

CANARD PUSHER

JULY 1998

RUTAN AIRCRAFT FACTORY

VOL.14, ISSUE 3, NO. 93

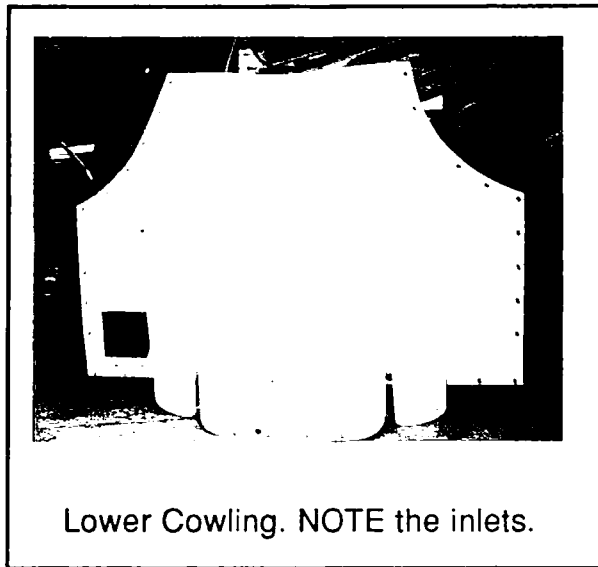
Feather Lite produces Mike's cowling

by Mike Melvill

Mike's Carbon Fiber engine cowling, is now available from Feather Lite. Call Larry Lombard, or Mike Dilley for details. The tooling is now in their hands, and I spent a weekend up in Boonville, discussing how to build the cowling, and taking photos of the cooling duct work that is in the lower cowl and required for good cylinder head and oil cooling.

First, a little history: during the early planning stages of my flight around the world, it was obvious that the marginal cylinder head and oil cooling that I had lived with for years in my Long-EZ, would not be adequate for the up-coming trip. The expected long climbs at very heavy take-off weights, in the warm temperate climate of the tropics, were sure to run my cylinder head temperatures to the stratosphere, and would peg my oil temperature for sure.

Over the nearly 18 years that I have been flying my Long-EZ, I have tried essentially every idea that came along to improve cooling. Most of them worked a little, but none of them completely cured the problem. A number of years ago, Jim Kern, of Task Research in Santa Paula, CA, built a highly



Lower Cowling. NOTE the inlets.

modified version of a Long-EZ, which had "armpit" cooling inlets in the corner of the wing/fuel strake and fuselage, at the forward edge of the cowling. These were quite large, and draggy, but very effective for cooling the engine and the oil. Some time later, we at RAF were involved with the US Army, in the modification and developmental flight testing of two Long-EZs. For other reasons they were not able to have the engine cooling inlet on the bottom of the plane, so we decided to design and install an "armpit" inlet on each side,

similar to Jim Kern's design, but with a lower profile, with a smaller rectangular shape.

Much more recently, while flying Dave Ronneburg's Berkut, I was intrigued that he did not seem to have the same high temperatures that I did. Talking to Dave I learned that I should try something close to what he had, and he very kindly provided me with a couple of Berkut inlets to try. They were designed specifically for a Berkut, so did not fit into the square corner of a Long-EZ very well. However, they worked well enough that I decided to bite the bullet and make a completely new cowling.

See *Cowling* on page 4

**For other photos & former article about Mike's custom cowling,
see Canard Pusher #86, October 96 issue**

BRIEFS

1000 Hour Club — We would like to know who out there has 1,000 hours or more on their Rutan canard airplane (Mike and Dick both have 3,000 hours!). Please pass us a note, and if you can, send a photo for the Canard Pusher.

Central States Newsletter On-Line

If you are looking for a particular article from a Central States Association back issue, check out the on-line index at <http://www.canard.com/csa/>

Thanks to the efforts of Bil Kleb and Wayne Wright, all 2200+ articles from January 1990 to the present are listed. The web site has an on-line search capability and you are also able to download the raw data (in tab-delimited format) for off-line use with a spreadsheet or other database software. Additionally when you visit a web site on-line, the information you see is actually downloaded to your computer. For instance, with the Netscape browser, you can save the information by clicking "File," then "Save As."

EZ pilot Jerry Hansen's new website covers Fly-In information, airports, reprints from the Canard Pusher, and much, much more! Take a look at <http://www.ez.org>

email RAF at raf@hughes.net

Light Speed Engineering Web Site

Klaus Savier has a new web site <lsecorp.com>

Golden West EAA Regional Fly-In

<http://www.gwfly-in.org>

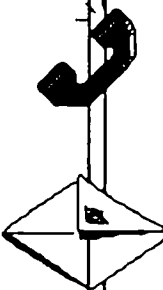
TEAM REMAX Around the World Balloon Web

<http://www.remax.com/balloon/>

RAF HOURS: Rutan Aircraft is officially open every Wednesday. Please call between 10 am - 2 pm (805) 824-2645 and 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.

Note — Sometimes you can catch Tonya at RAF Monday thru Friday. She is in and out. Try and try again.

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



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Editor: Mike Melvill
Publisher: Tonya Rutan

U.S. & Canadian subscriptions \$14; Back issues \$3.50
Overseas (Airmail) subscriptions \$16; Back issues \$4

RAF is no longer accepting multi-year subscriptions. Please renew only after your current subscription has expired.

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

VariViggen (1st Ed)

CP 1 to current

VariViggen (2nd Ed)

CP 18 to current

VariEze (1st Ed)

CP 10 to current

VariEze (2nd Ed)

CP 16 to current

Long-EZ

CP 24 to current

Solitaire

CP 37 to current

Defiant

CP 41 to current

A current subscription of the Canard Pusher is mandatory for builders, as it is the only formal means to distribute mandatory changes.

Take Precautions: Check safety related stuff!

Although the NTSB has not released it's final report on the cause of the accident that claimed John Denver's life, they have published a preliminary report on the internet, and elsewhere, that should give all of us who fly EZs reason to check our birds.

Fuel sight gauges: Verify that your sight gauges are calibrated and clearly marked as to fuel quantity. This is called out to be done before first flight in the owners manual, but not everyone has complied. This is not only an FAA requirement, it is also common sense.

It does not have to be anything exotic, a simple felt tip permanent marker line drawn across the sight gage at the 5, 10, 15 and 20 gallon levels, is fine. Remember to block the nose wheel up 'til the top longerons are 2 degrees nose up, for best in-flight accuracy. If you want to get a little more exotic, you could mark each 5 gallon increment in the three point attitude, so you could more accurately know what your fuel state was on the ground. You should mark these two conditions with two different colors, or in some way so that you will never be confused.


Drain all fuel, then put exactly 5 gallons in and mark the gage. Add fuel in 5 gallon increments until you have calibrated both fuel tank sight gages. I only marked my Long-EZ for in-flight, and only at 5, 10 and 15 gallons. This system is flawless, and the magic marker lines have been on the gages for nearly 18 years, and are still dead accurate!

Fuel Valve: Likewise the fuel valve must be clearly marked as to each position, *Off*, *Left* fuel tank and *Right* fuel tank. It is not wise to think that just because you built it you will always remember where to place that fuel selector handle. Someday someone else may fly your plane, and that someone may not figure it out in time if they were foolish enough to run a tank dry. Also, it is an FAA requirement, and again simply demonstrates good sense.

Placement of the fuel valve-selector handle: The plans call for this valve to be placed between the pilots knees, where it is in plain view of the pilot. The selector handle should be installed

such that when the handle points to the left, you are on the left fuel tank, likewise, if the handle points to the right, you are on the right tank. When the selector handle points at you, the valve is off. If yours does not function as above, fix it so that it does, and clearly mark each position.

Don't ignore any of these, they are all critical to flight safety. The Denver accident, was almost certainly a fuel-related problem, and in the plane he was flying, none of the above items were complied with. Your life, or the life of a friend could depend on you doing a conscientious job on any or all of the above — *Mike*



To report accidents and incidents

Call RAF
(805) 824-2645

Fax RAF
(805) 824-4174
(805) 824-3880

Write RAF
1654 Flightline
Mojave, Ca 93501

Email RAF
raf@hughes.net

Cowling

I actually used my original 17-year-old cowl for the male plug I built, so I was really committed! I removed the NACA inlet, filling that area in to be flush and smooth on the bottom of the plane. I extended the trailing edge of the cowling a couple of inches to try to achieve lower boat tailed drag, as well as to reduce the cooling air exit area. I believed that both of these features would result in lower drag.

I then designed and fabricated two inlet "armpit" scoops that were slightly less inlet area than what Dave had on his Berkut, not including the additional lower scoop that the Berkut uses for oil cooler cooling. I did not include one of those. My cowling only has two "armpit" inlets, both mounted on, and part of the lower cowl. The cooling air that passes into the cowling through these two inlet scoops, cools the cylinder heads, the engine and it's accessories, and the oil. In addition it also is the only source of breathing air for the engine (carb or fuel injector).

I conducted a very thorough evaluation of this cooling system, and found that I needed a larger oil cooler to keep the oil temperature in the middle of the green. I also had to control and deflect the high speed incoming air toward the cylinder heads to get the best possible results. I went through a number of variations on the composite ductwork in the lower, before I was happy with the results.

The final iteration is now documented and in the hands of Larry and Michael at Feather Lite.

I was so pleased with my new cooling system, that Dick Rutan, who had the same basic cooling situation that I had, decided to use my tooling and build and install one on his own Long-EZ. We both fabricated the cowling parts from Carbon Bid and epoxy, and were amazed at the weight savings over our old original cowls. My old cowl weighed 26 lb., and my new Graphite cowl weighs 13 lb. Cooling is dramatically improved, both in my plane, as well as in Dick's. Actually, my cylinder heads run almost too cold, in the low 300 degrees F at cruise, and never more than 390 on the warmest day, in the longest climb, at the heaviest gross weights!

As an example, the following data was taken at maximum power, in level flight, at 9000 feet, where the OAT was +6 degrees C. All temperatures are in degrees Fahrenheit.

Cylinder Heads:

#1-331, #2-335, #3-332, #4-336, Exhaust Gas Temps: #1-1380, #2- 1361, #3- 1385, #4- 1380.

All temperatures were taken on an Allegro Digital Engine Analyzer, which I believe to be the most versatile engine instrument available today. **Note:** In order to cool the oil on a larger than standard engine, it is mandatory that you use a larger oil cooler. The one I have used for several years now with great success, is a Stewart Warner, part #10634R, with 13 "bays" and is almost square, measuring Approximately 6" by 6.25" of

cooling area. This cooler is mounted in the same spot on the lower cowling as is called out in the original plans. I have tried mounting the cooler in every conceivable position, and have found this to work the best.

I must say, I am absolutely delighted with my lightweight cowling. It looks nice and clean, and it is definitely lower drag. It reduced the drag on Dick's Long-EZ, as I recall, he picked up about knots. His temperatures also are excellent, although his oil temperature is not as cool as mine. We believe this is because he does not have as large an oil cooler as I do.

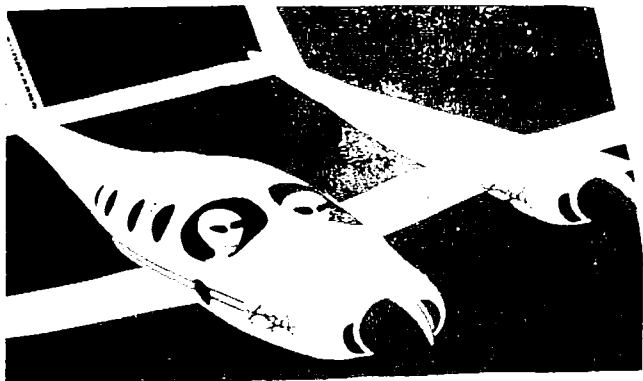
The new cowling design does not fit under the mounting flange on the plane as the old one used to. I added a flange under the existing flange, so that both the top and bottom cowls simply lay on to the plane, and are held in place with Cam Locs, no screws! Much quicker to remove, and I don't keep stripping the screw heads like I used to!

Installation details, together with internal ducting in the lower cowl, will be provided by Feather Lite when they send you your new lightweight graphite cowling.

See Page 10 for a list of Feather Lite products.

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

Boomerang Tee Shirts for sale



"It sure feels good to get out of those Rutan masks for a couple of hours!"



Limited Edition Alien Shirt
with *Glow-in-the Dark Aliens!*
Short sleeve, Black and White
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Artist Dan Kreigh

Boomerang Two-sided
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Hanes® 100% preshrunk Cotton
Burgandy on White
Artist Dan Kreigh

Alien Tee Shirt

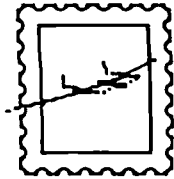
_____	Medium	\$17
_____	Large	\$17
_____	X-Large	\$19
_____	XX-Large	\$19
_____	XXX-Large	\$20

Boomerang Shirt

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_____	Large	\$19
_____	X-Large	\$21
_____	XX-Large	\$21
_____	XXX-Large	\$22

Overseas add \$3 for shipping California residents add 7.25% tax
Mail check or money order to: RAF 1654 Flightline, Mojave, CA 93501

Can Voyager be licked? Airplane's Postage Stamp One Letter Away



Neither rain, nor snow nor repeated rejections from the Citizen's Stamp Advisory Committee has stopped Kelly Hall's drive to put the Voyager back into the air — the airmail, that is.

Kelly Hall (from Dick Rutan's office) has been trying to persuade the Citizen's Stamp Advisory Committee (CSAC) to produce a Voyager Stamp since 1989.

She started with a handful of letters from friends and family. When *that* didn't work, Kelly turned to the extended Voyager and canard family for help. Thousands of requests poured into Kelly's office, which she

Citizen's Stamp Advisory Committee
United States Postal Service
475 L'Enfant Plaza, SW
Washington DC 20260-2435

has forwarded to the committee, and she says she is certain thousands more have reached CSAC on their own.

After eight years it now seems we are getting some deliverance. Kelly recently received news that the Voyager Stamp is under consideration by CSAC for "the nomination of First Flights or Manned Flights."

If you would like to give the CSAC your 32-cents worth, address your letter or postcard to the CSAC with your request for a Voyager Postage Stamp.

As Kelly says, "we may be just a letter or two away from convincing CSAC that the Voyager is worth a stamp!"

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Send check or money order to **TERF**, 11411 Culver, Brighton, MI 48116
(810) 229-2082

Burt, Mike & Dick's **'98 Oshkosh Schedule**

29 July:	2:30 pm — Ohio Aerospace Institute Forum — Tent 5 — Dick Rutan
30 July <i>Thur</i>	1:30 - 2:30 pm — Museum Appearance at Voyager Exhibit — Dick Rutan
30 July	7:00 - 8:15 pm — X Prize Talk — Tent 6 — Burt Rutan
31 July <i>Fri</i>	10:00 - 11:15 am — R & D & Homebuilt Programs — Burt Rutan — Tent 6
31 July	11:30 am — Around & Around & Almost Around — Tent 6 — Dick Rutan
31 July	1:00 pm — Mike's Cowling — Bull Session — Mike's Long-EZ — Mike Melvill
31 July	1:30 - 2:30 pm — Museum Appearance at Voyager Exhibit — Dick Rutan
1 August	10:00 - 11:15 am — Tent Talk Show — Burt Rutan & John Roncz — Tent 6
1 August	1:00 - 2:15 pm — X Prize Talk — Tent 6 — Burt Rutan
2 August	10:00 - 11:15 am — A Future Vision for General Aviation — Burt Rutan — Tent 6
2 August	1:00 pm — Mike's Cowling — Bull Session — Mike's Long-EZ — Mike Melvill
2 August	1:30 - 2:30 pm — Museum Appearance at Voyager Exhibit — Dick Rutan
3 August	1:30 - 2:30 pm — Museum Appearance at Voyager Exhibit — Dick Rutan

All date & times are subject to change. Be sure to check your EAA program

Mike to demonstrate cowling at Oshkosh

Meet at Mike Melvill's Long-EZ on Friday & Sunday for an in-dept discussion of his new cowling design.

Osh 98 Hot Dog Roast

Oshkosh Canard enthusiasts are invited to el famoso wienie roast hosted annually by Gene & Ann Zabler and Marty & Linda Pavlovich. The party will be held in the EAA Nature Center Hospitality Tent, west of the main permanent nature center building, on Friday, July 31 from 5 to 9 pm.

1998 EAA AirVenture Cup Kitty Hawk to Oshkosh Air Race

It has been reported in the July issue of Sport Aviation that the first annual Experimental Aviation Association's Air Venture Cup cross country air race will be run this year just prior to Oshkosh '98.

Starting at the birthplace of flight, Kitty Hawk, NC and ending at Oshkosh, the home of the EAA, the 822 nautical mile race is intended to recreate the excitement of the Bendix Trophy air races of the 1930s and 1940s.

This year's field has 15 entries:

Chuck Coleman, Lancair, Chesterfield, MO; John Daniels, Berkut, Pacific Palisades, CA; Dennis Flamini, Tailwind, Frankfort, IL; Hoot Gibson, Hawker Sea Fury, Ortho Sport, Forest Park, IL; Dick Keyt, Polen Special, Southlake, TX; Peter Lach, Skybolt, Clinton, MI; Craig O'Neil, Glasair, Arlington, WA; Jim Rahm, Lancair IV-V-8, Daytona Beach, FL; Richard Riley, Long-EZ, Santa Monica, CA; Dave Ronneberg, Berkut, Los Angeles, CA; Gus Sabo, Long-EZ, Las Vegas, NV; Bob Schmidt, Questair Venture, Ft. Worth, TX; Tom Taylor, Glasair, La Crescenta, CA; Claudio Tonnini, RV-4, Elizabeth, NJ; Rittner Will, Questair Venture, Sevierville, TN

Fly-In with Friends

1998 R.A.C.E. Schedule

Labor Day Wendover Race September 5-7

800-648-9668

Stateline Inn

800-531-7300

Call early, there will not be a block
of rooms reserved

September 26-27

JEAN R.A.C.E.

Gus Sabo 702-454-0078

October 31- November 1

Mesquite Sprints Week-end

Virgin River Resort

800-346-7721

November 28

Kilo Trials

Buckeye Airport

Fly into Goodyear, AZ

Comfort Inn Motel

602-932-9191

Shirl Dickey, E-Racer and King
Racer have a new address and
telephone: PO Box 828, Aquila,
AZ 85320
520-685-3126

email: mrracer@primenet.com

Airport: Eagle Roost Airpark,
Aquila Airport, 75 NW of
Phoenix

September 12-13 Beaver '98 Fly-In & Camp-Out

Bob Banville of Beaver, MI has again generously offered to host a "get back to nature" experience at the Beaver Island Airport. (SJX) 4000' paved runway, some fuel available on island, other airports within 30 miles, charming campgrounds, hot & cold water and in-door plumbing facilities.

You must RSVP before August 27 with Terry Schubert for reservations.

9283 Lindbergh Blvd
Olmsted Falls, OH 44138
jschuber@juno.com

25-27 September 1998

1st Annual Golden West EAA Regional Fly-In

Castle Airport, Atwater, California

<http://www.gwfly-in.org>

15-18 October

South West Regional Fly-In

Mass Canard Arrival at Abilene TX

Meet Oct 16 at Mineral Wells or Breckenridge
Airports

Dinner at Perini Ranch

Contact Vance Atkinson
(817) 354-8064
vaatk@flash.net

Fred Warden
1903 Mission Creek Circle
Houston, TX 77084
(281) 492-2078

JP Skip Barchfeld
PO Box 371
D'Hanis, TX 78850
(830) 363-7649

Spin-On Oil Filter Adapter for Lycomings

B & C Specialty Products' latest product is the neatest idea I have seen in a long time. It is a 90-degree, spin-on oil filter adapter for Lycoming engines. It is beautifully made by CNC milling out of a solid aluminum billet and bolts onto the accessory case in place of your oil screen housing or AC spin on filter adaptor. It fits perfectly, does not interfere with the magnetos, the vacuum pump or even the mechanical tachometer drive. It also has plenty of clearance on your engine mount and firewall, important considerations when you operate an EZ!

I installed one on N26MS and now have a full flow, spin on champion oil filter, with no high pressure hoses to a remote mounted filter which could leak. It comes with everything you need to install it: a new gasket, new aluminum washer for the vernatherm, and new copper washer for the oil temperature sensor. They even send a small container of the proper sealant for the gaskets. Of course it comes with new Lycoming bolts to mount it.

It is fairly expensive at \$395 but is available to EZ flyers until the end of 1996 for \$350. I am extremely pleased with mine and I heartily recommend it for anyone running a Lycoming engine on an EZ. A fuel flow spin-on filter allows 50 hours between oil changes and prolongs the life of your engine.

Give B&C a call at (316) 283-8662 or fax (316) 283-8000. You'll be glad you did! *Mike*

RAF Recommended Suppliers

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

Brock Mfg.
11852 Western Ave
Stanton, Ca 90680
(714) 898-4366

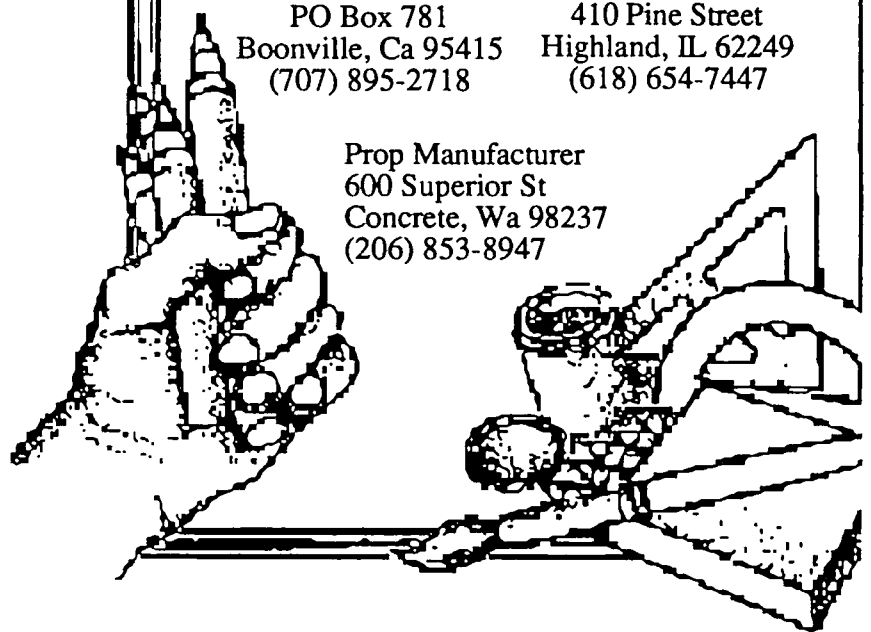
Aircraft Spruce West
PO Box 4000
Corona, Ca 91718-9961
(909) 372-9555
Fax (909) 372-0555

Aircraft Spruce East
PO Box 909
Griffin, GA 30224
(770) 228-3901
(800) 831-2949

Feather Lite
PO Box 781
Boonville, Ca 95415
(707) 895-2718

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

Prop Manufacturer
600 Superior St
Concrete, Wa 98237
(206) 853-8947



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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.

Call Bill Butters 800-758-8632
63032

Advanced Aircraft Electronics, PO Box 4111, Florissant, MO

Feather Lite Inc.

LONG-EZ PARTS PRICE LIST

Main Landing Gear Strut	\$379.00
Nose gear strut	\$64.00
Engine Cowl Glass Top & Bottom Set	\$369.00
Engine Cowl Kevlar Top & Bottom Set	\$499.00
Cowl inlet	\$ 60.00
Wheel pants (3.5x5 set)	\$170.00
Wheel pants (500x5)	\$195.00
Wheel Pants Kevlar	
500x5 Set original style only	\$230.00
NG 30 cover	\$23.00
Pre-cut Foam Cores Canard	\$180.00
*Pre-cut Foam Cores Wing & Winglets	\$1180.00
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Bulkheads Left & Right	\$199.00
Strut cover SC	\$23.00
Nose wheel cover NB	\$23.00
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Carb. Air Box Kit	\$165.00
Baggage Pod Set	\$395.00
Nose Bumper Rubber	\$10.00
NACA inlet	\$55.00 (requires cowl modification)
Propellers, with rain leading edge	(call for quote)

Contact Michael Dilley or Larry Lombard
(both former RAF employees
and EZ builders and flyers)
Feather Lite, Inc., PO Box 781
Boonville, CA 95415
707-895-2718

A check or money order is required to process orders.
Orders are filled by postmark date.
California residents add 7 1/4% sales tax.

All Truck orders shipped freight collect.

We've negotiated a 40% discount with Viking Freight.

Please include a telephone number, a mailing **and** a street address.

Please allow 30 days for delivery, we will expedite when possible.

We will discuss questions regarding our products by phone or mail.

*Items must be shipped by truck.

Nose Gear Ratchets

I have agreed, effective October 1, to take on the job of producing the nose gear ratchets that have been supplied by Dr. Curtis Smith. The job kind of overwhelmed him, and I am hoping that it does not do the same to us! I have orders for around 25 outstanding right now and am tooling up to do an initial run of 100. Price has, of course, gone up. The cost of materials and labor always does. I will be offering the units built exactly to his original specifications. I can't improve on a perfect design! I will, however, be offering the units in two finishes. The standard unit, part number 44807, and a chrome finished version, part number 44812. These are also the Sears part numbers for the two finishes of the 1/4 inch ratchet drives. Each ratchet includes installation hardware and instructions. Prices are as follows:

44807 Ratchet	\$49.95
44812 Chrome finish ratchet	59.95
Shipping & Handling	5.00

See our award winning Long-EZ at
<http://www.flash.net/~infaero/acgear.gif>

Projected shipping times are 5 to 7 working days after ARO. There is, as with all our products, a 30-day money back guarantee provided the unit is undamaged. Sorry, no COD orders. Prepaid personal check is preferred. Your check is held until 30 days after shipment to you. Visa and Master Card are also accepted. Please add \$3.00.

Bill Theeringer, N29EZ
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Santa Barbara, CA 93121
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email _ composite_aircraft_accessories_@CompuServe.com



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GU canard full span vortex generators with layout template - \$170.00. These are very exciting! Rudder horn CS-301L&R replacements, \$25/pair. Shipping inc.

Ti Specialties, PO Box 1052
Grover Beach, CA 93483-1052
805-489-8155



STARTER FOR 0-200 CONTINENTALS

B&C Specialty has introduced a beautifully made, 12 volt starter specifically designed to be installed into the accessory housing on a Continental 0-200 engine, or on an 0-240.

This starter has been thoroughly tested at Teledyne Continental (more than 5000 start cycles without a single problem!).

Bill Bainbridge has these starters available for immediate delivery and they can be had STC'd or for homebuilts.

Contact: B&C Specialty Products, Inc.
123 East 4th Street, Newton, KS 67114
316-283-8662



N49DW was on the cover of Trade-a-Plane last April.

Daniel & Monica Wicklund of the Flamingo Air Racing Team, Lake City, Florida have 360 hours on their EZ.

RUTAN AIRCRAFT FACTORY
1654 Flight Line
Mojave, CA 93501

Bulk Rate
U.S. Postage
PAID
Permit No. 75
Mojave, CA
93501

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87* LAST CP IS 9 9
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JULY 98
CP 93

If your label says LAST ISSUE CP 93, this is your last issue and you need to renew.