

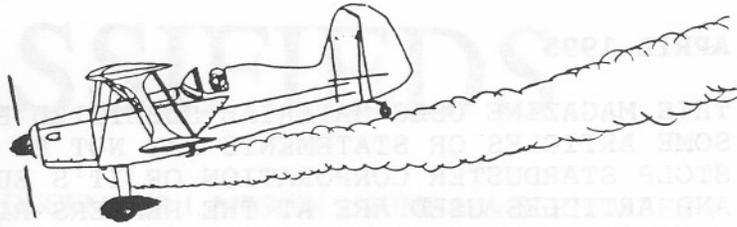
# *Starduster*

MAGAZINE



Dedicated to the  
ACTIVE Homebuilders

**April**  
**1995**



**"B.C."s Comments!**

Think most of us on the Western Side of good ole "U.S.of A."  
Are ready for some sunshine and favorable flying conditions-  
seems like its been a long and wet winter.

Am looking forward to May 5-7 to see many of my friends and  
their "Flying Machines" at Santa Rosa, CA.

It is not too early to make reservations for Wautoma/Oshkosh  
Those that need rooms - call now!! Super "8" & Plantation  
Inn, are closet to Airport.

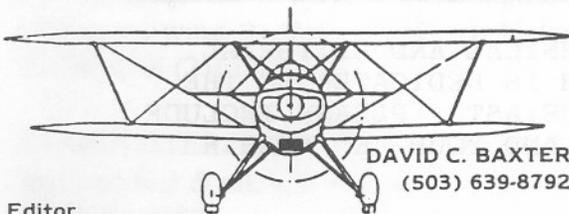
By the time you get to read this, I should be at "Sun & Fun"  
or back already - with the news of what went on with our  
vistorers there. Got to check with Ken Poteet and see if  
landing gear is still ok. [Alum Spring Gear], maybe catch  
Charles Wolff and sons with their 300 hp SA300 - and all the  
others that can get there.

Still very busy here at "Flabob" and the "Starduster Shop"  
-SA300 plans have gone to Belgium, France and Benin, Africa  
and naturally around the "US"., always projects here to work  
on - and in progress.

Have had several calls from interested parties - inquiring  
about the sale of Starduster Corporation - Am pleased with  
the interest that has been shown - Nothing positive at this  
time.

Till we meet again,  
"Trust your machine, You built it".

**STARDUSTER MAGAZINE**



**DAVID C. BAXTER**  
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APRIL 1995

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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** - Forground - N45GG Bill Kolb's SA-300 and Phil Hax's N13HX at Post Mills Airport, Fairlee, VT. Bill Kolb, RD 2 Box 48D, Lanaan, NH 03741. Phil Hax, Gaskell Hill RR 2 Bix 110A, West Burke, VT 05871.

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**BACK COVER** - N7989 Bob Pisani's airplane at Livermore, California after a long rebuild. Letter in this issue as to the problems of aircraft ownership. Bob Pisani, 610 Nevada Ave., San Mateo, CA 94402.

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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

Like Bill I am looking forward to Starduster Open House at Santa Rosa, which by the way has been moved 10 miles south from Healdsburg, the original location. The Days Inn at Santa Rosa will be where most of the Starduster folks will be staying (see new Open House flyer in this issue for details). I am also looking forward to Oshkosh / Wautoma and am looking for pilots who would like accompany us during our trip east. After Oshkosh / Wautoma we are currently planning a trip to Georgia which we would also like to have some company. So if any of you guys are interested please see me at Santa Rosa or call and let me know your plans. I have been planning this trip for some time and would like to visit many owners and builders along the way. Also Oscar Bayer of Arroyo Grande, California is trying to promote Oshkosh / Wautoma and will be sending invites to all registered Starduster enthusiasts who own flyable airplanes in hopes that a substantial turnout will occur. If you would like to help please call him at (805) 489-0951.

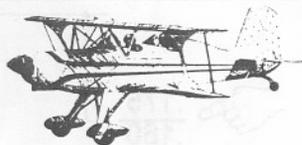
Bill at Starduster Corporation along with myself continue to receive information about products, publications and events as well as the many letters and pictures. We certainly appreciate the interest from our subscribers and try to print as much of it as possible. But with only forty pages to work with and printing and postal cost what they are it forces me to pick and choose based on what I think you readers want, or put off until the next issue things that would normally be included. So having said that there are several events that I have received that you might like to attend.

The Annual Porterville, California Moonlight Fly-in held June 9th and 10th at Porterville Airport. For information please contact Mike or Dawn McMaster at (209) 535-4510.

Also the EAA All American Sport Aviation Fly-in at Alliance Airport in Fort Worth, Texas. For information please call (817) 439-3703.

Last and on a very pleasant note we would like to congratulate Dan DUEWALL for his recent best biplane award in the plans built category for his beautiful Starduster Too N777DP. This was at last years Southwest Regional Fly-in held at Kerrville, Texas. Congratulations to him and to all the other Starduster enthusiasts who fly their airplanes to the many events across the country.

DCB Editor



**TEXTRON Lycoming**

Reciprocating Engine Division/  
Subsidiary of Textron Inc.  
652 Oliver Street  
Williamsport, PA 17701 U.S.A.

115-000-002  
FEB 19 1995

# MANDATORY SERVICE BULLETIN

DATE: February 3, 1995

Service Bulletin No. 518A  
(Supersedes Service Bulletin No. 518)  
Engineering Aspects are  
FAA Approved

SUBJECT: Inspection of Thermostatic Bypass Valves

MODELS AFFECTED: All Textron Lycoming engines employing thermostatic bypass valves P/N 53E19600, P/N 75944, P/N LW-13230 and P/N 53E19980.

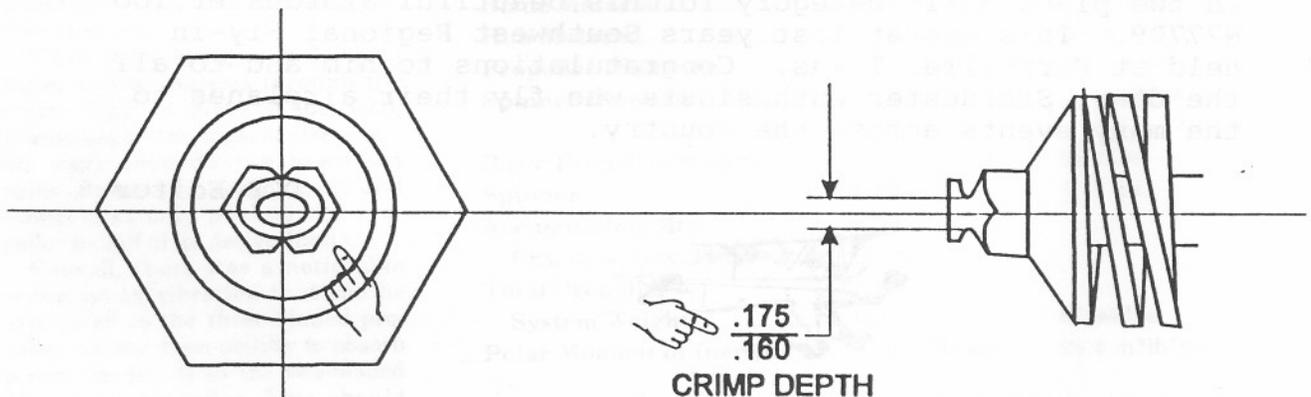
TIME OF COMPLIANCE: At next oil change, not to exceed 50 hours, and then annually thereafter.

Textron Lycoming has received reports that a number of thermostatic bypass valves are in service with loose crimp nuts. It has been shown that the nut can work free and drop into the engine causing engine damage.

All thermostatic bypass valves (except P/N 53E19600 with serial numbers 53788 and higher) must be inspected at next oil change, not to exceed 50 hours, with subsequent inspection each year thereafter. Thermostatic bypass valve P/N 53E19600 with serial numbers 53788 and higher are not subject to the initial inspection, but they must be inspected annually.

The thermostatic bypass inspection consists of two steps:

Step 1 is the dimensional inspection of the crimp nut. The crimp depth on the nut must be .160-.175 as shown in Figure 1.



Step 2 is the physical inspection of the crimp nut to ensure it is seated and solid on the shaft. Separate the seat and retaining nut by holding the valve assembly in one hand and compressing the valve spring with the forefinger and thumb. (See Figure 2.) With the seat and nut separated, grasp the crimp nut with the other hand and attempt to move it. The crimp nut must not move.

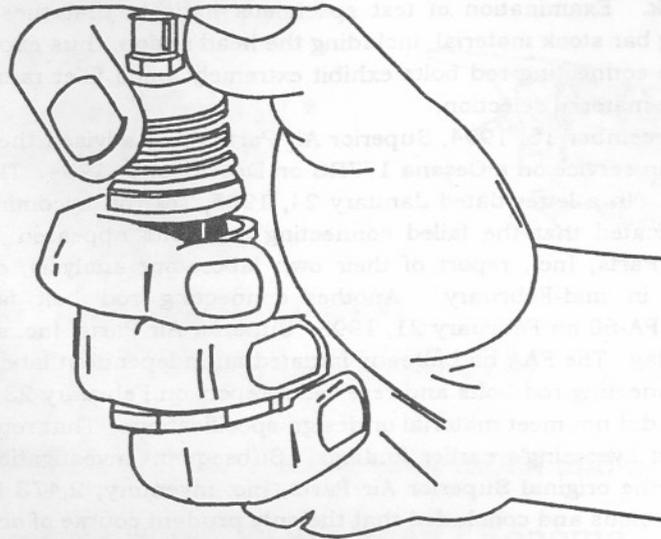


Figure 2.

If the thermostatic bypass valve does not meet either step of the inspection, it must be replaced immediately.

Make appropriate log book entries for each inspection.

Normal warranty policy applies.

For Your Information - AD Note and Service Bulletin

An airworthiness directive has been issued on Precision Airmotive Corporation (formerly Facet Aerospace Products and Marvel Schebler) Model HA-6 series carburetors that will require the installation of a clip to prevent the possible loss of mixture control. The AD will affect approximately 5,000 carburetors that were manufactured before 1979. Most of the affected carburetors are installed on Lycoming O-360 and O-540 engines. Compliance is required within 12 months after the effective date of February 13.

# PRIORITY LETTER AIRWORTHINESS DIRECTIVE



REGULATORY SUPPORT DIVISION  
P.O. BOX 26460  
OKLAHOMA CITY, OKLAHOMA 73125-0460

U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

DATE: March 17, 1995  
95-07-01

This priority letter Airworthiness Directive (AD) is prompted by reports of connecting rod bolt failures on Textron Lycoming O-360, LO-360, HO-360, HIO-360, TIO-360, LIO-360, AEIO-360, O-540, IO-540, TIO-540, LTIO-540, IVO-540, AEIO-540, TIO-541, and IO-720 series reciprocating engines. These connecting rod bolts failed with no particular pattern. The head of the bolt sheared off on some, while others failed at the threads and some at the shank. Examination of test specimens indicate that these connecting rod bolts were fabricated by machining bar stock material, including the head region, thus exposing end-grains in the head-to-shank radius. These connecting rod bolts exhibit extremely small fillet radii, numerous deep machining grooves, and inadequate material selection.

In a letter dated December 15, 1994, Superior Air Parts, Inc., advised the FAA that several connecting rod bolts had fractured in service on a Cessna 177RG on December 9, 1994. The pilot completed a power-off landing with no injuries. In a letter dated January 24, 1995, Textron Lycoming advised the FAA that their laboratory analysis indicated that the failed connecting rod bolts appeared to be suspected unapproved parts. A Superior Air Parts, Inc., report of their own laboratory analysis, dated January 3, 1995, was presented to the FAA in mid-February. Another connecting rod bolt failure was identified during maintenance on a Piper PA-60 on February 21, 1995. Superior Air Parts, Inc. advised the FAA of the second failure on the following day. The FAA had already initiated an independent laboratory analysis of a sample of suspect unapproved connecting rod bolts and received a report on February 23, 1995, which concluded that the connecting rod bolts did not meet material or design specifications. That report corroborated Superior Air Parts, Inc.'s and Textron Lycoming's earlier findings. Subsequent investigation revealed that of the 3,382 connecting rod bolts in the original Superior Air Parts, Inc. inventory, 2,473 had been shipped. The FAA considered all possible actions and concluded that the only prudent course of action was to issue this priority letter AD.

These connecting rod bolts were shipped from Superior Air Parts, Inc., between February 15, 1994, and December 20, 1994, as replacements for Textron Lycoming connecting rod bolts, Part Number (P/N) 75060, or Superior Air Parts, Inc., connecting rod bolts, P/N SL75060, or Aircraft Technologies, Inc. P/N AL75060. However, the failed parts have no markings to identify them. The traceability of these bolts is extremely difficult, and the FAA has determined that the vast majority of the bolts distributed cannot be recovered, nor can they be identified by a routine records search of engines which have been overhauled since February 15, 1994. The FAA has concluded that all engines which may have been overhauled using these connecting rod bolts must be visually inspected for the installation of unmarked connecting rod bolts. Further, since it is impossible to analytically determine how long these connecting rod bolts as installed may remain intact, this AD must be complied with before further flight. Therefore, all connecting rod bolts with no markings must be considered suspect unapproved parts. This condition, if not corrected, could result in engine failure due to connecting rod bolt failure, which could result in damage to or loss of the aircraft.

Also, during the investigation the FAA determined that only unmarked 75060 connecting rod bolts shipped from Superior Air Parts, Inc., between February 15, 1994, and December 20, 1994, are considered suspect unapproved parts. Approved serviceable parts can be readily identified by raised letters SPS, S, C, or FC, identifying them as Textron Lycoming parts, or SL75060 etched on the head identifying them as PMA parts manufactured by Superior Air Parts, Inc., or AL75060 forged into the head, identifying them as PMA parts manufactured by Aircraft Technologies, Inc.

Since an unsafe condition has been identified that is likely to exist or develop on other engines of this same type design, this AD requires removal prior to further flight of suspect unapproved connecting rod bolts and replacement with serviceable connecting rod bolts. Suspect unapproved connecting rod bolts may be identified as those bolts that are not clearly marked on the head by raised letters SPS, S, C, or FC, identifying them as Textron Lycoming parts, or not clearly marked with SL75060 etched on the head, identifying them as PMA parts manufactured by Superior Air Parts, Inc., or not clearly forged into the head with AL75060, identifying them as PMA parts manufactured by Aircraft Technologies, Inc.

This rule is issued under 49 U.S.C. Section 44701 (formerly section 601 of the Federal Aviation Act of 1958) pursuant to the authority delegated to me by the Administrator, and is effective immediately upon receipt of this priority letter.

**95-07-01 Textron Lycoming:** Priority Letter issued on March 17, 1995. Docket No. 95-ANE-14.

**Applicability:** The following Textron Lycoming reciprocating engine models, assembled on or after February 15, 1994, and that contain connecting rod bolts shipped directly or indirectly from Superior Air Parts, Inc., on or after February 15, 1994:

O-360-A1A, -A1AD, -A1C, -A1D, -A1F6, -A1F6D, -A1G6, -A1G6D, -A1LD, -A2A, -A2D, -A2E, -A2F, -A2G, -A3A, -A3AD, -A4A, -A4G, -A4J, -A4K, -A4M, -A4N, -A5AD, -B2A, -C1A, -C1C, -C1E, -C1F, -C1G, -C2A, -C2C, -C2D, -C2E, -D2A, -D2B, -F1A6; IO-360-A1A, -A1B, -A1B6, -A1B6D, -A1C, -A1D, -A1D6, -A2A, -A2B, -A3B6D, -B1A, -B1B, -B1D, -B1E, -B1F, -B2F, -B2F6, -B4A, -C1A, -C1B, -C1C6, -C1D6, -C1E6, -C1F, -J1A6D; AIO-360-A1A, -A1B, -B1B; LO-360-A1G6D; HO-360-B1A, -B1B; HIO-360-A1A, -B1A, -C1A, -C1B, -E1AD, -E1BD; LIO-360-C1E6; TIO-360-A1B; AEIO-360-A1E, -B1G6, -H1A; O-540-A1A, -A1A5, -A1B5, -A1C5, -A1D, -A1D5, -A2B, -A3D5, -B1A5, -B1B5, -B2B5, -B2C5, -B4B5, -E4A5, -E4B5, -E4C5, -F1A5, -F1B5, -G1A5, -G2A5, -H1B5D, -H2B5D, -J1A5D, -J3A5D, -J3C5D, -L3C5D; IO-540-A1A5, -B1A5, -B1C5, -C1B5, -C4B5, -C4C5, -C4D5D, -D4A5, -E1A5, -E1B5, -G1A5, -G1B5, -G1C5, -G1D5, -G1E5, -G1F5, -J4A5, -K1A5, -K1A5D, -K1B5, -K1C5, -K1D5, -K1E5, K1K5, -M1A5, -N1A5, -P1A5, -R1A5, -T4C5D, -K1F5, -K1F5D, -K1G5, -K1G5D, -K1J5D, -K1K5, -M1QA5, -M1B5D, -N1A5, -P1A5, -R1A5, -S1A5, -T4A5D, -T4B5D, -T4CTD, -V4A5D, -W1A5D, -W3A5D, -AA1A5; TIO-540-A1A, -A1B, -A2A, -A2B, -A2C, -C1A, -E1A, -G1A, -H1A, -J2B, -F2BD, -J2BD, -N2BD, -R2AD, -S1AD, -AA1AD, -AB1AD; LTIO-540-J2B, -F2BD, -J2BD, -N2BD, -R2AD; IVO-540-A1A; AEIO-540-D4B5; TIO-541-A1A, -E1A4, -E1B4, -E1C4; IO-720-A1A, -A1B, -B1B, -B1BD, -C1B, and -D1B.

These engines are installed on but not limited to the following aircraft:

Beech series 95, 23, 76,60; Piper series PA-24, PA-44, PA-28, PA-34, PA-23, PA-25, PA-32, PA-60, PA-31; Aero Commander (Intermountain, Callair, Aeronautical Agricola Mexicana, Twin Commander Aircraft Corp.) series A-6, A-9, 100, 500; Lake Aircraft Corporation (Consolidated Aero., Inc., REVO) series C-2, LA-4; Mooney Aircraft Corp. series M-20, M-22; Sud Aviation GY-180; Partenavia series P-68; Siai-Marchetti (Agusta S.p.A) series S.205, S.210, F.260, S.208; Procaer series F 15; SOCATA series TB10, MS-893, 235, TB20, TB21; Teal Aircraft Corporation (Bohica) TWC-1; Avions Mudry et Cie CAP 10; Augustair (Montanair, Inc.) 2150; Grumman American (American General Aircraft Holding Co., Inc.) AA-5 series; Fuji Heavy Industries, Ltd. FA-200 series; Bellanca (American Champion Aircraft Corp.) Aircraft 8GCBC, 8KCAB; Maule Aerospace Technology Corp. series MX-7, M5, M-6; Christen A-1, (Pitts) S1T; Schweizer Aircraft Corp.(Hughes, McDonnell Douglas) 269A series; Rockwell (Commander Aircraft Company) series 112, 114; Moravan ZLIN Z 242L; Slingsby Aviation Limited T67M; Enstrom F-28 series; Found Brothers Aviation Ltd. FBA-2C, FBA Centennial "100"; Dornier Luftfahrt GmbH DO-28 series; Spinks Industries, M.H. Spinks, Sr. Rawdon T-1; Pilatus Britten-Norman BN-2 series; Omega Aircraft Corporation BS-12D1; Robinson R-44 series; Aerostar Aircraft Corp. (Piper, Ted Smith); Brantly Helicopters Industries U.S.A. Co., Ltd. 305; Pacific Aerospace Corp., Ltd. FU-24-954 series.

**NOTE:** This AD applies to each engine identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For engines that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must use the authority provided in paragraph (g) to request approval from the FAA. This approval may address either no action, if the current configuration eliminates the unsafe condition, or different action necessary to address the unsafe condition described in this AD. Such a request should include an assessment of the effect of the changed configuration on the unsafe condition addressed by this AD. In no case does the presence of any modification, alteration, or repair remove any engine from the applicability of this AD.

**Compliance:** Required as indicated, unless accomplished previously.

To prevent engine failure due to connecting rod bolt failure, which could result in damage to or loss of the aircraft, accomplish the following:

(a) Prior to further flight, determine if the engine has been assembled on or after February 15, 1994. This AD does not apply to engines assembled prior to February 15, 1994.

(b) For the purpose of this AD, assembled is defined as the construction of an engine from its component parts for any purpose, such as, but not limited to, overhaul and inspection.

(c) For engines assembled on or after February 15, 1994, prior to further flight, determine if any connecting rod bolts were replaced during assembly. This AD applies only to engines that had connecting rod bolts replaced on or after February 15, 1994.

(d) For engines that contain replacement connecting rod bolts installed on or after February 15, 1994, prior to further flight, determine if any of those replacement connecting rod bolts were purchased directly from Textron Lycoming or Aircraft Technologies, Inc. This AD does not apply to engines with replacement connecting rod bolts purchased directly from Textron Lycoming or Aircraft Technologies, Inc. In addition, this AD does not apply to engines that were manufactured or remanufactured at Textron Lycoming.

(e) For engines that contain replacement connecting rod bolts installed on or after February 15, 1994, that were not purchased directly from Textron Lycoming or Aircraft Technologies, Inc., prior to further flight, visually inspect to determine if the connecting rod bolts are clearly identified by raised letters SPS, S, C, or FC, identifying them as Textron Lycoming parts, or SL75060 etched on the head, identifying them as PMA parts manufactured by Superior Air Parts, Inc., or AL75060 forged into the head, identifying them as PMA parts manufactured by Aircraft Technologies, Inc. If the connecting rod bolts can be positively identified, as provided in this paragraph, then no further action is required.

(f) If the connecting rod bolts can not be positively identified in accordance with paragraph (e) of this AD, prior to further flight remove unapproved connecting rod bolts and replace with serviceable parts.

NOTE: Further information may be found in Superior Air Parts Service Bulletin No. 95-002, dated March 3, 1995, or by contacting Superior Air Parts, Inc., 14280 Gillis Rd., Dallas, TX 75244-3792; telephone (800) 487-4884.

(g) An alternative method of compliance that provides an acceptable level of safety may be used if approved by the Manager, Special Certification Office. The request should be forwarded through an appropriate FAA Maintenance Inspector, who may add comments and then send it to the Manager, Special Certification Office.

NOTE: Information concerning the existence of approved alternative methods of compliance with this airworthiness directive, if any, may be obtained from the Special Certification Office.

(h) Special flight permits shall not be issued.

(i) Priority Letter AD 95-07-01, issued March 17, 1995, becomes effective upon receipt.

FOR FURTHER INFORMATION CONTACT: Richard D. Karanian, Aerospace Engineer, Special Certification Office, FAA, Rotorcraft Directorate, 2601 Meacham Blvd., Fort Worth, TX 76137-4298; telephone (817) 222-5195, fax (817) 222-5959; or Locke Easton, Aerospace Engineer, Engine and Propeller Standards Staff, FAA, Engine and Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803-5299; telephone (617) 238-7113, fax (617) 238-7199.

### For Your Information - AD Note and Service Bulletin

Teledyne Continental Motors recently issued a critical service bulletin to owners and operators of approximately 735 new or rebuilt 470-, 520- and 550-series engines that were assembled between February 1 and June 30, 1994. The bulletin identifies crankcases that may have certain stud mounting holes drilled oversize prior to their being tapped.

The resultant thread fit may allow the crankcase threads to strip. The service bulletin (CSB94-15) provides instructions to determine if the holes are oversized. If they are, an oversized stud kit should be installed to avoid possible loosening of accessories and related components or loss of oil. TCM's Terry Horton believes about 60 percent of those engines identified in the CBS are affected. TCM is providing a free service program to owners of the affected engines. For more information on this bulletin, call TCM at 1-800-335-5805.

## Technincal Tips

### Rigging

So you have just flown the required 40 hours off your new biplane or have just recently purchased one and have discovered that after your critical test pilot evaluation it really doesn't fly hands off after all. So now what. It drops a wing, it always wants to climb, or its a lot slower than your friends airplane at the same RPM. Here are some considerations you might want to check.

**SPEED:** Make sure your airspeed indicator is accurate, fly with another airplane (Cessna, Beech, or Piper) and check your airspeed against theirs. Also if you or your friends airplane is Loran or GPS equipped, ground speed values with this equipment is very accurate. If not in zero wind conditions, make two trips from A to B and back. The other common problem is an accurate tachometer reading. Many times it is one of these instruments that are giving you incorrect readings or you can just make your airplane faster by lying about it.

There are a number of different ways to check your rigging, and trim your airplane. In past issues of Starduster Magazine there are four articles written by Jim Osborne or Hank Schmeal in regards to rigging. Most of them deal with rigging during construction. But one of them titled "Trimming Your Biplane" by Jim Osborne was just recently reprinted in the October 1994 issue of Starduster Magazine, and although discusses most all of the problems one might encounter, it doesn't really discuss in detail how to go about the actual hands on nuts and bolts of rigging your biplane. I will only discuss two methods of rigging when dealing with finished and flying airplanes. But first a few simple things to check.

1.) Make sure your weight & balance is current and within the envelope 18" to 27".

2.) The airplane must be level fore and aft, and side to side. If you did not build the airplane you might not know where to place the level. The most common places are the top fore and aft longerons, as most fuselages were built upside on a flat level piece of plywood. The best place is usually in the front cockpit which may necessitate the removal of some sheet metal, but is normally the easiest to do. This will give you your fore and aft reading. So as long as you are there you should check the side to side. This can be done by placing the level just behind the front instrument panel or at the cross tube at the top of the front seat. Which ever is easiest to get to. An adjustable camper jack clamped to the tail wheel spring works great to level the airplane fore and aft. From side to side may require some plywood shimms of differnt thicknesses or by adding or subtracting air in your main wheel tires once it is level in both axis the wheels and tailwheel stand should be blocked so that it is not easily moved.

3.) Ailerons should not have any side movement at the hinge and aileron stream line slave strut interconnects, should have rubber grommets installed so that they will not move or twist, during deflection as they become little trim tabs if

allowed to do so and can cause you much grief. Several builders have used round tubing for the slave strut interconnects which eliminates this problem. If using streamline tubing slave strut interconnects they must be perfectly aligned.

4.) Rudder return springs and tailwheel steering springs can also hurt or help if not adjusted to neutral. Many of the early Starduster engine mounts were built with down and right thrust and the plans also indicated a vertical FIHN offset. All of these things were meant to produce a stable airplane in level flight at cruise RPM. Many of the new aerobatic biplanes, such as the Acroduster Too were built zero-zero, which in some cases includes the engine mount, verticle FIHN and the wing incidence. However they were done so to help the aircraft performance in an all aerobatic environment, and in this configuration are generally not stable cross country airplanes. The Starduster Too by contrast was designed as a weekend sport biplane and although Lou Stolp was never an advocate of aerobatics, he was smart enough to make it a 6G airplane, because he knew what many pilots would do with it, and can easily be a stable cross country airplane if rigged properly.

5.) All four ailerons should be the same in flight as viewed at the trailing edge. Most ailerons on biplanes are rigged so that they have a slight droop and from a slight droop up to 1/4 of an inch. This is so that when the airplane is going backwards, the stick will always be predictable and most usually occurs in a tailslide or in some cases a botched hammerhead or other maneuver. For those pilot owners who do little aerobatics such as myself, the droop can make your airplane slightly faster. It is very important that all four ailerons be rigged the same.

6.) Many of the trim conditions are compensated by opposite out of trim inputs to make the airplane fly straight, which also will slow the airplane down. I would guess that a large percentage of airplanes are flying in this condition. I myself have done so for many flights hours. But if you pay attention to detail, such as checking the flying wire alignment, IE all wires perfectly flat and aligned with the relative wind.... exact rigging wing and tail incidence, aileron adjustment and even some minor fairing installation your airplane can be faster and more stable. Subtle changes may not be obvious. but when they all add up, can mean a slow and not let go airplane.

7.) Along with aileron slave struts interconnects, tailwheel and rudder springs there are several other things that can effect your trim, carburator air scoop and landing gear fairings can also become subtle little trim tabs. Also the possiblity of having to cut and reweld the "I" strut or aileron slave strut interconnects by adding or removing metal may be the only way to get what you want.

The first system for checking your rigging that I will talk about is wing fixture rigging.

The second and I believe to be the most accurate form of rigging is done with surveyors transit.

## Rigging with Plywood Wing Fixtures

The tools required are a carpenters level, a bubble protractor and a long flat surface 6' to 8' long by 1"x1" wood or metal, also a smart level can be used.

Take the full size wing rib drawing and copy it on a copy machine then tape it together making sure the reference line is straight. Then take some 3/4" finish plywood using this drawing as a pattern and saw 8 each wing incidence fixtures. They should be approximately 32" long by 5" wide, 4 each for the bottom wing and 4 each for the top wing. The only difference between them will be the dihedral of 1 1/2 degrees that is in the lower wing. So what you need to do is cut those 4 on a band saw that has an adjustable table, 2 should be cut from the nose of the rib to the rear spar and the other 2 from the rear spar to the nose. This 1 1/2 degree cut should give you two lefts and 2 rights, which should result in a flat level surface on which to place your bubble protractor or smart level. Thus allowing you a reasonably accurate way to adjust your airplane to fly fast and straight with little attention.

When the plywood wing incidence fixtures are cut, care should be taken to insure that the reference line and the top level surfaces are parallel. Also I should not have to tell you that a good carpenters level is required. The longer the better. You also need a long piece of wood or metal 6' to 8' in length that is straight and has a flat surface. This will be used to lay on the wing, crossing as many ribs as possible so that with a bubble protractor, an average can then be taken into account while checking dihedral. It will also take into account extra layers of fabric, paint, and rib stitching.

With the wing rib fixtures and this straight flat surface incidence and dihedral can be accurately measured. The top wing is zero no incidence and no dihedral. The bottom wing is 1 1/2 degrees of incidence and 1 1/2 degrees of dihedral with the airplane level. Dihedral is usually measured by placing a flat surface on top of the front spars on either wing and then placing your bubble protractor or smart level on top of that. We then adjust the flying wires to get the readings we want.

Incidence can be measured by placing your bubble protractor or smart level on top of the plywood fixtures at several points on the top wing somewhere close to the butt rib and at the I strut. The bottom wing can be checked at these same points.

Tail and vertical FIHN adjustments: The horizontal stabilizer can also be measured by making two more plywood fixtures that lay on top of the rear stabilizer spar and fit the contour of the stabilizer at the leading edge one will be cut out to fit next to the fuselage and the other will lay just out board of the tail brace wires. The exact dimensions will vary due to the size of the leading edge tubing. Some early Starduster Toos had 5/16 leading edge tubing and some of the later ones had 1/2" diameter tubing and some could be in between. The horizontal stabilizer should be zero or level. But due to overall weight, engine propeller combination and engine mount length you may have some positive or negative incidence.

As for the verticle FIHN, the level or smart level can be placed along the tail post at the rear of the verticle FIHN, and the leading edge can be adjusted as outlined in the October 1994 issue of Starduster Magazine on trimming your biplane by Jim Osborne.

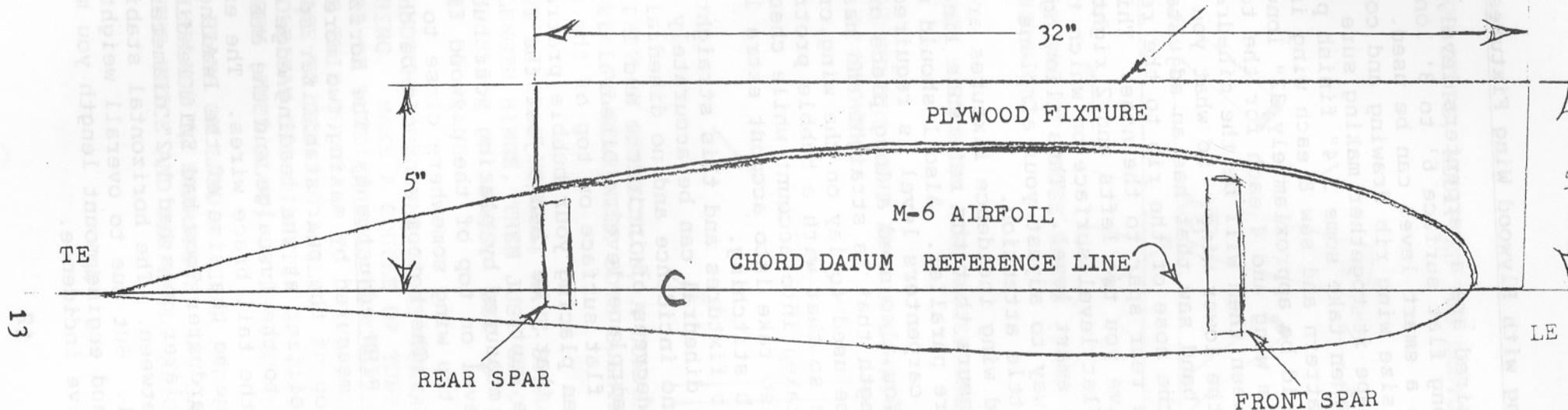
With some trial and error and by paying attention to detail, accurate rigging can be accomplished a detailed drawing of the plywood wing fixture is included with this article.

D.C.B. Editor

NOT TO SCALE

PLYWOOD WING RIGGING FIXTURE

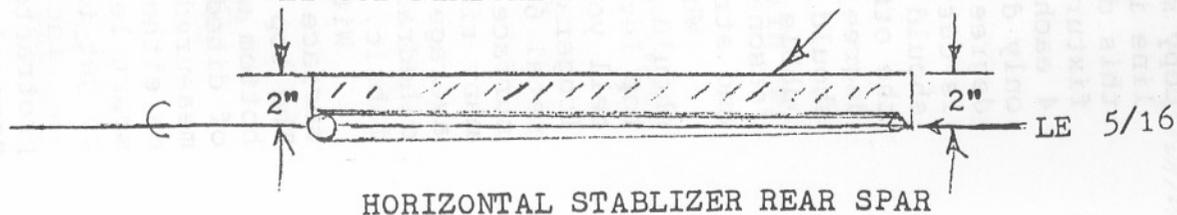
LEVEL SURFACE



4EA UPPER WING 4EA LOWER WING  
 LOWER WING REQUIRES 2LEFTS AND  
 2RIGHTS TAKING INTO ACCOUNT THE  
 1½ DEGREES OF DIHEDRAL

PLYWOOD FIXTURE

LEVEL SURFACE



HORIZONTAL STABLIZER REAR SPAR

## Rigging by Surveyors Transit

Much of the prior information can be used while working with surveyors transit. My airplane originally, before it was covered, was done in this manner and uncovered had numerous known points to shoot at. However after the airplane is covered care must be taken to insure that the same distances and known points are shot fore and aft and on each side.

The beauty of this method is that readings can easily be taken at more than one point and requires only colored stick-on dots with X,S drawn on them placed at these known points on your airplane. If you do not know someone in the construction business that you can borrow a transit from and that will show you how to use it, a trip to your local surveying equipment sales and service company may be in order. They recommend an electronic transit which will give you the desired angels you need by adding or subtracting from level. They typically rent for around \$50 per day, the standard non-electric go for around \$30 per day. If you want to purchase a used one they are between \$500 and \$1,000, pretty spendy to use for only a few times. If you rent one they will show you how to use it.

A smart level can be purchased for around \$100, but can also be rented just like the transit.

Sighting points can be done from the side and the front of your airplane. From the side you can level the aircraft as well as check the incidence on the wings and horizontal tail surfaces while also sighting from the side these sighting points can be located at the bottom of the top wing and the top of the bottom wing.

From the front you can check the side to side level of the fuselage and also the top wing and horizontal stabilizer, the verticle FIHN at the tail post can also be shot by simply moving the transit to one side of the nose cowling and then picking sighting points at the top and bottom of the tail post.

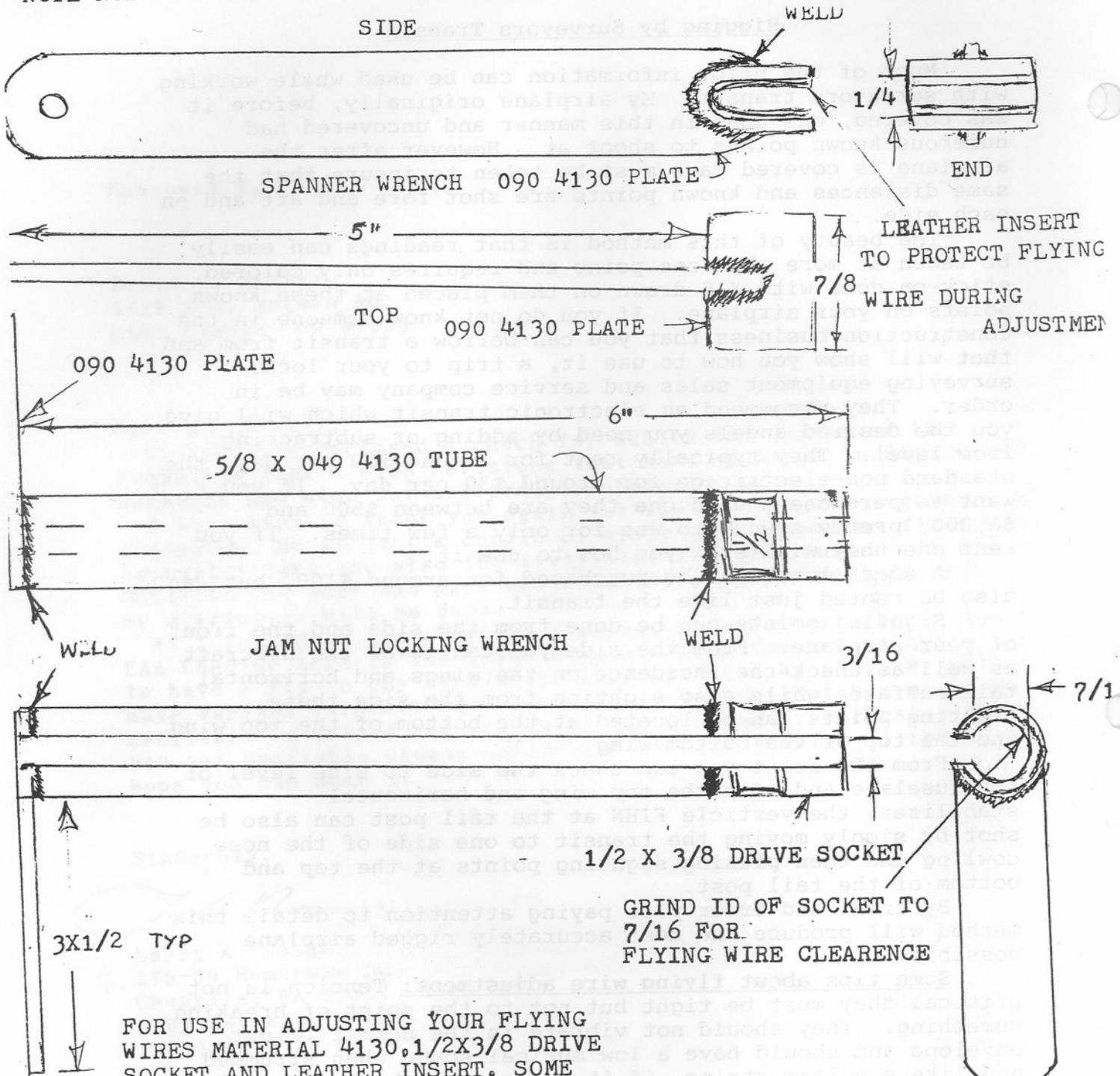
By trial and error plus paying attention to detail this method will produce the most accurately rigged airplane possible.

Some tips about flying wire adjustment: Tension is not critical they must be tight but not to the point of breaking something. They should not vibrate in the normal flight envelope and should have a low musical sound when strummed and like a guitar string, if it is loose or broken it will have little or no sound at all.

When adjusting flying wires all of the right hand clockwise terminal ends should be at the fuselage and all of the counter clockwise left hand terminal should be at the wing I struts. An article on flying wire tension was in the January 1992 issue of Starduster Magazine.

Several tools can be made to help in adjusting flying wires, one is a small spanner wrench that is made out of 4130 plate it slips over the wire to hold or ajust it while tightning and loosening wires or jam nuts. The other tool is used for tightning and loosening the jam nuts on the lower inboard wing wires that go thru the wing walk. Many times the inspection hole is not big enough to get your hand and wrenches in to loosen these nuts.

NOTE NOT TO SCALE



FOR USE IN ADJUSTING YOUR FLYING WIRES MATERIAL 4130, 1/2X3/8 DRIVE SOCKET, AND LEATHER INSERT. SOME CUT AND FIT TRIAL AND ERROR MAY BE REQUIRED TO INSURE THE CORRECT

FIT AND DIMENSIONS

So a tool to do this can be made by using a 1/2" socket by 3/8 drive and 6" piece of 5/8" OD 4130 tubing, welding the socket to one end of the tubing and the handle to the other, plus cutting a groove down the entire length so that it will fit over the flying wire and then can be pushed down into the flying wire hole to either tighten or loosen the jam nut. These tools will help in wire adjustments and are shown in detail elsewhere in the article. So have fun and fly straight and fast.

PLYWOOD FIXTURE  
WING INCIDENCE

SMART LEVEL

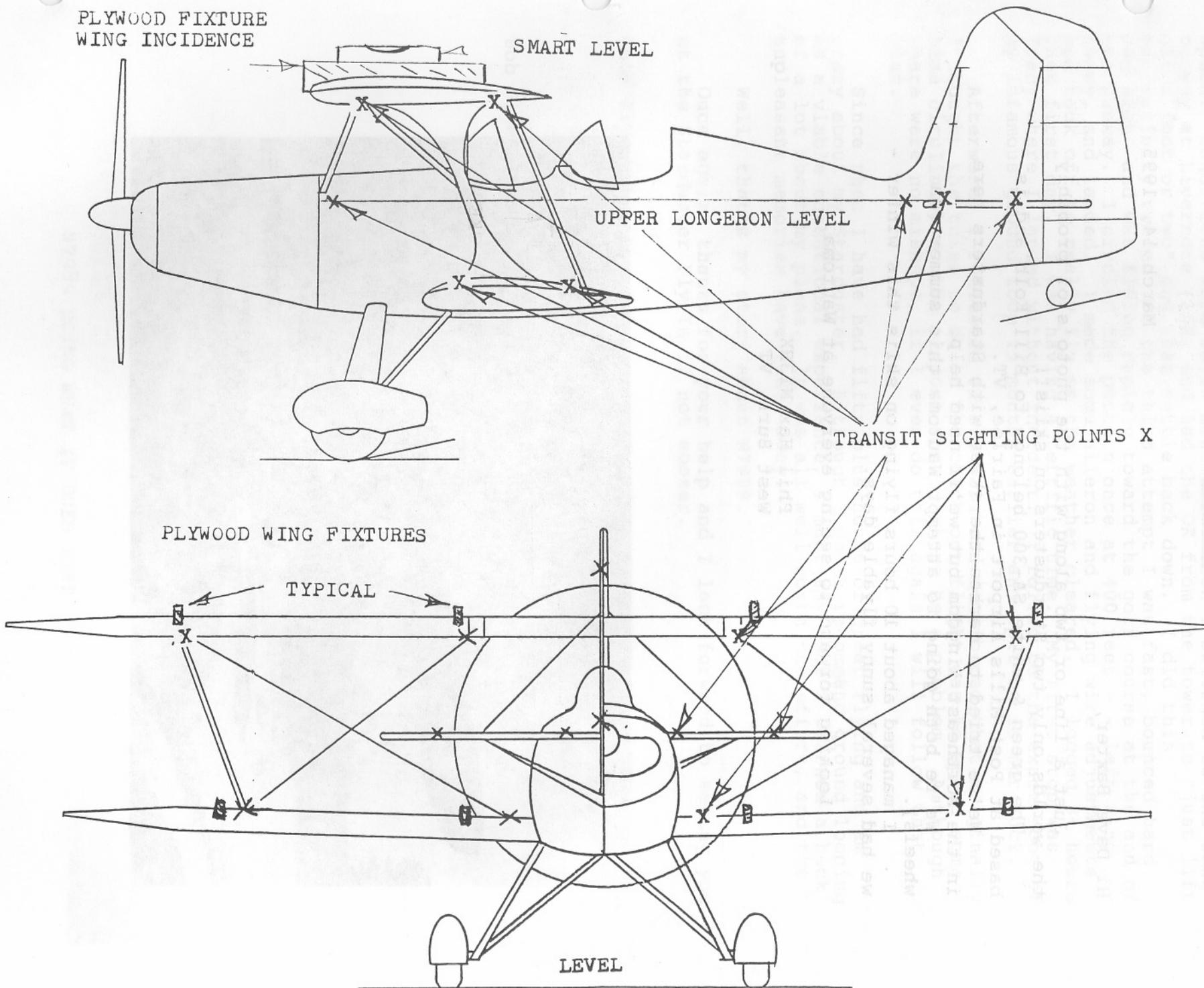
UPPER LONGERON LEVEL

TRANSIT SIGHTING POINTS X

PLYWOOD WING FIXTURES

TYPICAL

LEVEL



LETTERS

March 14, 1995

Hi Dave Baxter,

Just a line or two along with the photo's of probably the worlds only two Stardusters on skiis!!

The green & white SA-300 belongs to Bill Kolb and is based at Post Mills Airport in Fairlee, VT.

We've tried to darken the skies with Stardusters here in the northeast kingdom but we'll need help.

We're both going to attempt Wautoma this summer (on wheels).

I managed about 10 hours flying on skiis this winter - we had several sunny flyable days.

Looking forward to seeing everyone at Wautoma,

Phil Hax N13HX  
West Burk, VT



Gov Van Dyke  
3840 S. Van Rd  
Pleasant Grove, CA 95666

LETTERS

March 7, 1995

Hello Dave and Family,

I hope everything is going okay with you. Enclosed are some of the latest photos of my Acroduster II, as you can see I've decided to turn it into a single place using O25 sheet and patience? Cutting and fitting, finally got a tight fit. Also after several hours got a nice tight fit on the cowling. I installed camlocks and all oil hoses have been installed as well as instruments and radio. The master cylinders and brake lines are in, all but a couple of fuel lines have been installed. Next project will be wiring in my instruments.

Dave, I have been checking in my back issues of Starduster news Magazine, and I am ready to run the vent lines for my fuel tanks, and can't find the article, if you could possibly send diagram on venting. I have the inverted main tank and wing tank, thanks. I've been working as hard as I can to make the Starduster Fly-in. If not I should make Oshkosh.

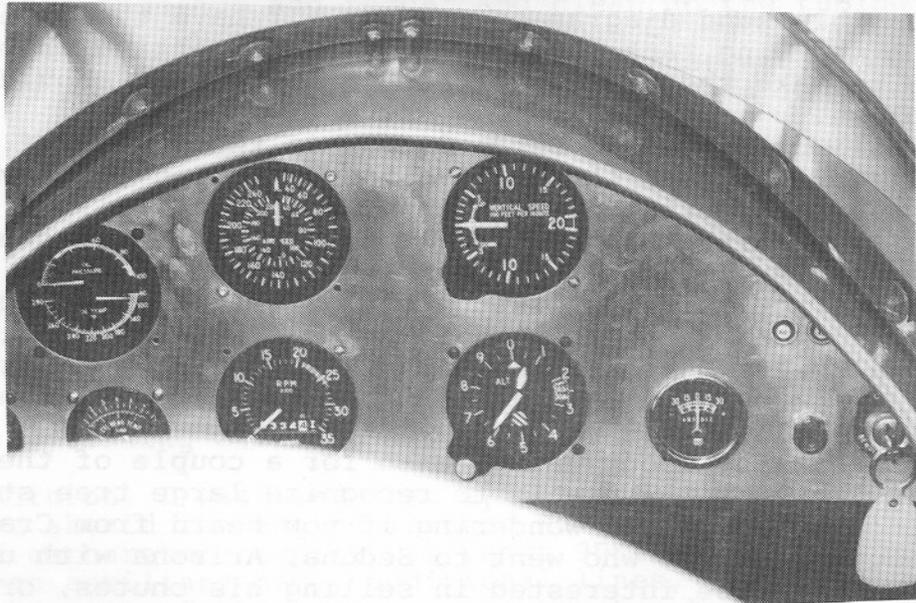
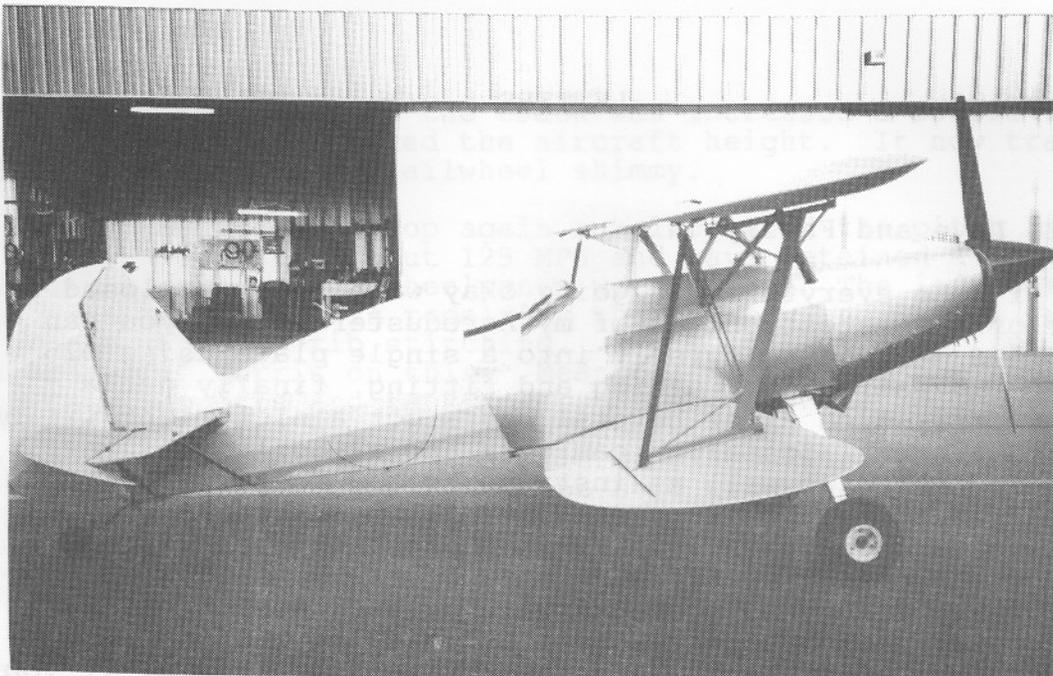
We will be moving to Bend, Oregon in the middle of May. Bill will love to hear this. I've been thinking of leaving all the aluminum polished, that means no paint. All Italians like shiny things as Bill would say. That means all aluminum panels, cowling, gear legs, spinner, tank cover, wing root fairings like on your airplane, and back inspection covers, over tailwheel and last but not least polished aluminum wheel pants. Also the prop is polished. Think of it Dave the first Italian built polished aluminum Acroduster II.

Also thinking about using Lexan for a couple of the belly pans, then I'll be able to recognize large tree stumps on landings. Also I was wondering if you heard from Craig, the Acroduster driver who went to Sedona, Arizona with us. He said he might be interested in selling his chutes, or disguise my snoring which kept him up in Sedona.

Well I'll write or call soon, see you in Oregon if not sooner.

Mike Mattei

P.S. Don't worry Bill, I'll make payments. I know you own half my airplane. Also sending a picture of the wife and twin girls.



MIKE MATTEI, s ACRODUSTER TOO  
AT LIVERMORE CALIFORNIA



February 16, 1995

David Baxter  
5725 S. W. Mc Ewan Road  
Lake Oswego OR 97035

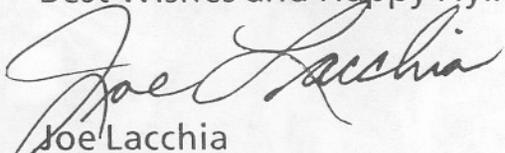
Dave,

I recently received the January issue of *Starduster Magazine* and have gone through it from cover to cover as usual. I have enclosed a check for \$20.00 to cover the cost of one set of "Technical Tips and Plan Revisions" that have appeared in prior *Starduster Magazines*. I'm sure I will find them valuable as I am well into my Starduster project.

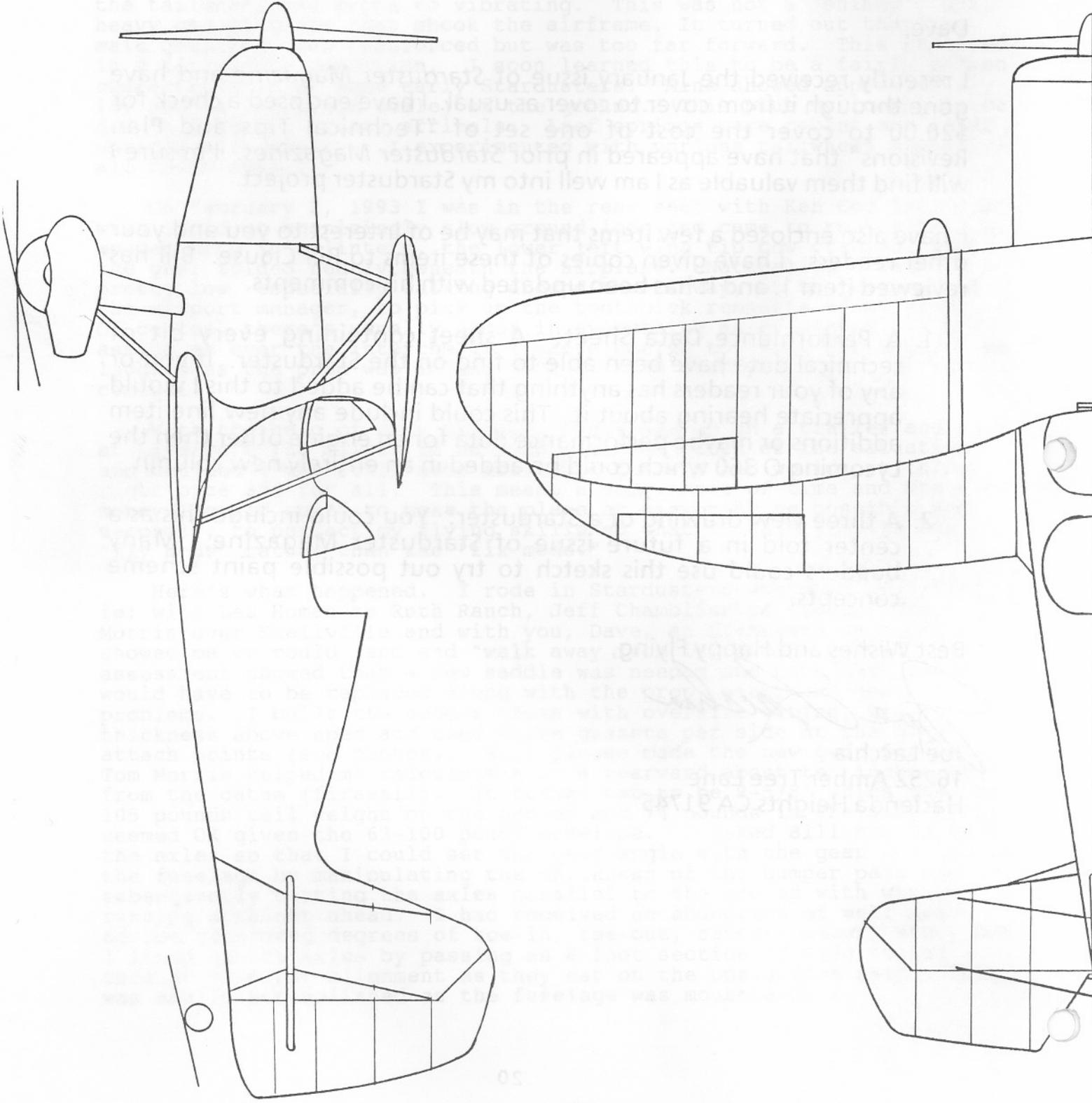
I have also enclosed a few items that may be of interest to you and your other readers. I have given copies of these items to Bill Clouse. Bill has reviewed item 1. and it has been updated with his comments.

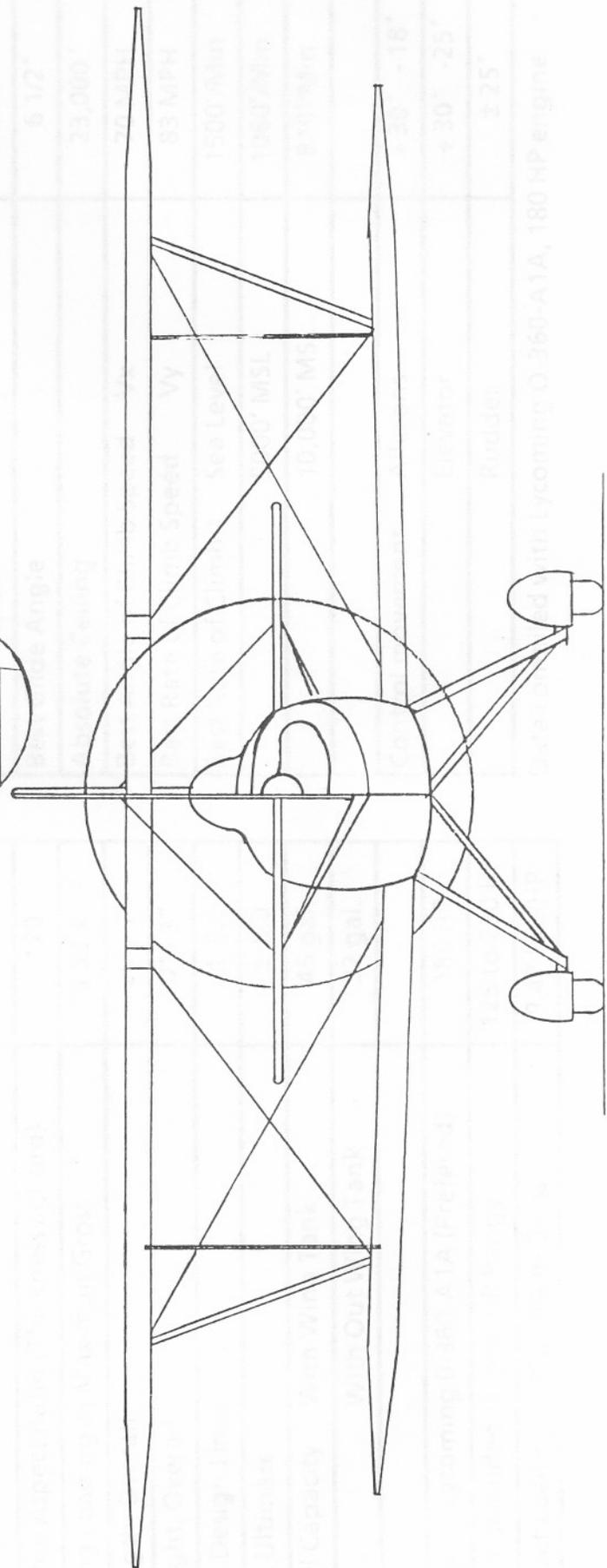
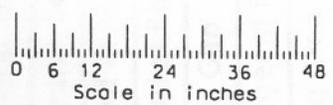
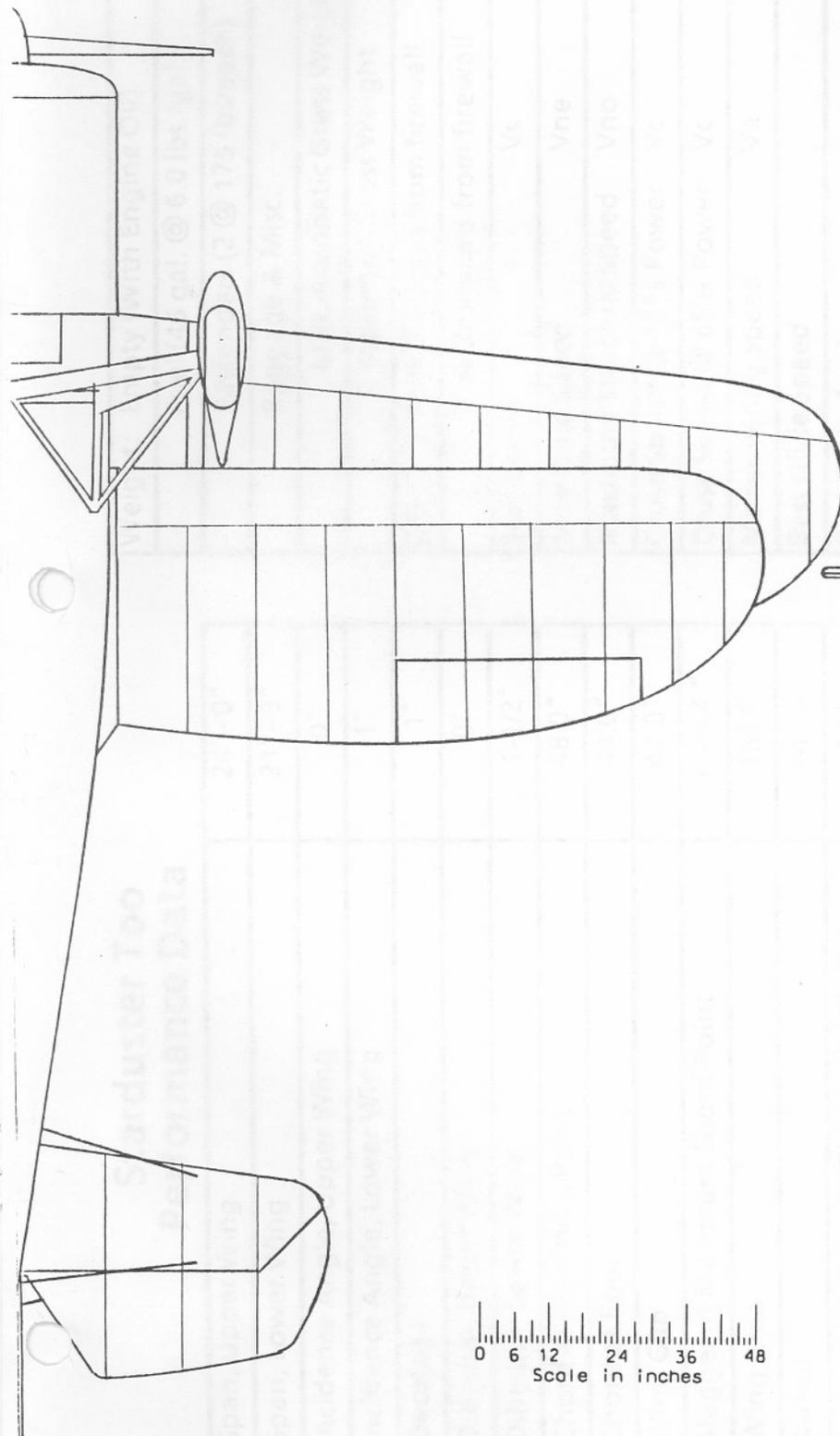
1. A Performance Data Sheet: A sheet containing every bit of technical data have been able to find on the Starduster. If you or any of your readers has anything that can be added to this I would appreciate hearing about it. This could include any new line item additions or maybe performance data for an engine other than the Lycoming O 360 which could be added in an entirely new column.
2. A three view drawing of a Starduster: You could include this as a center fold in a future issue of *Starduster Magazine*. Many builders could use this sketch to try out possible paint scheme concepts.

Best Wishes and Happy Flying,



Joe Lacchia  
16252 Amber Tree Lane  
Hacienda Heights CA 91745





## Starduster Too Performance Data

Span, Upper Wing	24' - 0"
Span, Lower Wing	21' - 9"
Incidence Angle, Upper Wing	0°
Incidence Angle, Lower Wing	1°
Decalage	- 1°
Dihedral, Upper Wing	0°
Dihedral, Lower Wing	1-1/2°
Chord at Maximum Point	48.0"
Chord at Root	44.0"
Wing Gap	47.0"
Stagger at Maximum Chord Point	+ 20.4 "
Wing Area	165 □'
Airfoil	M - 6
Airfoil Aspect Ratio (Thickness / Chord)	.120
Wing Loading at Maximum Gross	10.33 #/□'
Length, Overall	20' - 7"
Height, Overall	7' - 3"
G's, Design Limit	± 6.0
G's, Ultimate	± 9.0
Fuel Capacity: With Wing Tank	45 gal.
With Out Wing Tank	32 gal.
Engine, Lycoming O-360-A1A (Preferred)	180 HP
Recommended Engine HP Range	125 to 230 HP
Power Loading at Maximum Gross	9.47 lbs./HP

Weight: Empty (With Engine Oil)	1000 lbs.
Fuel (45 gal. @ 6.0 lbs./gal.)	270 lbs.
Passengers (2 @ 175 lbs/each)	350 lbs.
Baggage & Misc.	84 lbs.
Max. Aerobatic Gross Weight	1704 lbs.
Maximum Gross Weight	1985 lbs.
C G : Max. Forward from firewall	18.0"
Max Rearward from firewall	27.0"
Stall Speed Vs	56 MPH
Maximum Speed Vne	200 MPH
Maximum Structural Speed Vno	230 MPH
Cruse Speed @ 75% Power Vc	134 MPH
Cruse Speed @ 65% Power Vc	122 MPH
Maneuvering Speed Va	105 MPH
Best Glide Speed	70 MPH
Best Glide Angle	6 1/2°
Absolute Ceiling	23,000 '
Best Angle of Climb Speed Vx	70 MPH
Best Rate of Climb Speed Vy	83 MPH
Best Rate of Climb: Sea Level	1500'/Min.
5000' MSL	1060'/Min.
10,000' MSL	810'/Min.
Control movement: Ailerons	+ 30° - 18°
Elevator	+ 30° -25°
Rudder	± 25°

Data compiled with Lycoming O-360-A1A, 180 HP engine.

March 14, 1995

Dave Baxter  
5725 SW McEwan Road  
Lake Oswego, Oregon 97035



Dear Dave,

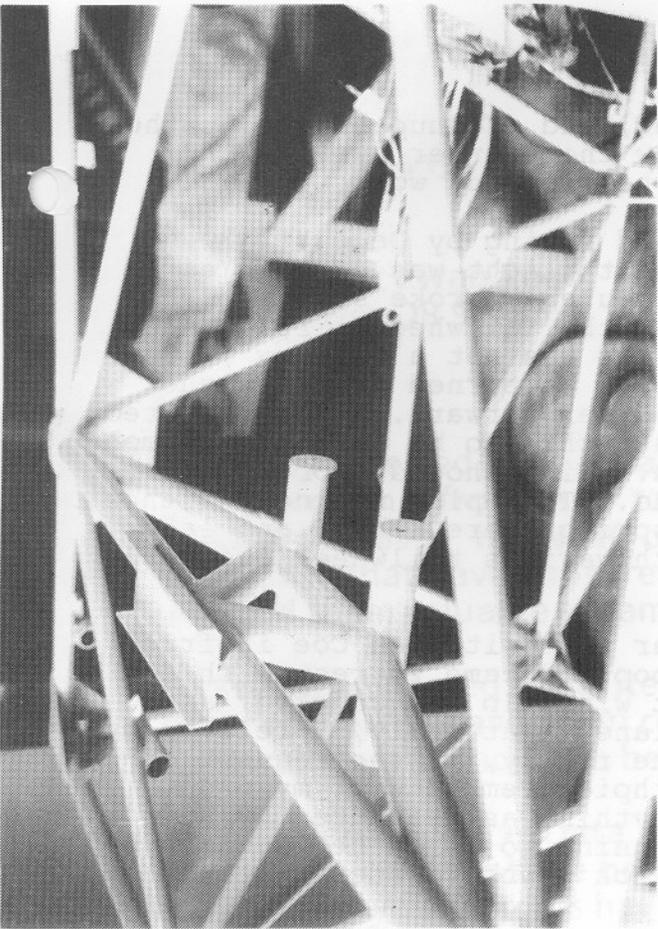
At long last, here is the account of how I became a Starduster owner.

In October 1991, I flew my Aeronca 7Ac (subsequently purchased by my brother Lou) to the Sonoma Valley Airport at Shellville, CA. You will recall that this is the home of the Shellville Antique Escadrille. Anyway, in the rear of a large wooden hangar behind a variety of aircraft sat Starduster Too N7989. It was blue and white, was started in the mid sixties and completed in 1971. It looked as if it had been flown many hours. However, the logs revealed that the engine only had 506 hours SMOH and that it had not been flown much the last few years. I liked it. The Ted Hendrickson wood prop had a "for sale" sign on it and said the six cylinder Continental was rated at 205 horsepower. More power -- what a good idea.

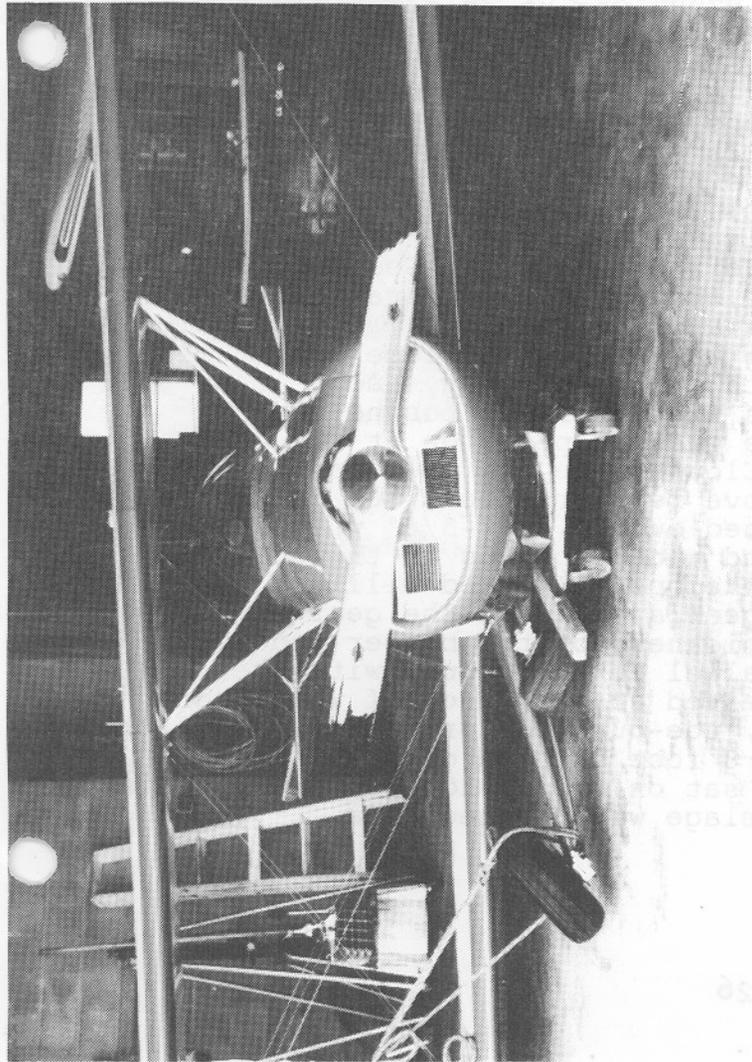
I lifted off the plastic sheet that covered the cockpit and saw the usual variety of instruments, old military seat belts and shoulder harnesses. Of particular interest were throttle quadrants that appeared to be the P-40/P-47 variety. I had to have it. I didn't want to shop even though it needed work and was the first Starduster I had looked at. I talked to owner Darrel Eastman and he arranged for Bill Ewertz, also from Shellville, to take me for a ride. We climbed out smartly, did some steep turns and then Bill let me fly. The contrast in performance between 65 HP (Champ) and 200HP sold me.

The following week my friend Ken Coe and I returned to Shellville for a second and more strenuous "checkout ride" which included a couple of rolls and loops, some slow flight and stalls. We landed and I made Darrel an offer. We negotiated some over the nest few weeks and I owned it on December 31, 1991.

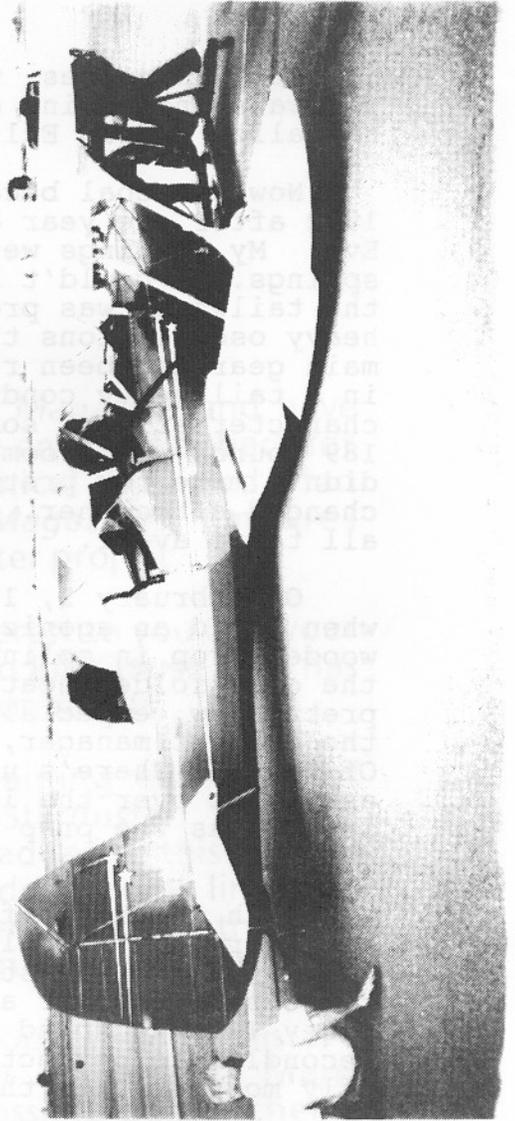
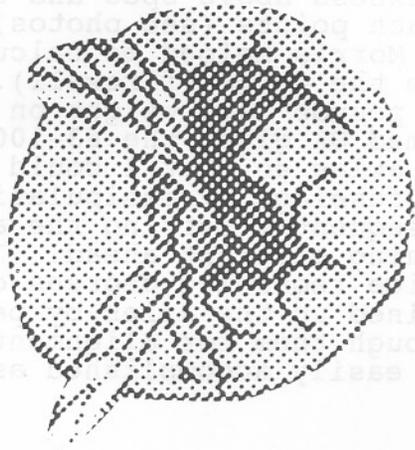
The immediate plan was to clean up the aircraft, install wheel pants, a spinner, transponder/encoder, and then learn to fly it -- 30 to 60 days tops. So much for planning and estimating. After six months of endless fixing, finding new "small" problems, doing some metal work around the gear legs, replacing rivnuts, etc., I rebuilt the tailwheel and was ready for taxi tests. In fact I gave numerous "taxi rides" around the airport before the Delco starter clutch scattered and tore up the magneto drive gears inside the accessory case. At this point I decided to pull the engine, redo the mags,



NEW GEAR TRUSS AND MCDS



BOBS EVENTFUL GEAR PROBLEM  
AT TRACY CALIFORNIA



ignition harnesses, update the mag drives, and cleanup and paint the firewall and engine compartment. I threw the starter away and installed an old Eclipse starter that's heavier but works well.

Now the goal became to be together and flying by December 31, 1992 after one year of ownership. Our next flight was on New Years Eve. My landings were very poor and I regularly broke steering springs. I couldn't seem to avoid hitting the tailwheel first. Also, the tailwheel was prone to vibrating. This was not a "shimmy", but heavy oscillations that shook the airframe. It turned out that the main gear had been reinforced but was too far forward. This resulted in a tail-heavy condition. I soon learned this to be a fairly common characteristic of some early Stardusters. Mine showed approximately 189 pounds (bathroom scale) on the ground. This plus my inexperience didn't make for pretty arrivals. Leaf springs were rebent and later changed altogether. I experimented with various tailwheel angles -- all to no avail.

On February 2, 1993 I was in the rear seat with Ken Coe in front when I did an agonizingly slow ground loop and came to rest with the wooden prop in splinters, the lower left wing tip bow cracked, and the gear folded neatly beneath the airplane. Naturally, I felt pretty low, especially walking around the runway, at the request of the airport manager, to pick up the toothpick remnants of my prop. Of course, there's usually humor in everything as evidenced by Ken asking me over the intercom if I was planning to "shut her down?" We laughed as the prop was idling with 10 inch stubby blades. It was comical.

With the help of many friends, N7989 was up on a trailer and back at Livermore (30 miles) in no time. I took stock of the situation and decided I was still nuts about Stardusters and would put things right once and for all. This meant a commitment of time and whatever money I could spend to make the plane as airworthy as possible and secondly, to perfect my flying skills so that I could stay in the "fly mode" rather than the "fix mode."

Here's what happened. I rode in Stardusters whenever possible ie; with Les Homan to Ruth Ranch, Jeff Chambliss to Sedona, Tom Morris over Shellville and with you, Dave, at Livermore when you showed me we could land and "walk away from it, etc." Damage assessment showed that a new saddle was needed and some bent tubing would have to be replaced along with the prop, wing, and gear problems. I built the saddle truss with oversize tubing, one thickness above spec and used three gussets per side at the gear attach points (see photos). Bill Clouse made the new gear for me and Tom Morris helped me calculate a move rearward about ten inches max from the datum (firewall). It turned out to be 9-5/8" which gave me 105 pounds tail weight on the ground and 74 pounds in the air. This seemed OK given the 63-100 pound envelope. I asked Bill not to weld the axles so that I could set the gear angle with the gear mounted on the fuselage by manipulating the thickness of the bumper pads and subsequently setting the axles parallel to the ground with wheels running straight ahead. I had received an abundance of well meant advice regarding degrees of toe-in, toe-out, caster/camber, etc., but I lined up the axles by passing an 8 foot section of 4130 tubing through them for alignment as they sat on the upsidedown gear. This was easily accomplished as the fuselage was mounted on a



BOB THE ITALIAN AUTO PILOT  
WITH N7989 THE FINISHED GREEN  
HORNET AT LIVERMORE CA



rotating jig. The width of the track was increased a couple of inches which slightly lowered the aircraft height. It now tracks straight and true with no tailwheel shimmy.

I used a Hendrickson prop again but increased the pitch from 52 to 58 inches. I cruise about 125 MPH and have retained a healthy climb rate. A spinner and wheelpants were added. The left wing work gave me some experience in repairing the tip bow and then I learned to re-fabric using 1" rib stitching. I got lots of help from "Starduster Tom" Morris on this. Meanwhile I rebuilt the center section tank supports and tank cover. I also rebuilt all the inspection holes with new rings and fabric. New fuel lines were installed. Elevator, rudder and aileron hinges were re-worked and play removed. The elevator push tube bell crank was repaired as it was worn and "slop" could be felt in the stick when changing pitch. Trim tabs were removed from the upper left aileron and rudder. Subsequently, the slave struts were lengthened to achieve proper adjustment.

The new wing looked so good on completion that I decided to re-fabric the fuselage and rudder and clean up the tubing throughout. I discovered and repaired bad welds where the lower horizontal stabilizer struts attach to the fuselage, and also at the trailing edge of the rudder at the nav light position.

I wanted a "classic look" and Oscar Bayer provided me with a 3-piece windscreen he had built. From this as a pattern, I built one for the front hole and mounted both on the airplane. The green, white, yellow and black colors came from a WW I German fighter design. The paint scheme was adjusted to fit the Starduster by Jack Mayes using his computer. Duane Bostrom did the painting. Seat belts and shoulder harnesses were replaced, a static system installed, instrument lights added, new radio, transponder/encoder, belly strobe, and oil separator added. The air filter box was rebuilt. I repositioned the rear rudder pedals rearward 1/2" to obtain full braking effect and installed new tires and tubes.

In addition, I realized that my fuel boost pump (which I had counted on should the engine mounted Romec fail) only put out 4PSI. The PS-5C carburetor requires at least 9PSI. I installed a Carter gear-driven auxiliary pump, additional lines, and check valves. I doubled the size of the engine compartment exhaust air vent and dropped the cylinder head temp about 50 degrees (425 to 375 degrees---the upper limit being 525 for E-185-3 Continentals). In chasing oil leaks I found the tach drive had gone belly up. This was an opportunity to relocate the tach generator from the back of the engine so the oil screen can be removed without having to take out the battery, the tach generator, etc. Finally, the plane was ready to fly.

High speed taxi tests and "second first flight" was planned for September 17th & 18th last year. Les Homan was a possible candidate for "test pilot" along with Chris Ferguson. Both knew the plane and had helped me a lot along the way. As it turned out, Les and Chris were at the Reno Air Races. I decided to do some high speed taxi runs. As I became more comfortable handling the aircraft I increased

speed. Conditions were below minimums. Then I switched to the long runway at Livermore (25R) and had the OK from the tower to "just lift off a foot or two" and then settle back down. I did this successfully twice. On the third attempt I was fast, bounced hard and high--and was flying rapidly toward the golf course at the end of the runway. I circled the pattern once at 400 feet - - left wing heavy, and landed. I made some aileron and flying wire adjustments and took off to really fly as the weather cleared. I logged 3+ hours that first day. I was having a terrific time. My first stop was Tracy where I landed without incident. I rolled to the exact spot of my infamous ground loop 19 months earlier and spit on it for luck.

Afterward, I reflected on all this and remembered that originally I thought the thing to do on the check-out flight was to spend some time circling over the airport should there be a problem. Although there were no mishaps, if I ever do this again I will follow that plan.

Since then I have had fifty plus hours of great flying and am crazy about my Starduster. Although I don't recommend ground looping as a viable educational experience, I must say that I learned a heck of a lot about my plane. It was all well worth the effort, and the unpleasant memories have faded away.

Well, that's my story about N7989.

Once again, thanks for your help and I look forward to seeing you at the Starduster Fly-In if not sooner.

Good Flying,

Bob Pisani



N7989 DOING WHAT IT DOES BEST

David Baxter  
5725 SW McEwan Rd.  
Lake Oswego, Oregon 97035

March 18, 1995

Dear David,

This letter has been many years in the making. The reason for drafting this document is one of great joy, and to announce to fellow STARDUSTER people that I on longer have a PROJECT, I have an AIRPLANE!

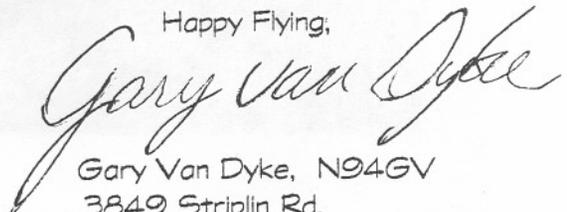
Starduster Too, N94GV, began about 1970 as a club project for the Sacramento EAA chapter but was never completed. It was sold as a project (I hate that word) and ended up in a garage in Fairfield for a few years. In May of 1980 an add in WESTERN FLYER about this SA300 project really got me interested, after all I had been a CESSNA pilot for about four years by then and felt ready for some more adventure. My cousin, Jim Van Dyke, had already built a beautiful ACRODUSTER TOO and said he would help. With my wife's blessing we broke the piggy bank and headed off to buy the project. Three to five years, my original estimate, turned into almost fourteen.

Although I'd logged about 700 hours only 30 had been in a taildragger, my brother's TECA CITABRIA. I had never flown a STARDUSTER TOO so Pat Fitzpatic offered to give me a ride in Dick Waltermire's. A little time in the air over Nut Tree and I felt ready. N94GV made it's first flight March 10, 1994 and it flew great. I sure was nervous, thank goodness the rigging was right on the money. N94GV and I flew for about 2.5 hours that first day, my landings were a bit on the rough side but not too scary. N94GV now has about 35 hours on her and I must admit my landings are much improved. Flying my bird is almost too much fun, all those years of waiting were worth it. To any of you who might be struggling with an airplane project, don't give up, great things some time take a while.

#### THOSE I NEED TO THANK:

Bill Clouse was alot of help over the years, I'm sure he thought this bird would never fly. Farm Air Flying Service, where final assembly took place, helped with all the final details and rigging. My son Gregory who helped a great deal the last several years of the project and kept me inspired to finish it. Jim Van Dyke for the countless hours of labor, advice and the years of hanger space he gave to this project. Without Jim's help this airplane would still be a project. I could not close without thanking my beautiful wife, Mary, who allowed me to pursue my dream.

Happy Flying;

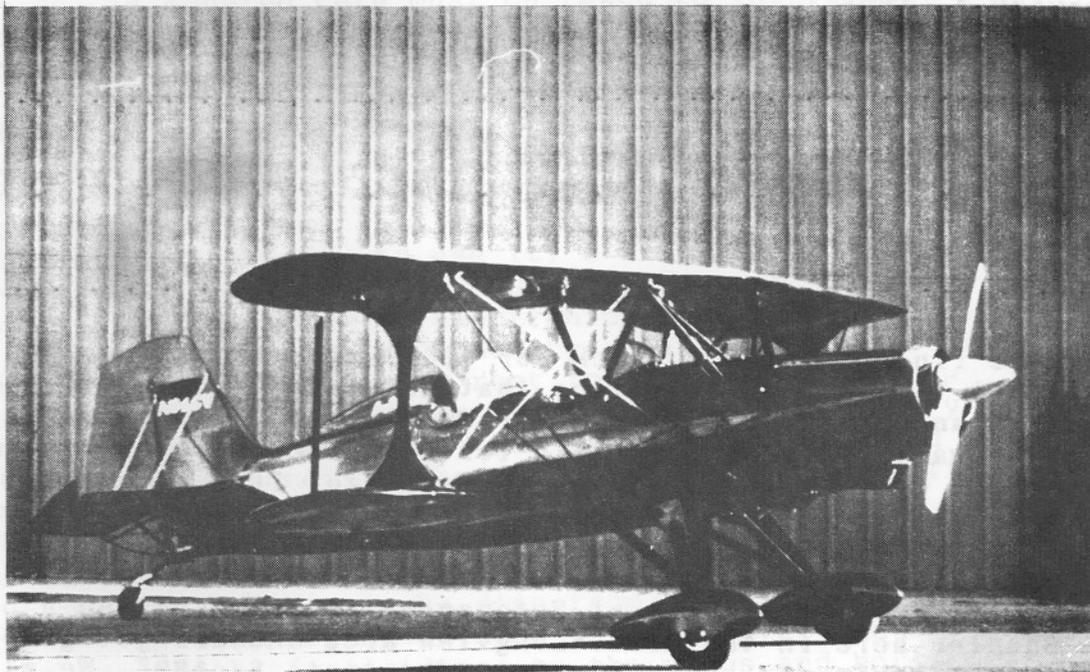


Gary Van Dyke, N94GV  
3849 Striplin Rd.  
Pleasant Grove, CA 95668

## N94GV BASIC INFO:

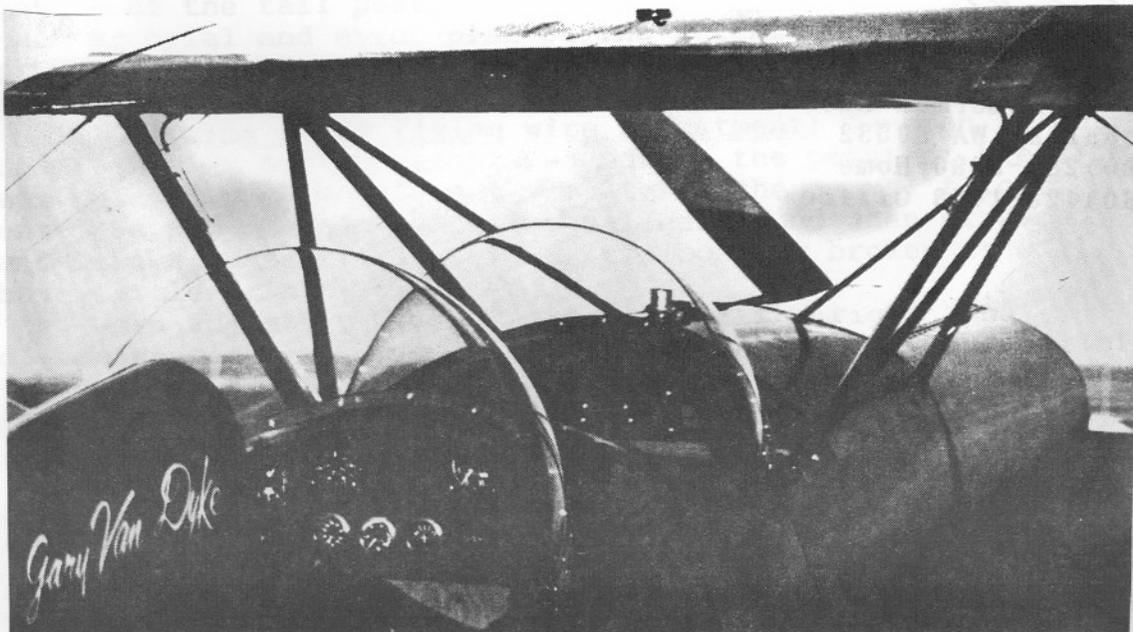
engine : Lycoming O-320 , 150 hp.  
weight : 1124# empty  
panel : very basic, no radios  
airspeed : 115-120 mph cruise

prop: Sensenich 74 - 56  
paint : Black Dupont Imoron  
fuel cap: 40 gals.  
stall speed: 52 mph / power off



Above: Starduster Too, N94GV

Below: View of the office, note complex instrument panel.



February 4, 1995

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

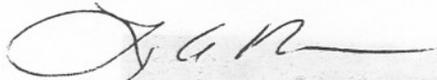
Dear Mr. Baxter,

Please find enclosed a check for \$25.00 for Copies of the Technical Tips & Plan revisions that have appeared in Starduster Magazine and also for a Starduster Cutaway.

I also want to thank you again for the ride that you gave me at Scappoose, OR airport a couple of weeks ago. It was my first open cockpit flight and also the first ride in a Starduster. It was GREAT!!! The only bad part was thinking of the time left before my Starduster will be done.

As I talked to you about at Scappoose, we have started a new EAA Chapter here in the Kelso-Longview area and are going to try to have a Fly-In day hopefully Saturday April 8, 1995. We will have various aircraft for rides. I was hoping that you might be available to attend and represent the Starduster enthusiasts. If you are available please contact me for the details. I really hope you can make it.

Sincerely,



Larry A. Moses  
270-30 Romerman Rd.  
Chehalis, WA 98532  
(360)262-9490 Home  
(360)423-1458 Office

DAVE,

John and Sarah Hude  
17206 Cluquot Ct.  
Poway, CA 92064

I DECIDED TO WRITE THIS BECAUSE BILL CLOUSE ASKED ME TO CONTRIBUTE TO THE MAGAZINE AND BECAUSE I HOPE IT WILL "PRIME THE PUMP" FOR MORE SUBMISSIONS FROM OTHER BUILDERS. THERE HAS BEEN A LACK OF "HOW TO" ARTICLES OVER THE PAST COUPLE OF YEARS. I HAVE WINGS AND FUSELAGE STRUCTURES PRETTY MUCH FINISHED (NO COVER OR ENGINE THOUGH) SO STILL NEED LOTS OF ADVICE. FOR THOSE OF YOU JUST STARTING OR THINKING ABOUT IT, HERE'S SOME STUFF TO CONSIDER:

1. TRY TO GET COPIES OF ALL THE BACK ISSUES OF STARDUSTER MAGAZINE. THE EARLY ONES HAVE A WEALTH OF GOOD INFO. THEY STARTED IN 1975. BY THE WAY, I'M MISSING JUL & OCT '82, OCT '86, JAN, APR, OCT '8 FROM MY COLLECTION. CONSTRUCT YOURSELF A BUILDER'S MANUAL FROM THOSE ARTICLES.

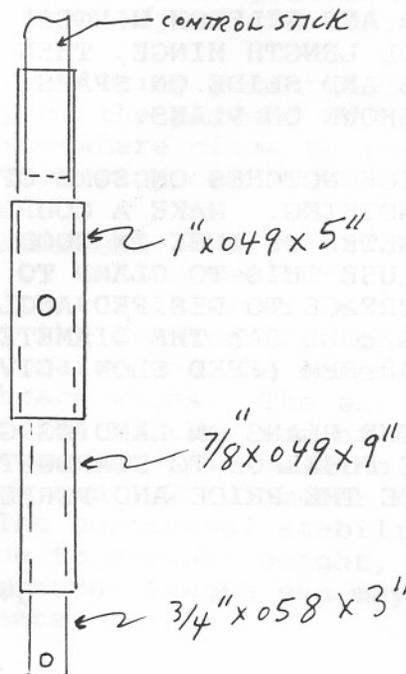
2. DON'T BUILD ANYTHING ACCORDING TO PLANS UNTIL YOU CHECK WITH A RECENT BUILDER OR BILL. SOME ITEMS REMAIN THE SAME BUT QUITE A FEW HAVE BEEN MODIFIED FOR THE BETTER OVER THE YEARS.

3. BUY FROM STARDUSTER! YOU MIGHT SAVE A BUCK OR TWO BUT BILL'S ADVICE THAT GOES WITH THE MATERIALS IS PRICELESS. THAT'S HOW YOU FIND OUT ABOUT THOSE PARA. 2 CHANGES.

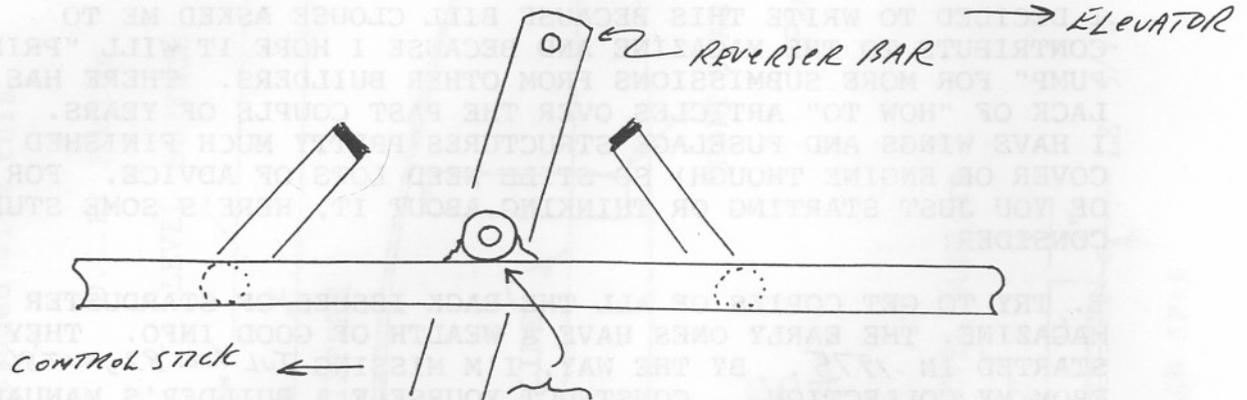
4. TOOLS. BITS, REAMERS, TAPS, DIES ETC FROM INDUSTRIAL PIPE & STEEL HIGH QUALITY AND CHEAP PRICES. GOOD CATALOG AND FAST DELIVERY. I'M SURE THERE ARE OTHERS BUT I LIKE THESE FOLKS.

1-800-423-4981

5. SQUARE VS ROUND TUBE WORKS REAL NICE IN A FEW PLACES. THE FLAT SIDES ARE EASY TO WORK WITH ON DRILL PRESSES AND MITER ANGLES AND EASIER TO JIG. ONE AREA I WISH I HAD USED RECTANGULAR TUBE WAS THE CARRY THROUGHS. COULD APPLY TO RUDDER PEDALS ALSO. ONE AREA I WAS CONCERNED ABOUT GETTING THINGS SQUARE AND TRUE WAS THE CONTROL STICKS. USED THE FOLLOWING SCHEME:



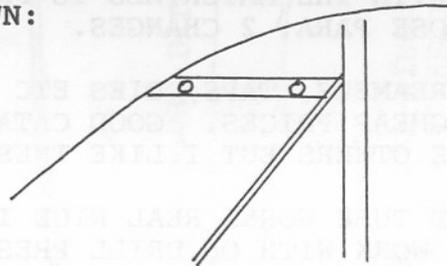
6. FOR THE ELEVATOR STOPS, MODIFIED THE DESIGN TO LOOK LIKE THIS:



ALSO, GET YOURSELF ONE OF THOSE BOLTS (FROM STARDUSTER) WITH THE GREASE FITTING INSTALLED.

7. BUILT THE RUDDER HORN LIKE ACRODUSTER TOO. EASIER TO BUILD AND INSTALL.

8. ON THE TAIL, MOVED THE WIRE ATTACH BUSHINGS UP INTO THE HORIZONTAL TUBE, AS SHOWN:



USED ROUND TUBE, BUT ON REFLECTION, A CONVENIENT PLACE FOR ANOTHER SQUARE TUBE TO GUARANTEE BOTH BUSHINGS AT 90 DEG TO VERTICAL.

9. FOR RUDDER AND AILERON HINGES, HAVE STARDUSTER WELD YOU ABOUT 12-16" OF FULL LENGTH HINGE, THEN JUST SLICE UP INTO DESIRED HINGE LENGTHS AND SLIDE ON SPARS. USE 6 HINGES ON THE ELEVATOR VS THE 4 SHOWN ON PLANS.

10. WANTED NICE NOTCHES ON SOME OF MY TUBES, SO BUILT A TUBING NOTCHER FOR NOTHING. MAKE A COUPLE OF TUBE CLAMPS OUT OF WOOD BY DRILLING DIAMETER OF TUBE IN WOOD BLOCK, THEN CUT BLOCK LENGTHWISE. USE THIS TO CLAMP TO DRILL PRESS AND ROTATE DRILL PRESS WORK SURFACE TO DESIRED ANGLE. LOTS OF CUTTING OIL, A METAL CUTTING HOLE SAW THE DIAMETER OF TUBE TO BE CONNECTED TO, AND ABOUT 1100 RPM (FEED SLOW) GIVES YOU THE PERFECT NOTCH.

11. STUDIED THE PLANS ON LANDING GEAR AND CABANES FOR A WHILE THEN TOOK THE FUSELAGE TO STARDUSTER AND SAID "PUT EM ON". CHEAP AT TWICE THE PRICE AND PERFECTLY ALIGNED.

12. WING TIP BOWS. READ SOME ARTICLES ON LAMINATED BOWS AND THOUGHT THAT LOOKED LIKE FUN(?) THEY LOOK GOOD, BUT LIKE MOST PARTS, TOOK TWICE AS MUCH TIME AND WORK AS YOU THINK.

13. RUDDER RETURN SPRINGS. DOES ANYONE HAVE A SOURCE FOR THE TYPE THEY HAVE FOUND DO THE JOB?

14. TO GET A MIRROR FINISH ON THE EDGE OF FITTINGS,  
PUT A WORN OUT (LITTLE OR NO GRIT LEFT) ~~ON~~  
BELT ON A TABLE TOP BELT SANDER.  
A LIGHT TOUCH (LENGTHWISE) OF THE FITTING  
LEAVES A REAL NICE SURFACE.

THANK

JOHN

P.S. DAVE,

TRIVIA: DEFINE "DECALAGE". IT IS  
-1° ON THE PLANS. I THINK I KNOW  
BUT NOT SURE.

#### DECALAGE

The difference between the angular settings of the wings of a biplane or multiplane. The decalage is measured by the acute angle between the chords in a plane parallel to the plane of symmetry. The decalage is considered positive if the upper wing is set at the larger angle.

#### AIRFOIL

Any surface, such as an airplane wing, aileron, or rudder, designed to obtain reaction from the air through which it moves.

#### AIRFOIL SECTION

A cross section of an airfoil parallel to the plane of symmetry or to a specified reference plane.

#### CENTER OF PRESSURE OF AN AIRFOIL

The point in the chord of an airfoil, prolonged if necessary, which is at the intersection of the chord and the line of action of the resultant air force.

#### CHORD

An arbitrary datum line which the ordinates and angles of an airfoil are measured. It is usually the straight line tangent to the lower surface at two points, the straight line joining the ends of the mean line, or the straight line between the leading and trailing edges.

#### ANGLE OF ATTACK

The acute angle between a reference line in a body and the line of the relative wind direction projected on a plane containing the reference line and parallel to the plane of symmetry.

#### ABSOLUTE ANGLE OF ATTACK

The angle of attack of an airfoil, measured from the attitude of zero lift.

#### CRITICAL ANGLE OF ATTACK

The angle of attack at which the flow about an airfoil changes abruptly as shown by corresponding abrupt changes in the lift and drag.

#### ANGLE OF INCIDENCE

Same as angle of wing setting. In British terminology the angle of incidence is equivalent to the American term "angle of attack."

#### ANGLE OF WING SETTING

The acute angle between the plane of the wing chord and the longitudinal axis of the airplane.

STARDUSTER HISTORY  
Cliff Stone's N3CS

My interest and enjoyment has always been in trying to find out how many Stardusters have been built, where they are and what has happened to them. So in keeping with that goal I occasionally run across airplanes that are currently setting dormant, and have been for some time. N3CS is one of those planes. The airplane was built by Cliff Stone during the early 1970's and was completed around 1975. The total time on the airplane is unknown. Cliff was a USAF pilot who flew C-124 Globe Masters and after leaving the Air Force he took a job with the U.S. Forest Service, although not as a pilot. He and his family lived in the Montague area of Northern California, this is where the airplane was built and currently it is still based there. I have just recently talked with an old friend of Cliff's, his name is Ken McDonald also a Starduster Too owner and builder. Ken is now a pilot for Horizon Airlines and lives just across the river in Vancouver, Washington. During the time Ken lived in Northern California he and Cliff spent many hours trying to get the better of each other in mock aerial combat. It was seldom that either would emerge the winner as most bouts ended in a draw. The results of almost equal airplanes and ability. Ken told me they were enjoyable times.

Anytime I travel around the country I take my names and "N" numbers of Starduster owners. This is what I had done in attempting to find N3CS during the late 1980s. The first thing I learned when asking around was that Cliff had been fatally injured during marginal weather in his Piper Pacer while returning from a hunting trip near Joseph, Oregon. And that his wife Eveland, who the airplane is registered to, had also past on. So between the two airports Montague and Siskiyou Co, some detective work and asking questions I was told the airplane N3CS was indeed in a hanger at Siskiyou Co and that the owner was Randy and Betty Akana of Chico, California, Betty being Cliff's daughter. So during our return trip home from Starduster Open House in 1990 I stopped in Chico and visited with Randy. At the time he was working for Aero Union a company that converts C-130s to firefighting tankers. He explained that he and Betty were currently working on restoring a piper J-3 Cub and that after that were going to do the same with the Starduster. Randy then gave me the combination to the hanger and asked if I would look in on N3CS at Siskiyou Co Airport. We had a hard time getting the doors open and was confronted with dust and spider webs. The airplane did not look all that bad for the time it spent unattended. I have just recently talked with Betty, it is now 5 years later and the airplane is still in that hanger. In the 17 years since Cliff's death the airplane has only been out, cleaned up and run a few times, which is so sad that circumstances what they are allowed this to happen.

DCB Starduster History

N3CS AND RANDY AKANA  
AT SISAIYU COUNTY  
DURING THE MID 1980s



N3CS AFTER SOME CLEAN UP  
AND ENGINE RUN MID 1980s

WHEN DAN AND I  
STOPPED BY TO  
CHECK ON N3CS  
MAY 1990



# 15th ANNUAL WEST COAST STARDUSTER FLY-IN

May 5, 6, & 7, 1995  
at  
SONOMA COUNTY AIRPORT (STS)  
Santa Rosa, California

*"The Heart of Northern California's Beautiful Wine Country"*

Originally scheduled to be held at the Healdsburg Municipal Airport, the 15th ANNUAL WEST COAST STARDUSTER FLY-IN has been moved 10 miles southeast to the Sonoma County Airport (STS). The new location at STS offers the following advantages for attending *Starduster, Acroduster, V-Star, Starlet and Sport Aviation* enthusiasts:

- More room, facilities, services, and attractions!
- Potential on-Airport activities including tours of the Pacific Coast Air Museum (F-16N, F-8U, A-6, B-26, etc.), CDF Air Attack Base, Aircrafters warbird restoration shop (Albatross, PBY, YAK, MIG, B-25, etc.), and Reno air racers (P-51 and Sea Fury).
- Nearby area wineries, mountains, lakes, and coastal attractions.
- Numerous area motels and restaurants (see list on Page 2).
- Rental cars available at the STS passenger terminal:
  - HERTZ 1-800-653-3131 or 1-707-528-0834
  - AVIS 1-800-831-2847 or 1-707-571-0465
  - THRIFTY 1-800-367-2277 or 1-707-573-0131
- Scheduled commuter air service to/from STS by:
  - UNITED EXPRESS 1-800-241-6522
  - RENO AIR 1-800-736-6247
- Hourly bus service between SFO and STS via:
  - AIRPORT EXPRESS 1-800-327-2024 or 1-707-837-8700
- Shared fly-in activities with local EAA Chapter 124 including breakfast, aerial tours, antique car display, "Old Buzzard" buddy rides, hangar flying, and lie swapping.
- On-Airport camping - in hangars or under the stars.



Festivities will commence on Friday afternoon, May 5th at the EAA Chapter 124 hangar complex located in the northwest corner of STS (see attached map). BE THERE!!

**PLEASE BRING YOUR OWN TIE-DOWNS!**

For further information, contact:

Dave Heal	1-707-838-0261	eves.
Bill Cannam	1-707-523-1977	eves.
Dave Baxter	1-503-639-8792	eves.
Bill Clouse	1-800-833-9102	



WEST COAST STARDUSTER FLY-IN  
May 5, 6 & 7, 1995

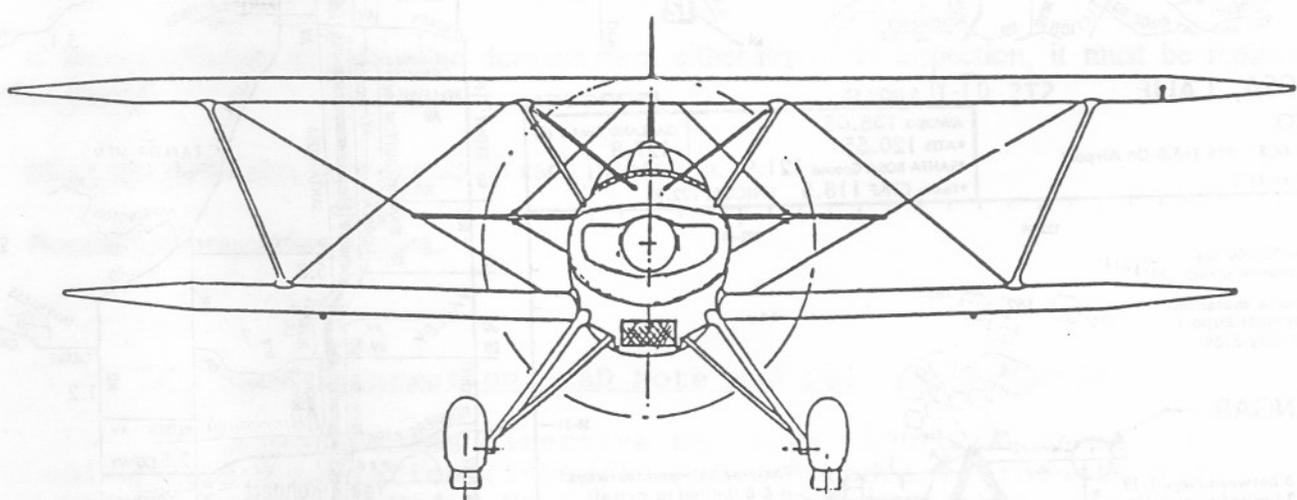
## THE FOLLOWING IS A PARTIAL LISTING OF SANTA ROSA AREA MOTELS

Fountain Grove Inn and Hotel (\$\$) 1-800-222-6101 \*  
Vintner's Inn (\$\$) 1-800-421-2584  
Doubletree Inn (\$) 1-800-222-8733 \*  
Days Inn 1-800-354-7672 \*  
Los Robles Lodge 1-800-255-6330 \*  
Ramada Limited 1-800-266-4600  
Heritage Inn 1-800-533-1255  
Sandman Motel 1-707-544-8570  
Flamingo Resort & Hotel 1-800-848-8300  
BW Dry Creek Inn in Healdsburg 1-800-222-5784



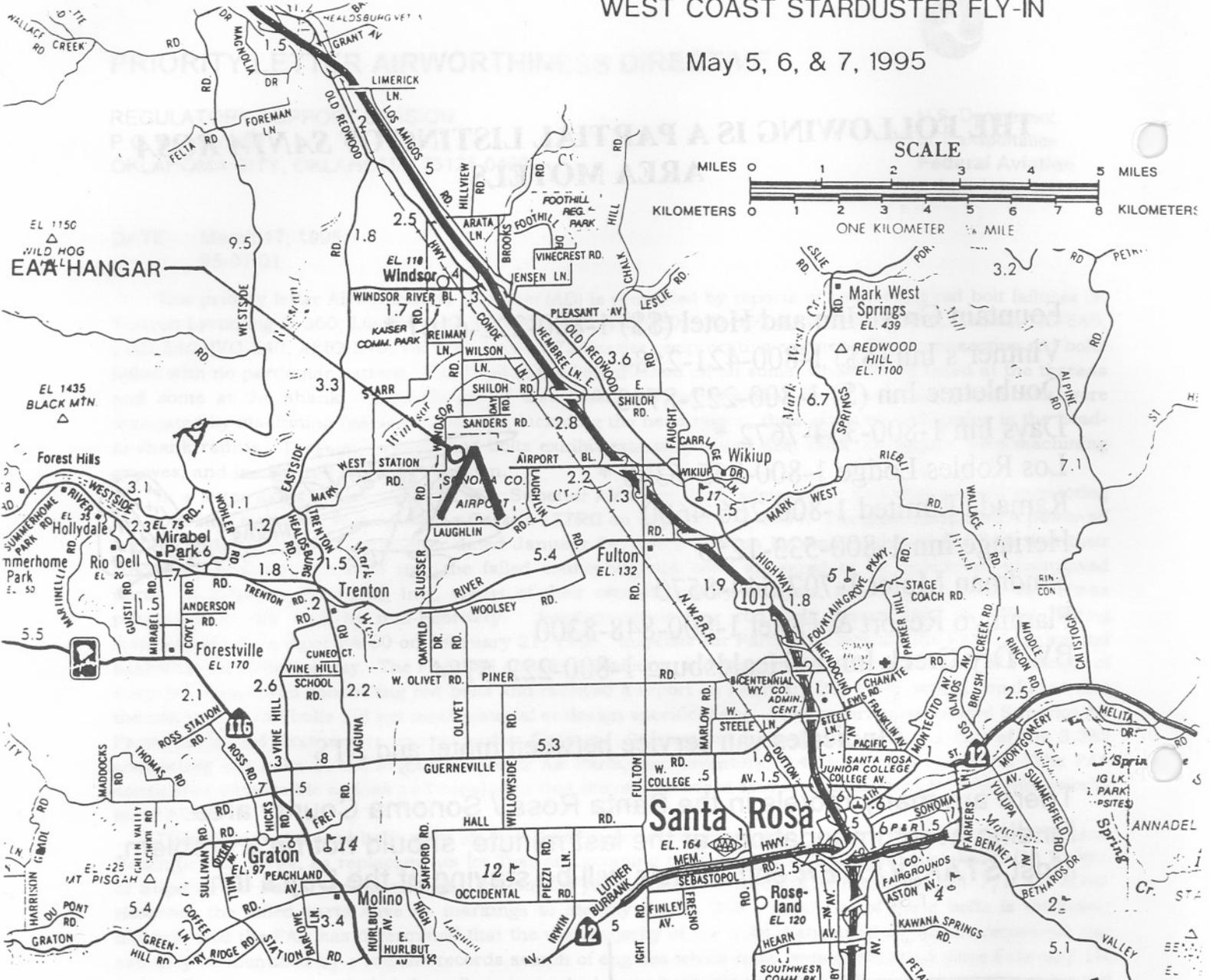
\*Indicates van service between motel and STS

There are many motels in the Santa Rosa / Sonoma County area.  
Finding accommodations at the last minute, should not be a problem.  
Most **STARDUSTER** enthusiasts will be staying at the Day's Inn.

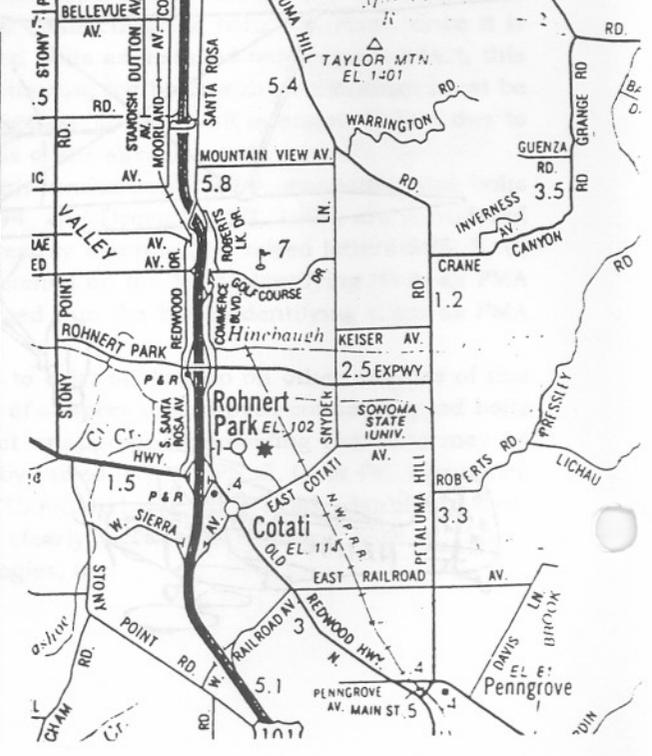
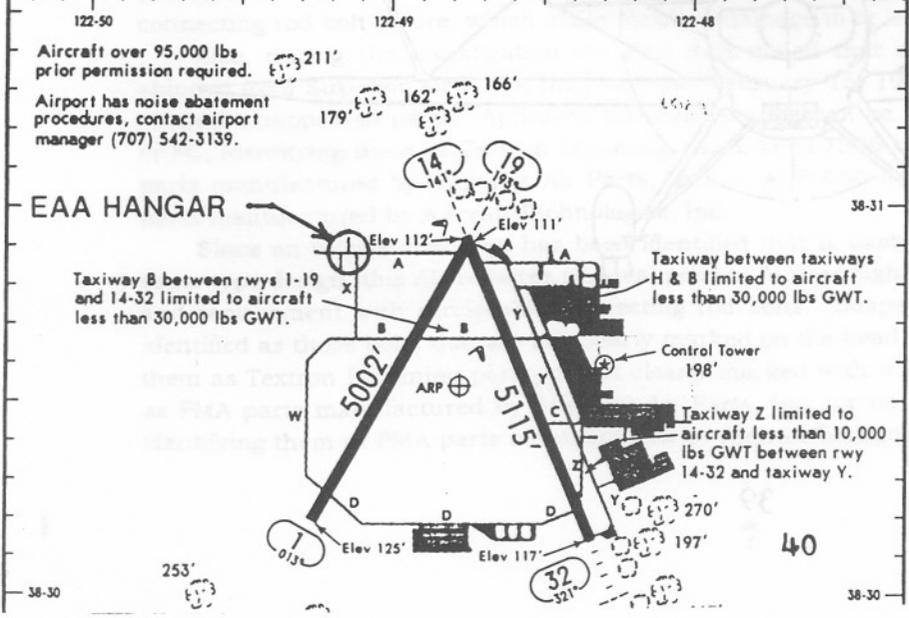


# WEST COAST STARDUSTER FLY-IN

May 5, 6, & 7, 1995



**SANTA ROSA, CALIF STS (11-1) 5 NOV 93 JEPPESEN**  
**SONOMA CO**  
 N38 30.5 W122 48.8 STS 113.0-On Airport  
 Elev 125' Var 16°E



Aircraft over 95,000 lbs prior permission required. ☎ 211'  
 Airport has noise abatement procedures, contact airport manager (707) 542-3139.

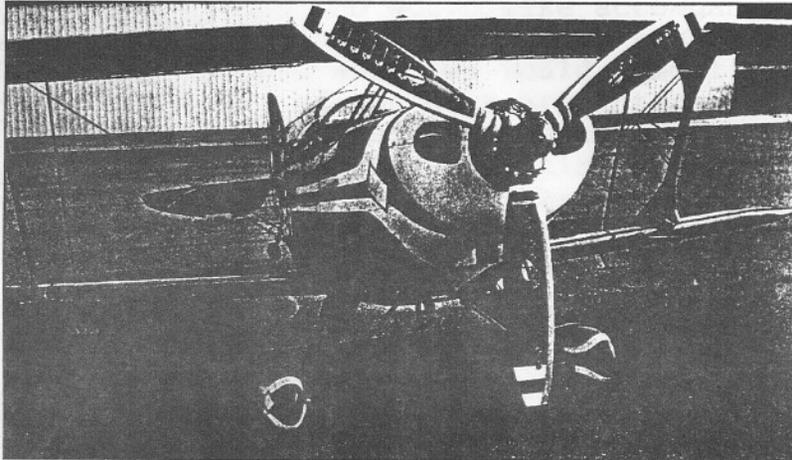
**EAA HANGAR**

Taxiway B between rwy 1-19 and 14-32 limited to aircraft less than 30,000 lbs GWT.

Taxiway between taxiways H & B limited to aircraft less than 30,000 lbs GWT.

Taxiway Z limited to aircraft less than 10,000 lbs GWT between rwy 14-32 and taxiway Y.

# HARTZELL THREE-BLADED COMPOSITE AEROBATIC PROPELLER



by  
Bradley Huelsman  
IAC # 19873

Since being hired by Hartzell Propeller Inc. in 1991, I have had the privilege of working to see the Composite Aerobic Propeller Program become a reality.

## HISTORY

Readers may recall John Lillberg's (IAC #956) evaluation on the first iteration of the propeller in the April 1989 issue of SPORT AEROBATICS. While significant performance improvements were observed, there were still some bugs to be worked out of the system.

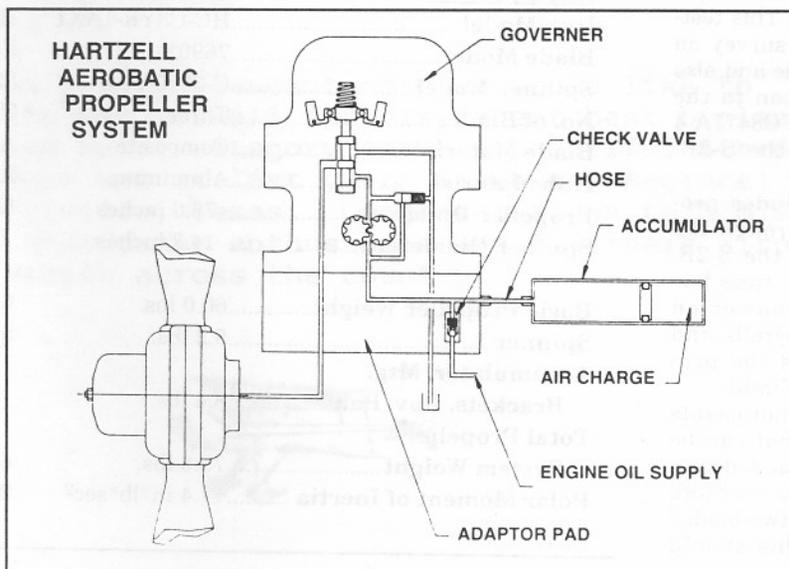
For instance, the nitrogen pressure system was proving to be a temperamental solution to the problem of propeller overspeed.

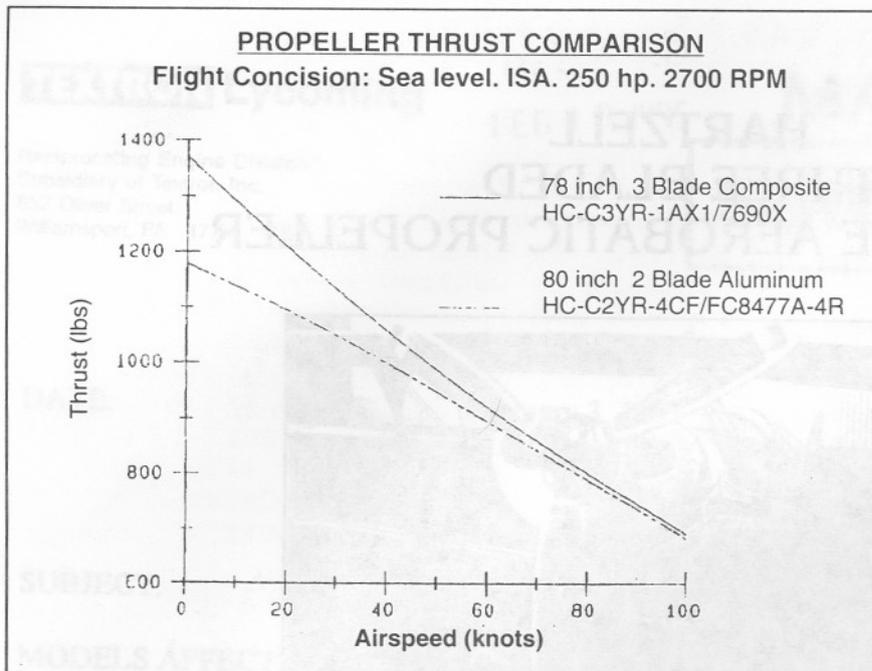
## DESCRIPTION

Over the last few months, Hartzell has been testing its new Three-Bladed Composite Aerobic Propeller. The propeller system features a newly designed shank and new blade airfoils made of Kevlar with a foam core. The system also features a nickel erosion shield bonded to the leading edge to pro-

vide impact resistance and to eliminate delamination.

In regard to propeller overspeed, an oil accumulator system has been married to the design with the advice of John Lillberg. The system consists of a valve pad assembly between the engine oil supply and the governor. When the valve senses an oil pressure loss from the engine, the accumulator takes over, continuing to supply the governor with oil. The accumulator is mounted on the engine which helps to further reduce weight that was formerly





located out at the propeller cylinder with the nitrogen, air charge system.

**OPERATIONS**

The three-bladed prop will initially be certified on the Pitts S-2B and therefore is designed to meet FAA certification standards which include vibration, endurance, lightning strike, bird strike and fatigue testing. Hartzell will also acquire Supplemental Type Certificates for retrofit of the three and a two-bladed version of the composite propeller system onto other aerobatic aircraft.

With the help of Ken Hadden (IAC #15274 and President of IAC Chapter #34 Columbus, Ohio), the new propeller and accumulator system were installed on his 1991 Pitts S-2B in April of this year. This testing included a vibration survey on the AEIO-540-D4A5 engine and also a performance comparison to the standard HC-C2YR-4CF/FC8477A-4 aluminum propeller on the S-2B. (See diagram)

Vibration testing includes propeller stress analysis through the entire flight envelope of the S-2B. Interestingly, the highest stress levels were seen during power-on spins. Snap-rolls, torque rolls and Lomcevaks only pushed the propeller to half of its design limits.

Overall, there was a noticeable reduction in vibration that can be attributed to the three-bladed propeller having more ability to absorb piston impacts than the two-bladed aluminum propeller. This should

also reduce wear on the engine, which of course, is a significant portion of the purchase price of a Pitts. Hartzell also plans to have Monty Barrett of Barrett Performance Aircraft evaluate torsional inputs on the crankshaft.

**PERFORMANCE**

Ken reported that "...vertical penetration is fantastic and more time can be spent on down lines because of the braking effect of the three

wide-chord blades". After every attempt to overspeed the propeller, the accumulator system proved to be the perfect solution. Ken was unable to overspeed the engine. Also, Ken reported, "...topping off a line from vertical to horizontal is easier because of the added low speed thrust of the propeller and the dramatic reduction in torque effect at high power settings".

**DURABILITY**

As mentioned, plans are to certify the prop on the S-2B. The design meets the same criterion as other Hartzell composite propellers on the Cessna Caravan, Beech 1900 Commuter, Shorts 360, the CASA 212 and the Mooney PFM. Also, at the time this article was written (May 1993), Aviat had received the propeller for flight evaluations at the factory with an eye on certification.

Finally, I would be remiss if I did not thank the many Hartzell test engineers who made this project a reality. Scott Rodriguez, in particular, spent three weeks with his feet sticking out of the front hole of the S-2B to see that the vibration tests were completed successfully.

Anyone interested in Hartzell's Composite Aerobatic Propeller should contact Mr. Mike Disbrow at the Hartzell Service Center. Tel: (800) 492-7767 or Fax: (513) 778-4202. Or Mr. Brad Huelsman Tel: (513) 778-4392 or Fax (513) 778-4391.

**HARTZELL PROPELLER INC.**

16-APR-93

**PROPELLER DATA SHEET  
LYC AEIO-540-D4A5**

<u>Engine Model</u>	<u>3-Blade Comp.</u>	<u>2-Blade Alum.</u>
Hub Model .....	HC-C3YR-1AX1	HC-C2YR-4CF
Blade Model .....	7690X	FC8477A-4
Spinner Model .....	C-3570(P)	836-60
No. of Blades .....	Three	Two
Blade Material .....	Composite	Aluminum
Hub Material .....	Aluminum	Aluminum
Propeller Diameter .....	78.0 inches	80 inches
Spinner Diameter .....	14.3 inches	14.2 inches

Basic Propeller Weight.....	60.0 lbs.	62.2 lbs.
Spinner .....	5.2 lbs.	5.74 lbs.

**Accumulator, Mtg.**

Brackets, Gov. Pad.....8.4 lbs.

**Total Propeller**

System Weight.....73.6 lbs. 67.94 lbs.

Polar Moment of Inertia .....17.4 in\*lb\*sec<sup>2</sup> 25.4 in\*lb\*sec<sup>2</sup>

# CLASSIFIEDS

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

COCKPIT RESOURCE MANAGEMENT AIDS.  
Flight monitor system: VFR and IFR cross country flight management cards, expense, maintenance, usage, and frequently visited airports cards. Small enough for any cockpit. Headset strain Relief Clips. Open cockpit Safety Lanyards. Limited edition prints of 1930's air racers. Wicker seat restoration or construction. Send \$1.00 for complete information packet. C & R Aircraft, P.O. Box 281, Quincy, IL 62306-0281 ... (217) 242-5967. See article in the January issue of Starduster Magazine.

FOR SALE Welded Starduster Too Fuselage. Just needs a little clean up. Call Bob Pisani Days: (510)352-9040 Eves: (415) 347-2559.

STARDUSTER II Project - Ready to assemble. New 180 HP Lycoming. \$10,000. Call Marc, (818)353-3467.

STARDUSTER II Project - Wings, center section completed. Fuselage ready to cover, much, much more. Lost License. Greg (310)432-8234 days, (714)848-1743 eves.

ACRODUSTER TOO SA750 - Basic Fuselage, tail. landing gear, wheels and brakes, tailwheel, bubble windshields, wing kit with some finished ribs. \$8500 obo. Rick Showalter (703)955-2016.

STOLP STARLET - Complete less engine & prop with lower wings to convert to V Star biplane, \$3,500 Call (216)449-7887.

STARDUSTER II - TT 410, Lyc. IO-360, CSP, Inverted fuel & oil. KX-145, VOR, \$28,000. Call (909)393-0587.

STARDUSTER II - Red, white, blue, low total time, 285 SMOH O-320, radios, intercom, September annual, winter price \$23,000, Call (703)347-5280.

ACRODUSTER I - 870TT, 180 Lycoming, press. carb. Christen inverted fuel & oil system, smoke system, IC-A2 Com radio, starter, alt. & Gel Cell, beautiful paint, \$19,000 firm. Call (405) 822-3897. Will have fresh annual at time of sale!

STARDUSTER II - TTAF 850, TTE 440, 180 HP Lycoming, polished Hartzell aerobatic constant speed prop, full Christen inverted, 2 place canopy, Cleveland w&b. beautiful plane. Call after 7:30pm (334)948-6913, \$28,500 or offers.

STARDUSTER II - 505 TT, Lyc. O-320. 150 HP, 360 Narco, great fun aerobatic plane. Want flying Longeze. \$24,900 or trade (805)526-3637 or (805)526-7845.

1983 STARDUSTER II, 475 TTAE, 125 SPOH, 250 HP, O-540. Must sell ASAP. \$26,000. (209)585-0948, call after 6pm.

IAS-II IGNITION HARNESS FAA-PMA Fitts Lyc. O-320/O-360 with bendix mags, new; \$100.  
SCOTT 3200 TAILWHEEL PARTS, bracket assy., fork, steering arm, etc., new, \$100.  
ENGINE DRIVEN FUEL PUMPS 15-18 psi for pressure carb Lycoming, \$50 each. Tom Overeynder, (817) 277-4812 after 5 P.M.

SPARE PARTS: Scott 3200 tailwheel, new, \$325 + shipping. Mike, (817) 421-9168.

