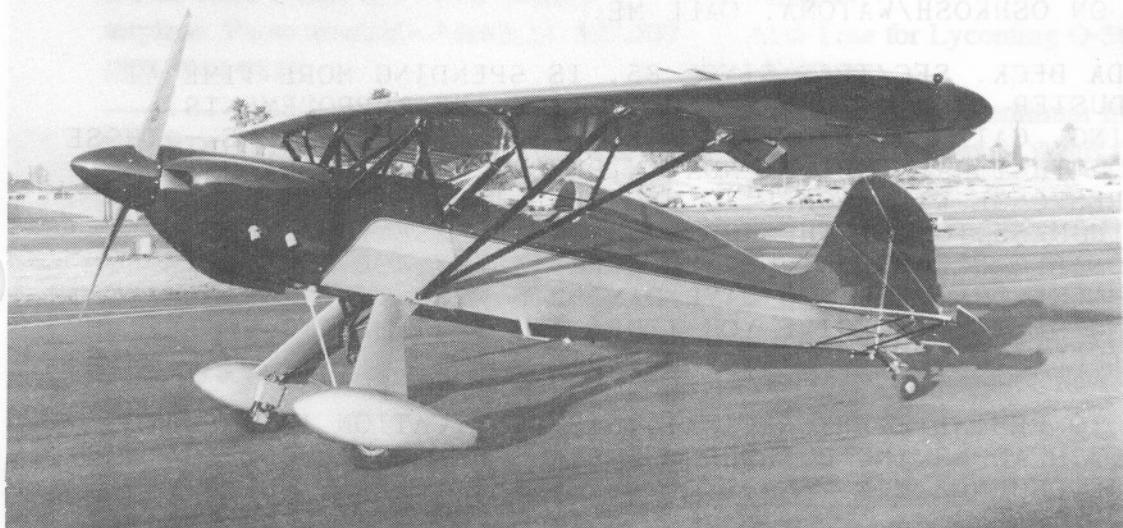




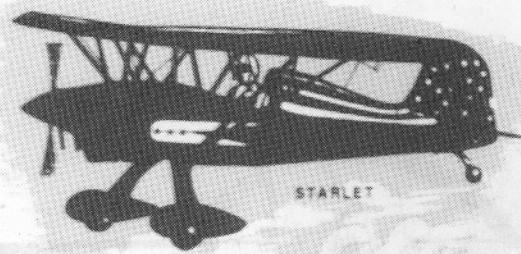
MAGAZINE



Dedicated to the  
ACTIVE Homebuilders

January 1993

JAN '93'



THE PREZ SAYS:

A NEW YEAR BRINGS NEW HOPE, AMBITIONS, ENDEAVORS AND NEW FRIENDS. ALSO A TIME TO SAY GOODBYE TO LAST YEAR THAT WAS GOOD TO "STARDUSTER" AND YOURS TRULY. AGAIN A TIME TO THANK ALL OF YOU THAT HAVE CONTRIBUTED TO MAKE "92" A MEMORABLE, PEASURABLE AND PROFITABLE YEAR.

FOR "93" AM PERSONALLY PLANNING TO ATTEND MORE "FLYINS" - SUN & FUN, STARDUSTER, WATSONVILLE, BARTELSVILLE, OSHKOSH-WATOMA - AND OTHERS IF TIME AWAY ALLOWS - AM LOOKING FORWARD TO OUR OWN "OPENHOUSE" 1 MAY, THEN WATOMA, WI. THERE IS A LOT OF INTEREST AND COMMITMENTS FOR THIS YEAR AT WATOMA. KNOW THERE WILL BE STARDUSTER OWNERS - BUILDERS AND ENTHUSIEST AT ALL OF THESE EVENTS - THOSE THAT NEED MORE INFO ON OSHKOSH/WATOMA, CALL ME.

BRENDA BECK, SEC/TRES SINCE 85, IS SPENDING MORE TIME AT STARDUSTER AND AM SURE YOU'LL NOTICE THE IMPROVEMENTS. MAILING, CATALOG, BROCHURES AND PLANS PRESENTATIONS - THOSE OF YOU THAT HAVE MET BRENDA IN PERSON OR BY PHONE MAIL OR FAX RESPONSE WILL AGREE TO HER ABILITIES. AMBITION AND WILLINGNESS TO GET THE JOB DONE AND PLEASE YOU. AM PERSONALLY PLEASED AT HOW MUCH EASIER MY JOB IS NOW - BRENDA'S WORK HERE AND DAVE BAXTER'S WORK ON THE MAGAZINE IS GIVING ME TIME TO GIVE YOU TIME - IS THAT MAKING SENSE? MY HEARTFELT THANKS TO DAVE & BRENDA.

WANT TO REMIND EVERYONE THAT THIS PUBLICATION IS USED TO NOTIFY READERS AND BUILDERS OF PLAN CHANGES / MODIFICATION AND RECOMMENDATIONS - A TWO WAY STREET, PLEASE USE IT.

WE AT "STARDUSTER" WISH FOR THE BEST OF LUCK AND GOOD HEALTH FOR ALL THE FRIENDS OF "STARDUSTER CORP."

HAPPY NEW YEAR!

BILL CLOUSE  
"BC" PREZ

A handwritten signature in cursive ink, appearing to read "Bill Clouse".

note - phone number area code change

**Stolp Starduster Corp.**

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FAX (909) 784-0072  
WATS 1-800-833-9102

HOMEBOUILT AIRPLANE PLANS  
SUPPLIES · COMPONENTS · MATERIALS

BRENDA J. BECK

Secretary - Treasurer

January 1993

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

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FRONT COVER - Beautiful Starlets. N211WK owned and built by Bill Kelly, 4721 Laurette St, Torrance, CA 90503 and Starlet N7139 owned by Phil Friar, built by Joe "Pee Wee" Thomas and his son Joey. Phil's address is 1203 W 6th St. #57, Corona, CA 91720.

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BACK COVER - Equally beautiful V-Star N18AM built and owned by Art Morgan, 1192 Devonport Circle, Lexington, KY 40504.

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SUBSCRIBE TO STARDUSTER MAGAZINE. PUBLISHED FOR PEOPLE BUILDING OUR AIRPLANES. TECHNICAL INFORMATION, NEWS AND PICTURES. PUBLISHED FOUR TIMES A YEAR. SUBSCRIPTION RATE IS \$12.00 PER YEAR, \$18.00 PER YEAR FOR OVERSEAS MAILINGS [EXCLUDING CANADA]. 1993

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THE EDITOR IS ALWAYS LOOKNG FOR TECHNICAL TIPS 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 ARITCLE SUBMITTED.

---

ODDS & ENDS

Well with cold weather upon us and Thanksgiving, Christmas and New Years out of the way, open cockpit biplane flying has probably dwindled down to nothing. Even I, have not flown much these last few months.

I did however attend school in Michigan in late October. Which allowed me to meet and visit with several Starduster Too owners and builders in the Detroit area. I attended school at the Detroit Diesel Training facility in Dearborn. The class, regarding electronic engine controls was great, but what really made it nice for me was that our school was over at 2:30 p.m. Friday afternoon, and my airplane didn't leave until 2:55 p.m. Sunday afternoon. This allowed me to rent a car and drive up to Brighton, MI to meet Jim Kilborn, a Starduster Too builder whom I had met at Oshkosh last summer. He became my host for Friday and Saturday night. He showed me his project and took me on a tour of the small airport he lives on.

After several telephone calls that evening we made arrangements to visit with several Starduster owners and builders the next day. Saturday morning found Jim and I in Pontiac, MI to visit with Dick Pearsall, owner of a Warner powered Starduster Too N79DC. I have seen pictures of this airplane, but had never seen it or taken pictures of it in person. He also has a "0" time 185 HP Warner he purchased in Germany several years ago, [it came off of an airship]. This, is a really pretty airplane and Dick is a swell guy.

From Pontiac it was on to Bay City to meet with Matt Kerr, owner and builder of N159MK. He became our host at the Bay City Airport. After pictures and conversation, he took us to T.K.Jones hangar for pictures of N151K. From there we visited with Doug Dodge, who along with being the airport manager, also runs a small aircraft shop specializing in fabrication, modification and repair of aerobatic aircraft, primarily Pitts and Lazer/Stevens Acro types. He was also recovering N249AK a Starduster Too, owned by Roberts Packaging Company of Battle Creek, MI. What I found quite interesting about Doug was that he had flown in numerous aerobatic air shows several years ago, and that he had an engine failure during and inverted ribbon pickup which resulted in a spectacular landing upside down. This was done prior to Craig Hoskins landing his Pitts upside down, which many of you may have seen during the last several air show seasons. So Craig was not the first.

Another interesting thing about Doug was, that he told me that Jim Osborne, former owner of Starduster Corporation, had offered him an Acroduster One back around 1980, so that he and Cindy Ricker could champaign them together as a dual aerobatics act. It is unfortunate that Cindy was fatally injured at El Mirage early in 1981 during her aerobatics routine. Details of this accident were printed in the April 1981 issue of Starduster Magazine, and shortly there after Jim sold the business to Bill Clouse.

After an interesting and enjoyable meeting with Doug Dodge, Matt Kerr took us over to Andy Kolaks, who lives next door to the airport, so that we could see his beautiful Starduster Too project.

He and Doug Dodge have become good friends, as Doug has been helping him with many of the problems of a first time builder. Andy is doing a super job, and his airplane will be a very light one for a 540 powered airplane.

After a late lunch with Matt Kerr, we headed back to Jim Kilborn's. Sunday morning found us at Willow Run to visit with Paul Holman. Paul was gratuitous enough to open his hanger and roll out his Starduster Too N88PH, so that I could take pictures of it. Paul, along with having a beautiful Starduster Too also owns an equally beautiful North American T-6. After coffee, conversation, and pictures, I bid farewell to Paul Holman and Jim Kilborn, two very fine gentleman, and headed back to Detroit Metro Airport for my return trip home.

I met some wonderful people and was able to see and take pictures of more beautiful Stardusters. It is my hope to be able to visit some of these people again after Oshkosh next year.

As I said earlier your editor has not been doing much flying lately. But after a number of night landings this past year and a few takeoffs I decided to make it legal and did so in the middle of October. Three takeoffs and three landings to a full stop, well after dark at my homebase Hillsboro, OR [HIO]. So your editor is now current at night in an open cockpit tail wheel biplane.

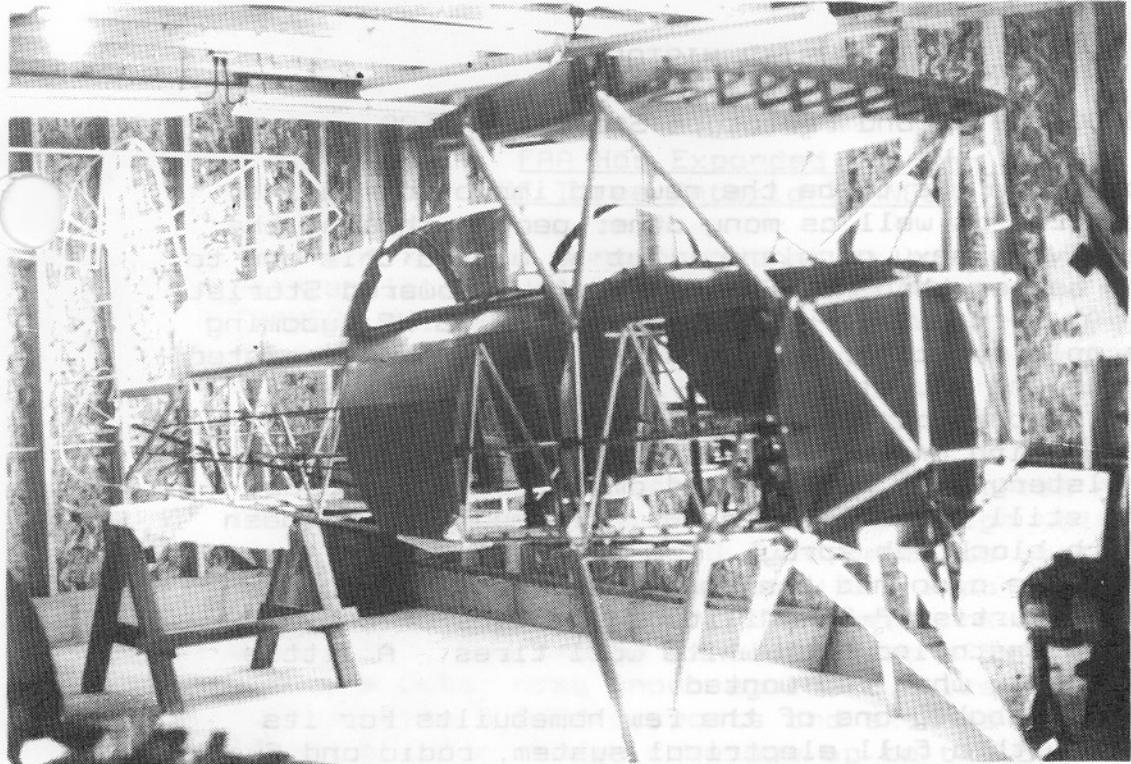
And as if your editor had nothing else to do, I have recently taken on the repair of the Starduster Too that was noted in the last issue of Starduster Magazine. The one that was involved in a ground collision in Snohomish, Washington, August 31, 1992. It was not a total as the article states, and at least to me, seems to be an easy but time consuming rebuild.

Last but not least, this may be of some interest to our readers. Kurt Russell, Actor, an owner of N47100 a beautiful Starduster Too, and mate Goldie Hawn [I knew he had good taste] flew his Starduster north with the Western Waco Assn. Air Tour, from Southern California to the Evergreen Antique Fly-in at Vancouver, Washington. Apparently Kurt is an accomplished and proficient pilot. He also owns a late model Twin. It is unfortunate that he only got as far north as Cottage Grove, OR., as the trip had taken more time than expected and other commitments required him to return earlier than anticipated. I of course was sorry to hear this as I also attended Evergreen, and had hoped to meet him. But of some consolation, four Stardusters showed up there including mine.

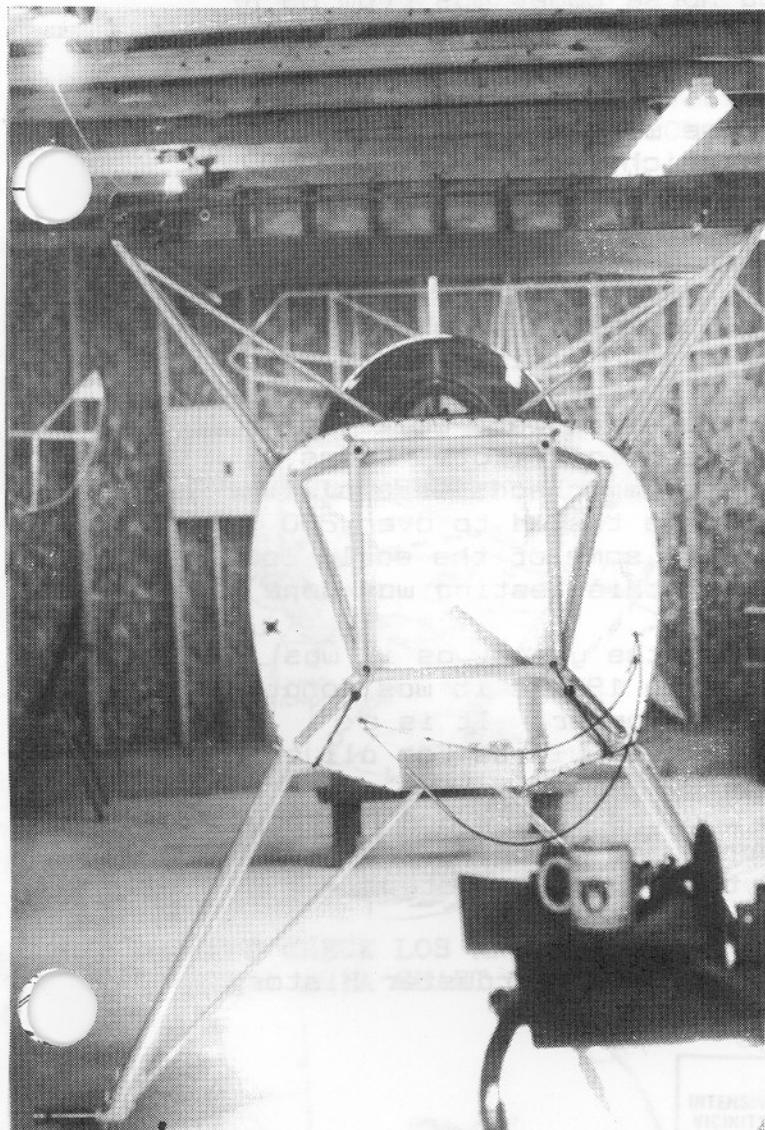
D.C.B. Editor

STARDUSTERS IN MICHIGAN





ANDY MCLEAN'S BEAUTIFUL  
SPARROWSFIRE PRO PROJECT  
AT BAY CITY MICHIGAN



CAUTION  
INTENSIVE MILITARY JET AIRCRAFT  
VISITORS OF NORTON/MARCH AFB

## STARDUSTER HISTORY

### N2300 The Second Prototype Starlet SA-500

This airplane was to be the new and improved model of the Starlet. Lou as well as many other people thought the Starlet was a very sexy airplane. But he wanted this one to perform much better than N501S, the first VW powered Starlet prototype. As I recall it was powered by a 108 HP Lycoming and was the only one to have aluminum flaps. It was painted red with white and blue trim.

My part in this airplane was fairly modest, as I did some of the welding and covering. The one thing I did do was the upholstery. It had white diamond tuck naugahyde. The airplane still has this interior, although it has been repainted with black fab spray.

The airplane also had the wheel pants cut out on the side, like the Curtiss P-6-E Military fighters of the mid 30's, and were installed with white wall tires. A little gaudy, but exactly what Lou wanted.

This was probably one of the few homebuilts for its time equipped with a full electrical system, radio and fuel tanks in both the fuselage and wing. The airfoil used was the Clark "Y" and the recommended horse power was from 85 HP to 125 HP. The wing sweep back was 9 degrees. The span was 25 feet; and with an empty weight of 723 Lbs, made the airplane a fairly docile performer.

Basic numbers for this airplane were: Lift off at 60 IAS, accelerate and climb 80 IAS, which resulted in a 1000 ft to 1,200 ft FPM climb rate. Level flight cruise was 125 MPH, max speed was a little over 150 MPH, stall speed was between 55 and 60 with no flaps, approach speeds were around 80 MPH.

The aircraft three pointed quite well with wheel landings being pilot skill and practice. This aircraft had all the initial flight testing done by Art Scholl. The aerobatics stall, and spin characteristics were well explored by this very competent aerobatics pilot. Loops, snap rolls, Cuban "8's", as well as hammerheads were all performed. The airplane was also dive tested to over 230 MPH. Art said that it felt much like some of the early low horsepower Pitts biplanes. All of this testing was done within the first five hours of flight.

I do not know who owned it over the years, as it was sold in early 1970's, and in the early 1980's it was donated to the EAA museum by its then current owner. It is a fitting place for this airplane, as it should be for all of Lou's prototypes.

If any of our readers know who the owners and history of N2300 were, I would greatly appreciate hearing from you. So this concludes the history of the second prototype Starlet.

D.C.B. Starduster History



N2300 AT WATSONVILLE



Significant Occurrence Alert

Malfunction or Defect Report

Many of you have recently read in Sport Aviation or have received from the FAA a letter and report form regarding problems, defects or malfunctions. The letter and article encourages you to report any problem encountered during the course of aircraft operation that maybe safety related and of mutual interest to other operators of similar aircraft. A copy of this form and the address to send it to is included with this article.

I as editor and owner of a Starduster Too would like to start out listing some of the known problems associated with the Starduster Too. I would further like to encourage all owners and operators of any Starduster designed aircraft to relate any experience they feel may be a compromise to the safe operation of their aircraft, this should be mailed to me, as I would like to make this a regular feature in Starduster Magazine. So please participate, as you could help save someones neck.

Problems Malfunctions with the Starduster Too

1.) [Weight & Balance] was, is, and continues to be a problem with many of the early model four cylindier Lycoming powered Starduster Too's. I.E., Aft, and CG conditions. I do not consider this to be a major problem depending on configuration. But some aircraft with low fuel, heavy pilots, and passengers should not attempt aerobatics without a current and accurate weight and balance computation.

2.) [Landing gear location] Many Starduster Too's have been built with the early landing gear configuration. If gear wheel contacts are two far forward, the result is a very heavy tail weight. Which can result in damage and excess wear to tail wheel, tail wheel spring and fuselage attach points. It also requires in most cases, the pilot to be more proficient in tail wheel aircraft operation.

3.) [Upper Ailerons over center] The possibility exists by pushing down on either aileron, a lock over center condition can occur on many of the early built aileron installation plans. I personally do not feel that this is a problem as it can only occur when the airplane is flying backward, and most Stardusters are not flown backwards. Those few who have experienced this condition tell me that the minute the aircraft reverses direction, such as in a tail slide, the ailerons snap loose into their normal configuration.

4.) [Rear control stick through bolt failure] Several fatal accidents have occurred in aerobatic aircraft that share the same type of control system. However, I do not know of any failure with the Starduster Too. The fatal accidents were in aircraft that had accumulated many hours of hard aerobatic flight. A condition that few Starduster Too's ever encounter during their lifetime.

By design, coupled with poor workmanship it is possible after many hours of flight to saw through this bolt, which would result in the loss of elevator control. Many builders during construction, do not insure that the hole is drilled straight and undersized and then reamed to the proper through bolt dimensions; and further during annual inspection [FAR Part#43] all control system bolts should be inspected I.A.W. the FAR's, especially this one.

5.) [Exceeding the design gross weight of the aircraft and attempting to do aerobatics]. Most Starduster Too's are several hundred pounds over the design empty weight of 1050 lbs, which could easily put them over the gross weight of 1704 lbs. This gross weight was the weight at which the "G" load of 6 positive and 6 negative was determined through engineering calculations. It should not be exceeded during aerobatics manuevers. If aerobatics are attempted at higher gross weights, a new limit load factor should be calculated, and would result in a lower "G" load rating.

6.) [Dry rot and glue deterioration]. It has been reported to me by several owners of Stardusters, that during the rebuild of their aircraft, they have found dry rot in the aft spar of the center section and in the aileron spars.

Along with this condition there has also been deterioration of glue joints at all parts of wing construction. Apparently some builders used poor or inferior quality glues. As well as not being waterproof. I do not know of any structural failure in a Starduster Too and none appear in the accident reports that I have in my posession. But this is a 25 year old design and many aircraft are approaching 20 years or more of service depending on the use, history, who built it, and how its been taken care of, a complete and thorough inspection could be in order.

Of the six items listed above, I personally feel none of them are a major problem. The weight & balance problem can be solved by a longer engine mount or operating the aircraft responsibly with this in mind.

The landing gear can be changed to the later design or proficiency with tail wheel aircraft operation can be improved.

The ailerons overcenter problem can be solved by several types of positive stops being installed, it can also be solved by using the Acroduster Too forward mounting aileron strut interconnect drawing installation. This should be considered if the aircraft is currently under construction.

As for the control stick through bolt, rear spar dry rot in the center section and aileron spars, and the possibility of glue deterioration; normal inspection and maintenance as well as drain holes should take care of this problem.

Last but not least, of course operation of an aircraft at excessive gross weights and high "G" loadings would not be done by a knowledgeable and responsible pilot.

TRATION NO.	DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION <b>MALFUNCTION OR DEFECT REPORT</b>			8A. COMMENTS (Describe the malfunction or defect and the circumstances under which it occurred. State probable cause and recommendations to prevent recurrence.)	FOR FAA USE ONLY	OMB No. 2120-0003
RAFT	A. MAKE	B. MODEL	C. SERIAL NO.		CONTROL NO.	
					ATA CODE	
ERPLANT						
ELLER						
<b>ANCE/COMPONENT (assy, that includes part)</b>						
NAME	B. MAKE	C. MODEL	D. SERIAL NO.			
<b>FIC PART (of component) CAUSING TROUBLE</b>						
A. NAME	B. NUMBER	C. PART/DEFECT LOCATION				
RT TT	E. PART TSO	F. PART CONDITION	7. DATE SUB.			

SUBMITTED BY

B.	C.	D.	E.	F.	G.	H.	OTHER
REP.	OPER.	MECH.	AIR TAXI	MFG.	FAA		



U.S. Department  
of Transportation

**Federal Aviation  
Administration**

**Small Airplane Directorate  
Chicago Aircraft Certification Office  
2300 East Devon Avenue  
Des Plaines, IL 60018**

**Don Michal  
Manager, Chicago Aircraft  
Certification Office**

# EMERGENCY AIRWORTHINESS DIRECTIVE



U.S. Department  
of Transportation  
Federal Aviation  
Administration

OFFICE OF AVIATION SYSTEM STANDARDS  
P.O. BOX 26460  
OKLAHOMA CITY, OKLAHOMA 73125-0460

September 14, 1992  
92-20-07

This priority letter Airworthiness Directive (AD) is prompted by a report of an aircraft accident caused by an obstructed fuel pump. The FAA investigation revealed that certain AC, Textron Lycoming, and Rajay/Rotomaster-modified diaphragm fuel pumps overhauled by Aero Accessories, Inc., may have a rubber washer manufactured from improperly cured material. The material can absorb fuel and expand, causing the washer to dislodge from its position and block off the outlet valve of the pump. Aero Accessories, Inc. is recalling fuel pumps overhauled between November 1991 and August 20, 1992, that may incorporate the suspect washer. Thus far, this recall has revealed three additional fuel pumps with the washer dislodged. This condition, if not corrected, could result in disruption of fuel flow to the engine, which can result in a loss of engine power.

Since an unsafe condition has been identified that is likely to exist or develop on other fuel pumps of this same type design, this AD requires the removal and replacement, prior to further flight, of all affected fuel pumps.

Pursuant to the authority of the Federal Aviation Act of 1958, delegated to me by the Administrator, the following priority letter AD 92-20-07, applicable to AC, Textron Lycoming, and Rajay/Rotomaster-modified diaphragm fuel pumps; models 40174, 40295, 40296, 40595, 41234, 41270, 41271, 41272, 41452, 41617, 41812, 75246, 75247, LW14282, LW15399, LW15472, LW15473, LW16335, LW16775, LW16947, 103396-01, 103586-01, RJ4033, R00253-2, R00253-501, and R00253-502; overhauled by Aero Accessories, Inc. between November 1991 and August 20, 1992; having serial numbers (S/Ns) 91K 073 through 91K 125, and all S/Ns beginning with prefixes 91L, 92A, 92B, 92C, 92D, 92E, 92F, 92G, and 92H 001 through 92H 146; installed on but not limited to Textron Lycoming model O-235, O-290, O-320, IO-320, LIO-320, O-360, IO-360, LO-360, LIO-360, LTO-360, O-540, IO-540, TIO-540, and LTIO-540 piston engines; installed on but not limited to piston engine powered aircraft manufactured by Beechcraft, Cessna, Mooney, and Piper; is issued and is effective immediately upon receipt.

**92-20-07 AC, Textron Lycoming, and Rajay/Rotomaster:** Priority Letter issued on September 14, 1992. Docket No. 92-ANE-43.

**Applicability:** AC, Textron Lycoming, and Rajay/Rotomaster-modified diaphragm fuel pumps; models 40174, 40295, 40296, 40595, 41234, 41270, 41271, 41272, 41452, 41617, 41812, 75246, 75247, LW14282, LW15399, LW15472, LW15473, LW16335, LW16775, LW16947, 103396-01, 103586-01, RJ4033, R00253-2, R00253-501, and R00253-502; overhauled by Aero Accessories, Inc. between November 1991 and August 20, 1992; having S/Ns 91K 073 through 91K 125, and all S/Ns beginning with prefixes 91L, 92A, 92B, 92C, 92D, 92E, 92F, 92G, and 92H 001 through 92H 146; installed on but not limited to Textron Lycoming model O-235, O-290, O-320, IO-320, LIO-320, O-360, IO-360, LO-360, LIO-360, LTO-360, O-540, IO-540, TIO-540, and LTIO-540 piston engines. These engines are installed on but not limited to piston engine powered aircraft manufactured by Beechcraft, Cessna, Mooney, and Piper.

**Compliance:** Required prior to further flight, unless accomplished previously.

To prevent disruption of fuel flow to the engine, which can result in a loss of engine power, accomplish the following:

(a) Remove from service fuel pumps overhauled by Aero Accessories, Inc. between November 1991 and August 20, 1992; and having S/Ns 91K 073 through 91K 125, and all S/Ns beginning with prefixes 91L, 92A, 92B, 92C, 92D, 92E, 92F, 92G, and 92H 001 through 92H 146, and replace with a serviceable pump.

NOTES:

1. An "S" stamped on the flange above the inlet port of the fuel pump indicates previous compliance with this AD.
2. The model number is located on the edge of the mounting flange.
3. The S/N is located on the "housing backbone" between the mounting flange and the round spring housing.
4. For further information, see Aero Accessories, Inc. Mandatory Service Bulletin No. 001, dated August 21, 1992. Copies of this service bulletin may be obtained from Aero Accessories, Inc., 1240 Springwood Church Road, Gibsonville, North Carolina 27249, telephone (919) 449-5054.

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

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

(c) Priority Letter AD 92-20-07, issued September 14, 1992, becomes effective upon receipt.

**FOR FURTHER INFORMATION CONTACT:**

Jerry Robinette, Propulsion Branch, Atlanta Aircraft Certification Office, 1669 Phoenix Parkway, Suite 210C, Atlanta, Georgia 30349; telephone (404) 991-3810; fax (404) 991-3606.

**CHANGE OF ADDRESS NOTICE****Signature requirements:**

- Individual owner must sign.
- Partnership, a general partner must sign.
- Co-owner, each co-owner must sign, continuing as necessary on an attached sheet.
- Government, any authorized person may sign.

AIRCRAFT REGISTRATION NUMBER	SERIAL NO.
MAKE	MODEL

**ADDRESS CHANGE REQUESTED**  
**NAME AND ADDRESS OF CERTIFICATE HOLDER**

STREET	ZIP	COUNTRY
CITY		
STATE		
SIGNATURE (In Ink)	TITLE	DATE

Airworthiness Directives (AD) for a particular make and model aircraft are mailed to the owners using the permanent mailing address on file with the FAA Registry. This address is the same as the one shown on the aircraft Certificate of Registration. Federal Aviation Regulation (FAR) Part 47.45 requires owners of U.S. registered aircraft to notify the registry within 30 days after any change in this address. A revised Certificate of Aircraft Registration is then issued without charge.

**MAIL TO:**

FAA Aircraft Registry, AVN-450  
Mike Monroney Aeronautical Center  
P.O. Box 25504  
Oklahoma City, Oklahoma 73125-0504

**CANCELLATION OF REGISTRATION REQUESTED:**  
(check applicable block, sign, and date)

1. Aircraft sold to: (Purchaser's name and address)

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2. Aircraft destroyed/scrapped

3. Aircraft exported to \_\_\_\_\_

4. Other, specify \_\_\_\_\_

I (we) request cancellation of registration for the above reason.

SIGNATURE (In Ink)	TITLE	DATE
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**LYCOMING**

# **FLYER**

Issue No. 52  
May, 1992

**TEXTRON Lycoming**  
Reciprocating Engine Division

## **Recognizing and Treating Carburetor Ice**

A recent incident at the local airport is just one reason for reviewing this subject. The pilot of a light general aviation aircraft flying above the clouds reported a partial loss of engine power to the controlling FAA facility. After a brief period, a safe let down and landing were accomplished. The radio transmissions from the aircraft were monitored in the facilities of the local FBO where they were heard by a Lycoming Field Service Engineer who is both a licensed mechanic and a licensed pilot.

When the pilot of the troubled aircraft came into the FBO facility, he was offered assistance in determining the cause of the power loss by the Lycoming employee. The pilot bluntly indicated that he was not interested in any discussion or assistance. He also asserted that there was no possibility that carburetor ice could have caused the problem because he was flying above the clouds and not in them.

While many pilots are well versed on the insidious characteristics of carburetor ice, there are some who could use a thorough review of the subject. One of the best sources of information is a study done by the National Transportation Safety Board. Much of the following data are taken from that report. Some of the material will be verbatim, but other

Please turn to Page 2, Column 2

## **The Crankshaft Gear**

At first glance this would seem to be a pretty boring subject. Who really needs to know about a crankshaft gear? The answer to that question would be "Any aircraft owner who depends upon his engine to provide the power for flight." Although the subject may seem boring, a failed crankshaft gear will cause engine failure and that is when the excitement may reach levels which are undesirable.

What is all this leading up to? A reminder to Flyer readers

about the contents of Textron Lycoming Service Bulletin No. 475A and AD 91-14-22. These documents have been issued to help assure safety of flight through compliance with the procedures outlined therein. Service Bulletin No. 475A is titled "Crankshaft Gear Modification and Assembly Procedures."

The introductory paragraph should lend emphasis to the need for compliance at each specified time. That paragraph states: "Damage to the crankshaft gear and the counterbored recess in the rear of the crankshaft, as well as badly worn or

Please turn to Page 4, Column 1

## **High Time Cylinders**

The aluminum alloy cylinder heads used on air cooled aircraft engines are subject to high stresses while operating. In addition, they are heated and cooled with each engine start up and shut down. Over long periods of operation, these stresses can lead to fatigue and eventually the cylinder head may develop cracks.

Lycoming metallurgists argue that welding of cracks in aluminum cylinder heads is not likely to meet with long term success. Therefore, an overhauled cylinder has little chance of being as serviceable as a new cylinder. Even if there were no cracks at the time of overhaul, metal fatigue is still a factor to be considered. But how? There is no record of time in use required for a cylinder assembly. An overhauled cylinder could have 4000, 6000, 8000 hours or more when it is put on an overhauled engine. Even a cylinder from your own engine with only one trip to TBO may not make it to TBO a second time.

As a result of the scenario outlined above, Lycoming has for many years recommended new cylinders when engines are overhauled. To practice what is being preached, Lycoming uses new cylinders on all engines shipped from the Williamsport Plant, including factory over-

Please turn to Page 2, Column 1

**Cylinders . . . Continued**

hauls. It is less expensive to install new cylinders during the overhaul as compared to having the engine torn down once or twice for cylinder replacement before it reaches the recommended TBO as an overhauled engine. The added reliability must also be considered.

With all the above a matter of record, there are still aircraft owners who write to ask for an honest opinion regarding "the risks of serious cracks in high-time cylinders." One such letter stated, "...we owners all know that Lycoming would prefer to sell us new cylinders at overhaul time." This is true, because experience tells us that new cylinders are in the owners best interest for the long run.

For all those doubters who have read to this point, it is not necessary to take the word of anyone at Lycoming on this subject. The following material was written by Richard L. Collins, long time editor of Flying Magazine and currently a contributor to AOPA Pilot Magazine. The material written by Mr. Collins seems to confirm the stand which Lycoming has taken - the more hours of operation on a cylinder, the more likely it is to crack. The following material is reprinted from FLYING, March, 1987. Copyright 1987, CBS Magazines, from "On Top" by Dick Collins.

**Cylindrical Objects**

"It's amazing how long it can take to catch on to basic mechanical truths. This realization was sparked by a conversation with Jack Riley, Jr., principal in RAM Aircraft. The subject was the overhaul of the TSIO-520 engine in my airplane. Riley was surprised that the engine had been overhauled twice (both times at TBO) and had not had

**Carburetor Ice . . . Continued**

items will be condensed to keep the length of this article within reasonable limits.

During the five-year period from which this data is taken, there were 360 general aviation accidents involving carburetor ice as a cause factor. There were 40 fatalities, and 160 persons were injured, 40 of them seriously. The number of persons exposed to death or injury in these accidents was 636; 47 aircraft were destroyed and 313 were substantially damaged.

"Carburetor ice", as used in the report, meant ice at any location in the induction system of aircraft equipped with reciprocating engines. The term is traditional. It is used in aircraft accident records, even though many reciprocating engine installations have fuel injectors rather than carburetors.

The report noted that carburetor ice normally does not remain in evidence for very long after an accident occurs. Thus, there may have been additional accidents during that five year period which were not so appraised because of the lack of evidence at the time of the investigation.

Unlike mechanical failure, over which the pilot has little in-flight control, carburetor icing accidents can be prevented by the pilot in virtually all cases. Increased pilot awareness and proper, timely action can reduce the number of accidents caused by carburetor ice. To aid in improving awareness and to suggest the proper procedures to be taken, the NTSB study covers many of the details which pilots should know.

It is important for pilots to know the three categories of carburetor ice, and the manner in which each is formed. These categories are: impact ice, fuel ice, and throttle ice.

According to the NTSB report, impact ice is formed by the impingement of moisture-laden air at temperatures between 15 degrees F. and 32 degrees F. onto the elements of the induction system which are at temperatures below approximately 32 degrees F. Under these conditions, ice builds up on such components as the air scoop, heat valve, carburetor screen, throttle, and carburetor metering elements. Pilots should be particularly alert to such icing when they are operating in snow, sleet, rain, or clouds. The ambient temperature at which impact ice can be expected is about 25 degrees F. when the supercooled moisture is still in a semi-liquid state.

Fuel ice forms at and downstream from the point at which fuel is introduced, when and if any entrained moisture reaches a freezing temperature as a result of cooling of the mixture by fuel vaporization. This cooling process takes place in the aircraft induction system when the heat necessary for fuel vaporization is taken from the surrounding air. Then, because the cool air can hold less water vapor, the excess is precipitated in the form of condensation, which then freezes. When any structure, such as an adapter elbow, lies in the path of the water, ice accretion develops on that structure. If no anti-icing action is taken, the ice buildup can increase until the obstruction throttles the engine.

Visible moisture in the air is not necessary for fuel icing; only air of high humidity is required. This fact, coupled with the fact that fuel icing can occur at high ambient temperatures, may make it difficult for a pilot to believe that ice is forming unless he is fully aware of the fuel icing process. It can occur in no more than scattered clouds, or even in bright sunshine, as often happens in Florida.

**Carburetor Ice . . . Continued**

The usual range of ambient temperatures at which fuel icing may be expected is 40 degrees F. to 80 degrees F., although the upper limit may extend to as high as 100 degrees F. The minimum relative humidity generally necessary for fuel icing is 50%, with the icing hazard increasing as the humidity level increases. Fuel ice is not a problem in systems designed to inject the fuel at any location beyond which the passage surfaces are maintained above freezing. Thus injection of fuel directly into each cylinder obviously will preclude the possibility of such icing.

Throttle ice is formed at, or near, a partly closed throttle (butterfly) when water vapor in the induction air condenses and freezes due to the expansion cooling and lower pressure as the air passes the restriction imposed by the throttle. This temperature drop normally does not exceed 5 degrees F. When the ambient temperature is above 37 degrees F., then the pilot need not be concerned with throttle icing as long as only air passes the throttle, such as in a fuel injection installation with the fuel introduced downstream from the throttle.

When there is a fuel-air mixture at the throttle, however, any ice formation would be attributable to water vapor freezing from the cumulative effects of the fuel ice and throttle ice phenomena. Icing at the throttle then can occur at ambient temperatures much higher than 37 degrees F. Throttle ice is not a problem in some fuel systems which are designed so that the throttle is located in a warmed region. For example, Lycoming designed turbocharger systems place the fuel metering device downstream of the compressor which places it in a warm area.

Any one or a combination of these ice-forming situations may cause loss of power by restriction of induction flow and interference with an appropriate fuel-air ratio. One reason it can be important to use carburetor heat as an anti-icer rather than a deicer lies in the "vicious circle" aspect, especially in fast-forming conditions and when the ice buildup might not be diagnosed at an early stage. An uncorrected carburetor ice condition can mean less power, and thus reduced carburetor heat which may result in the formation of more ice. It is certainly only prudent to guard against a buildup of carburetor ice before deicing capability is lost.

The results of tests conducted on light aircraft utilizing a float type carburetor may provide a better concept of when ice formation might be expected. Serious icing occurred up to carburetor air temperatures of 62 degrees F. and relative humidity of 80% or more at high-cruise power settings. At low-cruise power settings, ice formed at carburetor air temperatures as high as 63 degrees F. with relative humidity as low as 60%. These tests clearly indicate that carburetor ice may form while the engine is operating at cruise power. The tests also indicated that the possibility of ice forming in the carburetor is much greater under glide-power conditions. With this lower power setting, ice formed at temperatures as high as 93 degrees F. and with relative humidity as low as 30%.

Carburetor air heaters in small aircraft are usually of the exhaust pipe cuff type. The exhaust-heated air is directed into the carburetor air duct as desired, so that with full carburetor heat the normal air duct is essentially closed off at the carburetor heat valve location.

Under certain conditions, partial carburetor heat may be worse than none at all. For example, the fuel/air mixture temperature might be at 20 degrees F. with no heat applied. This normally would be less conducive

**Cylinders . . . Continued**

new cylinders. Then he launched into a dissertation on how the metal in cylinders wears out with operating time. The engine log revealed how right he was. On the first run of the engine from new, there were no cylinder problems. On the second run, with the original cylinders chromed, there was one incident of cylinder cracking (between a spark plug and the fuel injection line). On the third run of the engine, still using the original cylinders, there were four incidents of cylinder cracking — three between a plug and the injector and the fourth a large crack that finally led to a little chunk coming out of the inside of the cylinder. If I had sprung for new cylinders on the second overhaul I would have saved a lot of money, because changing a cylinder isn't exactly inexpensive. That knowledge — coupled with the fact that there was another cylinder with 4000 hours, and the rest had an undetermined amount of time on them (because they were reconditioned cylinders and no record is kept of total time on individual parts) — added some urgency to the matter of getting the engine to RAM for another overhaul and new cylinders. There is simply a time when some parts wear out. Until Riley told me that cylinders wear out, I had never heard of this. But they do, and I'll never again waste overhaul money on cylinders that have more than two TBO runs on them. And I'll never buy a reconditioned cylinder that has an undetermined amount of time on it.

The *Flyer* provides product information. Informed pilots and mechanics contribute to safe flying.

## The Crankshaft Gear...Continued

broken gear alignment dowels are the result of improper assembly techniques or the reuse of worn or damaged parts during reassembly. Since a failure of the gear or the gear attaching parts would result in complete engine stoppage, the proper inspection and reassembly of these parts is very important. The procedures described...are mandatory."

THIS BULLETIN AND THE AD WHICH MAKES COMPLIANCE MANDATORY apply to all Lycoming direct drive piston aircraft engines except the O-320-H, O-360-E, LO-360-E, TO-360-E, LTO-360-E, and TIO-541 series engines. The time of compliance is normally during overhaul, BUT ANY PROP STRIKE OR SUDDEN STOPPAGE ALSO REQUIRES COMPLIANCE. The loss of a prop or prop tip is included in the definition of sudden stoppage. Also, the bulletin and AD are to be complied with any time crankshaft gear removal or gear train repair is required.

For the majority of aircraft owners, the requirements of AD 91-14-22 will only come into play when their engine is overhauled or when they exchange their run out engine for a newly overhauled one. In either case the engine being installed in the aircraft should have had its crankshaft and crankshaft gear inspected in accordance with the step by step instructions which make up Service Bulletin 475A. New parts may be required based on the inspection, but as a minimum a new lockplate and bolt must be used in assembling the gear to the crankshaft. If the logbook entry requirements of SB 475A are completed by the overhauler, you as an owner can actually check to be sure that the tasks required by AD 91-14-

22 and Service Bulletin 475A have been completed.

In the interest of flight safety, both Textron Lycoming and the FAA consider compliance with

these two publications to be extremely important. They should be considered equally important by mechanics, pilots, and aircraft owners.

## Carburetor Ice...Continued

to ice forming than a temperature brought to 30 degrees F. by use of partial heat. Full heat could be expected to raise the temperature out of the icing range entirely. With smaller engine installations where there is no instrumentation to determine the temperature of carburetor air or fuel/air mixture, the general rule should be to apply full heat whenever carburetor heat is to be used. The use of full carburetor heat will reduce the amount of power available and can raise cylinder head temperatures. Since carburetor heat is rarely required under high power conditions, it is generally recommended that the carburetor heat be set at the cold position for all high power operations such takeoff, climb, or go arounds.

With larger, higher output engines, the installation usually includes temperature instrumentation which the pilot should use as a reference in controlling all engine temperatures, including that of the fuel/air mixture. Use of induction temperature instrumentation serves to assist in the anti-icing effort, and also aids in protecting the engine from possible overheating damage.

Carburetor ice should be considered immediately as the possible cause of a power loss. With a fixed pitch propeller a power loss is indicated by a reduction of engine speed. When there is a manifold pressure gage installed, a reduction in manifold pressure would show up along with the engine speed reduction. With a constant speed propeller installation, however, only the manifold pressure would be decreased.

Engine roughness may also be an indication of an iced carburetor. It is not a good indicator because in some cases the roughness might not appear until the engine is close to complete stoppage.

The susceptibility to induction system icing varies greatly among the various aircraft models. For example, an engine installation employing a float-type carburetor and having fuel introduced upstream from the throttle valve would be the most susceptible to carburetor icing. At the opposite end would be an installation with direct cylinder fuel injection. However, the induction system might still be subject to impact icing.

Consider use of the following procedures to help avoid carburetor icing troubles:

1. Periodically check carburetor heat systems and controls for proper condition and operation.
2. Start engine with carburetor heat control in the "cold" position to avoid damage to the carburetor heat system.
3. As a preflight item, check carburetor heat function by selecting heat "on" and noting a power drop indicated by a drop in RPM. If there is no drop in power, have the carburetor heat system checked BEFORE FLIGHT.
4. When the relative humidity is above 50% and the ambient

**Carburetor Ice . . . Continued**

temperature is below 80 degrees F, use carburetor heat IMMEDIATELY BEFORE TAKEOFF to clear the system of ice which may have formed during taxi. Return the selector to COLD before takeoff. In general, carburetor heat should not be used during taxi because air is unfiltered in the "alternate" or carburetor heat "on" position.

5. Conduct takeoff without carburetor heat unless EXTREME carburetor icing conditions are present and the use of carburetor heat is approved in the Pilot's Operating Handbook. If heat is used, insure that ample runway is available for the reduced power condition and that the increased engine temperatures will not incur engine damage.
6. Remain alert after takeoff for indications of carburetor icing, especially when the relative humidity is above 50%, or when visible moisture is present.
7. With supplemental instrumentation, such as a carburetor air temperature gage, partial carburetor heat should be used as necessary to maintain safe temperatures and forestall icing. Without such instrumentation, use full heat intermittently if considered necessary.
8. If carburetor ice is suspected of causing a power loss, IMMEDIATELY APPLY FULL HEAT AND KEEP IT ON. Do not disturb the throttle initially, since throttle movement may kill the engine if heavy icing is present. Watch for further power loss to indicate effect of carburetor heat, then a rise in power as the ice melts. Once heat has been applied, BE PATIENT. DO NOT EXPECT IMMEDIATE RESULTS AS IT WILL TAKE TIME FOR THE ICE TO BE CLEARED FROM THE INDUCTION SYSTEM.
9. In case carburetor ice persists after a period of several minutes of full heat, gradually move throttle to full open position and climb aircraft at maximum rate to obtain the greatest amount of carburetor heat. Cautiously adjust the mixture to the leanest practicable setting.
10. Avoid flying in clouds as much as possible, but also remember that carburetor ice can occur in clear air.
11. Consider that carburetor icing can occur with ambient temperature as high as 100 degrees F and humidity as low as 50%.
12. PRIOR to reduced throttle operation, such as for a descent, apply full heat and leave on throughout the reduced throttle sequence unless the Pilot's Operating Handbook indicates otherwise. Periodically open throttle during extended reduced power operation so that enough engine heat will be produced to prevent icing. Be prepared to remove carburetor heat if a go-around is initiated.
13. Return control to "cold" position immediately after landing to avoid the use of unfiltered air.

Because the formation of carburetor ice in general aviation engines seems to be just as prevalent today as it was 20 or 30 years ago, it is imperative that each pilot have a good knowledge of the causes and the cures. With knowledge, carburetor ice is a phenomenon which need not be a hazard to safe flight. The information which was presented in the NTSB report on "Carburetor Ice in General Aviation" and which is reprinted here is an effort to help make general aviation flying safer.

**Density Controller Adjustment**

Many Lycoming engine models are equipped with density controllers. This is a listing of those models to which Service Instruction 1187G applies: TIO-540-A1A, -A1B, -A2A, -A2B, -A2C, -C1A, -F2BD, -J2B, -J2BD, -N2BD, -AA1AD, -AB1AD, -AF1A; LTIO-540-F2BD, -J2B, -J2BD, -N2BD. To insure that these engine models will develop the maximum power for which they are certified, the density controller must be adjusted as defined in the latest version of Textron Lycoming Service Instruction 1187. The latest issue of this instruction is 1187G dated August 18, 1989, and Supplement No. 1 to Service Instruction 1187G dated April 22, 1991. The supplement updates the instruction to include the TIO-540-AF1A engine. Density controller settings for TVO-435 and TIVO-540 engines are covered in the Lycoming Engine Operator's Manual.

Although all engines are thoroughly tested after manufacture, remanufacture, or overhaul at the Textron Lycoming Reciprocating Engine Division, it is impossible to duplicate the individual installation characteristics an engine will encounter in the aircraft; consequently the density controller, which governs the turbocharging, must be adjusted after the engine is installed and before the aircraft is flown. Density controllers shipped as spare parts must also be checked and adjusted after installation and before the aircraft is flown. Before any adjustment is made to the density controller, the accuracy of the manifold pressure gage should be established.

Please turn to Page 8, Column 1

## Log Book Entries

The Federal Air Regulations are quite specific in designating those individuals and organizations who are authorized to approve aircraft, airframes, aircraft engines, propellers, appliances or component parts for return to service after maintenance, preventive maintenance, rebuilding, or alteration. These include the holder of a mechanic certificate, inspection authority, repair station certificate, or the manufacturer.

The regulations also require that those who are authorized to return an aircraft to service after maintenance do so by supplying written details of the maintenance which was performed. This information is to be an entry in the maintenance record of the equipment. The record will contain this information:

1. A description (or reference to data acceptable to the Administrator) of work performed.

2. The date of completion of the work performed.

3. The name, certificate number, and kind of certificate held by the person approving the work and returning the aircraft to service.

It is important that we understand the intent of these requirements. First, that only those who have the necessary training and skills will work on aircraft and their components. Second, that these maintenance records provide a history of what has been done to the equipment over its entire life.

To accomplish the spirit and intent of the regulations, each aircraft is delivered with an airframe log book and an engine log book. If the subsequent entries in these documents contain the appropriate details, a very satisfactory maintenance history will result. Unfortunately,

## Service Bulletins, Letters, Instructions Published from September 1, 1991 to March 31, 1992

The service publications listed below are those which have been issued most recently. We strongly recommend that a complete set of these publications be maintained by all maintenance organizations which work on Lycoming reciprocating engines. A subscription may be obtained through any Textron Lycoming distributor or directly from the Textron Lycoming Aftermarket Sales Department. Call or write for a copy of Textron Lycoming Service Letter No. L114 which provides a listing of available publications, prices, and ordering instructions.

### Service Bulletins

- 456D Supplement No. 1 states that replacement of an oil pump body incorporating a pinned idler shaft requires that Service Instruction No. 1341 must also be complied with.  
501B Recall of piston pin part no. LW-14077 — Subject piston pins received and used between June 18, 1991 and August 5, 1991 must be returned to Textron Lycoming Williamsport for exchange. Affected engine models and numbers are listed in the bulletin.

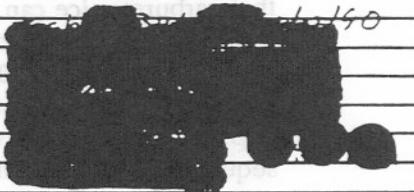
### Service Bulletins, Letters, Instructions & A/D Notes

DATE \_\_\_\_\_

① Replace 2 Cyls w/ O/H From New Mac Aero  
② Service cyl 8 QTS  
③ Clean Gap Test Plus  
④ Inspt + Lube Eng Controls  
⑤ Mac Timing Clean Leads  
⑥ For Ground Run Test Stake with Engs  
⑦ AGS GW thru this Date See List  
— End —

6/13/90

Tach 346



### Exhibit 1

the entries made in the aircraft and engine logbooks are sometimes woefully inadequate.

Refer to Exhibit 1 as the items in that log book entry are discussed. Note that this is a copy of a logged entry which actually applied to an airplane in service. The very first item which we see is the large black mark on the lower right which obliterates the

certifying information including kind of certificate and certificate number. Except for the three black circles in the lower right corner of that black mark, the log book entry was blacked out just as shown here.

Item number one of the logged entry declares that two cylinders were replaced. From the data furnished, we do not know why

***Service Publications . . . Continued***

### *Service Instructions*

- 1164A Oil Pump Application — All direct drive Textron Lycoming engines except engines that incorporate an integral crankcase and accessory housing assembly.
  - 1240C Valve Spring Replacement — All Textron Lycoming aircraft engines.
  - 1304G Engine Nameplate Replacement — All Textron Lycoming aircraft engines.
  - 1374B Slick Magnetos — All four and six cylinder Textron Lycoming engines equipped with Slick magnetos.
  - 1443A Approved Slick magnetos on Textron Lycoming engines — Engine model breakdown makes up the text of the instruction.

## *Service Letters*

- L114AD Reciprocating engine and accessory maintenance publications
    - Applies to all Textron Lycoming opposed cylinder aircraft engines.
  - L229A Revision A provides additional information about the use of MOBIL AV 1 synthetic lubricating oil in Textron Lycoming reciprocating aircraft engines — Applies to all Textron Lycoming opposed cylinder aircraft engines.

cleaned, gapped and tested would add to the history of this engine. Also there is no mention of rotating the plugs from top to bottom which is a fairly standard maintenance practice.

Perhaps items four, five and six are adequate to tell what was accomplished, but simply stating "tach 346" does not give the information needed for the aircraft and engine history. The total airframe hours and engine hours since new or since over-haul are needed for a complete history.

Exhibit 2 is a second example of a log book entry which tells little or nothing about the maintenance of the aircraft. Again, the certification information has been obliterated. The abbreviated entry is extremely difficult to read and leaves much to the imagination. What was accomplished prior to the engine ground run and flight?

Simply stated, these examples do not comply with the spirit and intent of Federal Air Regulations. They do not provide the data needed to establish a maintenance history of the aircraft and engine which they represent. Unfortunately, Lycoming personnel who have occasion to examine log books on a regular basis are finding that entries such as those shown in these exhibits are all too common. While there are many excellent maintenance organizations which do a very good job of following up their work with adequate records, there are also those which do a poor job of maintaining a running history of maintenance performed.

Aircraft owners are ultimately responsible for the airworthiness of their aircraft. Therefore it is important that owners examine the logbook entries which make up the maintenance history of

DATE	TIME Hrs. Min.	REPAIRS - ADJUSTMENTS - SERVICE - REMARKS		SIGNATURE	LICENSE NUMBER
		Eng Grand Run + Flaw AMW Imp air off Normal All ADs C/W thru this Date See Lshy Mo-1 Folder ~ Tech [REDACTED] 3/2/90 Ed			

## ***Exhibit 2***

they were replaced or which cylinders they were. Any mechanic working on this engine in the future will not be able to tell which cylinders were replaced on June 12, 1990. This makes future trouble shooting difficult.

Item two would appear to mean that the oil was changed. There is no indication of what kind of oil was used. Was it

single viscosity, multi-viscosity, or perhaps a synthetic oil? What brand was it? Was the filter changed too? And was the suction screen removed, cleaned, and checked for metal. This entry leaves many unanswered questions.

Item three deals with spark plugs. The condition of the plugs which required that they be

## Density Controller Adjustment . . . Continued

A characteristic of the density controller which is not understood by some operators is its ability to adjust engine output at full throttle to obtain the rated power of the engine regardless of air temperature. This is confusing because manifold pressure at full throttle will vary with the temperature of the air entering the engine. Pilots should not jump to the conclusion that a problem exists when they do not see the manifold pressure at red line or do not see the same manifold pressure with each takeoff.

It is required that density controller operation be checked before an engine is flown for the first time, and periodically during the life of the engine. This relatively simple procedure consists of measuring air temperature at the compressor discharge (induction air temperature) under operating conditions, and comparing it with indicated manifold pressure. Then, if necessary, the density controller should be adjusted. Accurate determination of the need for an adjustment to the density controller, and the instructions for making that

adjustment, require reference to the latest version of Service Instruction No. 1187, or the appropriate Lycoming Engine Operator's Manual.

For installations which have had an intercooler added in the field, it is required that the owner/operator consult the Pilot's Operating Handbook Supplement or Maintenance Supplement for density controller set up instructions which are specific to the applicable Supplemental Type Certificate (STC). This general requirement also applies to all turbo system modifications done by STC.

## Log Book . . . Continued

their aircraft each time maintenance is accomplished. Do the entries tell what has been accomplished so that it can be understood when read at some future time? Remember that a good record of maintenance performed

may prove to be just as important as the work on the aircraft or its components.

## Engine Nameplate Replacement Policy

A nameplate, to replace one that has been lost, will be issued only upon written request, and when accompanied by a document from the FAA authorizing a replacement nameplate. Upon receipt of the FAA letter, your written request, and a check for \$7.50, a new nameplate will be issued. Requests should be sent to Textron Lycoming Customer Service, Aftermarket Sales Department, 652 Oliver Street, Williamsport, Pennsylvania 17701.

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## TEXTRON Lycoming

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Williamsport, PA 17701 U.S.A.  
717/323-6181

### ADDRESS CORRECTION REQUESTED

Wyoming  
October 12, 1992

Dear Dave,

I haven't written in some time and thought I'd bring you up to date on my project. Also, I have a handy tip that you might want to include in the magazine and a favor to ask.

I finally got the welding monster beaten (more or less) and the project is moving along at a good pace. I got lucky and picked up tailfeathers, I-struts, wheels and brakes from Bud LeFaivre when he parted out his Starduster. I also got a pair of three-lever military throttle quadrants from him. Pity about lawyers. . . his scared him into cutting up a perfectly good airplane rather than risk the liability of selling it intact. Anyway, I hope to finish the two upper wing panels this winter and have the airplane rigged by June.

Here's the handy tip. It's pretty hard to weld the rudder pedals without getting distortion in the bottom tube thus preventing it from slipping on to the axle and turning freely. Even after heating the side opposite the weld to straighten it out and working the inside with emery cloth, the pedal still wouldn't turn on the axle. An EAA buddy suggested that I coat the axle with automotive valve grinding compound and lap the axle and pedal. I worked it for a couple of minutes, cleaned the valve grinding compound from both parts, then coated the axle with "BreakFree," a lubricant with a light abrasive used for breaking in new gun actions. Viola! The pedals work as smooth as silk. Eventually, I'll clean off the "BreakFree" and use non-abrasive lubricant. This same technique works for the walking beam in the elevator pushrod assembly. So, if you can't weld perfectly, try this and enjoy smooth controls.

Now, I'd like to ask a favor that I mentioned in May at Flabob. Would you be willing to weld up a set of aluminum heel recesses like you have on your floorboards? I'll be happy to reimburse you for your time and material. I'm cursed with long legs and every little bit of legroom helps in a Starduster. Hope to hear from you soon.

Sincerely,

*Bob Dugay*  
N28LJ

Although the subject may be boring, a failed crankshaft gear will cause engine failure and that is when the excitement may reach levels which are unreal.

What goes on during an A cockpit before a flight?

Dear Bill:

I am sending you a check for \$12.00 for a subscription to the Starduster Magazine. I didn't know you were publishing this great magazine till last Saturday. A friend of mine came to the airport and was looking at my Starduster and told me about it. He brought me about 15 of his back issues, so I am home here with a lot of reading to catch up on.

I am sending you some pictures of my Starduster Too - N2DT. It is powered by a Lycoming O-320 A3B. It cruises at 110 MPH. Empty Wt. is 1159 lbs. I have a 720 Narco escort II, Terra transponder and encoder, and STS 120 MC Loran. This is the best airplane that I have ever flown and owned, and I have been flying for 42 years. I spent 10 years building it, only because I always have had an airplane to fly, so you tend to put it on the back burner sometimes. First flight was Oct 28, 1989.

Sincerely,

Donald C. Mercer  
6968 Brantford Rd.  
Dayton, Ohio 45414

P.S. Bill I was the one talking to you when you were here for the Wright Brothers Invitational Banquet at the Air Force Museum.

Clinical subjects:

"It's amazing how little we can take in to catch on to certain clinical truths. This realization was sparked by a conversation with Jack Riley, R.N., director of RAM Aircraft. The subject was the overhaul of the Pratt & Whitney engine in my airplane. Jack was surprised that the engine had been overhauled twice (an engine is "BO") and had not be-

# EMERGENCY AIRWORTHINESS DIRECTIVE

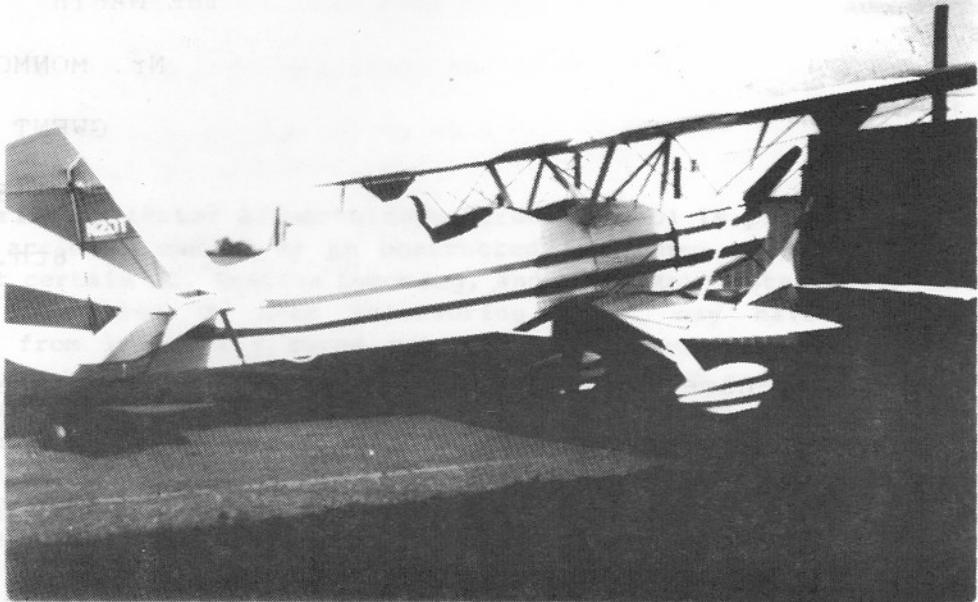
OFFICE OF AIRCRAFT APPROVAL  
U.S. Department of Transportation  
Washington, D.C. 20590  
(202) 267-2800

U.S. Department of Transportation  
Washington, D.C. 20590  
From \_\_\_\_\_  
Date \_\_\_\_\_

REASONABLE DANGER

DOE REG. NO. 401

ED KINGDOM  
This past year an investigation revealed that fuel valves manufactured by the expandable valve of the between November and December, the flow to the .00 add al



N2DF OWNED BY DON MERCER  
PURCHASED



N70P IN THE UNITED KINGDOM

From

FERNLEA

N.T.Davis

THE NARTH

Tel/Fax

Nr. MONMOUTH

0600 860133

GWENT NP5 4QL

UNITED KINGDOM

Dear David,

Your name and address was passed to be by the EAA and also Stolp Starduster Corp. in my search for information on the history of N 70P (Louis Stolp's prototype SA 100). Friends and I found this a/c in Jacksonville Florida and it is now with us here in the UK.

As you can see from the picture there is still much work to be done, and since it is the first SA 100 to be registered here, we need as much information on the type as we can get. I managed to contact Louis himself and he kindly sent me the original plans together with pictures of N 70 P when he built it. I think it is much modified now, having a Lycoming O-320 installed and four ailerons, smoke etc.!!

I would very much appreciate any help you can give us with this project, particularly such information as the number of SA 100's still flying, any problems, C of G information and known other 100's with 160HP up front.

When we have completed assembly of 70P I will send you a better picture. ( In the photo are Tony Diddiard (right) "Stake" Pritchard (Left) and myself (centre). The a/c belongs to a good friend Steve Watkins who has his own airstrip nearby.

Kind Regards from us all,

Nick Davis

NICK DAVIS

To All  
Vintage Festival Pilots

# VINTAGE FESTIVAL

Newberg, Oregon  
September 27, 1992

The gray skies of Friday hung around for much of Saturday morning as the colorful shapes of seven balloons rose above the parking fence in the northeast corner of Sportsman Airpark, announcing the opening of Vintage Festival 1992. By noon, the sun was out, the vendors were busy with their displays, and the air was filled with the smells of good food and the sounds of people having fun.

The near 100 classic cars again were placed near the vintage aircraft and the big 1928 Ford Tri-motor brought in by Evergreen International was placed on the pavement near the north end of the field. Its crew of three were garbed in authentic airline uniforms of the period. Classic motorcycles, and this year classic bicycles were displayed at the south end of the field.

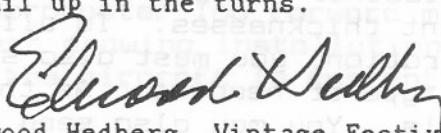
The "peoples choice awards" for the show planes this year continued to favor the biplanes, but the Best of Show was a surprise. Since it is Evergreen International's corporate policy to not enter their planes for judging in an event like the Festival, (they feel an aircraft restored and maintained by a corporation is not fair competition for individual owned and maintained aircraft) the competition was narrowed to the 16 privately displayed aircraft.

The 1st, 2nd, and 3rd place Peoples Awards went to Art Armstrong's 1932 De Havilland Tiger Moth, Dave Baxter's Starduster II experimental biplane (which he built himself), and John Gordon's 1943 E-75 Boeing Stearman. The Best of Show went to a gleaming 1946 Ercoupe, polished to brilliant shine by owner Mark Brewer of Tigard with the comment that "...any aircraft with two rudders and no rudder pedals is something special!"

As we toured the area during the day, the conversation seemed to indicate that each of you enjoyed the Festival. The presence of your aircraft, and your willingness to let the public "get close" was a major factor contributing to the success of this event. The committee is making plans for an event next year, and hopes that when the invitations go out, you will again respond.

If you have thoughts about the day, how you were treated, or of ways to make subsequent events even better, please let me know. A REMINDER...if you haven't cashed your fuel voucher, don't forget it is valid only through the end of October.

The committee extends best wishes for the continued good health of you and your airplane during the months ahead...  
....be sure to keep your tail up in the turns.

  
Elwood Hedberg, Vintage Festival Aircraft Committee  
7903 SW Ruby Terrace, Portland, Oregon 97219  
(503) 246-7611

cc Sonja Riihimaki

## TECHNICAL TIPS

### Head Set Comfort

Many of you Starduster Magazine subscribers have read my articles on past tech tips, and as you know I try to write about subjects that are benificial to all owners, builders and pilots. Many of you will recall the radio box drawing and subsequent text in the April 1991 issue of Starduster Magazine, and in that article I stated that my intercom and radio, as well as my avionics had performed flawlessly. I also stated that I was using the Pilot PA-11-40 headset. This headset has turned out to be equal in performance to my radio and intercom MFG by VAL of Salem, Oregon.

I do not mean to imply that only products made in Oregon are superior to any other as that is certainly not the case. But in the instance of headset comfort, the upgrade kit for headsets MFG, by Oregon Aero, are far superior to anything else on the market.

I have known Mike Dennis President of this firm, long before he started this business. It is wonderful to see the little guy start a business and compete with the large companies, as no one else offers this complete upgrade headset kit; that has superior noise reduction, excellent voice communication and most of all comfort above and beyond anything else now currently available. I had known about this product for some time, but had resisted purchasing them, as my old pilot PA-11-40's seemed to do a more than adequate job. But just prior to departing for Oshkosh this last year, I had a quick conversion to the Oregon Aero headset upgrade kit. The difference in comfort, reception, transmission and communication, not only with the intercom, but with unicoms and AIC as well is remarkable.

But what is really significant is the long term comfort of wearing them for two or three hours at a time. I strongly recommend to anyone who has had reception, transmission or comfort problems to consider installing this upgrade kit.

Mike has graciously offered this complete kit to any Starduster Magazine subscribers for \$75.00. Which is 10% less, as it normally lists for \$83.50. Orders should include \$3.50 for shipping and handling. You must also state, if ordering by phone, that you are a Starduster owner, builder or subscriber, and whether they are for open cockpit cloth or leather helmets or for closed cockpit as there are different thicknesses. To allow for installation in either configuration, you must also state the manufacturer and type of headset. As these items will not work on some models. You may also send your headsets UPS to Oregon Aero, if you think your not up to the conversion yourself. So do yourself, your head and ears a favor. Convert, you will wonder why you waited so long. I did and highly recommend this conversion to you.

D.C.B. Editor

Pilots enjoy new-found comfort and quiet with existing headsets and helmets. Oregon Aero's Upgrade Kit enables you to do it yourself and experience dramatic noise reduction and hours of long-term wearing comfort from your own headset or helmet.



## A short course in headset comfort

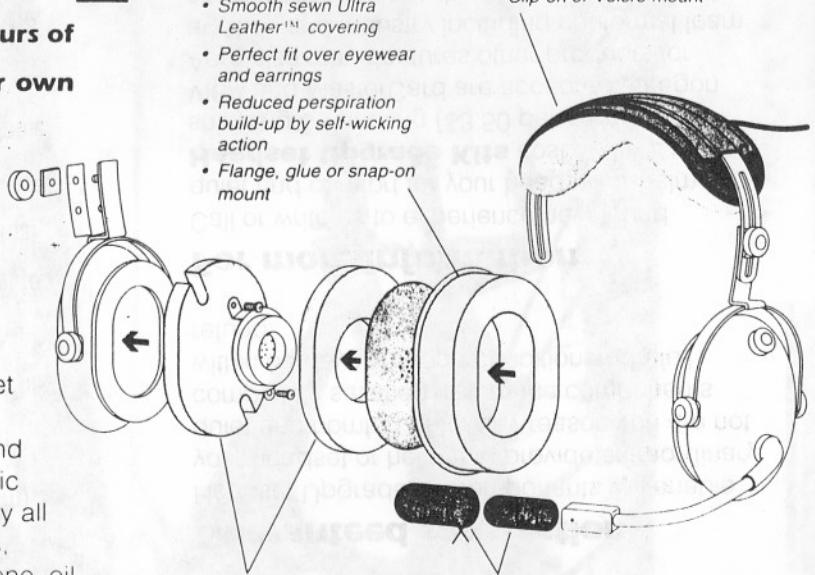
Our research has shown that most headset discomfort results from areas of *localized circulation reduction* on top of the head and around the ears, caused by the elastomeric (plastic) padding materials used in virtually all headsets. Elastomeric cushions and seals, whether made using rubber, foam, neoprene, oil or gel, respond to mechanical displacement with a force opposite to the displacement, and directly proportional to the distance displaced. In plain language, this means that areas on top of the head and around the ear and jaw joint receive too great a concentration of pressure, resulting in localized circulation loss and pain. Too small an ear seal volume causes pinching and folding of the ear structure, and also results in pressure from eyewear and earrings.

Oregon Aero's answer to these comfort problems is a unique, innovative design for the headband cushion and ear seals, and better materials that work together for maximum comfort and noise insulation.

## OREGON AERO

### Headset upgrade kit components:

- Subsidy 900-622 • 1-800-334-9220  
**SoftSeal™ extra-thick earcup cushions**
- Larger contact area for lower clamping pressure
  - 300% increase in ear seal volume
  - Temperature-sensitive Aero Foam™ core conforms to head
  - Smooth sewn Ultra Leather™ covering
  - Perfect fit over eyewear and earrings
  - Reduced perspiration build-up by self-wicking action
  - Flange, glue or snap-on mount
- SoftTop™ low-pressure headband cushion**
- Plush sheepskin wool
  - Eliminates top-of-head pressure
  - Flexible leather backing
  - Moisture-proof, self-wicking action
  - Keeps head cool (or warm)
  - Slip-on or Velcro mount



- HushKit™ additional earcup insulation**
- More attenuation in 2000-6000 Hz 'fatigue' range
  - Four die-cut Aero Foam layers fill all earcup voids
- MicMuff™ Microphone cover**
- Eliminates cockpit noise from radios and intercom
  - Better voice actuation
  - Smooth Ultra Leather covering over foam
  - Adaptable to all mics - electret or dynamic

As shown in the illustration, earcups are disassembled to install the HushKit noise-insulating foam and conformal SoftSeal ear seals. The SoftTop low-pressure headband cushion completely replaces or fits over existing headpads. The MicMuff microphone cover is slipped over the mic and held in place by an elastic tie.

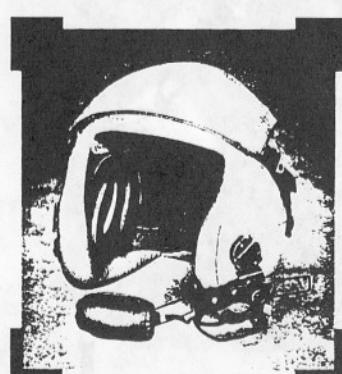
## Noise-cancelling innovations

The Upgrade Kit enables your existing headset to achieve very high noise reduction without using active noise-cancelling (ANC) circuitry. While ANC works well for certain frequencies, it can result in other acoustic problems, as well as reliability concerns. Aircraft generate many different noise frequencies, which Oregon Aero believes are better attenuated by a unique combination of innovative design and passive noise-cancelling materials. The kit provides maximum noise attenuation in the fatigue-inducing 2000-to-6000 Hz region.

Aerospace-developed Aero Foam installed in the earcups conforms to fill all the nooks and crannies, providing better sound insulation than conventional polyfoam. The same material is used as a conformal core in the specially-designed oversized ear seals, providing more noise attenuation and a nearly perfect seal around the ears. A unique microphone cover of Ultra Leather over foam reduces cockpit background noise and improves voice-activated intercom operation.

### For military-type helmets also

A kit version designed for SPH and HGU series helmets provides maximum noise-cancelling in the range where many warbirds, aerobatic aircraft and helicopters generate increased engine and transmission gear noise, as well as prop and rotor noise. The Upgrade Kit also enables helmets (including leather and cloth versions) to better attenuate noise encountered in open-cockpit or open-door situations where wind and exhaust noise can cause severe communications problems.



## Unique materials from aerospace and nature



Borrowing from the old and the new, Oregon Aero uses materials from nature's own, and a spinoff from the aerospace industry:

**Plush sheepskin wool** – The headband cushion uses natural wool on a flexible leather backing to provide an almost infinite number of resilient fibers that evenly distribute weight, wick away moisture, and keep your head cool (or warm).

**Aero Foam™** – This aerospace-developed material is used as the ear seal's core and inside the earcups. It is both noise-cancelling and temperature-sensitive, molding on contact with body heat to provide a firm, yet fluid-like support. The conformal foam enables the oversized ear seals to reduce contact pressure, virtually eliminating uncomfortable pressure on your head, ears and jaw joint.

**Ultra Leather™** – The ear seal cushions are covered with this smooth high-tech material that has that wonderful feel of soft leather, contains no harsh seams, and very effectively wicks away moisture. The microphone cover uses the same material, sewn over a thin foam wind screen to virtually eliminate cockpit background noise in radios and intercoms.

## All aviation headsets and helmets can benefit

Dramatic noise reduction and increased comfort are possible using new technology to upgrade your existing headset or helmet. Upgrade Kit components are compatible with most headsets, whether the ear seals are flange, glue or snap-mounted, and headpads removable or permanent. The kit is designed as a do-it-yourself project, or Oregon Aero can modify your existing headset for you.

Kit versions are also available for the SPH and HGU series military-style helmets, and for cloth and leather-style headgear. Call for more information.

## Guaranteed satisfaction

Headset Upgrade Kit components will enable your headset or helmet to provide extraordinary quiet and comfort. If for any reason you are not completely satisfied, return the components within 30 days, in good condition, for a full refund.

## For more information

Call or write us to experience new-found quiet and comfort for your headset or helmet. **Headset Upgrade Kits** cost \$83.50, plus shipping & handling (\$3.50 per order). Both VISA and MasterCard are accepted. Oregon Aero also manufactures other products for aviation and industry including conformal foam seats, seat cushions, hearing protectors and professional headsets.

O R E G O N A E R O



### Fact:

*Headset comfort and quiet is something everyone wants but seldom gets*

### Fact:

*New materials and technology are available to make your existing headset extraordianarily comfortable and quiet.*

# Headset Upgrade Kit

O R E G O N A E R O

P.O. Box 5984 • Aloha, Oregon • 97006

Shipping address: 2900 219th, Suite 550  
Hillsboro, OR 97123

Phone:(503) 649-4778 • Fax:(503) 642-5158

Order line      0-888-6910



FAA Has Expanded Non-Reg Area  
Of Three Ontario TRACON ARSA's

The FAA has announced that it has expanded the non-regulatory outer area of three ARSA's in the Ontario TRACON airspace - Ontario, Norton AFB and March AFB.

Standard ARSA designs include regulatory airspace within the inner and outer cores and a non-regulatory extension described as a point 20 miles from the center of the airport.

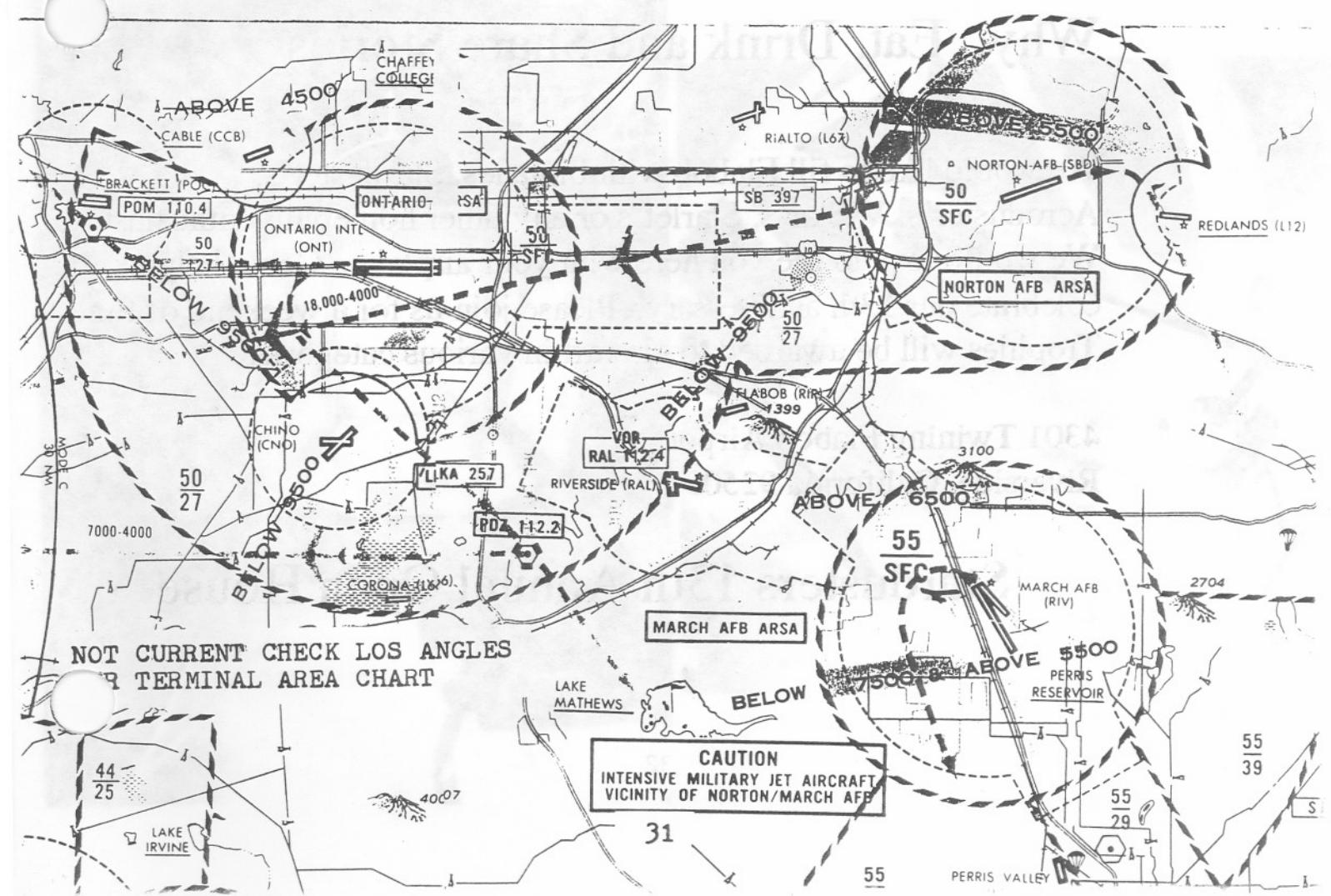
Previously, the outer area of the three ARSA's had been reduced by about 10 miles due to the high volume of traffic.

However, the FAA said "In order to provide the highest quality service to the user, we are expanding ARSA service in the outer area to the full dimensions of Ontario TRACON airspace." The change is already in effect.

The Outer Area (non-regulatory airspace) extends outward from 3 ARSA airports and extends from the lower limits of radar/radio coverage up to the ceiling of Ontario TRACON's delegated airspace, excluding the ARSA regulatory and other airspace as appropriate.

"This is not a change to the regulatory airspace of the three area ARSA's," the agency stressed.

For further information, contact the FAA's Ontario TRACON at (714) 986-2058.





**When : April 30th & May 1st & 2nd, 1993**

**Where : Flabob Airport**

**Why : Eat, Drink and Share Stories**

We would like to fill Flabob with biplanes, Starduster's, Acroduster's, V-Star's, Starlet's or any other homebuilt enthusiast. We would love to see you here with your airplane. Come help us celebrate our 13th anniversary. Please join us for a weekend of fun. Trophies will be awarded to aircraft in various categories.

4301 Twining Flabob Airport  
Riverside, California 92509

**Stardusters 13th Annual Open House**

## Starduster Magazine Renewal Policy

Because this magazine is the combination of input from a lot of sources, and is put together by individuals just like you; the possibility of mistakes or in-accurate journalism, as well as subscription information problems, do exist. We have also encountered problems with the U.S. Postal Service. So with this in mind, I will try and explain to you how the magazine works.

Bill Clouse President of Starduster Corporation and I share the job of creating the magazine. I write, edit, and do the layout for the masters; which I then send to Bill, who handles the subscriptions, printings and mailings.

We both receive letters from people who send us information about Stardusters, and from those interested in starting a subscription. So getting all this information together and into Bill's hands (as he handles this part) sometimes things get a little confusing.

This last year it seems that some renewal notifications were not sent out in the January issue of Starduster Magazine as they have in the past. Which caused several subscribers to be unsure as to the exact date their subscriptions expired.

We have tried over the last year to get a list of subscribers onto a computer disk, so that we can better keep track of this problem. However, some of you may have fallen through the cracks. So please, if you have experienced a problem or have not received an issue of Starduster Magazine that you felt you should have, let us know.

Subscriptions are from January to January. Some have been accepted in the middle of the year. However, we wish to discontinue this practice as it is just too difficult to keep track of middle-of-the-year subscriptions. If you do subscribe in the middle of the year, back issues of Starduster Magazine will be sent to you for the current year. Subscriptions received in November or December will be applied to the next year unless otherwise noted.

Subscriptions generally expire upon the receipt of the January issue. Bill will usually send one more issue, April, and if he has not received payment for the renewal by July, that subscriber would then be dropped. If at any time during the year a check is received, back issues of the current year will be mailed.

Also back issues of Starduster Magazine may be purchased from either Bill or myself. They are \$3.00 each, plus postage, and are sold by the year. (example: 1991 - four issues - \$12.00 plus \$3.00 postage). Checks for subscriptions and renewals should be sent to Bill Clouse President of Starduster Corporation, 4301 Twining, Flabob Airport, Riverside, California, 92509, or call 1-800-833-9102. The current subscription price for 1993 is still \$12.00 per year, which barely covers the cost of printing and postage. But, will remain this amount for the rest of 1993. I hope this answers any questions you may have about Starduster Magazine's Subscription Policy.

Sincerely - D.C.B. Editor

## Elliptical Wings and A Ford Engine at OSHKOSH

Sunday August 2, 1992 the morning services at church went a little faster than usual. The preacher seemed to be a bit more hurried than other days. And nobody had ever seen him preach in blue jeans and casual shirt before either. But they all knew that he and his two sweethearts were heading to Oshkosh for three days of sharing with a different congregation.

The time of departure was delayed for a short while due to a locally heavy thunderstorm. But after about an hour delay, Renae and "Miss Renae" (My two Sweethearts) were ready to depart. Originally we had planned to fly about one hour, stop and stretch and join up with a Citabria 7ECA. Then we were to stay airborn for about two and a half more hours to our first fuel stop while picking up another 7ECA on the way. However due to our late start, the decision was made to join everyone in the air. The plan worked fine except we were in the air just over three and a half hours about fifteen minutes beyond my bladder's comfort zone.

The trip up was marvelous. The beautiful cumulus clouds were scattered with tops at about 6,500 ft. The Starduster slipping through those cotton like mountains was one of the prettiest pictures you might ever see. The Citabrias looked O.K. too.

We finished the 600 mile trip arriving at Ohskosh about 7:30 following the Sunday Airshow. We had seemingly just arrived when greeted by Bill Clouse, Starduster Corp. and soon afterwards Dave & Donna Baxter with Les Homan. Bill graciously provided me with a "Starduster privacy fence" as we were parked flight line front airshow center. This proved to be invaluable before our stay was over.

"Miss Renae" drew a fair amount of attention with her Ford V-6 engine. There were several who were building other projects that were either using the Ford or considering it. Each of them was armed with a series of questions about both the engine and the aircraft. I was most pleased to share of my knowledge of both. During the Monday airshow, we were blessed with a brief rain shower. I was delighted to find out that sixteen people can fit under the various parts of a Starduster II, using it for an elliptical umbrella of sorts.

All in all Oshkosh was great as always! I was able to attend the Starduster Banquet for the first time. It was a really special evening. Bill Clouse is a very gracious host. As we visited with Les and Dave, we discovered that they were planning to fly home to the west coast through our neighborhood. It was exciting to plan the return trip home with two other Stardusters. They were and are very good traveling companions. If you ever have a chance to fly with either of these gentleman, take charge of the opportunity. You won't regret it.

The Ford engine has about 270 hours on it now. I just completed its second annual. It seemed to be very comparable

to Les and Daves aircraft in performance. Although we were all loaded very heavy for the trip. Since the returning from Oshkosh, I have added a Loran. What a blessing that is. All I had before was a wet compass. Talk about a revelation, WOW! Well, Oshkosh is over for another year, "Miss Renae" finally got to make the trip. New friends and relationships were made and developed and about 1,300 hundred miles of flying has been logged. Both the Starduster and the Ford are doing great. Winter is on its way and my canopy is feeling better with each flight. I would like to send a special thanks to Dave and Donna Baxter , Les Homan and a Special thanks to Bill Clouse.

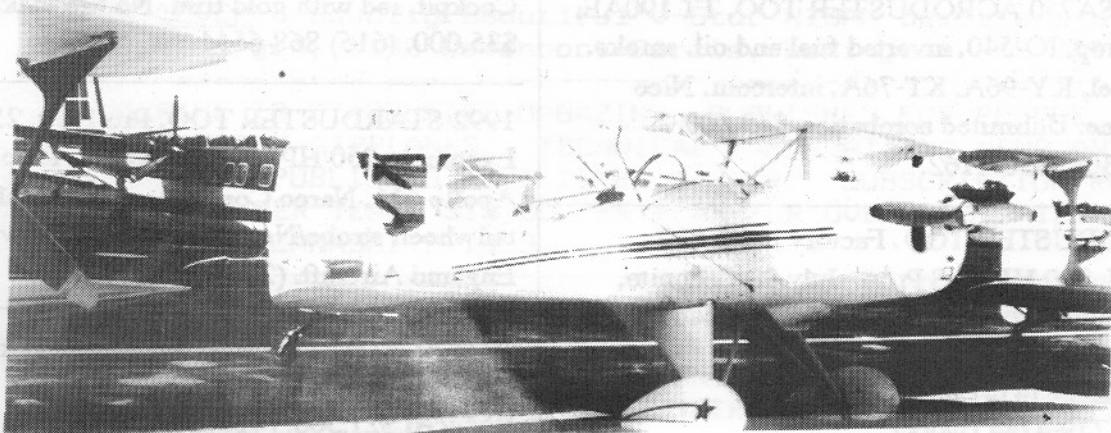
"I Dreamed I was an angel  
And with the angels soared  
But I was simply touring  
The Heavens in a Ford."

"The Winged Gospel", 1926

Sincerely,



Bob Ely  
Rt. 2 Box 114 Airport  
Baxter Springs, Ks. 66713  
116-856-3364



# 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.

Storm Damaged STARDUSTER TOO.  
Complete - less the engine and prop. Four wing panels, rebuildable fuselage, bent includes tail surfaces, instruments, wheels and brakes and flying wires. Will sell only as a complete package for \$5,000. Call Ken Poteet, Homestead, FL (305) 247-2530.

WANTED - Wood Prop for 245 HP Jake 88-56? Off Cessna Bob Cat or Stearman. Contact John Clark, Route 2, Box 7P, Oakaloosa, KS 66066.

STARDUSTER SA-100. 310 TTAFE, 150 HP Lycoming O-320, elect. system, Genave, Nav/Com, 3/92 annual. \$16,500. (602) 940-1212.

STARDUSTER TOO PROJECT. fuselage, tail feathers and landing gear completely and professionally welded. Includes wheel pants, brakes with new master cylinders, wood for wings, plans and much more \$3,200 OBO Ken (414) 468-8233, Wisconsin.

1983 SA750 ACRODUSTER TOO, TT 190AE, 120 prop, IO-540, inverted fuel and oil, smoke, LR fuel, KY-96A, KT-76A, intercom. Nice airplane. Unlimited aerobatics. \$49,500. Call (303) 530-1162.

ACRODUSTER TOO. Factory built. 830 TTSN, 200 HP, C/S Prop. July 90 Ceronite, hand rubbed butyrate, canopy, too much to list. Excellent \$38,000. Call Shane (414) 727-0993 (home) (414) 749-4244 (work).

STARDUSTER TOO. 200 + HP. constant speed. spades, new Stits/Imron, inverted fuel/oil, too much to list, need to sell quick. \$28,000. (806) 797-4138.

STARDUSTER TOO : 674 TTSN, 67SCMOH, 180 HP Lycoming, Nav/Com, intercom, David Clark Headsets, transpoder, blind encoder. \$23,000. (214) 223-4301.

STARDUSTER TOO, 205 HP Continental, 800 SMOH on 1600 TBO engine, new Cleveland wheels and brakes, annual due 2-93. Collins com. Flybuddy Loran. King transponder w/encoder. \$20,000 firm. LA. (504) 356-3565 days only.

STARDUSTER TOO, 50% done. 180 HP Lycoming A1G6, prop and spinner, full rear panel, wheel pants, new tires. (412) 533-3911

1991 STARDUSTER TOO. 10 hrs. TT. TSIO 520-T 310 HP Continental, engine heavy case, 115 hrs since new, 3-blade McCauley prop 25 hrs since new. Open Cockpit, red with gold trim. No tire kickers! \$35,000. (616) 868-6544

1992 STARDUSTER TOO. Pro-built 25TT, Lycoming 250 HP engine, Hartzell Prop, Apollo 611, Narco Com, intercom, Manle tailwheel, strobe/Nav lite. \$29,950. New England Aircraft. (203) 748-1449

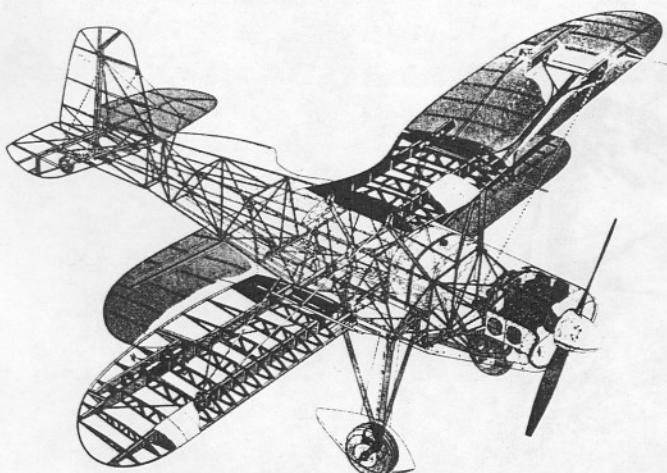
1975 ACRODUSTER TOO. IO360. Hartzell CS prop, Stits, 415 TT, AF, eng., prop. Reduced \$27,500. (414) 538-4000.

ACRODUSTER TOO. 55TT. 260 HP. With 3-blade prop. Christen inverted system. beautiful and well constructed by professional builder. Sell \$45,000 or trade on Mooney or other aircraft. Eves (219) 464-1866.

STARDUSTER TOO. 180 HP with fixed pitch. 220 hrs. total time aircraft. Engine has 220 hrs. SFNEW. Inverted fuel/oil, strobes, Nav Lites, Nav/Com, metal front cockpit cover with removable front windshield (2 extra tinted bubble windshields if you want them) Stits cover and paint. always hangared, fine condition and appearance. 2 chutes and 2 David Clark headsets. S.C. Hi-country airplane. Photo available. March lic. \$27,500 (803) 944-0819.

STARDUSTER TOO Fuselage welded & all fittings & wing ribs. \$2,500. (407) 562-5809

STARDUSTER TOO Rebuild Project, O-360, constant speed prop, full inverted system, Loran, full instruments, bubble canopy. \$12,500 evenings (304) 372-5822.



STARDUSTER CUTAWAY. Available in Black & White 18" x 24" for \$5.00. Contact David C. Baxter (503) 639-8792.  
5725 SW McEwan Rd. Lake Oswego, OR 97035

#### PARTS FOR SALE:

NARCO Nav 11 W/OBS. 108.00-117.95MHz  
8-1/2" x 3-1/2" x 3-1/4" excellent condition  
- \$350.00

PROPELLER GOVERNOR - Woodard Model 105 Bench Tested 5/92 : Operations within spec. - \$350.00

SPINNER W/BACKING PLATE - 13" diameter For McCauley C/S Propeller, Painted Tennessee Red, Excellent Condition - \$150.00

PUSH TO TALK - Set of two. never used.  
- \$ 30.00

#### INVERTED OIL SYSTEM

- \$300.00  
Acr-Line for Lycoming O-360, Steel braided  
- \$100.00,  
hoses/annodized aluminum fittings.

CONTACT: Christine Wolff (303)321-9660 Hm or (303)628-8381 Wk

Buy your aircraft needs from STARDUSTER CORPORATION, much hardware and material, Bill Clouse a good guy to buy from. VISA now accepted. (714) 686-7943 or 1-800-833-9102

#### FLASH NOTICE:

Those people who have recently purchased plans for the SA-300 Starduster Too, sheet 11 for fuselage is now in. If you did not receive yours please contact Starduster Corp and will be mailed to you. B.C.

ALSO NEW PART: Christine Wolf of Denver, Colorado recently purchased a new fiberglass tailwheel spring and reports that she is pretty happy with it. Only a few minor problems noted. B.C.

