore, identified as zero and the station and arm are usually identical;

**useful load**—the weight of the pilot, copilot, passengers, baggage, usable fuel, and drainable oil;

**empty weight**—the airframe, engines, and all items of operating equipment that have fixed locations and are permanently installed in the aircraft. It includes optional and special equipment, fixed ballast, hydraulic fluid, unusable (residual) fuel, and undrainable (residual) oil.

A simple and fundamental weight check should always be made before flight to assure that the aircraft useful load is not exceeded.

If there is the slightest doubt about the loading, it will be advisable to calculate it by using actual weights and moment arms to determine that the aircraft is loaded within safe limits.

#### LOADING INFORMATION:

- Aircraft Empty WT × C.G. (ARM) = Moment
- Oil WT × ARM = Moment
- Pilot and Passenger WT × SEAT (ARM) = Moment
- Passengers WT × Seat (ARM) = Moment
- Baggage WT × Compartment (ARM) = Moment
- Fuel WT × Tank (ARM) = Moment
- Aux. Fuel WT × Tank (ARM) = Moment

Add total weight and check against maximum takeoff weight. If within limits, add the the total moment and divide by total weight to determine loaded c.g. The loaded c.g. should be within the fore and aft c.g. limits shown in the aircraft flight manual weight and balance information. If not, a few minor load adjustments may correct the problem.

For your safety, and the safety of your passengers, check the weight and balance of your aircraft before each flight. Keep the aircraft gross weight and center of gravity within prescribed limits.

This publication was prepared to inform pilots of the adverse effects of improperly loaded aircraft. An in-depth explanation of the subject of weight and balance is provided in several FAA advisory circulars available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. They are:

- AC 91-23A, Pilot's Weight and Balance Handbook  
SN 050-007-00405-2
- AC 61-23A, Pilot's Handbook of Aeronautical Knowledge  
SN 050-011-00051-8
- AC 43.13-1A, Acceptable Methods, Techniques, and Practices—Aircraft Inspection and Repair  
SN 050-011-00058-5

# FROM STARDUSTER HISTORY

## WEIGHT AND BALANCE STORY

I must qualify myself regarding weight and balance. It is not one of my most knowledgeable subjects. I have not intended this article to be 100% factual in every respect; it is only written to help owners and builders stimulate their interest so that they can be better informed as to what is involved in determining the proper center of gravity for their airplane.

All one really needs in order to determine the proper center of gravity is the limits of allowable C.G. travel. With this, one can do a weight and balance on any airplane.

Some useful information regarding the Starduster Too is listed below:

1. The center of gravity limits are from 18 inches aft of the firewall to 27 inches aft of the firewall.
2. Main fuel tank 30 gal., 28 useable; wing tank 15 gal., 14 useable.
3. Mean aerodynamic chord is 44 inches aft of the datum.
4. The center of gravity location of the wing tank is approximately 19 inches aft of the datum.
5. The tail weight, with the latest landing gear and engine mount in level attitude, should be around 65 to 100 lbs. on all models.
6. As the fuel in the main tank burns off, the center of gravity moves aft.

Weight and balance is important with all airplanes, including this one. However, with the Starduster Too, once the aircraft is built, it is very difficult to overload the airplane or move the center of gravity out of limits. This is so simply because the design does not provide a large baggage area and there are only two seats.

Aircraft under construction should be built to the latest plans. Primarily, the engine mount length should be longer and the empty weight should be held to the minimum.

Aircraft already built should be changed if at all practical, or operated with care, taking these conditions into consideration. Several different weight and balance combinations should be worked - most forward, most aft; with or without a passenger; baggage and fuel. Refer to sample weight and balance sheet included with this article. (Example #1)

M.A.C. What does it mean?

The mean aerodynamic chord on most homebuilt biplanes is not something most owners or builders are familiar with, and

it is not generally included with the weight and balance information regarding the airplane. And of course it is not discussed at all on single wing aircraft weight and balance data sheets.

Essentially what M.A.C. means is the percentage of lift each wing is able to create in relation to the other. A theoretical lifting point in between the two can be used for weight and balance purposes. Each wing obviously creates lift, but one wing is generally considered to be more efficient than the other. As with model airplanes, one could easily split the gap, stagger and sweep at 50%, and be quite successful. However, with real aircraft, there are several other things that need to be considered.

The three different mean aerodynamic chords that could be used regarding biplanes are shown in Example #2.

Most air foils have what is called center of pressure or center of lift (Example #2). It will be referred to as "C.P." This center of pressure moves on most air foils. These changes depend upon speed and angle of attack, and for some air foils it can be from 15% to 35% of the chord. i.e., as the speed increases, the center of pressure moves aft, which makes the airplane more stable or more nose heavy, and as it decreases it makes the aircraft more tail heavy and less stable.

Many air foils have center of pressure travel. However, there are some that do not. The M-6 air foil used on the Starduster Too is one that has a constant center of pressure as it remains relatively stable throughout the normal flight envelope. This is one reason Lou Stolp used it on the Starduster Too.

When working the M.A.C. on biplanes, it is generally considered that the upper wing is more efficient than the lower. Some of the reasons are that the fuselage covers part of the lower wing, "I" struts, flying wires and controls also protrude from the lower wing, plus the lower wing is shorter than the upper. All this makes it less efficient.

Some of the reasons the upper wing is considered to be more efficient are longer span, no controls, "I" struts or flying wires on the upper surface. It is also away from the fuselage.

The fact that the upper wing is swept back 6 degrees also has to be considered while working M.A.C.s.

Wings are generally swept back on light aircraft for three reasons: to help the center of gravity; to increase the roll rate; and on a biplane, so a person can get in and out of the front cockpit. It also doesn't hurt the looks.

In the old days, one way to determine the center of gravity in relation to the center of pressure was to place a saw horse under the fuselage at a point considered to be the center of pressure between the upper and lower wings, and then temporarily mount the engine on a movable engine mount so that it could be moved fore and aft and the actual balance point could be determined. Many airplanes were done this way and proved to be successful.

There are a few of the older biplanes that were made with horizontal stabilizers that contributed significantly as a lifting surface. It is my opinion that in some cases it was done to help an aircraft that already had an aft center of gravity condition. The other reason was to help in the spin recovery, as it helped keep the tail flying and did not let the spin become flat.

Many early designers were not privileged with the information that is available to us today, and so tried different solutions to resolve problems that have long ago been designed out of today's airplanes.

It is my opinion that horizontal stabilizers should not have drastic angles of incidence. If on your airplane the horizontal stabilizer is at the maximum positive angle of incidence, you should be suspicious of an aft center of gravity condition and vice versa.

It is also my opinion that about 70% of all four cylinder Lycoming powered Stardusters are flying in the aft end of the C.G. One of the reasons why the weight and balance was not changed or recognized to be a problem until the mid 1970's was due to the fact the prototype Starduster N94505 was totally destroyed before much flight testing could be done.

The second Starduster prototype, N1300S, was powered by an 0470 230 HP six cylinder Continental, a much heavier engine. This resulted in a much better C.G. condition. Another contributing factor is the M-6 air foil with its constant center of pressure. Many pilots have flown Stardusters with this airfoil in aft C.G. conditions and have stated the airplane flew and felt fine, although the weight and balance numbers proved it to be otherwise. There was an article in the old Civil Aeronautical Manual (C.A.M.) #18 regarding the weight balance of biplanes. It was the procedure that took place if there was no existing information from the manufacturer regarding weight and balance, and it used the 20% M.A.C. for those purposes.

There also is a very good article regarding weight and balance written by Jim Osborne in the April 1976 issue of Starduster Magazine.

Jim Osborne

YE OLDE WEIGHT AND BALANCE

Weight and Balance Example #2

The three different mean aerodynamic chords for determining the center of pressure depending upon air foil, airplane, and point-of-view are listed below in Example #2.

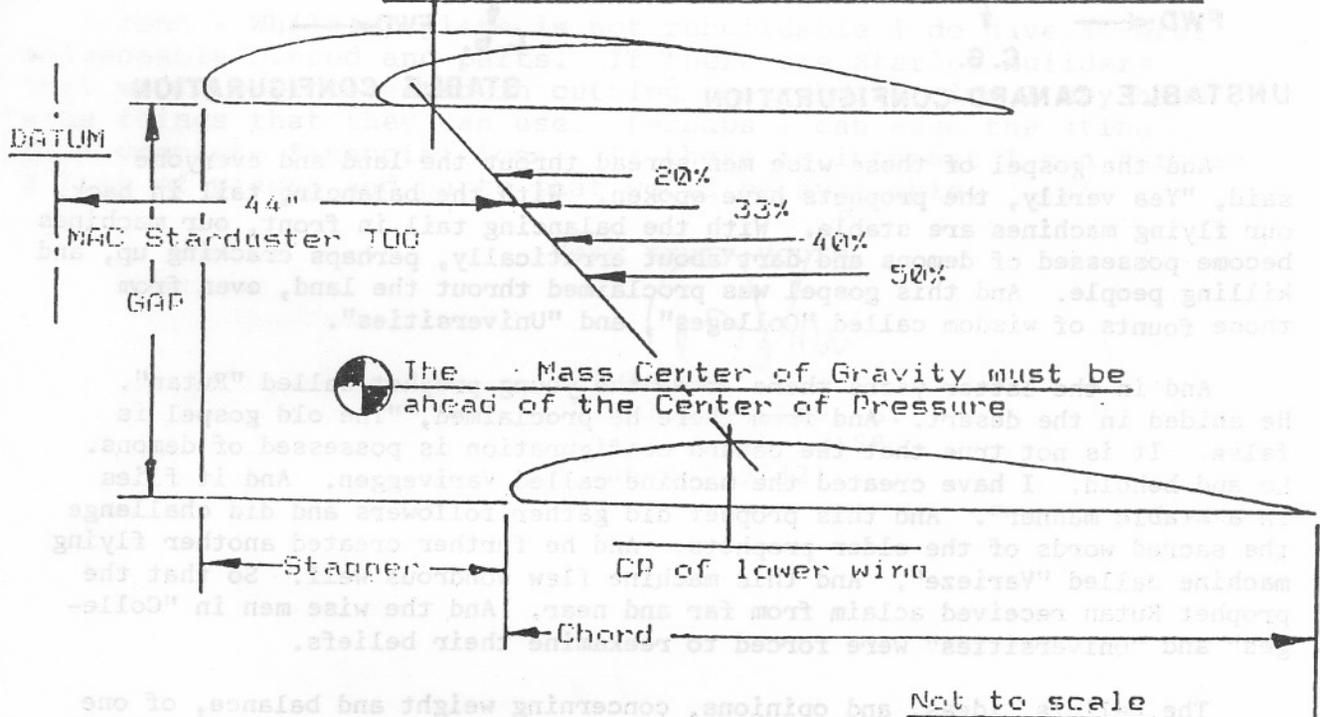
20% down from the upper wing which generally results in a more nose-heavy condition.

33% down from the upper wing which generally results in a more neutral condition.

40% down from the upper wing which generally results in a more tail-heavy condition

EXAMPLE #2

CP of upper wing taking into consideration 6 degree sweep



Not to scale

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

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

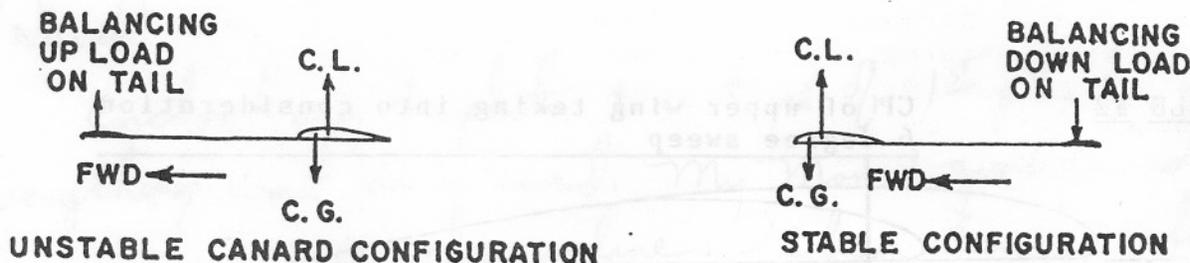
(1) All structure presenting a horizontal surface to the wind functions

as an airfoil. It may lift, depress, or be neutral.

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

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

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



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

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

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

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

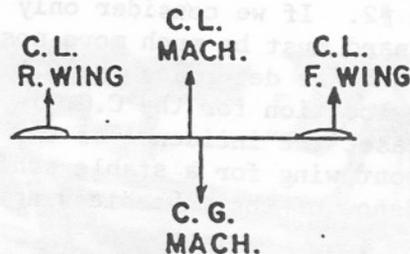
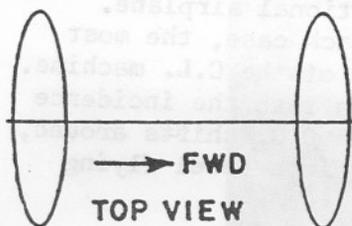
- (1) All structure presenting a horizontal surface to the wind functions as an airfoil. It may lift, depress, or be neutral.

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

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

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

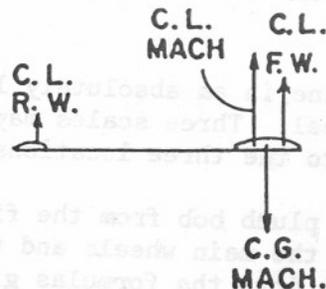
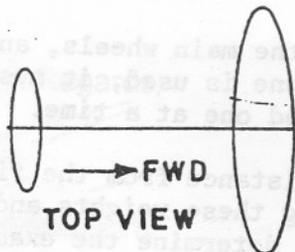
Consider the following theoretical machine. Postulate two wings, identical, in size and shape, connected by a line, both wings with the same amount of incidence.



# 1.

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

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

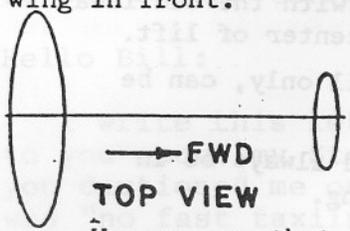


# 2.

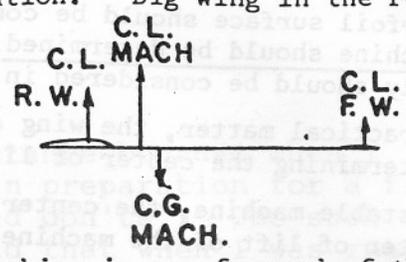
We can see that, with equal incidence, the C.L. of the machine is still behind the C.L. of the main wing. Putting the C.G. in front of the C.L. of the machine requires the rear (small) wing to have less incidence and less lift. Putting the C.G. in front of the C.L. of the main wing again requires negative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

October 16, 1935

Let us now consider a canard situation. wing in front.



#3.



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

Conclusions that we may now draw, are as follows.

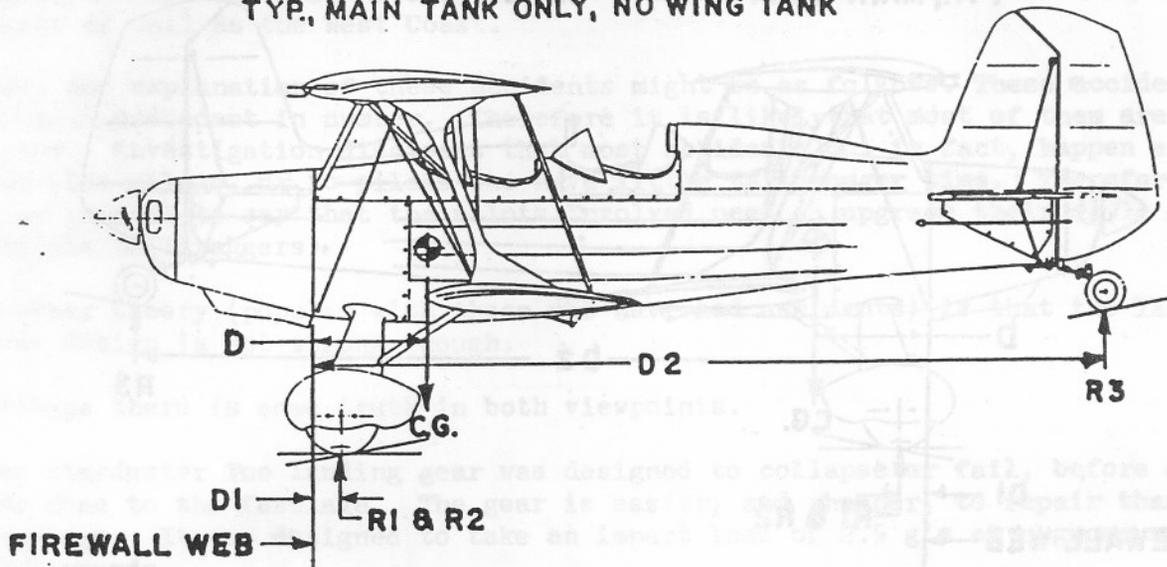
- 1- In order to fly straight and level, the C.L. and the C.G. of all machines, must coincide, when in flight.
- 2- In order to make the C.L. & C.G. coincide, incidence must be adjusted, in either the front or rear wing.
- 3- In order to be stable in pitch, the front wing must have more incidence than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

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

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

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

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



HORIZ. DATUM: TOP LONGERON - SHOULD BE LEVEL  
 VERT. DATUM: FIREWALL WEB  
 FWD C.G. LIMIT: 18.0  
 AFT C.G. LIMIT: 27.0

EMPTY WEIGHT C.G. (INCLUDES ENGINE OIL)

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

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

MAX. FORWARD C.G.

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

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

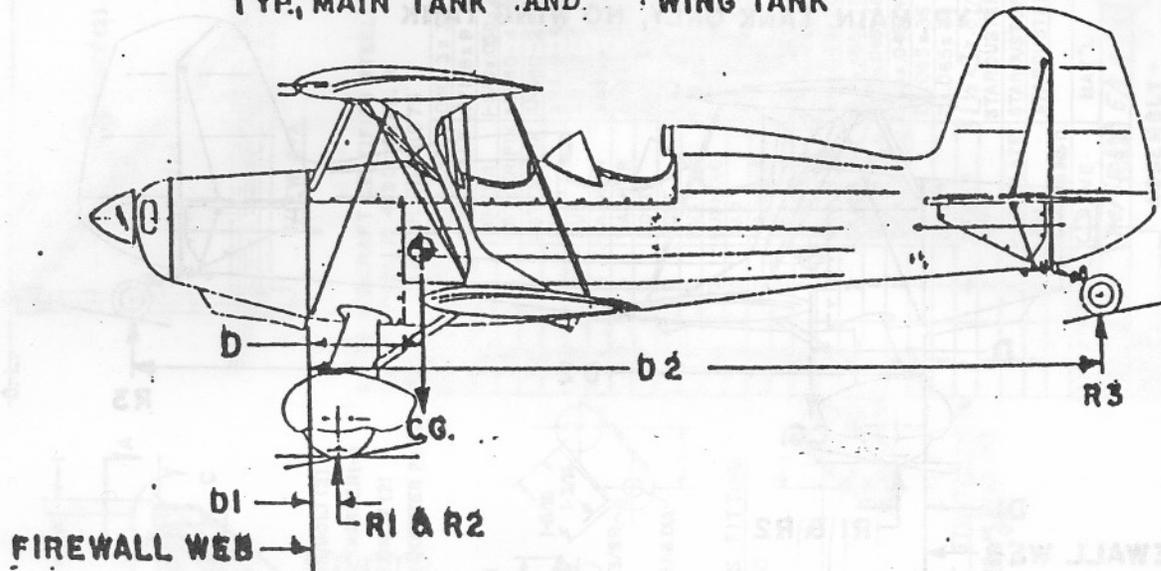
MAX. AFT C.G.

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

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

EXAMPLE # 1

STARDUSTER TOO SA300  
 WEIGHT & BALANCE  
 TYP. MAIN TANK AND WING TANK



HORIZ. DATUM: TOP LONGERON - SHOULD BE LEVEL  
 VERT. DATUM: FIREWALL WEB  
 FWD C.G. LIMIT: 18.0  
 AFT C.G. LIMIT: 27.0

EMPTY WEIGHT C.G. (INCLUDES ENGINE OIL)

<u>WEIGHING POINT</u>	<u>WEIGHT</u>	
RIGHT (R1)	530	4043.9
LEFT (R2)	530	4043.9
REAR (R3)	90	16290.0
		<u>24376.8</u>
AVERAGE EMPTY WEIGHT	1150	1150 = 21.19
$D = \frac{D1(R1+R2) + D2(R3)}{R1+R2+R3} = \frac{7.63(530+530) + 181(90)}{1150} = 21.19$		

MAX. FORWARD C.G.

	<u>WEIGHT</u>	<u>ARM</u>	<u>MOMENT</u>
AIRCRAFT EMPTY WEIGHT	1150	21.19	24368.5
PILOT	175	70	12250
FUEL, MAIN TANK	180	9	1620
FUEL, WING TANK	90	19.5	1755
	<u>1595</u>		<u>39993.5</u>
$\frac{TM}{TW} = \frac{39993.5}{1685} = 23.7$			

MAX. AFT C.G.

	<u>WEIGHT</u>	<u>ARM</u>	<u>MOMENT</u>
AIRCRAFT EMPTY WEIGHT	1150	21.19	24368.5
PILOT	175	70	12250
PASSENGER	175	42	7350
BAGGAGE	10	90	900
NO FUEL	0		
	<u>1510</u>		<u>44868.5</u>

$\frac{TM}{TW} = \frac{44868.5}{1510} = 29.7$

## COPY LETTERS ABOUT WEIGHT & BALANCE AND LANDING GEAR

I'm not sure where to start, but here goes. I have copies of at least a dozen weight and balances regarding the Starduster Too as well as the "original" design weight and balance (copies enclosed). I also have several copies of articles regarding weight and balance, and have some blank sheets for you to play with. As for your original weight and balance and current numbers, none of them are worked like the copies I have, not that there wrong, but everything I have worked is from the firewall using it as the datum, CG range is 18" to 27" aft of the firewall. Your appears to be from 20" to 26". By converting it from the prop flange to firewall, and by subtracting 40" from all the original arms makes the numbers workable with my CG information. This places your main gear center approximately 4" aft of datum/firewall webb. Just guessing, I have worked several weights and balance sheets based on the data you supplied and using Stardusters / Lou Stolp format. There is no question that it is in the aft end of the CG. But it is not quite as bad as what your numbers show. Depending on which M.A.C. you subscribe to (example : Lou Stolp 33%)

Now for the questions you've asked.

#1 As you can see by the original weight and balance information N94505's empty weight 1000 lbs, gross 1704 lbs. "G" loading is 6+ and 6- with an ultimate of 9 "G"'s. The prototype airplane N94505, had no electrical system, no C/S prop, no center section fuel tank, and no extras, gyros upholstery or creature comforts. By todays standards a well built Starduster Too with all the above mentioned items and with a weight conscious builder should have an empty weight of around 1250 lbs. You can set the gross weight at what ever you want. I set mine at 1850lbs. However anything over 1704 lbs, requires a new load factor to be calculated. This in its self is not a problem, provided the pilot stays with in the new "G" load rating. The problem you have as well as many Starduster Too owners and builders is where the weight is located.

#2,3,4.) By putting 100 lbs of lead under the front of the motor it would only move the empty weight CG forward approx. one inch, it would also make the tail lighter, which would in turn help the weight and balance. Enclosed is an ad that was in the January 1986 Starduster Magazine, advertising lead ballast for sale. J.V. Winthrow Central City, Kentucky, builder of N27JV, 1985 Reserve Grand Champion, used it initially perhaps if you call him he could answer your questions and he might even still have the weight.

#5) As far as C/S props are concerned there is no adaptor I am aware of to extend the prop. But there is a propeller made for the Piper Twin Comanche. That had a 5 to 6 inch extension built right into the hub. This required a different Dynafocal engine mount. Most all engines were 30 degree Dynafocal. The Twin Comanches were I think 18 degree, so even if you found one of these props at the right price you would still have to have a new engine mount made. And if you do that you might as well make it a little longer and use the prop you already have.

#6.) Yes other folks have had this problem. See enclosed information.

You are a heavy pilot but not the heaviest, and yes losing weight would help. However you shouldn't have to. I would suspect that 70% of all four cylinder powered Starduster Toos are flying in the aft end of the center of gravity.

I would like to hear about some of the other problems that came with your bird. Perhaps I will see you at the Starduster Open House May 3, 4, 5, 1991 at Flabob in Riverside. Please try to attend.

Here are some of my ideas that may be of some help to you.

1.) I use a soft nylon travel bag with clothes and heavy items, ahead of the front control stick bungee corded to diagonal tubes located behind the main fuel tank, it fits under the passengers knees, I limit my baggage compartments upper and lower to 25 lbs max (example 2 sleeping bags one tent, and one ground cover, the headrest compartment has survival gear and first aid kit as well as one quart of oil.

COPY

2.) Remove any and every non-essential piece of equipment, upholstery, hardware and instrument from the front cockpit back. Weigh everything and add it up. Make new floor boards, and lighter cushions. Keep fuel tanks, wing and main full as much as practical. Full fuel keeps the CG forward, move the battery to the firewall or up to the motor mount, maybe even try two batteries in series.

3.) Build a new horizontal stabilizer and elevator to the latest plans. Do not put lead in the counter balances on the elevator, go on a weight reduction in this area. Do anything you can to make it lighter or get rid of it. Remove lower tail brace streamline tubing and replace it with 1/4 round stainless tie rod wires, replace push pull tubes from pilot to elevator with aluminum tube as used on earlier glassairs.

4.) Of course the thing that needs to be done is to buy or build a longer engine mount for your weight and engine propeller combination. A 25 inch mount would probably be about right. I realize this would be major work, but it is probably the correct solution.

5.) As far as squirrely landing at aft CG's are concerned, all of the problem is not with the CG. Most of the Stardusters built prior to 1974 had early landing gear locations, (example contact point center of wheel axle directly under the firewall in level flight), over the years it was moved back several inches at a time. Your appears to be approx. 4 inches aft of the firewall. The current dimension is 8 inches aft of the datum firewall web. This result in a 55 to 65 pound tail weight in level flight. With the tail on the ground it increases by approx. 15 lbs. Many of the early Starduster Toos weighed 175lbs or more on the tail. This coupled with a low time tail wheel pilots resulted in numerous landing accidents.

You do understand the difference between a tail wheel aircraft and a nose wheel aircraft. Regarding landing gear geometry. Example : on a tail wheel airplane the mass CG is behind the main gear, the heavier the tail coupled with higher landing speeds, due to over weight airplanes makes roll out and pilot skill much more demanding than the lower tailweights. The opposite is the case with nose wheel airplanes as CG is ahead of the main gear and at touch down tends to straighten out the direction of travel.

An aeronautical engineer friend of mine once told me the formula for landing gear location based on the center of gravity location. For tail wheel aircraft, I have been unable to locate it. But it is a moot point if the gear is 8" aft of the firewall. The M.A.C. used should probably be closer to 20% rather than the 33% used by Lou. This along with the arms As you can see get quite creative notice the distance of tailwheel from firewall, it could be anywhere from 178" to 185" inches the higher the number the more aft the CG. Many people use the shorter distance to make the numbers work. Also the arms for pilot, passenger, fuel, and baggage have, and can be altered to make the CG look better, (see enclosed Weight & Balance). There is one other reason that hasn't been mentioned and that is the M-6 airfoil. See weight and balance information Starduster History pg.22, regarding the M-6 airfoil, even with aft CG conditions the M-6 airfoil is very helpful and in my opinion has helped to save many lives, any other airfoil with moveable C.P.'s could be deadly on this airplane at aft CG's. A symetrical airfoil used on aerobatic aircraft requires accurate CG information so that stall an spin recovery are predictable. I base my opinion on the fact that many Starduster Too's have been flown hundreds of hours with aft CG conditions, yours included.

However I would not want to fall out of any aerobatic maneuver while flying one of these airplanes. Most owners, builders, and pilots who fly the Starduster Too, soon realize that the airplane was not intended for aerobatics and fly them accordingly. Most of the fatal accidents with Starduster Too have been low altitude Acrobatics and in many cases they took a friend with them. I suspect that most were in the aft condition and when the maneuver was screwed up the airplane was unrecoverable especially at low altitude. Even well trained airshow pilots make mistakes. So it hardly comes as a surprise, that would be Acrobatics pilots of Starduster Toos should get proper training by a competent instructor that is familiar with this type of airplane, they should have lots of altitude, wear parachutes, and have an aircraft in the proper center of gravity limits (example 20% in my opinion).

I'm sure that now, you do not want a good CG on paper, you want the real world airplane N to have a forward CG, as opposed to aft.

COPY

As you can see by my weight and balance numbers, even mine leaves something to be desired. With minimum fuel, two people and baggage nose down trim is required. Mine has a 23" motor mount because I was not sure what propeller I was going to end up with. Well anyway I hope this information helps to enlighten you.

On another note if you do plan on attending the Starduster Open House, there are several Starduster Owners in the New Mexico area, one of which attends every year. Perhaps you can meet each other and fly in together. I am trying to get one hell of a turnout this year. Their names are Larry Rydberg, 12404 Domingo NE, Albuquerque, New Mexico 87123, Phone #'s (home) (505)294-1961 (work Larry's Custom Cycle) (505)294-0485 N530RL Starduster Too. The other person is Ken Humphreys, P.O. Box 1546 Moriarty, New Mexico 87035, phone #'s unknown N2581 Starduster One.

Thanks so much for the pictures and information. I did not have any pictures of Tom Macrario's antique S/D Too and really appreciate this as I collect this kind of stuff.

Well so long for now, if there is anything else I can help you with please advise.

Sincerely,

David C. Baxter  
5725 S.W. McEwan Rd.  
Lake Oswego, Oregon 97035  
(503) 639-8792

P.S. You owe me about \$5.00 for copies and postage or you can wait and buy me lunch at the Starduster Open House!!!

LYCOMING FLYER

## Throttle Jockeying — Bad Technique

Does Throttle Jockeying, i. e., rapid movement of throttle from low to high power settings, have an affect on spark plug operations? It certainly does — and here's how.

The deposits formed on spark plugs during extended idle or low power settings are electrically conductive to some extent. However, sudden elevations of temperatures cause them to change chemically through stages to increasingly higher electrically conductive compounds. Misfiring then can occur if the gaps become bridged or the material covers a sufficient area of the insulator nose.

Low temperature carbon deposits formed on spark plugs during idle or low power can normally be removed by performing a proper engine "burn-out". This is accomplished by slowly opening the throttle until full power is achieved. Should misfire occur during power application, decrease power slightly until all plugs fire consistently for approximately 15 to 30 seconds, and again slowly open the throttle until full power capability has been achieved.

**DISCOURAGE THROTTLE JOCKEYING AND GET  
BETTER PLUG AND ENGINE PERFORMANCE!**

(Courtesy of Champion Spark Plug)

## A Daily Engine Preflight Checklist

1. **FUEL** — look for signs of fuel dye which means **leaks**, check **amount** of fuel, drain for **water**.
2. **OIL** — check for leaks, check oil level.
3. **EXHAUST SYSTEM** — check for white stains which are exhaust leaks at the cylinder head or cracks in stacks, check condition of heat mufflers for cracks or leaks.
4. **COWLING AND BAFFLES** — check for cracks in cowling and baffles, check for proper position of baffles, secure cowling fasteners.
5. **AIR FILTER** — good tight fit, good condition.
6. **ANYTHING LOOSE OR UNATTACHED** — wires or lines, fuel pump, bird's nests, rags, etc.

The average pilot is not sure what he is looking for when he lifts the cowling to do a daily preflight. He can easily memorize the six items just listed, which will serve as a helpful guide.

## COPY OF LETTER ABOUT WEIGHT & BALANCE

It was wonderful to talk with you about Stardusters during our recent telephone conversation. I am sorry to hear about all the problems you have had with your airplane and am glad you have finally resolved them to your satisfaction. Weight & Balance has been and still is a problem for many Stardusters and I have received several letters describing the same trouble.

It is unfortunate that this information was not made available to all owners and builders many years ago, along with the forceful details. Previously in issues of Starduster Magazine Jim Osborn warned owners and builders about weight and balance problems starting as early as 1975.

Even before this Will Neubert editor of Stardusters International (cir 1970 to 1974) wrote on several occasions about weight & balance problems. But most interest is Fred Meyer's book on "Building the Starduster" first published in 1970 and subsequently offered for sale in Sport Aviation during that time. It addresses the subject in great detail, advocating a 24" mount when the plans called for a 17" mount. Many builders were afraid to do anything other than what the planes called for and subsequently built airplanes with not only CG problems but with the landing gear as well.

I myself knew about the problem as early as 1981, after being away from Sport Aviation for over 10 years and during my research for publication of Starduster History I came to the same conclusion that they did after working the numbers in detail. This prompted me to write about it so that owners and builders would be informed.

I am also quite aware of Harry Dellickers weight & balance calculations and have copies of the same. I also agree that if one is going to do much aerobatics that his numbers should be favored.

But for normal weekend flying I still think the 33% M.A.C. is acceptable and as I am sure you are aware of the peculiarities of the M-6 airfoil as well as biplane S stall characteristics I.E. angle and incidence between the two wings which softens the stall. This of course is with a 24" mount and an airplane built paying attention to detail.

My airplane has worked well for me when I fly by myself the trim is in neutral. It is only when I load it up passenger, baggage and low fuel does the trim go toward the nose down. After flying the airplane almost 500 hrs in little over 2 ½ years and with over half the time being cross country and at gross weight, I have found that it flies quite normally. The only thing that would make it better in more horsepower as it does not perform well at high elevations or high altitude. But then neither do Pipers or Cessnas. So all in all I can't complain.

I have met a number of builders who have either told me they have no intention of changing their engine mount or landing gear (to much work cutting it apart) and later being sorry that they didn't and the ones who did, at my urging, were very happy they did. Well enough of this for whatever it's worth.

Enclosed is a current copy of Starduster History as well as some pictures. I hope you get the time flown off so you can go to the Starduster Open House with us, but either way I plan on stopping by to see you. If I can help you with any other information please let me know.

Sincerely,

David C. Baxter

P.S. Also enclosed is a copy of the article you asked for on avionics box for the Starduster Too.

For some reason, this spring, there has been an unusual number of landing gear accidents involving STARDUSTER TOO'S. These accidents have occurred on the East Coast as well as the West Coast.

Now, one explanation of these accidents might be as follows. These accidents are without precedent in number. Therefore it is likely that most of them are pilot error. Investigation discloses that most accidents do, in fact, happen either to low time pilots, or to pilots who have little taildragger time. Therefore it would seem logical to say that the pilots involved need to upgrade their skill in flying biplane taildraggers.

Another theory (popular with those who have had accidents) is that the landing gear design is not strong enough.

Perhaps there is some truth in both viewpoints.

The Starduster Too landing gear was designed to collapse or fail, before damage was done to the fuselage. The gear is easier, and cheaper, to repair than is the fuselage. It was designed to take an impact load of 2.5 g's at a gross weight of 1704 pounds.

However, many, perhaps most, Starduster Too's are like the lady on a diet, in a word, overweight. Combine this overweight with some hard or groundlooping landings and it might be argued that the gear should be a bit stronger.

A third factor, which I have personally noticed, is that many owners have the safety cable which wraps around the gear, on much too tight. This safety cable is on for one purpose only; and that is to keep the gear from collapsing if the shock cords break. It is NOT on there to keep the shocks from breaking; but only to save the situation in case they DO break. If the safety cable is too tight, the gear will hit the cable, hard, before the shocks have hardly extended themselves. This means that the cables will probably bend the top cross piece. If the hit is hard enough, and the bend great enough, the welds holding the cross piece in place will fracture, and we have another landing gear accident. Such an accident could have been prevented by making the safety cables long enough to allow the gear to come off the rebound pad by at least 4 inches. Six inches wouldn't hurt.

Another safety habit we should get into, is to inspect the gear after hard landings. Professional, and military pilots do this as a matter of routine. If you have had a bad day practicing landings, the least you can do before putting your bird to bed, is to carefully inspect the landing gear for damage. Usually, a gear bends a little, or gives a little, before letting go entirely. A safety inspection after an unusually hard landing might spot this incipient damage.

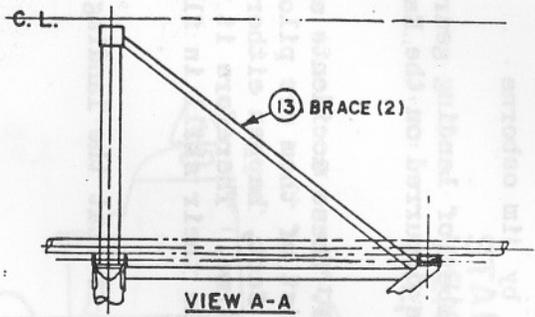
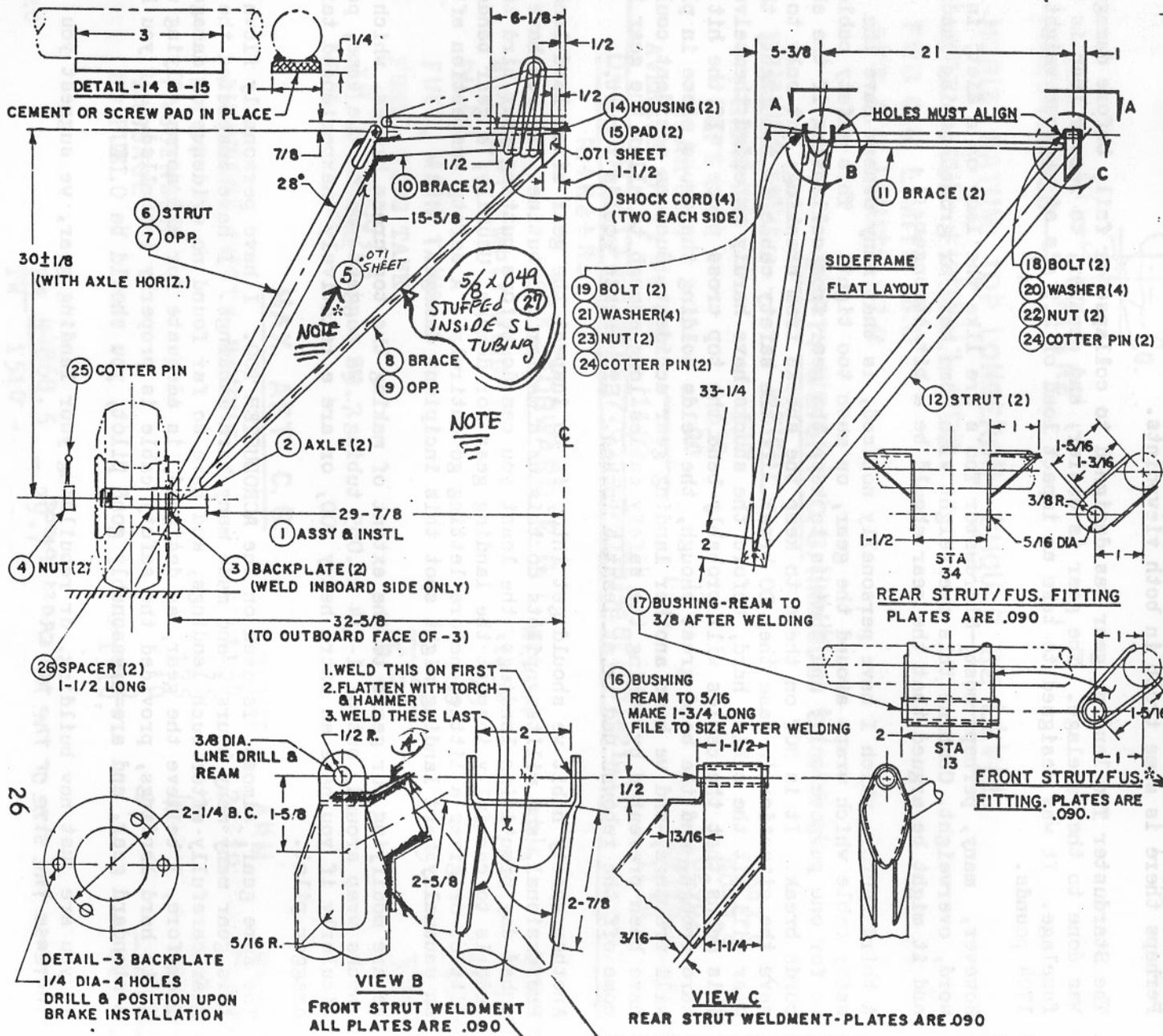
We are modifying our gears to the extent of making the top cross braces, which the shocks wrap around, out of 1-1/4 x .065 tubing. We suggest you do the same, particularly if you have an extra heavy TOO, or are a relatively inexperienced tail dragger pilot.

The same gear, almost, is used on the ACRODUSTER TOO. I have personally flown this gear many many hours, and made many hard landings. I have inspected the gear carefully after such landings, and have so far found no evidence of damage. Therefore, I believe the gear, as designed, is adequate for all normal flying and quite hard landings, provided the safety cable is properly installed. If you have a standard gear, and are a reasonably good pilot, you should be O. K.

If you are just now building, or rebuilding your landing gear, we suggest you increase the size of the top cross piece

# NEW MODS ON LANDING GEAR

\*-DENOTES CHANGE - CAUTION SAFETY CABLE MUST ALLOW 4" OF GEAR TRAVEL



2-USE AIRCRAFT CERTIFIED STEEL.  
1-ALL STEEL IS 4130, COND. N  
NOTE: COPYRIGHT 1975

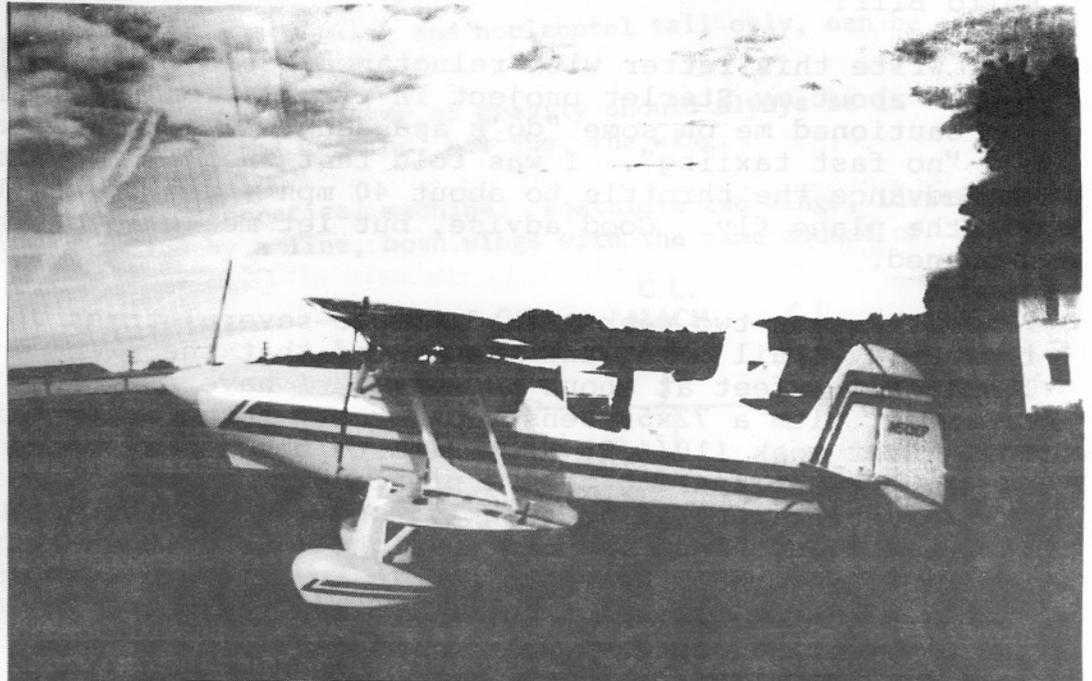
ITEM	REQ'D	NAME	MAT'L	NUMBER
	1 PC	4130 SHEET	.090x3x36	
	1 PC	4130 SHEET	.071x9x9	
26	2	SPACER	1-5/8x.058x2	-26
25	2	COTTER PIN	AN380-4-8	-25
24	4	COTTER PIN	AN380-2-3	-24
23	2	NUT	AN310-6	-23
22	2	NUT	AN310-5	-22
21	4	WASHER	AN960-616	-21
20	4	WASHER	AN960-516	-20
19	2	BOLT	AN6-30	-19
18	2	BOLT	AN5-22	-18
17	2	BUSHING	1/2 x .065	-17
16	2	BUSHING	7/16 x .065	-16
15	2	PAD	BELTING, 1/4	-15
14	2	HOUSING	.071 SHT.	-14
13	2	BRACE, RD	1/2x.035x26	-13
12	2	STRUT, S.L.	2.360x.049x43	-12
11	2	BRACE, RD.	3/4x.049x20	-11
10	2	BRACE, RD.	1-1/8x.065x16	-10
9	1	BRACE, S.L.	1.685x.049x48	-9
8	1	BRACE, S.L.	1.685x.049x48	-8
7	1	STRUT	2x.065x36	-7
6	1	STRUT	2x.065x36	-6
5	4	STRAP	1 1/2 x 3 x .071	-5
4	2	NUT	STARDUSTER	-4
3	2	BACKPLATE	STARDUSTER	-3
2	2	AXLE	STARDUSTER	-2
1	1	ASSY & INSTL		SA300-14-1
27	2	REINFORCE	5/8 x 0.49	-27

SCALE: \_\_\_\_\_  
DATE: \_\_\_\_\_  
DRAWN: J. Calzone  
STRESS: J.O.  
CHECKED: B.C.

ASSEMBLY-  
LANDING GEAR  
MODEL SA300  
STOLP STARDUSTER  
CORPORATION

STARDUSTER  
"TOO"  
SHEET NO. 14

10/23/95



Dear 'BC'

Here are the photos I promised on the newest Acroduster, N513EP. It was started by Francis Burkhardt formerly of Monument CO. In 1989 the project was purchased by Earl Biter of Florida. It was purchased by Emmor Porter of Mt. Pleasant PA in 1993 and completed a couple months ago. It is S/N 325 powered by 260HP IO540 with a Hartzel constant speed prop. We are still working out some minor bugs but should be ready for some traveling this spring.

Thanks very much for your help on the rigging. We made the adjustments to the aileron bell cranks, but as of this moment haven't had weather to test it. Probably this afternoon we will find out.

Best Regards,

Ron Menhorn

October 16, 1995

TO STARDUSTER CORPORATION

Hello Bill:

I write this letter with reluctance because when I last spoke to you about my Starlet project in preparation for a first flight you cautioned me on some "do's and don'ts". One such caution was "no fast taxiing". I was told that when I was ready to go, advance the throttle to about 40 mph - get the tail up and let the plane fly. Good advise, but let me tell you what happened.

In the past two weeks I had taxied several times up and down the runway, tail down, and discovered that the plane would get light on its feet at about 1200 rpm. I have a 0-235 (108 hp) Lycoming, with a 72x50 Sensenich prop., total empty weight 694 lbs. Last week (10/4/95) I taxied to the runway intending to do some faster taxiing than I previously had done. I advanced the throttle, perhaps to quickly, and in a split second I was 15-20 feet in the air, drifting right toward the hangers. I apparently over corrected to the left, tried to compensate back right and just that quick I stalled in from about 15-20 feet. The plane hit right wing first, than left and apparently was nose high because the nose came down and buried the prop blade about a foot and a half into soft soil. The aircraft was damaged beyond repair. Two plus years and several thousand dollars are down the drain. Total incident lasted probably less than a minute and covered a distance of about 400 feet. Everything was within the confines of a private airport, in the country, south of Seattle.

Fortunately (or unfortunately) a farmer in the next field saw the whole thing, thought the worst and called 911 reporting an airplane crash. The magical words "airplane crash" brought everyone out including the FAA. There were no serious injuries and no property damage. The FAA wrote up their accident report as a "Taxiing incident". Case closed.

There was a time when farmers did not carry cellular phones. If this farmer had not been keeping up with the times he would not have been able to call in so quickly and the whole thing would have gone unnoticed. I was immediately out of the plane, walking around and shedding big tears, but he had already dialed 911. I don't fault him - it's possible that a matter of a minute or two might have been the difference between life and death. He has since apologized because he brought a lot of attention to the airport and a lot of needless press. I did get a cut on the leg that required hospital attention but other than that I was not hurt. Pride does not count in this evaluation of injury.

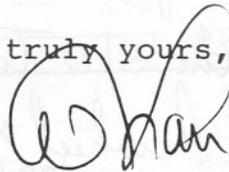
601-835-2600 • 438-9000 • 425-2400  
PLU  
SERVICE  
Danny Miller's  
PLU  
SAFE  
177  
If you are a religious person you may agree with my rational that my guardian angel was watching out for me. When the nose of the plane impacted, the weight of the prop and engine caused the engine to break from the mount. I had a dynafocal mount and the breaks occurred at the welds or the tubing tore free from the air frame. When I bought my project I received the welded up mount with the purchase. I guess that it is possible that I could have been at several hundred feet, at some time in the future, doing stalls or other stressful maneuvers (I'm not an aerobatic type) and the engine mount could have failed. Results might have been disastrous for myself or another person who may have purchased the plane from me. So - while I am out a little now, perhaps I have been saved a lot.

I send you this information now for two reasons, assuming that it will make the newsletter.

First - I would caution all Starlet builders to heed and obey your words. The Starlet sets on a high gear, the tail is low and there is a lot of incidence in the wing in this configuration. If there is any speed involved it is important that the tail gets up. I discovered that the speed, in my case, did not have to be much over the normal taxi speed as I faced into the wind.

Second - While my plane is not rebuildable I do have several salvageable pieced and parts. If there are Starlet builders that would be interested in cutting their build time I may have some things that they can use. Perhaps I can ease the sting of a complete financial loss. If there is interest I can furnish a list of pieces and parts that would be available.

Very truly yours,



Al Lau  
16461 54th Ave. S.  
Seattle, WA 98138  
(206-431-9732)

Danny Miller's

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2-4-96

David Baxter

5725 S.W. McEwan Road  
Lake Oswego, Or. 97035

Re: 1<sup>st</sup> flight V20PD  
\_\_\_\_\_ One Plumber Dan

David,

Enclosed are 4 photos + a tape of 1<sup>st</sup> flight of V20PD. Everything went as planned. My mom + good friend Bob Cunn were in the chase plane. Gibson Berry, Mike Council + Randy Replegle were ground support. We were all pleasantly surprised how well the S/D too handled, because I'm a 40hr 172 pilot w/ 20 hr tail-wheel + 0 in a bi-plane.

V20PD was completed Jan 96 + flown JAN 13, 96. The empty wt = 1160 lbs - 0-360 180HP hyc. 7563 Mc Cauley first pitch prop.

my marriage to Janet (26 yrs ago) + the birth of my son Adam are the only events in my life that compare to this flight. I am/ feel very honored to be able to sit back + say... I did that.

V20PD

Danny Miller



**DAN MILLERS FIRST FLIGHT OF  
N20PD OVER GULFPORT MS  
ALSO ON THE GROUND AT HOME  
BASE PICTURES ABOVE AND BELOW**



1:13'96



Robert & Cynthia Griffin  
2444 Henn-Hyde Rd. N.E.  
Warren, OH 44484

Hi Bill,

Thank you for including N507RG in the Jan. 96 Starduster Magazine. I'm sorry for not keeping you up to date, but now that the full force of Ohio's winter is upon us I finally have the time.

As you stated in the newsletter N507RG flew for the first time Aug. 6 1995 at 7:30 pm. The test flight went well, with no surprises and was one of the most exciting experiences I've ever had.

I've always loved bi-planes and as biplanes go the Starduster II has to be one of the most beautiful to ever grace the skies, thank you, Mr. Stolp. I didn't really think I had the skills to build a plane, so I forgot about the Starduster for a number of years. Although I had considered purchasing a completed Starduster, I wanted something I had a hand in creating. I decided to try a kitplane first and completed a Kitfox IV serial #1484 N582RG in Aug. of 93 after 23 months and 800-1000 hrs. The Kitfox flew great and after about 80hrs of flying, good old Gerry Rhinehart comes along with news of a Starduster II project in Trade-A-Plane.

Jerry even offered to ride along to inspect the project, (what a guy). N507RG was begun in Larry McDonald's shop and work was very nice. So with a few phone calls to Bill Clouse (Thanks Bill) and some encouragement from Jerry, I brought the project home. I started working on it the day I got it home and I quickly discovered I needed something else; more money, so I sold the Kitfox and got serious. In about 10 months it was signed off and ready to fly. Oh sure there were problems, like a O since majored engine that needed a complete overhaul anyway at a substantial unplanned for cost and a few other hurdles. Luckily my wife is very understanding of my passion, besides she likes to fly too. All I can say is it was worth every penny and every hour of work because it is an absolute ball to fly.

N507RG is powered by a Lycoming O-360 A4A a solid crank, carbureted 180 hp. It weight 1,138 lbs empty, has a 30 gal fuel capacity, cruises at 124-130mph at 2450rpm, climbs 1200+ fpm with a Sensenich 76-60 fixed pitch prop. It is equiped with a bosch 55 amp alternater, a gel cell battery, basic VFR instruments, with 3 position strobes, King Ky-97 com, KT76 Transponder with encoder, with a Garman 90 handheld G.P.S. for navigating. The plane is covered with Stits (polyfiber) and finished in international orange with Eagle Blue trim with white accent in Aerothane. The best thing about the Starduster II is that it is a very docile, honest and easy to fly airplane, especially when compared to some other biplanes. I absolutely love it.

Since winter came to North East Ohio very early and has been intense I've only been able to put about 27 hrs on 507RG. But even a 17 degree day wasn't enough to keep Jerry Rhinehart from going for a open cockpit ride, last weekend.

I have alot of people to thank for N507RG starting with Mr. Stolp, for dessigning such a fine airplane. Thanks to Larry McDonald for starting the project and allowing me to purchase and complete it. My wife Cindy for putting up with my long hours in the garage, (International orange garage). My dad and my brother for their help and support, Jerry Rhinehart for convincing me to take the plunge, Ken Gibson whose hanger Jerry and I have been trashing, as well as many EAA members fo their support. Also thanks Bill Clouse and staff for keeping Stardusters going and producing a fine newsletter that I really look forward to getting.

I hope to get to meet some other Starduster owners and builders a Wautoma 96, Jerry and I and a couple other local Starduster Too's plan on departing North East Ohio for Wautoma this summer, so if anyone is interested in joining the flight we would be glad to have you. If anyone is interested please give me a call at (216) 856-4644.

Thanks  
Sincerely Robert L. Griffin

STARDUSTER HISTORY



BOB GRIFFINS NEW STARDUSTER TOO  
N507RG AT HOME BASE WARREN OHIO



N570RG WITH BOB AND CINDY GRIFFIN  
CINDY HAS BEEN GREAT IN SUPPORTING  
BOB DURING THE CONSTRUCTION OF N570RG

## STARDUSTER HISTORY

## N7691 THE STARDUSTER TOO BUILT BY HARRY DELICKER

N7691 was started in late 1969 and first flew in February of 1972, it was also one of the first three airplanes that had six cylinder engines. The first was Lou Stolps prototype N1300S, 0470-230 Hp Continental. Followed by Paul Dechamps N14157, G0 480 275 Hp Lycoming and Harry Delickers N7691 0540 235 Hp Lycoming the engine coming from a Pawnee spray plane. Harry originally had a shop at Flabob, but moved to Strathmore, California during the mid 1960's and was their for a number of years before moving to his present Porterville location. Harry has a company called Del-Air, he is an I.A. He also told me that he would work on most anything aviation related as long as the customer would pay him and at one time worked on an original design air car, has restored many antique airplanes and continues to do all types of maintenance repair and aircraft recovering. This is one thing his wife was know for her covering xpertise. As she had always helped him in this part of the business.

During the early 70's Harry built a number of fuselages for Starduster Toos the most notable one was N69JY Big Red built by Jim Young. Harry did all of the steel work and rigged the airplane which eventually became the Oshkosh Grand Champion in 1975. Harry was also working on a slightly larger Starduster Too about 10% that was to be powered with a 300 Hp Lycoming radial. It is still not finished, but he still has it along with another 540 powered Starduster Too project that is also pretty well along. But getting back to N7691 the airplane was and still is painted orange with black trim, it won many awards in Central California at Airshows and Fly-Ins during the early 1970's and still is a fine example of the plans built Starduster Too. In late 1975 the airplane was sold to two brothers in the San Diego area and was later taken to Texas by one of them and in the early 1980's was sold again to Jim Moore of Port Arthur, Texas, but was based at Orange, Texas during this time. Someone ground looped the airplane getting the wing tip and also taking the gear off as it was replaced by one of the older style landing gears that was farther forward apparently no one bothered to check and see if there was a later design. Because when Harry first built the airplane he moved the gear back. He also was one of the first to question the CG numbers and came up with the same solutions as did Jim Osborne and everyone else at the time. However N7691 had a heavier engine that helped solve CG problems on N7691.

During the mid 1980s Harry got a call from the current owner of N7691 Jim Moore. Asking him about the airplane and if he would be interested in doing some recovering and repainting the airplane and of course he said yes. Eventually going back there to pick it up. Harry rebuilt the cockpit area, instrument panels, floor boards and only recovered the fuselage and one of the lower wing panels. He did however get to deliver the airplane back to Texas. It was during this time on one of my trips south I stopped by Porterville to visit with Harry and was able to take some pictures of N7691 when it was all apart. Also in Harry's shop at the time there were several Starduster Too projects. As Harry still has not only steel jigs for all Starduster Too Steel parts. He still has a warm and fuzzy feeling for the airplane. And at one time like myself entertained the idea of owning Starduster Corporation with even the idea of certifying the airplane in a four and six cylinder version. However better sense prevailed. Not much is known as to the history of N7691 during its time in Texas it was purchased by Terry Thayer of Eaton Rapids, Michigan. During the early 1990s and on the way North stopped at Bartlesville for the Biplane Fly-In. I have since met Terry on several occasions at Oshkosh/Wautoma in 1993 and again in 1995. He had some questions about landing techniques and also gave my son Dan a ride in it this last summer at Wautoma. The airplane appears to be in not only good shape, but in good hands and is a fine example of the Starduster Too and for being over 24 years old. Looks as beautiful as ever, good luck Terry. I look forward to flying with you again.

Starduster History  
David C. Baxter

COPY LETTER GETTING STARTED  
BUILDING A STARDUSTER TOO

Enclosed is the information you asked for. I am certainly glad to see that you are investigating all the information regarding the Starduster. Too before people do not take the time to do research is why the Starduster is around. I am also glad that you are interested in the Starduster. You have some ideas as to how to build one. I haven't had an magazine and we now have over 300 and the many builders and owners. As for the Starduster, it is a quality work. Starduster (quality work)



N7691 AT WAUTOMA/CSHKOSH 1993



N7691 AT BARTLESVILLE EARLY 1990s



N7691 AT OSHKOSH/WAUTOMA 1995

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## COPY LETTER GETTING STARTED BUILDING A STARDUSTER TOO

Enclosed is the information you asked for. I am certainly glad to see that you are investigating all the information regarding the Starduster Too before jumping in. Most people do not take the time to do so, which is why there are so many unfinished projects around.

I am also glad that you were able to visit Bill Clouse at Starduster Corporation so that you have some idea as to what it is about and I was glad to hear that you enjoy the magazine. I haven't had anyone ask for there money back yet (regarding subscription) and we now have over 400 subscribers. It is however a good way to keep in contact with the many builders and owners of these fine aircraft.

As for ideas about getting started, my suggestion is to purchase a project that someone else has started and given up on. This is usually the best way (providing they have done quality work). Starduster Too projects typically go for between \$3,000 to \$12,000. The idea is to get the most for your money in parts and workmanship.

There is nothing wrong with building from scratch. But most builders generally do not have the time, money or know how to build cheaply. Having a place to work that is convenient, being able to do all your own work and knowing what and what not to buy is the difference. If you buy everything at list price over the counter you will probably have at least \$20,000 in the airplane not including the engine.

Finished and flying Starduster Toos generally go for around \$25,000 to \$35,000 depending on condition, engine, time and avionics and unfortunately you can pay a lot for a bad one that looks pretty.

Building time for the average dedicated builder I.E. Three weekends a month and at least 3 nights a week can mean the difference between finishing one in 3 to 5 years or spending less time over a longer period.

These are some of the reasons I recommend buying a project, as in many cases you can buy parts, hardware and material and components at yesterdays prices with the labor thrown in.

As far as doing it this way you probably won't save any money, in fact it might even cost you more, but if you can get started now, with just a few parts at a time and keep adding to them as well as continue building at a constant rate, eventually you will have a Starduster Too. The engine and the flying wires are the two big ticket items. The ideal engine is the 200 hp Lycoming, it has the most horsepower available for the least amount of weight. There are however still some good buys in the O540 Lycoming engines. The 180 hp Lycoming is the smallest hp engine I would install in the airplane. But, the sooner you buy some parts and get started the sooner you will fly. Once you have the basic wings, fuselage and materials for the major components, there is a lot of work you can do without spending a lot of money.

I do not know how close Minot, ND is to you, but Al Pietch of Pietch Flying Service FBO, AG, Acro and Starduster Too builder might be someone to talk to in your area (phone 701-852-4092).

Also keep looking in Trade-A-Plane in the experimental section for projects and parts, best source, and of course Starduster Magazine, my stuff is old though compared to Trade-A-Plane and buy as much stuff as possible from Starduster Corporation. Well good luck, let me know of your progress.

# 16<sup>TH</sup> ANNUAL STARDUSTER OPEN HOUSE

When : May 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> of 1996.

Where : Oroville Municipal Airport (OVE)  
in Northern California located on the San Francisco sectional.

Why : Fly, Food, Fun and Friendship.

We would like to fill Oroville with biplanes, Stardusters, Acrodusters, V-Stars, Starlets or any other homebuilt enthusiast. We would like to see you there with your airplane. Come help us celebrate our 16<sup>th</sup> anniversary. Please join us for a weekend of fun. Camping will be allowed on the airport. This event will be hosted by the City of Gold EAA Chapter 1112 of Oroville, California.

Please let us know if you plan on attending especially for banquet reservations:  
Howard Fairbanks should be contacted as soon as possible with the number in your party.

Bill Clouse 1-800-833-9102 Southern California. President Starduster Corp.  
Dave Baxter 503-639-8792 Oregon. Editor of Starduster Magazine.  
Les Homan 510-516-1094 Bay Area contact.  
Dix Mackey 916-532-0919 EAA Chapter 1112 President.  
Howard Fairbanks 916-533-8303 EAA Chapter 1112 City of Gold events Chairman.  
Fax 916-533-6244

Reservations should be made in advance.

THE FOLLOWING IS A PARTIAL LISTING OF OROVILLE AREA MOTELS.

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Lets have a safe and enjoyable event so please  
no low passes or unusual attitudes in the vicinity  
of the airport or over the City of Oroville.



# 16th ANNUAL STARDUSTER OPEN HOUSE

**When** : May 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> of 1996.

**Where** : Oroville Municipal Airport (OVE)  
in Northern California approximately 60 NM north of Sacramento,  
California and 20 NM NE of Sutter Butte.

Tentative Schedule of events:

Friday May 3<sup>rd</sup> - Early arrivals parking and registration. Members of EAA Chapter 1112 will be on hand to assist and greet.

Friday May 3<sup>rd</sup> - Evening 5:00 to 9:00pm. Local EAA Chapter 1112 host Spaghetti dinner, snacks and drinks in Dix Mackey's Hanger with donations to offset expenses.

Saturday May 4<sup>th</sup> - Early Morning. Dawn patrol from Oroville to Willows Glenn Co Airport (WLW) for a special Starduster breakfast. Briefing at 5:45am, take off at 6:00am, breakfast at 6:30am.

Saturday May 4<sup>th</sup> - Mid Morning to Mid Afternoon. More arrivals local flying, rides, use of Dix Mackey's hanger for informal aviation folklore also food drink and brunch? For those unable to make the dawn patrol. Tentative plans are for an organized flight over the city and up to Lake Oroville and back to the airport. This hopefully will include a photo mission.

Saturday May 4<sup>th</sup> - Afternoon. For those not interested in all the aviation events, a free houseboat tour of some of the more interesting points around Lake Oroville will be available departing from the airport in the afternoon. (But we will need to know how many people would attend.)

Saturday May 4<sup>th</sup> - Evening 6:00pm. Banquet and awards. Place to be announced. Food: chicken or steak, salad, garlic bread, desert and drinks approximat cost \$14.00 per person. Early reservation for those planning on attending are a must. After dinner there will be awards and entertainment hopefully a colorful speaker regarding aviation knowlage and folklore. This should be a very enjoyable experience.

Sunday May 5<sup>th</sup> - Mid Morning. More rides for the locals. Say our goodbyes and launch for home. Perhaps some orgianized departures.

Please Note EAA Chapter 1112 and a number of sponsors from the City of Gold Oroville, California will be co-hosting this event. And not only do they want us to come they will be doing everything in their power to make our visit an enjoyable one. So please thank all the locals and let them know you appreciate their effort.

For additional information please contact:

Howard Fairbanks 916-533-8303 or FAX 916-533-6244 Events Chairman EAA Chapter 1112 City of Gold  
Bill Clouse 1-800-833-9102 President Starduster Corporation  
Dave Baxter 503-639-8792 Editor Starduster Magazine

DATE: February 5, 1996

TO: David Baxter  
FAX 603-625-2497

FROM: Howard Fairbanks, Vice President, EAA Chapter 1112  
FAX 916-533-6244

SUBJECT: Motel Accommodations for Friday, May 3 & Saturday May 4

**TRAVELODGE**

580 Oro Dam Blvd.  
Oroville, CA 95965  
800-578-7878 916-533-7070  
FAX 916-532-0402  
(70 units)  
Continental breakfast included

1 person, 1 bed \$45\*  
2 persons, 1 bed 50\*  
2 persons, 2 beds 55\*

\*will discount this price by 10% for  
5 or more rooms

**VILLA MOTEL (AAA)**

1527 Feather River Blvd.  
Oroville, CA 95965  
916-533-3930  
(20 units)

1 person, 1 bed \$40  
2 persons, 1 bed 42  
2 persons, 2 beds 46

**BEST WESTERN GRAND MANOR**

1470 Feather River Blvd.  
Oroville, CA 95965  
800-528-1234 916-533-9673  
FAX 916-533-5862  
(54 units)  
Continental breakfast included

2 queen beds \$59  
1 king bed 59  
2 king beds 69

I would recommend the Travelodge as your "headquarters". Since it has recently undergone renovation, we inspected the rooms and feel they will best meet the needs of your group. The Villa motel is also a good choice - It is an older motel, but very clean. The Best Western is the newest motel, but so far have been unable to get a group rate since we must deal with their Redding office.

Please identify yourself as part of the "Stardusters" group for these rates. Any problems, please call me at 916-533-8303 or fax 916-533-6244.

Registration Form — Please mail to

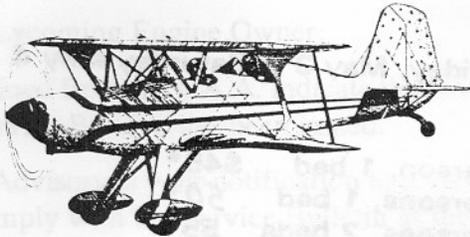
HOWARD T FAIRBANKS  
P.O. BOX 1977  
OROVILLE CA 95965

FAX 916-533-6244

REGISTRATION IS NOT REQUIRED BUT  
WOULD BE HELPFUL, AND YOU DONT HAVE  
TO PAY UNTILL YOU ARRIVE. ALL WE ARE  
TRYING TO DO IS COME UP WITH SOME  
NUMBERS ESPECIALLY FOR THE BANQUET.

STARDUSTERS  
OPEN HOUSE

May 3-5 1996  
Oroville, California



Registration No. \_\_\_\_\_

Name: \_\_\_\_\_ Arrival Date: \_\_\_\_\_

Names of Spouse Or Other family members: \_\_\_\_\_

Address: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_

Home Phone: \_\_\_\_\_ Business Phone: \_\_\_\_\_

EAA Member:  Yes  No Chapter Name & Number: \_\_\_\_\_

Flying:  Yes  No Type or Aircraft: \_\_\_\_\_ N \_\_\_\_\_

Camping:  Yes  No

Friday spaghetti dinner:  Yes  No Number of people \_\_\_\_\_ (\$3.00)

Saturday breakfast: \_\_\_\_\_ Willows Airport \_\_\_\_\_ Oroville Airport (EAA) (\$3.00) Number of people \_\_\_\_\_

Saturday afternoon 2 hr. Houseboat:  Yes  No Number of people \_\_\_\_\_ (Free)

Saturday banquet:  Yes  No Number of people \_\_\_\_\_ (\$11.50)

Sunday breakfast:  Yes  No Number of people \_\_\_\_\_ (\$3.00)

# PORTERVILLE AREA PILOTS ASSOCIATION



PORTERVILLE AIRPORT  
1893 S. NEWCOMB  
PORTERVILLE, CALIFORNIA 93257

January 7, 1996

## FOR IMMEDIATE RELEASE:

46th Annual Porterville Moonlite Fly-In and Airshow  
Porterville Municipal Airport  
Friday, June 14 & Saturday, June 15, 1996

Now in their 46th year, the Porterville Moonlite Fly-In and Airshow is the longest running fly-in in the United States. And as always this event will have something for everyone to enjoy. Static display aircraft of all types, a thrilling airshow, live entertainment, great food and dancing under the stars. Plan to join us for food, fun and flyin' at the 46th Annual Porterville Moonlite Fly-In and Airshow!

For more information please call PAPA president, Michael McMaster at (209) 535-4510 or write to PAPA at 1893 S. Newcomb Ave., Porterville, CA 93257.

# STARDUSTER TOO

70 HOURS TT & SMOH (CHROME) ON LYCOMING 0-320 / 160HP  
CHRISTIAN FUEL AND INVERTED OIL SYSTEMS  
VAL MX-11 RADIO / KT-78 TRANSPONDER W/MODE C ENCODER  
FUSELAGE AND WING TANKS (TOTAL 40+ GAL.)

**\$30,000**

Bill Ewertz 110 Specht Rd. , Sonoma CA. 95476  
(707) 938-1465

## FOR SALE

### HIGH PERFORMANCE BIPLANE

Super Starduster / Acroduster I design  
"Factory built" kit by Starduster - Bill Clouse; Tom and  
Dick Green

Great competition / sport acro plane  
(good thru IAC Advanced)

Cover plane:

SPORT AAEROBATICS Dec. 1984

HOME BUILT A/C Sept. 1983

325 hrs. AF/E smoh

200+ HP Lycoming IO 360 angle valve by FWF

high compression pistons

solid flange acro crank, uprated rods

Sensinich prop, nearly new

smoke (not installed)

Terra hand held

B & C starter

symmetric wings and ailerons

55 mph stall, 175+ mph, easier to land than a Pitts  
Will outfly anything in this price range

\$27.5

Dick Heath  
602 870-1627 eves.  
602 942-1630 Fax

8047 N. 12<sup>th</sup> Ave  
PHX, AZ 85021

# CLASSIFIEDS

ADVERTISING CLOSING DATES : DECEMBER 1, MARCH 1, JUNE 1 AND SEPTEMBER 1.  
CLASSIFIED ADVERTISING RATES \$3.00 PER COLUMN INCH. MINIMUM CHARGE \$3.00.  
MAKE CHECKS PAYABLE TO STOLP STARDUSTER CORPORATION. THANK YOU.

ACRODUSTER, 840TT, O-360A4A, Christen inverted fuel and oil, gell cell, smoke, Icom radio, parachute, set up fo competition aerobatics, \$18,000. (405) 282-4250, eves - (405) 282-6792, FAX - (405) 282-3130.

1978 STARDUSTER TOO, 180HP Lyc., 550TT, 250 SMOH, Com Radio w/txp./enc., Loran, intercom, (209) 665-7319. \$27,000.

260 HP STARDUSTER TOO, 250 TTAESN, out of license needs work, may be trade, deliver, ? (216) 847-0865.

VERY NICE '72 STARDUSTER TOO, 205hp Continental, 800-SMOH, inverted, KY-196 Com and intercom, open cockpits, in Colorado. \$20,000. (970) 484-8578.

1979 STARDUSTER TOO, STUNNING. 442 TTSN, 200hp Lycoming, Hartzell VP prop, 130 TSO VHF Com, intercom, fresh annual, \$38,000 US/OBO. UK +44 1843 860866.

PARTING OUT STARDUSTER TOO flying wires, controls, hardware, tail group, IO540 parts, many Cessna aircraft parts, Scott tailwheel. Scott Patrick, (208) 383-3323.

STOLP STARLET, 65hp, 14hrs TTAE, King Nav/Com, \$34,000 invested, best offer over \$12,000. Pictures available. (906) 774-8934. Beautiful.

STOLP STARLET PARTS, wing lift struts, cabanes, controls, tanks, center section, tail wires, gear with wheels, brakes, turtle deck, fuselage, empennage and wings damaged. \$1900. (206) 431-9732.

ACRODUSTER TOO PROJECT, on gear with engine mounted and all instruments. IO360-A1A and acro prop. Wings and fuselage ready for cover. \$21,500. (770) 228-1918.

ACRODUSTER TOO PROJECT, wing kit, fuselage on gear with tail feathers, turtle deck, most materials to complete airframe. \$4800. (910) 367-7646 days; (910) 367-5239 nights.

STARDUSTER TOO, COMPLETE construction, engine mounted, on wheels, ready for covering, no wires, Continental E-185-205, 415hrs, (316) 721-0550 or (316) 269-4350.

STARDUSTER TOO, almost completed project. Covered and has been rigged, includes SS wires, cockpit instruments, etc. Motivated seller. Call for more details. Ray (501) 753-7286.

STARDUSTER TOO, 487.7 TTAF, 548.3 TSMOH, too much to list, call for details. Test flown 9/82. Days (505) 842-7070; (505) 831-6229 eves.

STARDUSTER TOO, IO-360, CSP, canopy, 650 TT, full inv., 40 gal. fuel, everything FWF new in '94. Call for details. \$38,000. (619) 598-9841.

ACRODUSTER ONE PROJECT, wings, landing gear, wheels, brakes, nose bowl, wheel pants, fuselage materials, lots extras, \$2000. (319) 392-4178 evenings.

WANTED: STARDUSTER ONE, flying electronics, hangered. logs, hopefully SE area. Call Bill at (904) 678-6896. Will return your call for details.

STARDUSTER TOO, 460 hrs A/C, 350 hrs engine since new, 220 Franklin, fixed pitch prop, 720 Nav/Com, King Xponder, with Mode "C". New ELT, good Vox intercom. Cessna Gear, Cleveland brakes, Gen A/C conditon excellent, good records. \$27,500. Will take Bakeng Duce or Champ in trade. (208) 467-6924.

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

