

CIRRUS BUILDERS ASSOCIATION

Published by Rick Mills & Dave Doucette

Circulation 32



CBA

Fall 95

WHAT'S INSIDE

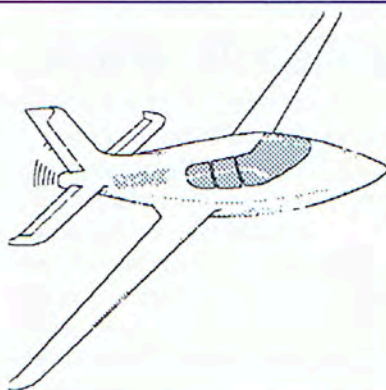
By Rick Mills.....

Glenn Elliott's new elastomeric/Graphite drive line

In this issue we present a detailed look at Glenn Elliott's new VK-30 drive line. Glenn designed and installed the new drive line last spring. To date it has performed beyond all expectations. Glenn has over 60 hours on the new system. Glenn, please keep us up to date as you build hours on the new drive. Inquiring VK-30 builders want to know.

Cy & Jim Mehling keep improving CM94

Is it possible to improve CM94? Cy and Jim Mehling will find a way. Cy and Jim continue to supply CBA members with valuable information as we build our VK-30. If you haven't been saving your



CBA newsletters in the past, I suggest you start now. Cy and Jim's newsletter articles are an excellent reference source.

Al Corey builds hours

Al now has 67+ hours on his VK-30 and building. I had an opportunity to fly Al's VK-30 several weeks ago.

Al flew his Cirrus from Hadley, MI. to my home field, Wadsworth, Ohio. That trip was Al's longest cross country so far, 1.10 hours. I still can't figure out why Al wouldn't let me land his Cirrus??. Oh well, thanks for the demo flight Al, I certainly did enjoy the ride.

CBA Video Newsletter!

Thanks to everyone who participated in the 95 CBA video newsletter.

We had an opportunity to view Roger Carter's excellent workmanship. Roger has made major modification to his Cirrus VK-30 flight control system, cooling fan and exhaust system.

Don Lewis presented some interesting construction techniques for the pitch control system.

Ramon Pabalan gave us a tour of his shop and the latest in elevator construction methods. As a bonus, Ramon flew to Daytona Beach where he interviewed Jim Rahm, president of EngineAir and gave us a look at the new 420 hp EngineAir V8".

Cy and Jim Mehling's video included a detailed preflight check list and in flight footage of their Cirrus. Cy Mehling has real star potential.

Tom Hastings started his video with the engine running and the prop spinning. That got my attention!

Thanks Jim Blair for another excellent job producing the video newsletter!

The Winter issue

We would like to hear from you in the next CBA newsletter. We have included a builder survey with this newsletter. So if you don't have time to write an article just fill out the survey and we will include your update in the winter issue.

New CBA member!

Please welcome Cyrus Kissling to the Cirrus Builders Association. Cyrus lives in Stuart, Florida.

Cirrus Builders Association

5005 Park Drive
Suite W2
Medina, Ohio
44256

Mr. Sam Shimada
Toyota Motor Corporation
Aviation Products Division
1 Hamilton Road
M/S 1-1-AB33
Windsor Locks, Connecticut 06096-1010

Dear Mr. Shimada,

The Cirrus Builders Association is a group of 30 individuals who are owners and builders of the Cirrus Design VK-30 kit aircraft.

Several members of our organization have read articles in aviation magazines about your new liquid cooled engine. We are looking for a liquid cooled, fuel injected, turbo charged engine in the 350 HP to 400 HP range to power our Cirrus aircraft.

I publish a quarterly newsletter for our group (Cirrus Builders Association Newsletter).

I would be very interested in including specification on your new engine in the next newsletter (late November). We would request general specification, price and delivery. Most of our builders would be ready for engine installation by late 1996 or early 1997.

We would also request information on price discounts for group purchases (6-12 engine purchase).

Thank you,

Richard A. Mills
CBA newsletter
216 723-4615

cc: Dr. Dave Doucette



**UNITED
TECHNOLOGIES
HAMILTON
STANDARD**

Sam Shimada
Toyota Representative
BLACKJACK PROGRAMME TEAM



**UNITED
TECHNOLOGIES
HAMILTON
STANDARD**

One Hamilton Road
Windsor Locks, Connecticut 06096-1010
Mail Stop 15-06 1-1-AE 33
(203) 654-7599 4-65 65
FAX: (203) 654-7523 26 10

November 27, 1995

Mr. Richard A. Mills
CBA Newsletter
5005 Park Drive
Suite W2
Medina, Ohio 44256

Dear Mr. Mills,

Thank you for your letter regarding our engine.

We are proceeding with our engine development program to obtain a Type Certificate as our target, however we are facing cost improvement performance. Currently we are expecting to be Type Certified by the end of this year, without any impact from Government shutdown, or early next year; and Production Certified by the end of next year with the completion of the cost target.

Thank you also for your request for group purchases. We could advise you on the above information hopefully at the end of next year.

Sincerely,

Sam Shimada



Cy & Jim Mehling

18 OCT '95

Dear Rick-

We recently had an RC Allen horizon gyro failure after only 2½ yrs in service. I was a bit upset when I learned that JA Air in Chicago will not repair them, but instead sold me a Sigma tech horizon. Ever since the first day I started my engine, I was unable to adjust the vac. pressure, but since it was 5.5" I had other more pressing problems and ignored that. (I have one of the quarter size gages) Now I decided to find the source of the problem. I sent the pressure reg. back to Airborne in Elyria and was told it worked fine for them. They sent me a test kit, no charge to trouble shoot the sys. It was a \$600 kit that I could keep for two weeks. I found I could adjust the vac. fine, but my panel gage stayed right on 5.5". I ordered a new gage. Meantime I borrowed a nice 2" vac. gage that was certified for test work and read easier to set the 4.8" I wanted, and cranked up the engine. It read zero, I checked a couple more things and cranked up again, it still read zero. I took it out and sucked on it with my mouth and noted the needle tried to move CC, backward from normal.

There are two ports on the gage, one says P, the other says V. I hooked the sys up to V for vacuum and I was wrong. This is just an example of the things you will discover for months after your first flight. That's why they classify us as experimental - this project is for our

education and recreation. Right?

As a result of the problems we have had with the gascolator, I saw a replica of a 1915 Lincoln Beachey in NY a month or so ago that had the same gascolator on it. I decided now was the time to find a new filter. We are using a FRAM FBM 1110 PLM, it is a marine unit that has a cartridge and a port for a drain valve. (you have to use a nipple and coupling with the valve, the valve will bottom out and not open otherwise). Lyle Powell's article in Sport Avn. this month tells of a different filter to do the same thing.

A phone call from Tom Hastings confirms he had the same low hyd pressure on the down side for his nose gear, he reset it and the nose gear locks fine now. He experienced the same vac. sys problem I had, but was too embarrassed to report on it in the newsletter. Boy, did I give him the business about that. His pride caused me a lot of grief and big bucks for failed parts and shipping stuff back and forth.

I got my manual updates and while looking them over I see Cirrus still shows the aileron cable system with left cable and teleflex on the left etc. We found we had to cross the cables to make it work like it should. I wrote a note to Pat Waddick, but in the meantime, make your own corrections and be sure it will bank left when the wheel is rotated CCW.

We installed a new B&C voltage regulator this month. It has over and under voltage protection and warning. We had all this before, but this unit comes with a flashing warning lite and I wanted that. B&C cautions to set the voltage on the system with only certain reliable digital volt meters. We have one of the radio shack jobs that was listed as approved. In the past we found the voltage on the avionics bus differed by 1 V from the main bus as shown on the Vision Micro gage. Using the radio shack meter, I found the av bus was reading ½v low and the main bus was ½v high. The new reg. came set at 29.6V, which I thought was way too high. I set mine at 28V. I think I read that the new high tech batteries take a higher charge rate, perhaps that's what it was set so high for.

Mary and I visited the factory about a month ago. We were absolutely awed by the welcome we received, the facilities they have now, the quality of the work on the new wing and the great team of men and women working on our new wings. To top the whole thing off, Dean Vogel let me fly the new SR-

20. I had always thought this was just a made over cherokee using glass instead of aluminum, did I ever get a surprise. You cannot imagine the spaciousness, the comfort, the visibility, the ease of handling, the quietness, the expansive panel with those side control sticks and the radio stack in the console, it's just wonderful. The entire airplane is so smooth, it looks like it was a toy dipped in a bucket of paint. This is the same quality of work we will see on our new wings. A second proto of the SR-20 was on its gear with eng and prop and wings etc. installed.

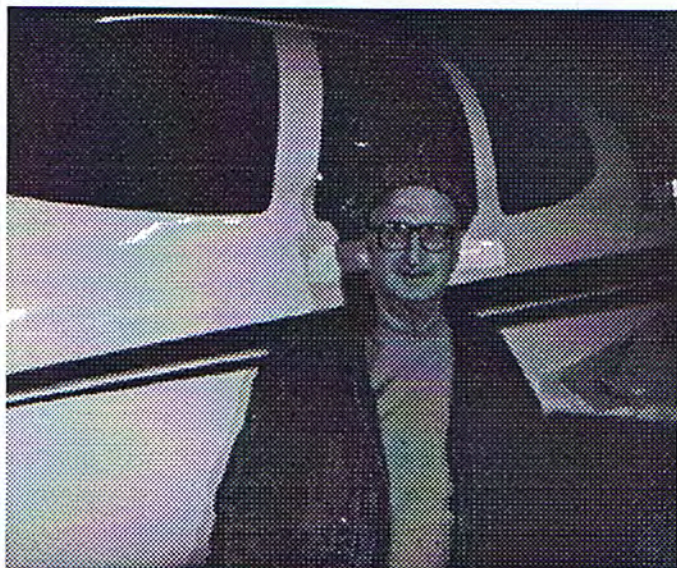
I had a nice meeting with Rick and Eric and we discussed a number of items. I hope I convinced them to install tie down and jackpad provisions. They are using a float type valve on the fuel vent at ea tip which allows only air to translate and will close when fuel enters the valve. There is also a relief built in which will pass fuel overboard when pressure builds in the tank. I wanted an additional vent tube connecting the tanks at the tips. Hopefully this will pass fuel from a low wing to the high one on a sloping surface as well as acting as a second source of vent air if one system is plugged. They want to run this line externally along the LE. Of course the quantity standpipes need to be vented also, I suggested they tee into this cross vent in the root area for this purpose and also to drain the system if it collects any fluid.

The tank itself is much improved over the original. There is no exposed foam to the fuel. All the ribs are flanged to assure a good seal on the inboard and outboard ends. The ribs used for baffles and the area near the inbd end of the tanks all have a space under which fuel can flow without trapping any debris as we had on the original wings. I was impressed with the quality of all the details and I soon found the reason for the delay we are encountering waiting for our wings. Every day, someone comes up with a better idea on how to improve the product, and this sometimes involves going back and building new and better molds. There is a huge shop devoted to making molds and those guys are perfectionists. You have to see it to believe what they are doing for us. There is a full time crew assembling the proto wing and many other people supporting them. Dale told me they have 67 employees now.

As any builder knows, when you think you are 90% done with a project the remaining 10% takes just as long to complete as the other 90%. Based on my observations, I would think proto IV's wing should be installed in November and it might be ready to fly in the spring. At the same time, we think our wing might be ready for us in the spring also. Only time will tell. One thing I am sure of is that we are going to get a great product in the end. Rick once told me when they go into serious production, they will produce a wing every two weeks. He still thinks this is

possible, but I have great doubts about that.

We are presently using an Apollo 2001 to replace our Magellan 5000 which was very troublesome. Unfortunately we are having a problem with the seating of the datacard or the processor which reads it, and hope to have that taken care of shortly. Apollo is known for its prompt service.



Al Corey

A year in review by Al Corey....

Dear Rick and Dave,

A few notes about my experiences this past year with the Cirrus.

I now have 65 hrs. on 33G. So far our longest trip, about 1.10 hrs, was to visit Rick Mills at Wadsworth airport. No problems!.

In *January* 95 we finally found our problem with the engine. It was not adjusting fuel pressure in the injector system, but it is now running OK.

In *May* we worked on our autopilot, as per Cy's instructions (the Stec 50 autopilot that came with the kit). It works fine.

I clean the gasculator screen about every 10 hrs. Have installed a Fram G15 in line filter before fuel pump. I change it every 25 hours.

June 6 signed off for flight with 40 hrs on tach.

In *July* at 50 hrs did the annual inspection. Prop housing leaked, so I sent it to Jungblood. Four

weeks later it came back; no charge. He stopped the oil leak. We disassembled the drive train and didn't find any problems.

July: First passenger was my wife Marge, a great flight.

Discovered that the auxiliary pump will not prime the engine with less than 35 gal aboard. Will put a check valve in line to keep fuel in auxiliary pump.

Attempted to use speed brakes in landing and bent nose gear chrome tube; Rick sent me a new tube and was back in the air in three days. Will replace original nose gear with a new design Rick is building now. Hope to make longer trips in the future, so may see some of the other builders.

Al Corey

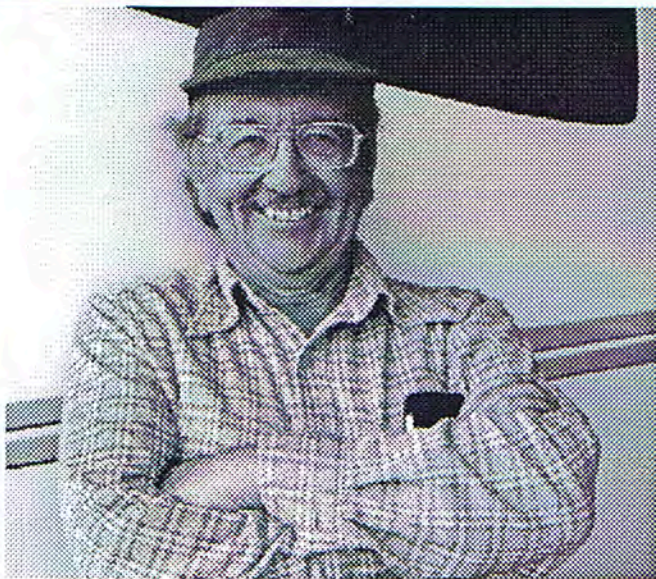


above:
Al Corey departing Wadsworth Airport 11/15/95

right top
Al and friend (copilot) Don Wrote during visit with Rick.

right bottom:
Al's Cirrus at Rick's hanger, nice view.





Glenn Elliott

PROP DRIVE COUPLING SYSTEMS

INTRODUCTION

This article is about the design of a coupling system for use in N60GE. Although it has given satisfactory service in my aircraft, I cannot state that it will work well in any other application. The design of propeller drive systems for rear-prop/mid-engine aircraft is a complex task and requires capable, experienced engineering effort dedicated to the application. This design is offered merely as a guide. It may be inappropriate for use in any other aircraft and could result in serious consequences.

There are four basics to the design of propeller drive systems for aircraft: torque, torsional vibration, misalignment, and environmental.

TORQUE - The drive system must handle the torque put out by the engine with sufficient safety factor to be reliable. We must all consider that failure of any part of the drive system could have disastrous consequences in the VK30. Most designers consider that a safety factor of 2.0 is an absolute minimum. I like 4 or 5. By a factor of 2.0 we mean that the component can take twice the maximum expected torque without breaking.

Torque is expressed in pounds-inch or foot-pounds. It is easy to compute from the horsepower of the engine and the prop rotational speed using the following formula:

$$\text{Torque (lb-in)} = \frac{63025 \times \text{HP}}{\text{RPM}}$$

For example, the TSIO 550 in N60GE develops 350 HP at 2700 rpm; torque is then 8170 lb-in. For a V8 that puts out 400 HP driving a prop (through a gear box, probably) at the 2200 rpm, the torque is 11,560 lb-in. As a practical manner, couplings which handle misalignment, soak up some of the torsional vibrations, and work at ratings above 10,000 lb-in with a reasonable safety factor are either quite heavy or very expensive. Designing a drive system for a high power engine turning a low-speed prop is a formidable task.

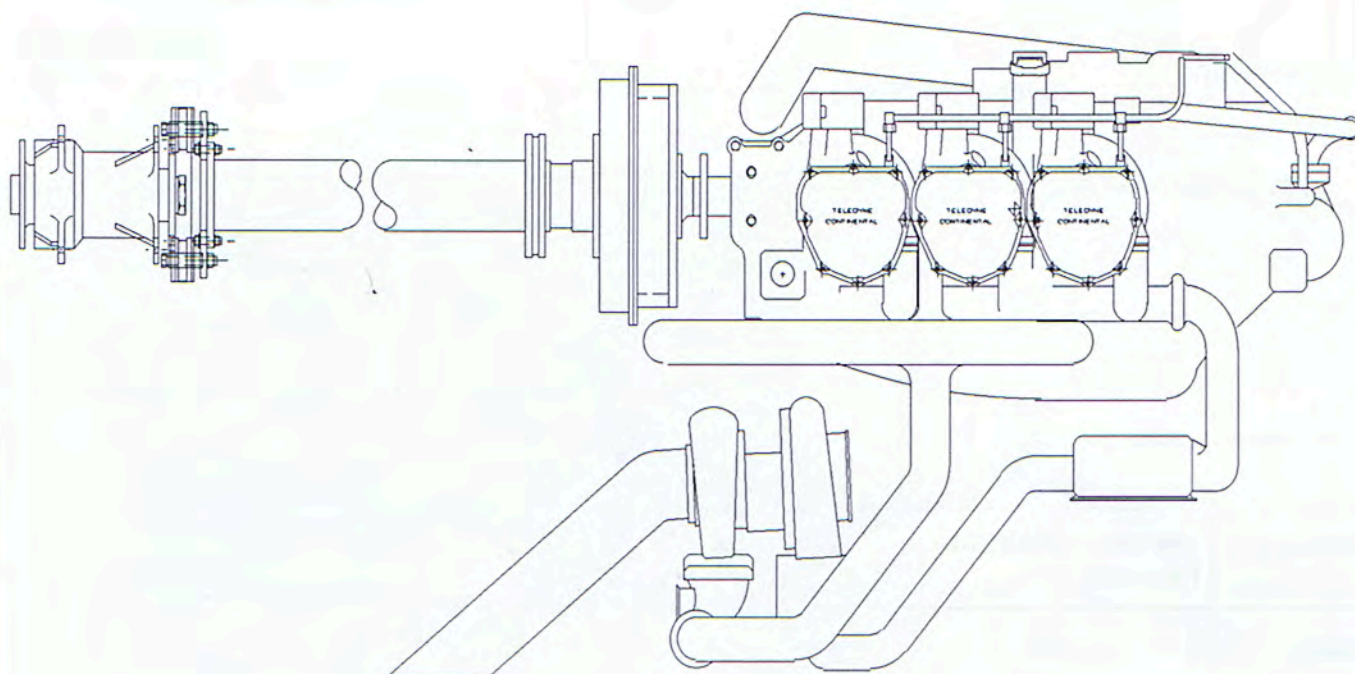
The elastomeric forward coupling used in N60GE is rated at 10,000 lb-in, has an intimate torque rating of 40,000 lb-in, will effectively dampen the firing pulses from the engine, and will work at up to 1.5 degrees of angular misalignment. It weighs 18 pounds and costs less than \$400. The same manufacturer's coupling for a rated torque of 12,000 lb-in weighs over 80 pounds.

TORSION VIBRATION - This type of destructive force working on long drive trains like those in the VK30 is not easily understood unless one has had a lot of training and/or experience. It depends on several factors: rotational moments of inertia, spring rates of the couplings and shaft, and damping factors. It needs to be addressed because even small amounts can cause shortened life of the engine. There are two primary means of exciting the natural rotational resonance frequencies of the various parts of the drive system: The sharp firing pulses from the engine which excite the resonance frequencies regardless of rotational speeds, and rotational excitation, which only excites the natural resonance if the rotational frequency equals the resonance frequency. (Or, to a lesser degree, the harmonics of either).

Continental TSIO 550

New drive line design and development

by Glenn Elliott

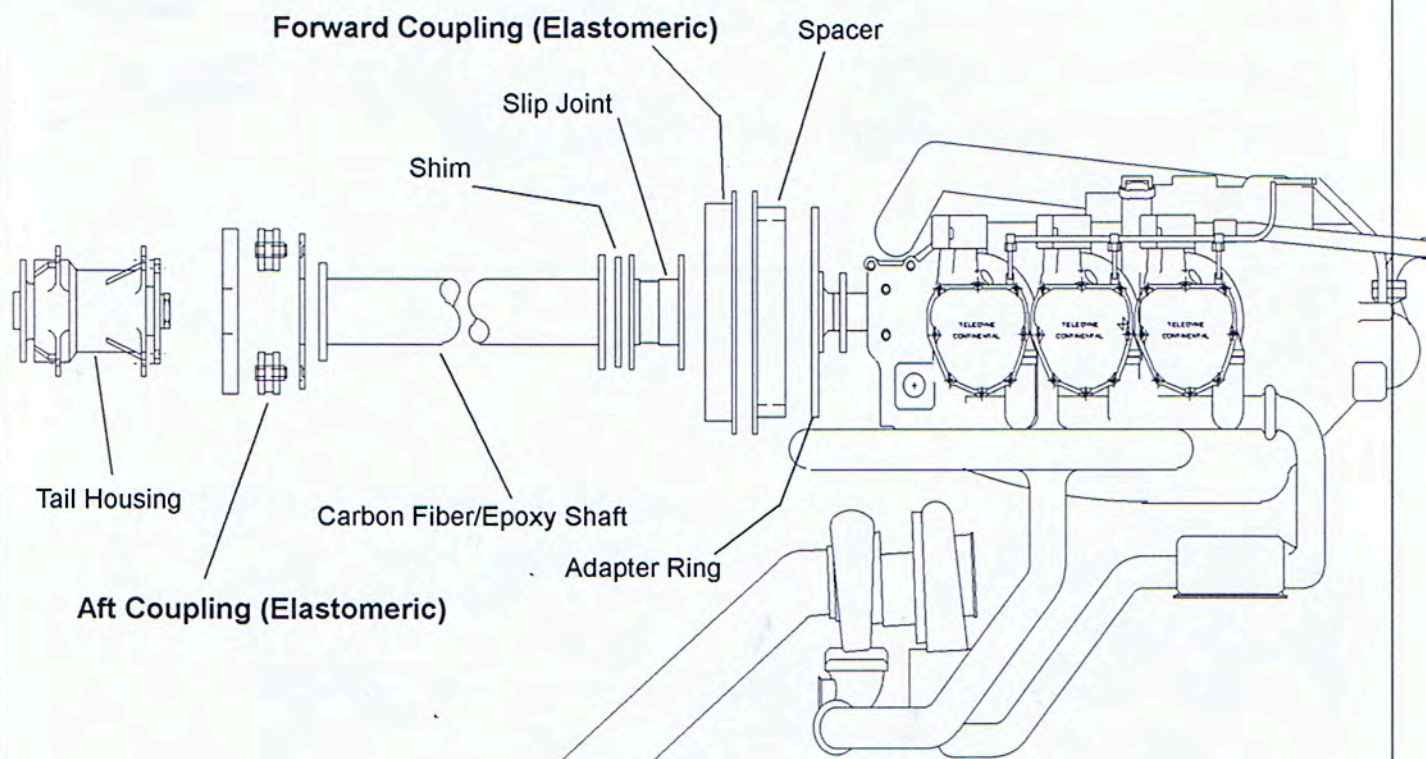


Illustrations by RA Mills Corp.

After some study and some help from a friend who is a mechanical engineer I came to the conclusion that, for me, elastomeric (usually rubber or soft plastic) couplings were the answer. They are cheap, effective and offer a lot of flexibility and ease of design. We used a basic approach suggested by Lord, Inc. in one of their publications. 1) Soak up the engine firing pulses as close to the engine as possible, and, 2) make all other parts of the system have resonant frequencies above the rotational speeds of the prop. Basically this means that the first, forward, coupling should be soft and all other parts of the system should be stiff.

One cannot eliminate the resonance; one can only move it to unobjectionable places in the operating

Continued on page 14

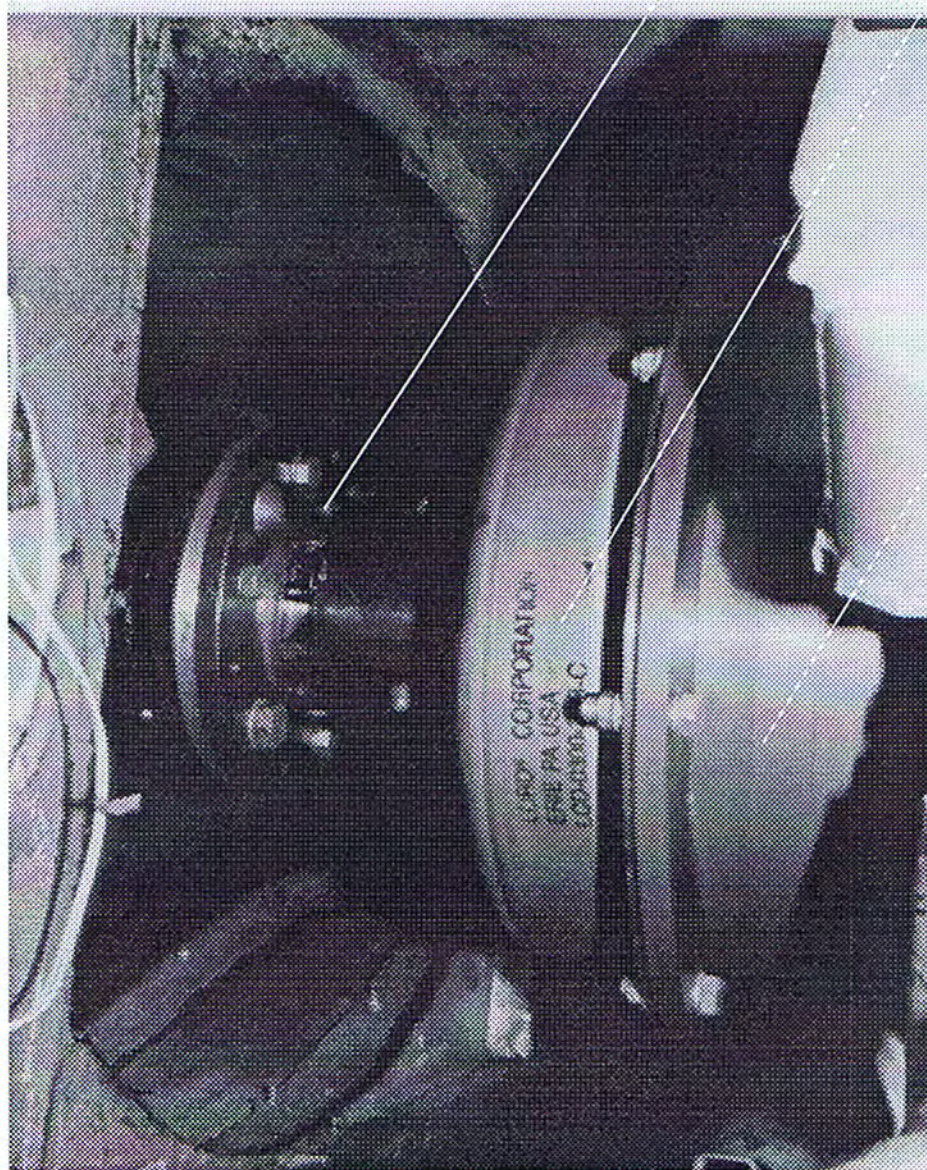
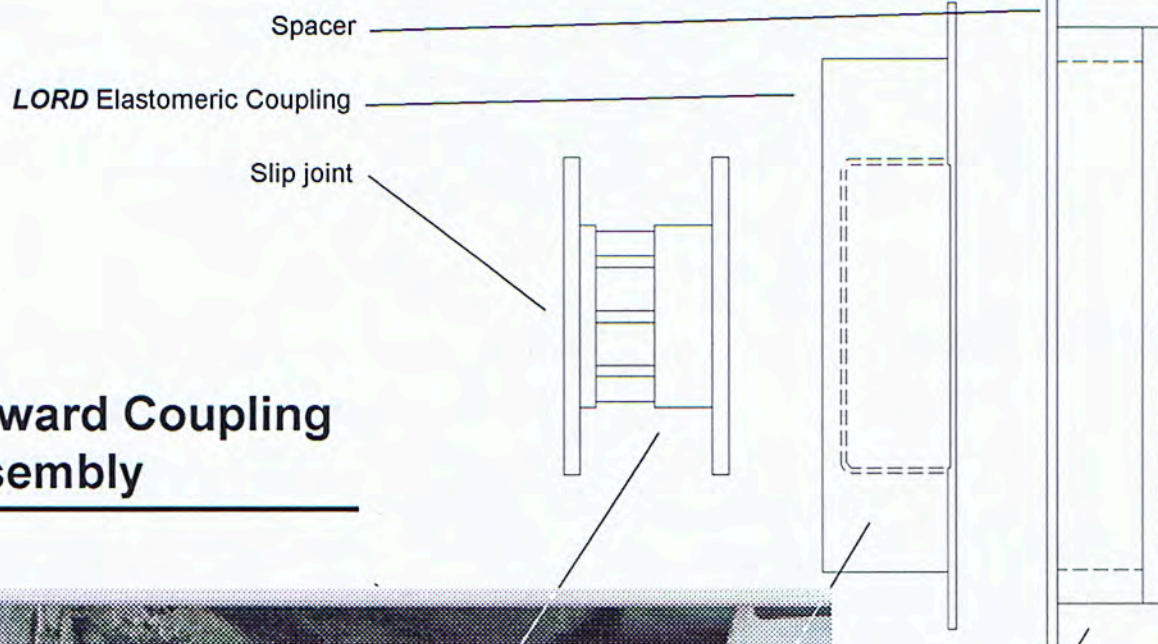


CONTINENTAL TSIO 550 (350 HP)

Illustrations by RA Mills Corp.

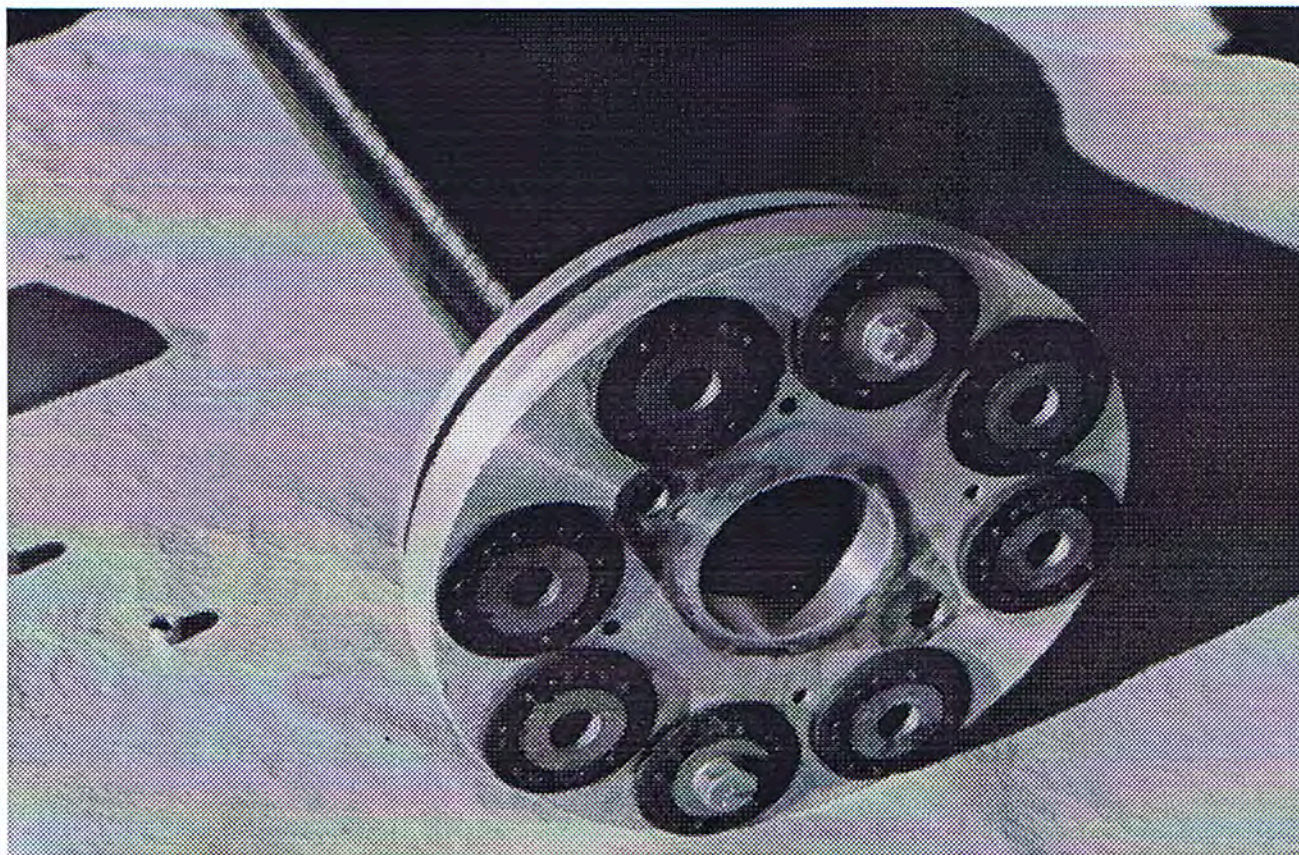
Component	Weight Pounds	Fail/Safe	Service Factor	Replaces	Comments
Spacer	6.8	N	>10	NA	Needed to clear Cross-over exhaust pipe on TSIO 550 installation.
Adapter Ring	3.2	N	>10	NA	Forward Coupling to Crankshaft end plate adapter.
Forward Coupling (Elastomeric)	17.2	N (slips for a few seconds before failure)	4.8	Dry Fluid Clutch/Flex Pac/Inertia Rings.	Provides for misalignment and dampens Torsional vibration caused by engine firing pulses.
Slip Joint	12.2	Fails gracefully	4(estimated)	Slip Joint	Modified part from Dry Fluid Clutch.
Shim	0.5	N	>10	Shim (If used)	Sets slip joint for proper spacing. May not be needed if drive shaft is proper length.
Carbon Fiber/Epoxy Shaft.	10.5	N	9.0	Aluminum Shaft.	Provides some damping.
Aft Coupling (Elastomeric)	16.1	Y	NA	Flex Pac	Provides for misalignment and dampens High frequency torsional vibrations.

Forward Coupling Assembly



Forward Coupling
looking Aft

Illustrations by RA Mills Corp.

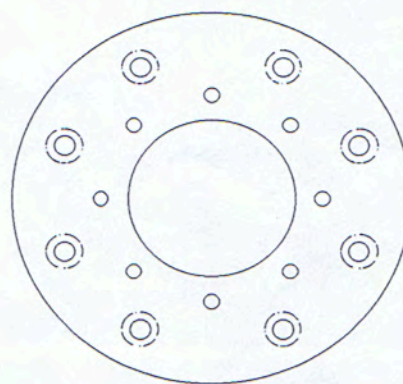
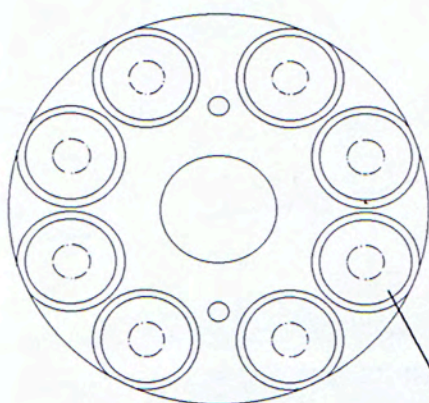
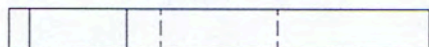


Top: Aft end of 10" dia. coupling.

Bottom: Aft coupling disassembled.



Aft Coupling

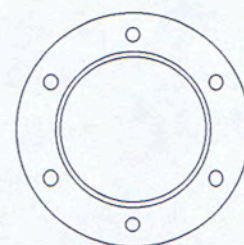
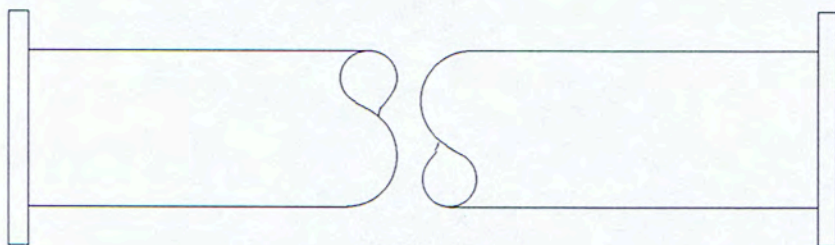


Bushing Socket Plate

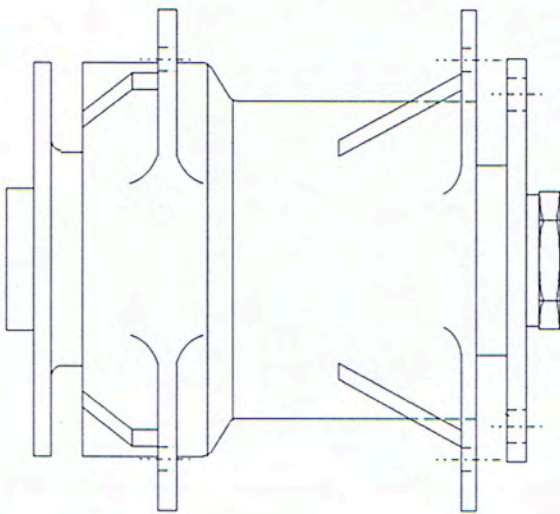
Adapter Plate

LORD Bushings (8 ea.)

Carbon Fiber/Epoxy Drive Shaft



Illustrations by RA Mills Corp.

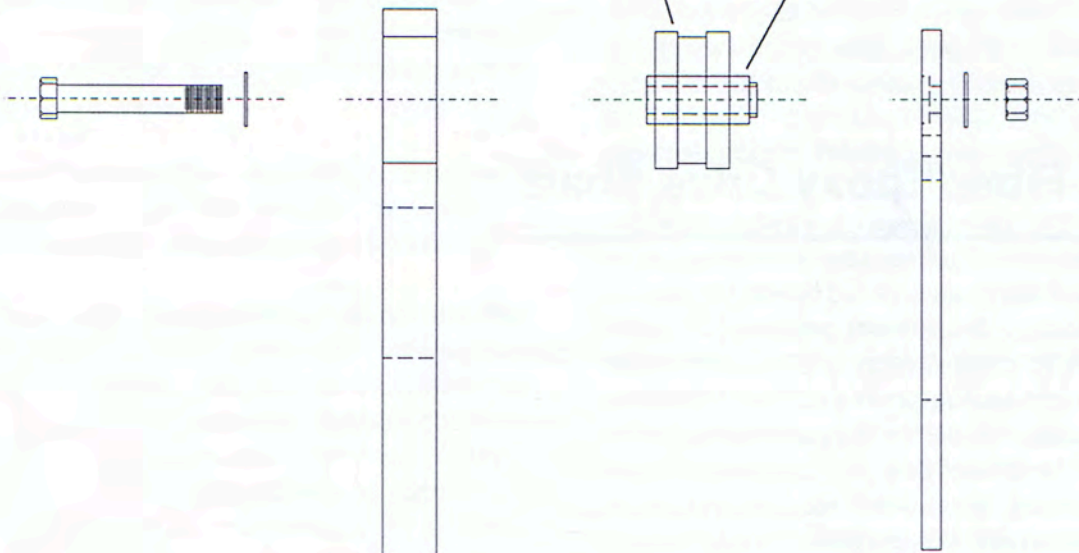


Tail Housing

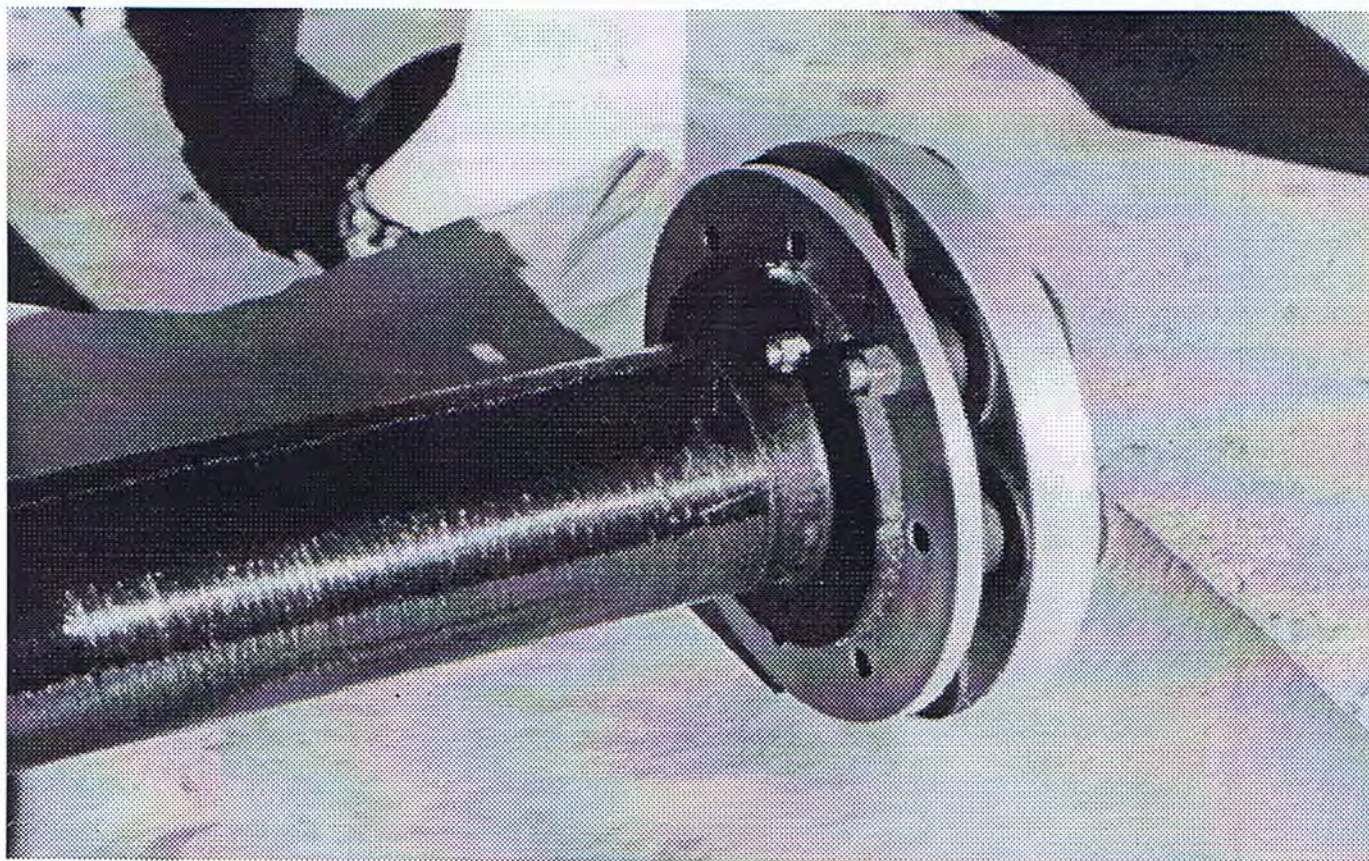


Aft Coupling Assembly

Lord Bushings (Elastomeric)
Steel bushing.



Illustrations by RA Mills Corp.



New graphite drive shaft and Aft coupling

range, or completely outside the operational range, by design of the couplings and other rotating parts. The publication by Lord also suggested that the resonance frequency of the first coupling be somewhere between the cranking rpm and the idle rpm. This is 200 to 800 rpm for the TSIO 550, except one must use the firing frequency of the engine; three times rpm for a 6 cylinder, four stroke engine. Now we are no longer talking rpm, but pulses per minute. 600 to 2400 pulses per minute for my installation. I think that the resonance point that I came up with is around 1500 pulses per minute, or 500 rpm. It's difficult to check, and I haven't done it.

The natural resonance of the rest of my drive train is well above the 2700 rpm max operating point. It's around 5000 rpm for the carbon-epoxy drive shaft and about 3200 for the aft coupling.

I've tried to make this discussion of torsional vibration as simple as I can and still use terms normally accepted in the industry. If it all seems complex it's because it is complex. I encourage all of the builders to seek expert help in drive train design, especially in the area of torsional vibration.

MISALIGNMENT- No matter how well one has done in aligning the engine and tail housing there will still be misalignment. The engine sits on shock mounts which move, and the airframe of the VK30 moves some with temperature and loads. The maximum that one should tolerate for static misalignment is about 0.5 degree. The elastomeric couplings that I've used are made to function satisfactorily under about 1.5 degrees of misalignment, an unlikely situation in the VK30.

ENVIRONMENTAL - The primary environmental concern for most drive train systems is temperature. Most of the elastomers used in modern couplings (natural rubber in mine) withstand an oily, wet, or dusty environmental very well.

The elastomeric couplings that I've used are specified to function between 0 and 200 degrees F. They experience some small changes in characteristics above 150 F. I haven't done any real accurate temperature measurements. We did some quick checks after some ground tests where the oil temperature went above redline and the forward coupling was about 150 F. The whole system has performed well throughout the hot Southwestern summer. Some tail housings get quite hot under normal operation and that should be checked for each aircraft. Preheating of the whole drive train is recommended when temperatures are below 0 F; but we all preheat then anyway. Just blow a little hot air in the tail cone.

FINAL WORDS - Once again, be careful. Be conservative. Get expert help. Please do not copy my design. It may not work for your aircraft.

Glenn Elliott

CIRRUS BUILDERS ASSOCIATION

Association Members

Al Corey	4669 Spring St.	Hadley, MI	48440	810 797-4551	IO550
Cy Mehling	5393 Ridgeview Dr.	Doylestown, Pa.	18901	215 348-8134	IO550
Jim Mehling	Box1	Buckingham, Pa (Wk)	18912	215 794-5850 609 951-1951	
Glenn Elliott	817 Loma Vista N.E.	Albuquerque, NM	87106	505 266-7612	TSIO550
Roger Carter	2111 Merrill Field	Anchorage, AK	99501	907 278-9815	TSIO520
Don Brosie	Century 21 Lab 9047 Soknel Dr.	Aptos, CA	95003		Allison
Don Lewis	7739 El Pensadar	Dallas TX	75248	214 661-1946	Allison
Urs Villiger	Riedhalde 3	Hunenberg, Switz FAX	6331	42 36 54 43 41 42 36 2850	Allison
Sandy DiFazio	10 Mineola St.	Holtsville, NY. Before 10 AM Est. (fax)	11742	516 654-9080 516 289-2549	Allison
Rick Mills	5005 Park. Apt. W2	Medina, Ohio	44256	216 723-4615	V8
Lillard Christ	P.O. Box 146	Port Aransas, TX	78373	512 749-5072	V8
Jeff Doddridge	1312 Hamilton Ln.	Escondido, CA.	92025	619 480-2330	V8
Frank Leinbach	2129 Putnam	Forest Hill, MD.	21050	410 893-9887	V8
Dave Doucette	457 Rolling Timber Tr.	Kettering, OH.	45429	513 299-6292	V8
Ramon Pabalan	P.O. Box 1771	Bradenton, Fl. (FAX)	34206	941-748-4076 941-745-1470	V8
Mike Barrett	1190 Bigfork Stage Rd.	Big Fork, MT.	59911	406 837-3455	TIO540
Robert Last	11402 Havenner Rd.	Fairfax Station, VA.	22039	703 250-2298	
Dennis Lyons	6450 Buena Vista	Paso Robles, CA. 8 am - 10 pm Pacific	93446	805 467-3148 805 467-2434	
Tom Westenberger	4623 N. 124 St.	Butler, WI.	53007	414 691-3733 Wk. 414 781-5484 Fax 414 781-5420	IO 550G
Tom Hastings	8344 Oso Ave.	Winnetka, CA.	91306	818 341-2039	IO550
Bob Long	1501 N.W. Cassen	Oklahoma City, OK.	73106	405 235-6065	Lyc. TIO540
Richard Terns	P.O. Box 276	Jamison, PA.	18929	215 345-8228	
Alan Shaw	WP 16-100	West Point, PA.	19486	215 652-7400 Fax 215 652-2142	



Darren Worden	P.O. Box 416	Mecca, CA.	92254	619 396-2313
			WK.	619 396-2116
			Ext.	#12
Ben Smithers	2130 Melridge Place	Austin, TX	78704	512 447-2012
Jim Blair	5710 Whispering Pines	Lorain, OH	44053	216 233-5805
			Fax	216 277-1137
Bud Brady	5823 S. Drycreek Court	Greenwood Village CO.	80121	303 741-2332
			Fax	303 290-8138
Gary Udall	1100 Stout Street Suite 680	Denver, CO.	80204	303 575-9100
			Fax	303 575-9004
Steve Dincognito	26265 N. Hwy 83 # 18	Mundlein, IL	60060	708 566-4294
			Fax	414 857-6443
			Wk.	414 857-7296
Cyrus Kissling	# 4 Mindoro Street	Stuart, FL	34996	407 221-1242
			Fax	407 221-1249

Roger Carter
Anchorage

Urs Villiger
Hünenberg
Switzerland



Newsletter Financial Statement



The cost of publishing the Cirrus Newsletter is paid for by voluntary contribution from Association members.

Contributions to date.

\$1622.00

Expenses to date:

Jan 94.	\$ 68.24
Apr 94.	\$ 137.84
Jul 94.	\$ 124.65
Oct 94	\$ 90.34
Jan. 95	\$ 110.22
Apr. 95	\$ 148.35
Spring Video Letters	\$ 58.89
Sep. 95	\$ 82.35
Nov 95	\$ 110.00(est)
Account Balance (11/22/95)	\$ 691.12

Disclaimer

The Association is intended to be an information transfer media which will facilitate the direct communication between individual Cirrus Builders. That means that there is no intent by the newsletter coordinator (Rick Mills and Dave Doucette) to edit any information, to endorse any product or equipment, or make any judgments on any builder's project. Articles or other news items will be published in their full, original text with the author identified.

It is important to state that the Association is not a technical reference for Cirrus kit parts, or construction or aircraft operation manuals supplied by Cirrus. ***Cirrus Design is the sole and final authority on these items.***

Cirrus Builders Association

Newsletter is published by:

Dave Doucette
457 Rolling Timber Trail
Kettering, Ohio 45429

Rick Mills
5005 Park Drive
Apt. W2
Medina, Ohio 44256

Cirrus Newsletter

is composed on:

Gateway 486DX2-66 (IBMCompatible)
Microsoft Word 7.0
Aldus PageMaker 5.0
Aldus PhotoStyler 2.0
AutoCad 12
Hp Laser Jet II
Hp Scan Jet IICX

Submitting Articles:

Hand written or typed articles are fine. If you have a computer available please include a hard copy with your disk. Any IBM compatible word processor program will work. Microsoft Word, WordPerfect, etc.

Newsletter Publication Dates



Fall

Oct. Issue
Mailed Sept.15
Deadline Sept.1



Spring

April. Issue
Mailed Mar.15
Deadline Mar.1



Winter

Jan. Issue
Mailed Dec.15
Deadline Dec.1

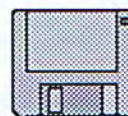


Summer

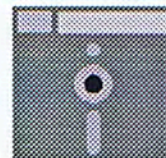
July. Issue
Mailed June.15
Deadline June.1

Deadline dates are for articles submitted on IBM compatible disc. Please add two weeks for typed or hand written articles. Send photos and graphic work as early as possible.

3 1/2 disc.



5 1/4 disc.



Photos!

Please include color or black & white photos with your article. Please let me know if you would like the photos returned.

Please include a photo of yourself with your article.