

THE CANARD PUSHER

No. 78

Apr. & July 1994

Published quarterly (Jan., April, July, Oct.) by

RUTAN AIRCRAFT FACTORY, INC.

Building 13 - Airport

1654 Flight Line

Mojave, CA 93501

805-824-2645

U.S. & Canadian subscriptions	\$14.00
Back issues	\$ 3.50
Overseas (Airmail)	\$16.00
Back issues	\$ 4.00

If you are building a RAF design, you must have the following newsletters:

VariViggen (1st Edition), newsletters 1 to 78.

VariViggen (2nd Edition), newsletters 18 to 78.

VariEze (1st Edition), newsletters 10 thru 78.

VariEze (2nd Edition), newsletters 16 thru 78.

Long-EZ, newsletters 24 through 78.

Solitaire, newsletters 37 through 78.

Defiant, newsletters 41 through 78.

A current subscription for future issues is mandatory for builders -- as this is the only formal means to distribute mandatory changes. Reproduction and redistribution of this newsletter is approved and encouraged.

PLEASE NOTE: RUTAN AIRCRAFT IS OPEN TUESDAY ONLY FROM 8:00 TO 4:00. When you call on Tuesdays, please give your name, serial number, and nature of the problem. If you are not in an emergency situation, we ask that you write to Mike.

When writing to RAF, send along a stamped, self addressed envelope if you have builder's questions to be answered. Please put your name and address on the back of any photos you send.

ANOTHER RECORD FOR BURT'S CATBIRD

As reported in *Sport Aviation* in April, 1994, Mike Melvill has set an unofficial world record for FAI Class C-1C (2204 to 3858 lbs.) over a 2000 kilometer closed course. He tried twice before he succeeded. The first attempt was going very well when the overcast decided to come on down. In only a few minutes, he picked up enough ice to slow him down 17 miles per hour! It was obvious he could not break the record so he aborted the attempt and returned to Mojave.

A few days later, the weather was perfect and he covered 1087.2 nautical miles in 4 hour and 52 minutes for an unofficial speed of 223.28 knots (257 mph). The old record was 242.22 mph and was set by Ed Miller in a Piper Malibu. That is one fast Catbird! Confirmation from the FAI is expected soon.

BURT'S TALKS AT OSHKOSH

FRIDAY - JULY 29

10:00am - Tent #3

LIFE, THE UNIVERSE AND EVERYTHING ELSE

1:30pm - Museum

VOYAGER

SATURDAY - JULY 30

8:30am - Design College

SEATING ARRANGEMENTS AND OTHER DESIGN ISSUES

10:00am - Tent #3

TENT TALK SHOW

SUNDAY - JULY 31

10:00am - Tent #3

BOOMERANG AND THE COMPUTER COCKPIT

WES AND MILLIE GARDNER, APRIL 1994

Wes and Millie were very good friends and will be sorely missed by all who knew them. On Monday, April 4, 1994, Wes took Millie for her first ride in their recently completed E-Racer. After only a few minutes, Wes called that he had a problem and was returning to the airport. Sadly, he did not make it and they were both killed in the crash.

Several mutual friends have investigated this accident and have reported a consensus that the throttle linkage separated, allowing the engine to return to idle. Unfortunately, idle power was not enough to allow them to return safely to the runway.

All of you who had met Wes knew him to be a regular at the Jackpot, Wendover and Kanab EZ races. He was a truly dedicated and extremely competitive pilot and loved racing of all kinds, including boats and cars. He was one of the first to fly with an Ellison throttle body and an electronic ignition system. His VariEze was not only beautiful, it was very fast! Wes set the fastest time at the Flying Kilometer in Chandler, AZ in 1990 and he was thrilled!

Wes and Millie were some of the kindest, most generous people we ever knew - until we meet again, fly high and fly safe, Wes and Millie.

ENGINE CONTROLS

We have talked about this subject several times over the years yet many builders continue to do less than their best work in this area. Pay close attention, Guys: Your ability to control your engine is second only to your ability to control your airplane. You do your very best work on the pitch, roll and yaw control system and you should do the same for the throttle and mixture controls.

Before you do your first flight, and at regular intervals thereafter, get someone to help you check that the throttle and mixture controls do, indeed, move the appropriate range to the full throttle/full rich positions and also to the idle/cut-off positions without the use of any helper springs. If you cannot get the throttle and mixture controls to work satisfactorily without springs, consider going to push/pull cables. I realize this is a hassle, but not nearly as much of a hassle as losing control of your engine at a critical time.

I installed a push/pull throttle cable when I installed an Ellison throttle body almost 1200 hours ago. (This is a mandatory requirement when you install an Ellison and not a bad idea for any carburetor). I carefully measured to determine the exact length required, then ordered a custom-made aircraft push/pull cable

from Aircraft Spruce. I removed the throttle lever from the Brock throttle quadrant and scribed around it onto a piece of 1/16" thick 2024-T3 aluminum, adding about 2-1/2 inches to the bottom of the throttle lever. This was band sawed out and deburred.

A small rodend, screwed and jam-nutted to the push/pull cable end, bolts to this lower end of the new throttle lever. The outer cable is secured to a bracket mounted on the inside of the left arm rest (I used a "u" bolt located in the grove machined in the end of the outer cable).

At the engine end, the outer cable fits perfectly into a bracket mounted on the Ellison throttle body (provided by Ellison) and the cable end has an aircraft-type ball and socket. The "ball" bolts onto the throttle lever and the "socket" screws onto, and is jam-nutted to, the cable end. The "socket" fits onto the "ball" and is held securely in place by a threaded insert that can be tightened onto the ball and is safetied with a cotter pin.

Exactly the same system can be used for the mixture control. There are many acceptable ways to obtain reliable engine controls. Just be certain in your own mind that what you have installed is fully functional and safetied so that it cannot possibly come undone or separate in some way. Have other builders or an A&P look at your work, the more pairs of eyes that check your system, the less likely you are to have a failure and a failure in this area is not acceptable and will almost certainly result in, at least, a forced landing. Never forget that!

WATER IN FUEL

A recent off-field landing in a Long-EZ, fortunately with no injuries, forcibly brought to mind the ritual of checking for water at all the drains. A standard Long-EZ has a gascolator drain on the firewall which should be easily accessible through the cowling inlet. This should be drained before each flight, once the airplane is in the level position (on all three wheels). There is a water drain at the forward end of each main fuel tank and these must be drained before each flight but before the airplane is moved. That is to say, while it is parked in the normal nose down position. Do not lift the plane up to the 3-point

position until after you have checked these two water drains. If you are in the habit of normally parking your EZ in the level, 3-point position (tying the nose down), you should consider installing low point water drains in each sump blister and then check them religiously before every flight.

Where does the water come from? Sometimes, but rarely, from the gas pump (or gas truck), very rarely, if ever in a composite EZ-type, from condensation in a less than full fuel tank. This is common in metal airplanes. That is why it is normal to top off the tanks in any Spam Can after a flight. Because the fuel tanks in any RAF design are insulated sandwich construction, they are similar to a thermos bottle and condensation does not normally form on the inside of our fuel tanks. The most likely way for water to get into your fuel tanks is a leaking fuel cap on an airplane left out in the rain. The "O" rings on any of the commonly used fuel caps do not last forever. Far from it, in fact. Ozone, ultra violet light and many airborne pollutants attack these rubber "O" rings. Check them frequently and replace them as soon as you see small cracks in the outer edges of these "O" rings.

Be especially diligent about checking your water drains if you have left your airplane out in the rain. Also, if you fly into an airport on one fuel tank with no problems, consider taking off and climbing to a safe altitude on that same, known to be free of water, fuel tank. Switch to the other (unknown) tank only after you have plenty of altitude to allow a safe return to the airport in the event water may be in this fuel tank. This philosophy is an old one but a good one. For the same reason, if anything untoward happens when you switch tanks, always switch back to the first tank before you try anything else.

BROKEN STARTER CASE?

Recently, we heard of a couple of builder/flyers with this problem. It reminded us of the time we broke the starter on the rear engine of the Defiant, in flight, resulting in a single engine return and landing.

Rather than try to reinvent the wheel, I would like to recommend an article in the July 1993 *Sport Aviation*. It is written by Bob Nuckolls and

can be found on page 57. If you are close to deciding on a key locking, rotary mag switch, Bob's article entitled "Magneto switch options" is mandatory reading.

There is definitely a general misunderstanding about wiring magneto switches and a mistake here can be critical to the health and well being of your starter, your engine and, maybe, even your own body! This problem is exacerbated by the use of the modern lightweight starters that are becoming so popular.

BLISTERS IN THE PAINT

Our thanks to Ian Wilde (Long-EZ G-BOOX) from England for all of the carefully researched material on this subject. I guess we are pretty naive about problems like paint blisters living here in the very dry conditions in the Mojave desert. Paint blisters are rare in our neighborhood and just about any paint system seems to hold up quite well.

This is not at all true, however, in more humid areas of the US and, indeed, any other country including England. Ian reports having severe blistering problems over just about all of G-BOOX (except main gear legs and cowling). He had the paint job done by an experienced aircraft painter in an unheated paint booth. Contouring was done with epoxy and micro and lots of elbow grease! Featherfil (a polyester material) was used as a "fine finish" over the micro. Corlar epoxy primer was sprayed over the Featherfil (allowing plenty of time for the Featherfil to completely dry as Ian was very aware of the hygroscopic nature of polyesters and he is adamant that this care was taken). The Corlar was allowed to cure overnight (per the data sheet) then wet sanded and allowed to dry. The sanding did break through in a few places. They did not spray any Corlar over these areas (a mistake, I believe - ED). DuPont's Imron top coat was then sprayed overall, all of this done in accordance with the appropriate data sheets.

One wing blistered so badly that it had to be refinished within 6 months. The other blistered but it was 4 years before it required refinishing. The canard now needs refinishing after 5 years. WHY? The consensus from DuPont is that moisture was somehow introduced into the paint

films. Apparently all paint systems have a process called "osmosis" which is the facility to allow moisture to pass back and forth through the paint films and no paint system is tight enough to prevent this process.

The possible sources of moisture suggested by DuPont are: 1) Moisture contamination from the compressed air system. The compressor tank may need to be drained completely and, depending on humidity and weather conditions, should be drained several times a day. Water traps must be used in the airlines. 2) Spray painting when the weather is bad - raining or very humid. 3) Using the wrong thinner. The correct thinner must be used with each and every coat of paint, the primer, the primer filler, the top coat. Do not use one manufacturers thinner with another manufacturers paint, however good either may be. It is even worst to use a cheap quality thinner since these materials often have a moisture content well above specified limits. 4) Flash point and drying times, as called out by the paint manufacturer, should be strictly adhered to. Many paint jobs are rushed, the painter thinking he is saving time but, in the long run, this can cause blistering. Applying a top coat too soon over a primer may not allow full evaporation of the thinner. This entrapped thinner will force its way through the top coat causing micro blistering and it may be months before conditions and temperatures are right for this to happen. GO SLOW, and follow the directions. 5) An even paint film weight must be used. If you sand through a primer, re-spray the primer. Low film weights are one of the most common causes of blistering, especially when combined with adverse environmental conditions as described above. 6) Contamination, such as salts (from finger prints) or from water containing minute quantities of salt, can, cause blistering. 7) Applying a solid wax polish to paint when it is still fresh should be avoided. Wax can seal the surface of the paint and trap thinners which can, in turn, lead to soft top coats and possible subsequent blistering. 8) Finally, allowing the painted parts to "cure" in an area where there is high humidity can cause blistering later on because isocyanate activators are, themselves, "moisture seekers" and while not fully cured, can attract moisture.

What did Ian do to try to fix this problem? He used the following procedure: Sanded everything off the wing including the polyester Featherfil. He then applied a coat of wet micro and epoxy which was sanded to contour and, hopefully, would seal the wing. Corlar epoxy primer was applied, sanded and followed by the Imron top coat. The result: Five years later, no blisters. (Careful attention was paid to all of the suggestions above).

CAUTION

A Swiss Long-EZ builder/flyer reports finding the four bolts that attach the landing brake hinge to the fuselage badly corroded. He had removed the brake to install an electric linear actuator and found these bolts heavily corroded. He has been flying for 5 years and has 350 hours on his Long. A regular inspection of these bolts is recommended and this is especially important if you live near the ocean or in a wet climate.

BRAKES AND MASTER CYLINDERS

EZ's require serious diligence when it comes to brake maintenance because the brakes are not only used to slow or stop the airplane, but they are the only means of steering while taxiing.

Recently, there have been two incidents involving brake failures resulting in loss of control, running off runways, through ditches, causing no injuries but seriously damaging both airplanes. The damage included ripped out landing gears, broken wings/winglets and even a broken canard.

Maintaining the brakes is absolutely essential to the safe operation of an EZ and is easy to forget or ignore because most EZ's have wheel pants fitted that hide the brakes. Make it a habit to routinely and regularly remove these wheel pants and carefully check the brake linings for wear. Look for any sign of hydraulic leaks. These will appear as a dark stain at the threads of a "B" nut or fitting. Do not use shop air to blow the dust out of the wheel, this dust consists of asbestos or asbestos-like particles which could be very harmful to your lungs over the long term. Rather, use a high pressure water jet (a garden hose) to flush most of the dust, then use a commercial brake cleaner in a spray can (available at auto parts store) to completely clean the entire brake

caliper, brake disc and wheel. Replace worn brake linings and fix any hydraulic leaks. Allow the brake assembly to dry out completely before going flying.

If you have Nylaflo brake lines, you should change them out every year when you do your annual inspection. Nylaflo is easily damaged by ultra violet (sunshine) and is prone to damage from the radiating heat of the sometimes red hot brake disc. To be safe, change them out as often as necessary. I, long ago, went to Stratoflex Teflon/stainless braided brake lines and have never regretted this upgrade.

Brake master cylinders are all too often ignored. Every couple of years, or more often if you have a brake problem, you should remove and dismantle these critical parts. Replace any suspect "O" rings and thoroughly clean all the parts. (Denatured alcohol works well). Use a bright light and examine the bore of each master cylinder. If there is any scoring or other contamination such as rust, consider honing the bores prior to reassembly.

Aircraft hydraulic brakes are always filled from the bottom of the brake caliper. The hydraulic lines should run continuously uphill to the master cylinder to assure that the fluid drives all of the air out of the system as it is forced into the small brake bleeder on the lowest part of the brake caliper. Have an assistant watch for the fluid as it gets to the brake master cylinder or reservoir. They should do this using a flash light and looking through the small threaded hole usually plugged with a plastic plug.

If you have to do this job alone, you need to make up a clear plastic tube with a fitting on one end that will screw into the 1/8" pipe threaded hole in the reservoir. The plastic line should be long enough to reach out of the reservoir and down to a can on the floor. You must be able to see this plastic line as you pump brake fluid into the brake caliper. (I use a large trigger-operated oil can and it never gets used for anything else!). Continue to pump until you can see brake fluid flowing through the overflow line you have installed. Usually there are a few bubbles in this line. Continue to pump until there are no air bubbles. Now, as you are pumping, tighten the 1/4" nut that is the bleeder. Do not over tighten this nut, it only needs to be firmly snug. Remove

the overflow fitting and plastic line and siphon a little fluid out, lowering the fluid level about 1/2" in the reservoir. I use a 3 foot length of Nylaflo to suck the fluid out. Be careful not to get any in your mouth, it tastes awful! Replace the plastic plug, be sure that it has a small breather hole (1/16" dia. is fine) drilled through it.

Careful maintenance is the key to safe flying - and don't forget, the airplane will usually let you know before it bites you. If you notice a change in your brakes, don't fly - fix it first!

NAVAID WING LEVELER TRACKING

Andre Deberdt reports that the fix recommended in the CP for this problem, namely, to reduce friction in the roll control system, worked very well for him. He replaced the phenolic bushings in the wing roots with ball bearings and now his NAVAID tracks to the degree - and besides, his control stick has much lower friction and the Long-EZ is more fun to fly.

PLANS CHANGES AND OTHER IMPORTANT MAINTENANCE INFORMATION

ALL RAF DESIGNS - NO PLANS CHANGES THIS CP.

Since RAF is no longer active in the development of homebuilts, we are not likely to discover many new errors or omissions in the plans. For this reason, we need your help. Please submit any significant plans changes that you may come across as you go through the building process.

RAF RECOMMENDED SUPPLIERS

Aircraft Spruce
PO Box 424
Fullerton, CA 92632
714-870-7551

Wicks Aircraft
410 Pine Street
Highland, IL 62249
618-654-7447

FeatherLite
PO Box 781
Boonville, CA 95415
707-895-2718

Brock Mfg.
11852 Western Ave.
Stanton, CA 90680
714-898-4366

These suppliers are still the only authorized RAF dealers for all your various aircraft materials and components.

RAF recommends the following prop manufacturers:

Bruce Tift	Ted Hendrickson
B&T Props	PO Box 824
75872 Mosby Creek Rd.	Concrete, WA
Cottage Grove, OR 97424	98237
503-942-7068	206-853-8947

SHOPPING

FLUSH, INTERNALLY MOUNTED ANTENNAS

A complete line of antennas, specifically designed for, and flight tested on, composite aircraft. The antennas are tuned for maximum performance and, in general those who have used them so far, report reception is doubled over standard external antennas.

VariEze builder/flyer, Bill Butters, has started a company to develop a full range of buried antennas. These are normally supplied with a BNC connector built into the actual antenna, but can be supplied without connectors to include enough length of co-ax cable to facilitate easy installation with minimum weight and bulk.

Contact: Bill Butters
Advanced Aircraft Electronics
PO Box 4111
Florissant, MO 63032
1-800-758-8632

CANARD PUSHER DIGEST, 2ND EDITION

Stet Elliott's "Canard Pusher Digest for the Long-EZ" is now in its 2nd Edition. (For a complete description, see CP57). Includes all builder related information from CPs 24-77. The 2nd edition of the Digest has now grown to over 700 pages, and is professionally printed on double sided 8 1/2 x 11" paper from a laser printed master.

Quarterly updates to the Digest are also available. The updates provide additional information from newly published CPs to bring the Digest current. The updates are compatible with either Digest edition.

Note that the Digest is for builders and flyers of the Long-EZ only. It does not support other RAF designs.

CP Digest for the Long-EZ (2nd Edition)
\$75.00
(Overseas orders add \$20.00 for airmail)
Annual Update Subscription (4 updates)
\$25.00
(Overseas orders add \$5.00 for airmail)

CANARD PUSHER NEWSLETTERS "ON DISK"

Stet Elliott has also compiled the text of all the Canard Pusher newsletters in electronic format. The set includes all of the Canard Pusher Newsletters, from the very first one published in May of 1974, to the present. The set of CPs is provided in a text only format which should be 100% compatible with any computer word processor you presently use. It is available for either the IBM or Macintosh platforms. A hard disk is strongly recommended since the set contains over five megabytes of textual information!

This product is ideal for anyone interested in reading about the evolutionary development of RAF's canard designs through the years, or for those builders still plagued with the "I know I read it here somewhere!!" syndrome. With one of the inexpensive text search and retrieval programs, text string searches across the entire set of files are a snap.

CPs on disk costs \$65.00. Specify disk size, (3 1/2" or 5 1/4"), platform (IBM or Mac), and disk capacity.

For either the CP Digest for the Long-EZ, or the CPs on disk, contact:

Stet Elliott
5322 W. Melric Dr.
Santa Ana, CA 92704
(714) 839-8233

VARIEZE INDEX

Lists all plans changes from CP10 through CP68 as well as all suggestions, problems, etc. For any VariEze builder, this is a must. Bill sells it a couple of different ways. You can buy just the

printed book for \$20.00 or you can get the book plus a 5-1/4" IBM compatible floppy disc with a delimited ASCII listing of the data base (or optional PFS professional file data file) for \$24.00. Specify which you would want. This index will be updated annually.

Contact: Bill Greer
811 Cooper Square Cir. #240
Arlington, TX 76013

PLEASE NOTE: Those of you who have the first edition, Bill has improved the indexing of several topics and added more cross-indexing. You may find it helpful to get an up-grade.

DEFIANT FLYER

If you are building a Defiant and you are not currently receiving John Steichen's Defiant Flyer, you are missing a bet. This publication is exactly what is required by both builders and flyers. It contains all kinds of helpful information and great articles. Bayard DuPont's letter on his Ford-powered Defiant in the December issue is a case in point. See CP67, page 2 for information on subscribing to the Defiant Flyer.

Seen at Oshkosh. Beautiful leather seat cushions (also available in various fabrics) for Long-EZ, VariEze and Defiant.

Contact: Diana Davidson
Alexander Aeroplane Co.
900 S. Pine Hill Road
PO Box 909
Griffin, GA 30224
404-228-3901

LONG-EZ PARTS PRICE LIST FROM FEATHER LITE

Main gear strut	\$ 349.00
Nose gear strut	58.00
Engine cowls, pr. (glass)	329.00
Engine cowls, pr. (Kevlar)	480.00
Cowl inlet	48.00
Wheel pants (3.5x5)	150.00
Wheel pants (500x5)	180.00
Above item in Kevlar	215.00
NG 30 cover	21.00
Pre-cut canard cores	160.00
Pre-cut wing & winglets	1199.00
Leading edge fuel strakes w/bulkheads	524.00
Strut cover SC	19.50
Nose wheel cover NB	19.50
Sump blister	19.50
NACA inlet	47.00

3" extended nose gear 70.00

Feather Lite, Inc. is proud to announce another product to re-introduce to EZ builders: The original Space Saver Panel by the late Rusty Foster. This is a bare fiberglass panel with a molded recess for builder installation of an aluminum flat stock electrical panel. \$40.00 Contact Michael Dilley or Larry Lombard (both ex-RAF employees and EZ builders and flyers) at:

Feather Lite, Inc.
PO Box 781
Boonville, CA 95415
707-895-2718

RAF "GOODIES" AVAILABLE

We now have available VHS tapes of two of Burt's talks at Oshkosh '93.

Tape #1 - Design College - Cockpit of the Future.
Tape #2 - RAF Builder's Support Forum.

Please send \$20.00 per tape to RAF at 1654 Flight Line, Mojave, CA 93501. We will pay the postage.

Charms-Long-EZ/VariEze (gold or silver)	6.50
Name patch	1.50
Silhouette patch (no Defiant or Long-EZ)	3.50
3-ship poster (17"x22")	3.75
2 Long-EZs in trail (11"x17")	3.00
Defiant on water (11"x17")	8.00
RAF Chronological poster	15.00
Long-EZ lithograph	10.00
Color photos (EZs, Solitaire, Defiant)	1.25
Night photo by Jim Sugar	5.00
Videos - Building the Rutan Composite	25.00
Go-A-Long-EZ	25.00

FOR SALE

F-16 DEEP STALL INCIDENT VIDEO

Gives a pilot's-eye view of a deep stall which almost doesn't recover. Includes a letter describing what the important learning points are from the video, especially as they apply to EZ pilots who are unfamiliar with deep stall, as well as a transcript of the audio portion (for clarity). Price - \$13.00.

Contact: Charlie Precourt
7015 Little Redwood Dr.
Pasadena, TX 77505-4433

AIRCRAFT COVERS

Custom cover for you Long-EZ. This neat design completely covers your prop, canopy and nose and only uses two straps. Made from space-age Evolution 3 material. Reasonable price.

Contact: Tony Brazier
PO Box 6478
Ocala, FL 32678
904-237-1811

NOSE GEAR RATCHET

Dr. Curtis Smith's nose gear crank ratchet is still available at \$38.00 which includes postage and packaging. No need to call, just send check or money order. This little device should be considered a "must" by all Long-EZ and VariEze builder/flyers. Once you have flown with it you will wonder how you ever did without it.

Contact: Curtis Smith
1846 Sextant Dr.
Worden, IL 62097
618-656-5120

SIGHT GAUGES

New, improved fuel sight gauges. Use with auto fuel or Avgas. Clear bubble with white background. Retrofit for Long-EZ and VariEze. \$35.00 per set.

Contact: Vance Atkinson
3604 Willomet Court
Bedford, TX 76021-2431
817-354-8064

ORIGINAL REM 37 BY SPARK PLUGS. These are the short ones available up to mid 80's. New - \$17.00 ea.

They were the "thermos" expanding "o" ring-type. This type of fuel cap requires regular lubrication of the "O" rings at 25 hour intervals. If this is not done

Contact: Steve Franseen
303-987-2985 (leave message)

FOUR STACK STAINLESS EXHAUSTS

Further update on the all stainless steel 4-stack exhaust pipes. They are now available with springs and slip tubes at the flange or with ball joints, builder's choice, each still has the original slip tube support on each side to keep the pipes totally independent of each other. They have 1/4" type 321 stainless steel flanges and type 321 .035" stainless steel tubes. The tubes are "degreased" inside and out before they are purged or back-gassed with argon while being welded (others don't do these two very important steps). They fit Lyc. engines for any pusher aircraft, EZ's and Cozys, etc. - Cost - \$500.00 plus \$15.00 shipping and handling.

Also, if anyone would like to have ball joints fit and welded on their existing pipes, the cost is \$150.00.

The RAM AIRBOX is still available at \$325.00. Reusable foam air filter - \$20.00 plus \$11.95 shipping and handling.

The increase of performance of both 4-stack exhaust pipes and airbox combination is very impressive, about 200 rpm on the average Long-EZ installation. Builders can call or send SASE for a flyer. Both items come with an installation sheet.

Contact: Hal Hunt
6249 Longridge Ave.
Van Nuys, CA 91401-2528
818-989-5534

HARD TO FIND BELLCRANK BEARINGS

Bellcrank bearings for control systems are now in stock again. Due to a nation wide shortage, Wicks has contracted with a local manufacturer to provide as many as needed. They just received 5000 of the BC4W10 bellcrank bearings which are used on many experimental aircraft.

THE LATEST IN LAMINATING EPOXY

In stock - a large supply of the newest laminating epoxy available. PTM&W Industries 2032 Epoxy Resin and 3660 Hardener is designed for all types of structural applications and for all your laminating needs.

PTM&W Industries, working with respected aircraft designers, has developed this new epoxy laminating system to be the safest to use, and to

have the best chemical adhesion on fiberglass, carbon fiber, Kevlar, etc.

Contact: Wicks Aircraft Supply Co
Bill Weder
618-654-7447 or
1-800-221-9425 for a free catalog.

PARTING OUT A LONG-EZ

Lyc. 0-235 2400 TT, 46.6 hours since major. Landing gear with wheels and brakes, nose gear, stereo headsets with intercom and much more. Send SASE for complete list:

Contact: Barbara Raymond
Box 214
Big Oak Flat, CA 95305-0214
209-962-5752

NOSE WHEEL SHIMMY DAMPER

Bob Davenport tells us that he can still supply this excellent damper. Unfortunately he gets very few orders nowadays but can sell them even if he gets only one order. Including the set up charge, the cost is \$236.00 delivered in the USA.

Contact: Bob Davenport
PO Box 650581
Vero Beach FL 32965-0581
407-567-1844

AILERON/RUDDER HINGE RETROFIT KIT

The purpose of this kit is to effectively prevent additional wear on the aircraft hinges and thereby circumnavigating a time consuming hinge repair down the road. The hinge kit will fit any MS20001-P3, -P4, -P5, or -P6 extruded aluminum piano hinge that is specified for use on the Long-EZ, VariEze, Defiant, Cozy, Glasair ailerons and/or rudders. You will be supplied with enough Teflon spaghetti tubing and a special high grade stainless spring steel wire for all the hinges used in the ailerons and rudders.

This hinge kit will work in an already worn hinge, but just how worn out (larger I.D. of hinge hole) remains a questions we cannot answer. We believe the DuPont/Teflon tubing supplied in the kit will wear proportionally to the amount of space between the tube and the hinge. After more than four years there has not been any additional wear on any of the installed retrofit kits that we know of.

INSTALLATION: I enclose detailed instructions with each kit explaining several different installation methods used by various builders.

Please note: These kits cost \$27.00 US within the USA and Canada. Overseas, the cost is \$31.00 US. All orders shipped in the 48 continental United States will be UPS, the rest are shipped by mail. Please add \$2.00 US on Rutan Defiant Kits and \$10.00 on Solitaire kits. Please try to send the correct amount as kits will be sent COD (balance owed) unless other arrangements are approved by us.

When ordering any of the kits, please supply the following information for purpose of giving you the proper kit supplies and providing emergency updates should that necessity arise. Shipping costs are included in the above prices.

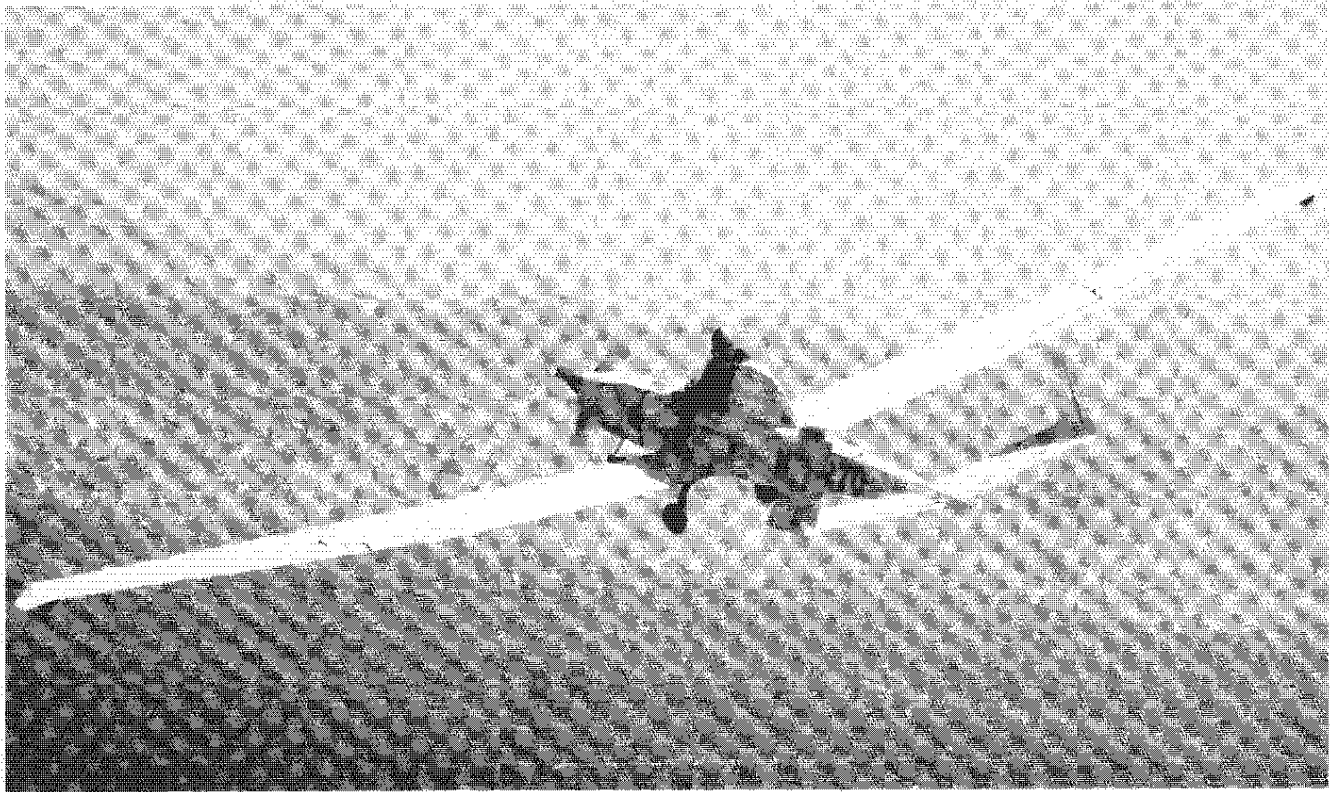
1. Name and address. Kits cannot be delivered by UPS to a PO box. Address must be a physical structure. Please type or print clearly.
2. The serial number the kit designer has given you and your government supplied tail number, if you have them.
3. Phone numbers for both work and home, if that is as all possible or practical.
4. Type of aircraft, e.g., Glasair, Defiant, Long-EZ, etc.

Contact: Gary A. Hall
851 SW 63rd. Ave.
North Lauderdale, FL 33068
305-971-9731 (home recorder)
305-477-0809 (SoftSol Corp.)

WANTED

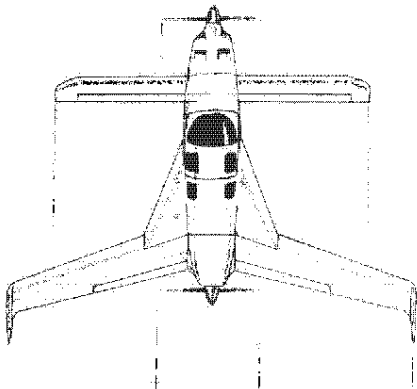
VariEze prop - new or used, for Cont. 0-200.
Contact: Cindy
303-440-3579

One set of 500x5 wheels and brakes, complete.
Contact: Byrdell Mathews
26311 Hwy 75
Spring, TX 77380
713-523-1751



“Quiver”, a high-altitude, unmanned air vehicle — seen here on its second flight with Doug Shane in the saddle. Several flights were flown manned to prove the systems before flying as an RPV.

RUTAN AIRCRAFT FACTORY
1654 Flight Line
Mojave, CA 93501



TO:

APR. & JULY: 94

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CP 78