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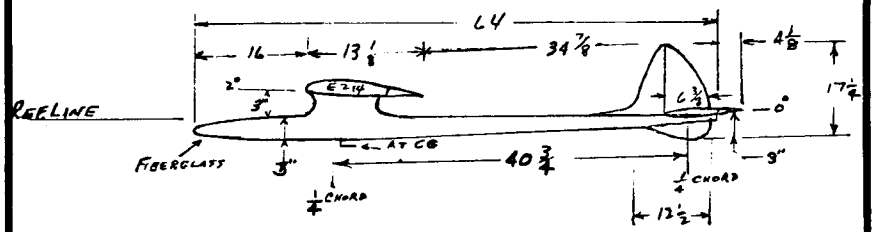
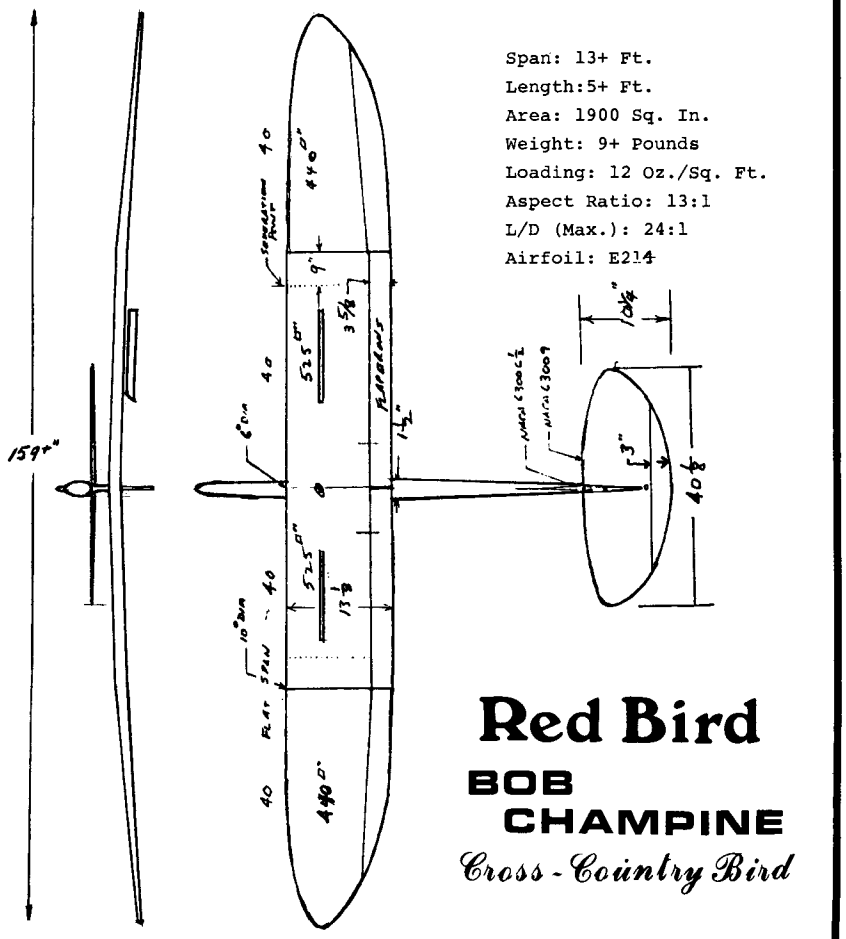
Soaring RC Digest

VOL. 1 NO. 12 DECEMBER 1984





Span: 13+ Ft.
Length: 5+ Ft.
Area: 1900 Sq. In.
Weight: 9+ Pounds
Loading: 12 Oz./Sq. Ft.
Aspect Ratio: 13:1
L/D (Max.): 24:1
Airfoil: E214

Red Bird

BOB CHAMPINE

Cross-Country Bird

HI START

December is typically a time to take stock of things, to look back over the previous months and to decide whether you would have done anything differently if you had the chance. It's also a time to look forward, to think about the future and to determine not to repeat the mistakes of the past. Editors and Publishers often make a habit of boring their readers with a perennial rehash of the year... so, let's do a bit of stock-taking, shall we?

Basically, I am very pleased with the reception to RC Soaring Digest. Your ideas, your comments, and - yes - your criticisms, too, have helped me get over the hurdles of publication and content. RCSD seems to have met a need, and has not fallen too far from the mark originally set for it: to provide information of use to soaring pilots everywhere. This is not to say that I am satisfied; in fact, far from it.

The print is too small. Hopefully, in the future I'll be able to fix that problem. Many of you would like to have more pages - and so would I. That will come as we get more subscriptions, and have the money at hand to provide them for you. Too much F3b coverage, according to some of you. Okay, I'll accept that, but won't discontinue F3b at all; rather, I'll de-emphasize it a bit. Most of you have asked for more technical information of a 'how to' nature. All of you want more about construction, design, and airfoils...so I'll try to cater to that wish. A very few have objected to the cost, and I can sympathize with that viewpoint. Nevertheless, the cost of paper, halftones, printing, and mailing have eaten up whatever small profits there could have been. I don't pay myself any salary, nor do I pay my wife and business manager any salary. Every bit of money taken in goes right back into the business, as it must to keep going. I spend perhaps ten hours a week of spare time on RCSD, but Peggy spends more like 30 or 40 hours on it. To do this without pay means that we consider it a labor of love... our contribution if you will to RC Soaring. There has been no real profit in '84, but I am happy to say that it has been a 'break-even' year. In 1985, I hope to make a small profit - not to be able to pay us, but to be able to improve the quality and quantity of the content.

Now, a word about you - my readers, supporters, friends, and beloved critics. Your input each and every day has made this effort your own. RCSD exists not only for you, but because of you. Without you I just couldn't do it, and I wouldn't bother. You have inspired me, helped me, picked me up when I was down, and encouraged me to keep going. For that I owe you my gratitude and thanks...and a continued Digest. I hope to bring you more photos and better drawings, plus much more of the sort of things you like. For example, Bill Kournikakis up in Saskatoon, Saskatchewan has suggested publishing a collection of digested articles on a common subject. Such a book might be on tricks to improve your own soaring performance. Another might be about construction and finishing. Another might be on the subject of airfoils for sailplanes...speaking of which, I must call your attention to Michael Selig, a bright young man who has already contributed greatly to airfoil evaluation and design. Michael's work has appeared in SOARTECH III, and you absolutely must become acquainted with it. So, in '85 you may see the first of these anthologies appear.

The December issue that you are reading now contains a list of RCSD subscribers, and this is my bonus gift to you. If some of you wonder why I've put together a list for all of you to use, the reason is simple: together, you can do more than any one of us can do separately. There's strength in numbers and in knowledge. Who knows, maybe you would like to write to each other, visit each other, or even fly together sometime. Perhaps you wren't even aware of there being someone like yourself in your own state. Here's your chance to find out. Maybe you travel in your business and on vacation. How better to discover local information than to carry your subscriber list with you and contact a reader in the area where you'll be visiting? Getting to know each other personally will be one of the best things that can happen to any of us, and it has already enriched my life.

RED BIRD, featured in this issue, is a cross-country design that is quite sophisticated despite its old-fashioned appearance. Bob Champine, the designer and builder, credits Carl Goldberg and Frank Zaic with the appearance - pylon, elliptical wing, and all. Enjoy!

Happy Soaring and Season's Greetings,

Jim

RED BIRDS I & II .....Bob Champine

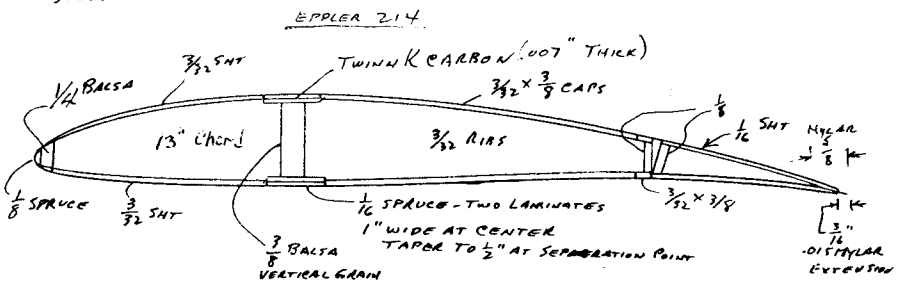
Cross-country soaring has become very popular in the last few years, and several times each year in such diverse places as Florida, California, Illinois, teams of competing soaring pilots come together to test their mettle against wind and rain, sun and clouds, time and terrain - and each other - to see who can fly the farthest and the fastest. Some cross-country courses are straight-line, downwind runs while others are loops, squares, triangles, circles or just plain out-and-return courses. Vehicles used to carry each 'team' (consisting of a driver, a spotter, a pilot and a utility man) have included convertibles, pickup trucks, station wagons, and any other kind of conveyance suitable for holding pilot and crew for the time needed to traverse the course. Most of all, the vehicle should be comfortable for the pilot, and should afford the best possible visibility in all directions. The final ingredient is the sailplane itself, and here is where almost everyone concludes that size is of great importance, and the bigger the better. In this exposition of his own views of Cross-country sailplane design, Bob Champine tells us how BIG RED was designed, and why he chose to do things in the way he did. The results, to date, are also given to us. Maybe there's something here that YOU can use to build your own cross-country machine.

"Red Birds I & II are not simple sailplanes, as you can see, and I'm sure the average modeler would find them more complicated than he would be willing to contend with. Nevertheless, they may be of general interest, and perhaps will stimulate others to ideas that are far more simple and practical.

"The fuselages are molded fiberglass, right and left sides, and taped together. Red Bird I has some Kevlar in it, but the strength is a bit 'over-kill'... . It has been stuck into the ground like an arrow, and it has hit a car (which moved into the landing area) one time. The fuselage has never been broken, so I'd say it is like a tank.

"The single bolt method of attaching the wing is working out quite well; however, the real key to success is the silicone rubber seat under the wing. This produces a lot of friction when it tries to turn about the bolt. The spar and webbing are reinforced to take the compression loads of the bolt.

Both models fly well, being very easy to make turns and make spot landings as well. The speed range is very good and the L/D at high speed (gets out of down air fast) is the best I've seen (flaps up 6 degrees). They thermal as good as most, but pilot skill to make smooth climbing turns (no stalls) is, as always, what makes 'em look good.



"The wing tips and stabilizer started from a 1/3-2/3 chord ellipse, but I flattened out the curves a bit to produce a little more area. The areas noted were obtained by counting 1" squares on grid paper.

"While constructing Red Bird II there was an attempt to make the tail assembly lighter, thus reducing balance weight in the nose. About two ounces were saved at the tail, but the wing weight is about the same because of the flap pushrod system.

"Red Bird I flies good, but I felt the spoilers were too weak (aircraft descended too slowly) and the elevator control was also too weak - most all of the available down elevator was required to keep from breaking the average tow line (about 100# test). Also, the flaperons were not needed.

"So, Red Bird II was designed with increased elevator area, pop-up spoilers, and flaps (camber-changing from 6 degrees up to 15 degrees down). These changes worked out really well, and the reduced weight makes Red Bird II a little easier to carry around...and improves the flying somewhat because it flies more slowly. Both sailplanes perform better than any of my other sailplanes (of which there are quite a few - JHG). As with so many good sailplanes, it's the pilot that makes the difference.

BOB CHAMPINE'S "RED BIRD" (continued).....

Bob says the ship flies real well - really better than he claims he can fly it, modest fellow that he is. It was built for LSF Level V work, and has completed all of the tasks except for the 8-hour slope duration flight. Bob is planning to complete that in the next month or so...and may even have done so by the time you read this.

The Level V 'cross-country' of 10 Km (6.2 miles) was done on the first attempt; a good day, true, but the performance was better than Bob expected. In lift, he set the flaperons slightly 'down' and slowed to thermalling speed, whereupon the ship would climb like mad. When 'down' air was encountered, Bob raised the flaperons to -6 degrees above the normal Eppler 214 profile position, and then increased speed until he flew into another area of lift. In that way, the sailplane spent more time in lift, and less in sink...and not much time had to be spent in circling within a thermal. Full-scale sailplane pilots call this 'dolphin' soaring because it describes the undulating motion used by dolphins when they swim. Bob says he was able to keep up speed on course in this manner, so that the entire flight was completed in 1 hour and 05 minutes.

Although he took Red Bird to the Great Race, Bob says that the ship suffered from a bit of radio trouble and his (then) inexperience in flying it. The high winds didn't help any, either.

Bob also claims that the Red Bird is like any sailplane: it needs lift to stay up much over 4½ minutes on a typical day, and it has suffered many 2½-minute flights! He plans to build a second one, but - to save weight - it will have only full-span flaps (one servo) rudder, elevator, and spoiler controls. The tail parts are much lighter, allowing nose balance weight to be reduced...permitting all-up weight to come in at around 8 pounds.

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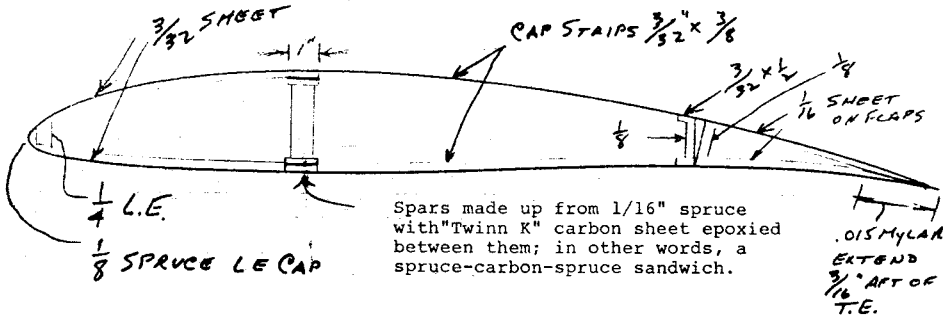


EPPLER 214 AIRFOIL

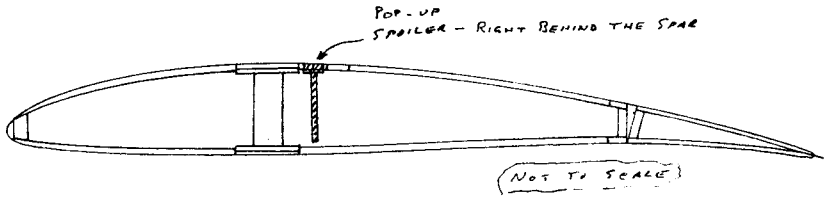
The spars are 1" wide at the center, and taper to 1/2" wide at the separation point between the root panel and the tip panels. Tips plug in. The wing is held on to the fuselage with a single 1/4" x 20 steel bolt 3½" long. A 1/4" diameter hole is drilled through the spars to receive the bolt, and a 1/4" five-ply shear web is placed on each side of the bolt hole for reinforcement and stress 'carry-through.'

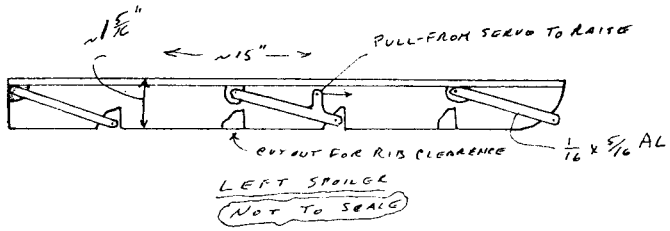
Bob, like many others believes in very thin trailing edges, and has solved the problem quite neatly by using a sheet of mylar drafting film, and placing it between the upper and lower trailing edge balsa sheet. He roughens the mylar with sandpaper first, and then bonds it with CA cement to the balsa.

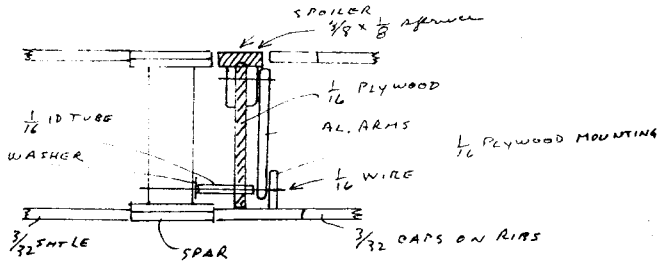
Bob has also suggested (and used) that black plastic industrial strapping tape that is about 3/8" wide as a substitute for the trailing edge mylar strip. One reason is that it's tougher.

RED BIRD (continued)

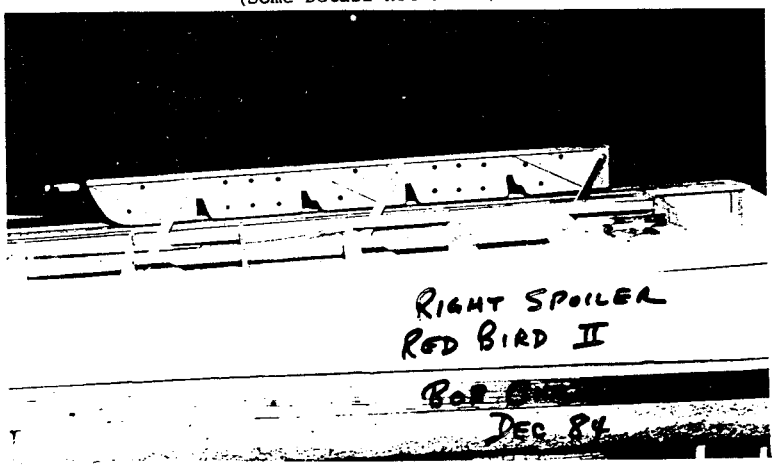
"The pop-up spoilers were a real pain to design, construct, and rig and 'rig again' but they work great! They produce a slight nose-down trim (due to altered downwash angle over the horizontal tail - according to Herk Stokely, a clubmate of Bob's), a great deal of drag, and operate on a small servo, as only a small force is required to open and close them.







GENERAL IDEA OF SPOILER
(Some Detail not Shown)



4-METER "RED BIRD"

Specifications

WING

Span (projected) 157-3/4" (13.15 Feet)
Chord: 13-1/8" (max.)
Area (Flat): 1900 Sq. In.
Area (Total): 1930 Sq. In.
Av. Chord: 12.05"
Aspect Ratio: 13.09
Airfoil: Eppler 214
Features: Spoilers, flaps, ailerons

TAIL

Elevator/Stabilizer
- Span: 40-1/8"
- Chord: 10-1/4"
- Airfoil: NACA 63009
- Area: 348.28 Sq. In.
- Area: 18.3% of Wing Area

Rudder/Fin
- Height: 17-1/4"
- Chord: 12-1/2"
- Airfoil: NACA 63006½
- Area: 170 Sq. In.
- Area: 8.9% of Wing Area

Fuselage

Length: 64"
Width: 1-1/2"
Height: 3" (pod)
Height: 6: (pylon)
Cross-section area (under pylon): 9.2 Sq. In.

Weights and Loadings

Fuselage: 85.5 Oz. (light)
130 Oz. (heavy)
Wing: 66 Oz.
Stab/elev.: 7.5 Oz.

Total Weight: 159 Oz. (9.15 lbs.) with thermal sniffer and SR-2000 batteries

Wing Loading: 12.05 Oz./ Sq. Ft.

C.G. located: @ 43% of Root Chord

DESIGNER

Bob Champine
205 Tipton Road
Newport News, VA 23606
(804) 595-0997

Project Started:
Red Bird I - October 1982
Red Bird III - " 1983

First Flight:
Red Bird I - February 1983
Red Bird II - January 1984

Performance: (Theoretical - no flap)

Speed:	17mph	20mph	38mph
Sink:	1.14fps	1.26fps	4.85fps
L/D:	22.0	24.0	11.5

Differences between the Red Birds

Red Bird I - flaperons
Red Bird II - ailerons and flaps, plus pop-up spoilers
- has anti-drag t.e. on stab/elev. plus more elevator area

According to Bob Champine, Red Bird II flies somewhat better than Red Bird I, and its empty weight is slightly less. The flaps of Red Bird II are segmented in two sections and driven by a single pushrod which actualtes two control rods per segment. Ailerons are also driven by a push rod with two control rods each.

Total Weight (with ballast): 203.5 Oz. (12-3/4 lbs.)

Spoiler Area: 19.5 Sq. In.(each)

Dihedral: 6 Degrees-Inboard panels
10 Degrees-Tip panels

Wing Incidence Angle: 2 Degrees Positive (with respect to CL of fuselage)

Stabilizer Incidence Angle: 0 Degrees (with respect to CL of fuselage)

Bob suggests that this sailplane is not intended to be reproduced by another builder, but is intended to provide ideas for other builders.

Red Birds I & II, as their name implies are covered and painted in a solid red color. Right pylon side has Frank Zaic autograph, and left pylon side has Carl Goldberg autograph, in black.

FLYING THE TEMPEST.....John Benson

Last January I built the 72" version of Scott's Models TEMPEST sailplane. Construction went smoothly enough, and the finish chosen was a sprayed satin black auto paint for the fuselage, fin, stab, and rudder, with charcoal Monokote on the wing. When completed, the shape and lines were so strikingly handsome that I decided against any decoration save for a white roundel under the right wing tip to aid in orientation.

In the calm of an early morning on our local athletic field, we tried the first hand launch. It was an interesting exercize. Even with a gentle hand toss the glide was so good that we almost ran out of room! A more vigorous throw allowed a couple of circles and a chance to see this unusual flying at close quarters. It really seemed to just hang in the air. As luck would have it, ours 'flew right off the building board' and required only minor elevator trim. Tracking was straight and stability excellent. It should be noted, however, that the sophisticated design of this ship places a premium on good building Accurate construction and alignment and proper trim are of the utmost importance.

After a few more glides, we stretched out the hi-start and went for some altitude. With the tow hook placed slightly forward of the c.g., launches were steep and dramatic. The polyhedral wing keeps everything on rails, and you can just stand back and let the plane fly itself off the line. Once up, the TEMPEST proves to be a graceful and highly efficient soarer. The undercambered Jack Chambers JC-11 airfoil provides superb lift, and its thin section gives plenty of latitude for fast flight when you nudge in a little down. This sailplane will take advantage of all the lift you can find.

Our intial c.g. location was per the plans at 1-7/8" or about 32% of the chord. With this setup, the plane pretty much flies by itself. Talking later to Scott, we learned that a more nimble setup could be had by putting the c.g. 2-3/4" back from the leading edge. This is exactly at the halfway point of the chord! Trimmed like this, the TEMPEST flies where you point it and will not return to level flight with neutralized controls. While this makes for intense flying, it also stretches out the glide and gives the model great agility. We did experience some difficulty in establishing proper elevator trim with this c.g. location. Hand launches tended to encounter ground effect which prompted too much down trim for a good flight path at altitude. After several attempts, we got it about right and decided to head for the slopes.

The TEMPEST is advertised as a "high-performance fully aerobatic sailplane." As soon as it was thrown off the edge of our local slope, it began living up to its billing. In a clean fifteen-mile-per-hour breeze, our thirty-foot ocean front slope gave enough lift to put the model up about eighty feet. We found that strong rudder control produces a pronounced roll which can be combined with up elevator to produce a very tight turn. A close Figure-eight slope pattern is a cinch to fly. From our eighty feet, we did loops, rolls, stall turns and about everything that we knew enough to try. Inverted flight seemed tricky at first, but a longish dive into a half loop with full down applied at the top got it going nicely. The polyhedral wing wants to return the plane to normal flight, so close attention to rudder is required. On the plus side, this means that normal flight is just a quick half-roll away. On another day off the hi-start, we tried several times and finally decided that an outside loop is just not possible.

On windy days, the TEMPEST can be made to move calmly and steadily, even in heavy air. Our procedure is to add nose weight in half-ounce increments up to 1-1/2 ounces above normal. This gives good penetration and solid tracking up to about 20 m.p.h. winds. For aerobatics the added weight and forward-shifted c.g. enlarge and steady the maneuvers. It is possible to fly comfortably in higher winds by adding weight at the c.g. In addition to nose ballast, we have put four ounces of lead under the wing, and have flown in real howlers, but winds of this strength should be approached with caution. Off a good slope, beautiful slow flight can be had in the 5 - 10 m.p.h. range. 10-15 allows all the tricks, and 15-25 is great for hot-dogging!

Two things strongly recommend this sailplane to both the novice and seasoned pilot. First, the extraordinary lift and maneuverability of the TEMPEST allows it to be flown off slopes that few planes of its size could handle. This writer has had great flying from six-foot-high sand dunes, seafront bluffs of about ten feet, and even a five-foot-high concrete seawall. All that's needed is a clean breeze in the 10-15 m.p.h. range. Second, the TEMPEST is an extremely durable machine well capable of withstanding the inevitable punishment that slope flying entails. The wing is held in place with a 4-40 nylon bolt at the leading edge, and a 1/8" hardwood dowel at the trailing edge of the wing. In a hard landing, these shear cleanly and so absorb the shock that would otherwise wreak havox with wing and fuselage. The fuselage itself, constructed of glass cloth, graphite fiber and polyester resin, is very strong and is joined to a nearly unbreakable graphite fiber tailboom. This flexible boom also absorbs much of the shock of a hard landing and minimizes shock-transmitted damage to the tail feathers. Finally, the full-flying stabilizer, as mentioned in the construction article (October RCSD), is held in place by an ingenious platform and rubber band mounting system that virtually eliminates the usual vulnerability of T-tail configurations.

Most people shy away from slope flying because of the hard usage it exacts from the models. Likewise, the absence of high cliffs often leads to the conclusion that no workable lift can be found. Wit the right sailplane, however, the importance of these factors is much diminished. The TEMPEST is just such a sailplane. It is certain that the exciting world of slope soaring can be made available to many new converts with the help of this remarkable model.

For those who would like more information about the TEMPEST, write to Scott Metze, Scott's Models, 255 Avenida Del Mar, San Clemente, California 92672. Telephone (714) 498-7695. Kits are available in stock now. Call for prices. If you wish to correspond with John Benson, write him at 29 Thames Street, Newport, Rhode Island 02840.

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COMPUTER DESIGN OF SAILPLANES AND AIRFOILS.....Software Sources

Many of you have written to RCSD asking for information. Fortunately, a considerable amount of information has surfaced within the last several months, and many programs for the sailplane flier and designer are now available from a variety of sources. The following list is by no means complete, but will be added to as more data comes in.

Chuck Anderson, 202 Inglewood Circle, Tullahoma, TN 37388
John Duino, 657 Greengate Street, Corona, CA 91719
David Fraser, 1025 Thomas Drive, Warminster, PA 18974
Lee Murray, 1300 Bay Ridge Road, Appleton, WI 54915
Herk Stokely, 1504 Horseshoe Circle, Virginia Beach, VA 23451
Al Scidmore, 5013 Dorsett Drive, Madison, WI 53711

If any of you know of some software not listed here, please inform RCSD.

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AIRBORNE (TELE) METERING SYSTEMS...Interest Developing Rapidly

The subject of air-to-ground telemetry of flight information is being looked into by several RCSD readers and subscribers: Bob Cheney, Box 42, Jackson, NH 03846; Bill Kournikakis, 404-906F Duchess St., Saskatoon, Saskatchewan, Canada S7K 6K3; and Bob Reimer, 822 Minnesota Avenue, South Milwaukee, WI 53172. Anyone known to be working on systems for this purpose is invited to contact these persons, or to contact RCSD for the dissemination of results and information. About a year ago, a fellow in the Philadelphia area claimed to have a working model of an altimeter with remote readout. Several Californians are also known to be transmitting data on airspeed and altitude to the ground via sub-carrier channels on amateur television frequencies (fast scan). Some work is being done on airspeed and compass heading data transmission, as well. Let's keep one another informed about this new facet of our hobby.

MICRO TV CAMERAS PAVE WAY TO MODEL INSTRUMENTATION

If you happen to have an amateur radio license, and have an interest in ATV, there is every possibility of using a video link with an airborne camera looking at in-the-cockpit instrumentation and relaying the pictures to a ground monitor in real time; that is, quickly enough to use the information for maneuvering.

COMMODORE 64 AIRFOIL PLOT PROGRAM FOR DOT MATRIX PRINTERS

The airfoil plot program is a group of Commodore 64 programs that allow airfoils to be plotted on Gemini-10X, Epson FX, and other dot-matrix printers that use the same print codes. The package consists of four separate programs:

1. DATA ENTRY -- This program is used to enter airfoil coordinates in a data array and store them on tape or disk. This program needs to be used only once for each airfoil uless the data file is destroyed.

2. PLOT 1 -- This is the primary plot program normally used for sailplane and free-flight airfoils. It uses quadruple density or ultra-high resolution graphics for maximum accuracy, and is somewhat slow. It will plot airfoils with chord lengths from 2 to 15 inches, and up to 1.5 inches thick (1 inch above the chord line and 0.5 inch below). The accuracy (neglecting paper slop and printer slippage) is approximately 0.002 inch, and requires approximately 2 minutes per inch of chord length.

3. PLOT 2 -- This program plots in the double density or high resolution mode, and sacrifices accuracy for speed. It must also be used on some models of Epson printers that do not support high resolution graphics. Airfoil size limits are the same as for PLOT 1. Speed is twice that of PLOT 1, but accuracy is only half as good (0.004 inch).

4. PLOT 3 -- This program is identical to PLOT 1 except that maximum airfoil thickness has been increased to 3 inches (1.5 inches above and below the chord line). Accuracy is the same as PLOT 1, and the plotting speed is approximately 3 minutes per inch of chord length.

All three plot programs can also plot the airfoil with allowances for skin thickness. If the skin thickness option is selected, a dotted line will be plotted offset inside the airfoil contour by the skin thickness. The program works for almost any airfoil as long as coordinates of sufficient accuracy are used. All computer-generated airfoil coordinates tried to date have given satisfactory results. All data files supplied with the plot programs have been plotted and give satisfactory plots.

The equipment required to run the program are a Commodore 64 computer, a TV or monitor, a Gemini 10-X or equivalent dot-matrix printer with interface, and either a Dataset tape recorder or a disk drive. The interface does not need any special graphics capabilities, and any interface with a 'transparent' mode will work. A disk drive will speed up operation and is much easier to use, but the program was originally developed with a tape system and the program will run with either one.

The programs are specific to the Commodore 64 computer and have been tested with the Gemini 10-X and Epson MX/FX printers. Many other printers use the same or similar print codes. If the program doesn't run with these printers, conversion of the BASIC programs should be relatively simple. Consult your printer and interface manuals. If you wish to modify the program to work with other printers, I suggest that you plan to spend a lot of time with your printer manual.

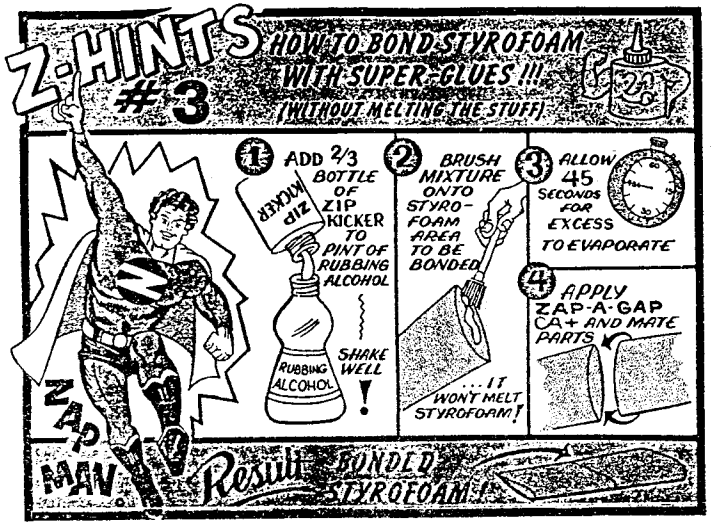
The BASIC programs run quite slow. Therefore, a compiled version of the programs has been prepared and runs about three times faster than the uncompiled programs. The compiled programs cannot be modified, and must run with the Gemini 10-X, Epson FX, or equivalent printer.

The basic Airfoil Plot Program package is supplied on either disk or tape, and consists of the four programs written in BASIC and data files for a test pattern and four airfoils. The complete Airfoil Plot Program package is supplied on disk only, and consists of the compiled programs, the uncompiled programs, and data files for 39 sailplane airfoils. The basic package is $10, while the price of the complete package is $25.

Data files for the following airfoils are included with the complete package: 1. Test *; 2. Spica*; 3. Clark Y*; 4. MB253515*; 5. MB303515; 6. Wortmann FX60-126; 7. Quabeck 1.5/8; 8. Quabeck 1.5/9; 9. Quabeck 1.5/10; 10. Quabeck 1.5/12; 11. Quabeck 2.5/8; 12. Quabeck 2.5/9; 13. Quabeck 2.5/10; 14. Quabeck 2.5/12; 15. Eppler 174; 16. Eppler 176; 17. Eppler 178; 18. Eppler 180; 19. Eppler 182; 20.Eppler 184; 21. Eppler 193; 22.Eppler 195; 23. Eppler 197; 24. Eppler 201; 25. Eppler 203; 26. Eppler 205; 27 Eppler 207; 28. Eppler 209; 29. Eppler 211; 30. Eppler 212; 31. Eppler 214; 32. Eppler 374; 33. Eppler 385; 34. Eppler 387; 35. Eppler 392; 36. GO 795; 37. GO 795.5; 38 GO 796; 39 Antares; 40. Selig S3002-099-83. Files marked * are included on the basic disk. Send check or M.O. to Chuck Anderson 202 Inglewood Circle, Tullahoma, TN 37388.

AND STILL MORE WING TIPS...

From the Mid-Pacific Soaring Society out there in Hawaii, we have 'lifted' the following idea for using CA adhesives to bond foam cores. Yep, that's right, folks, FOAM cores. Here's how:



FIBERGLASSING AN AIRFRAME - Jeff Troy - May 1984 Hear Ye

Many moons ago I ran a 'how-to' on fibreglassing an airframe. It was rather condensed and I don't think quite explicit enough for the inexperienced modeller. We're going to go through the process again, this time, over several installments and with much greater clarity.

If you would like to get a high quality 'contest' type finish that resists dings and handling abuse, read on!

Before we start, here are some basic things required of you;

1. An airframe with no open bays. Glass cloth will not cover bays like silksapan or monokote. It does NOT shrink as it dries.

2. A lot of will power and a genuine desire to do a lot more work than an iron-on finish.

3. Being prepared to spend $40. to $90. to get the job done. These types of finishes are not cheap. There is NO FREE LUNCH!

4. Your promise that you will let me know the results of your labors with my method, or let me know if you have a better way. I'm always open to ways of improving myself.

I'll begin with a small lecture on weight vs. strength. Before you lay glass cloth you must decide on how critical the weight factor is in YOUR airplane. Glassing of a fully sheeted wing on a Drifter sailplane with 6 oz cloth would be prohibitive to the basic design of the ship. On the other hand, using 3/4 oz on the center section of a pattern ships' wing is equally sick!

It's really pretty simple. The heavier the cloth, the more resin and fillers must be used to seal and fill the weave. Also increased with cloth weight is strength. Come to a good balance of strength to weight where you need each, and you'll be OK. I generally use 3/4 oz for finish-base work and 2 oz for fuselages and nose areas where a little greater endurance is nice. I don't feel that 3/4 oz cloth adds enough strength to my sailplane fuselages to let them withstand a season of my somewhat incompetent flying abilities. I am far too prone to hard, missed landings and 2 oz suits me better. I feel that a slightly heavier sailplane flies much better than a super light one that has broken in several pieces! Anyway, you decide what you need. A basic starting point on say, a typical pattern type aircraft, would be 3/4 oz overall with 6 oz on the center-section of the wing, and possibly 2 oz over the nose area and retract gear area. The 2 oz would be ONLY if you feel you needed it.

If you're not turned off by now, I'll have you assemble the following supplies. Retail prices are given to give you an idea of what you're in for. This is not a complete list but, only what you'll need for this months' installment.

1. Quart can of K&B polyester resin (NO Substitutes) $11.75
2. K&B Glass Cloth (3/4 oz, 2 oz, or 6 oz) 5.50 each
3. Quart can of K&B Superpoxy thinner 7.50
4. 1/2" wide dope brush 1.35
5. DGP Perma-grit sanding tool 6.95
6. K&B 1 oz mixing cups (pkg of 24) 2.50
7. A good SHARP scissors
8. Masking tape
9. Mixing stix (I use 1/8" square scrap spruce sticks.)

TROY'S TRIX (Continued) - Fiberglassing:

If your ready, we'll get started. Make sure you FULLY understand each step BEFORE you start it. If you blow it, there's no easy bail-out. You will be COMMITTED!

INSTALLMENT #1 GLASSING THE AIRFRAME

1. Seperate all the major components of the airplane. (ie. wing, fuse, hatches, ailerons, elevators, rudder, etc. If the fin is an integral part of the fuse, leave it attached and work both pieces together. If not, separate them as well.

2. Make sure you have cut all hinge slots, and made any exterior cut-outs for pushrod exits, switch mounting, wing bolt holes, retract wells, etc.

3. All parts should be final sanded to the point where you would normally begin to apply an iron-on finish. If you use epoxo-lite or a micro-balloon/resin mix for fillets, DO NOT apply them until a later installment. We will cover fillet installation in the next issue.

4. Since it's the easiest place, we'll begin work with the center-section of the wing. Mix 1/2 oz of polyester resin with 8 drops of catalyst. Stir it thoroughly with a stick. If you stir with a brush, uncatalyzed resin can creep up the brush and fall back onto your work. Uncatalyzed resin DOES NOT CURE!

5. Cut a length of 6 oz cloth 6 inches wide and about 4 inches longer than the chord of the wings' center. Tape an inch or two to the top surface of the wing and then bring it around the bottom and back over the top at the trailing edge. Pull tight, removing any wrinkles and tape it securely.

6. Using the resin you just mixed up, brush it carefully over the cloth and into the wood underneath. You'll know it's properly saturated when you can clearly see the wood through the cloth. Be sure to brush the cloth over the leading and trailing edges onto the top of the wing about 1 inch. Go watch a movie and let the resin completely cure.

7. Using the perma-grit tool, remove the masking tape and knock off the excess cloth on the top of the wing and blend the edges of the glassed strip into the top of the wing.

8. Make another strip and attach it to top as you did for the bottom. Mix another batch of resin and repeat all the previous steps. When you're done you should have the two strips blending into each other and forming a double layer at the leading and trailing edges.

9. Mix a 1 oz batch of resin, and re-coat the entire glass strip top and bottom. Go out on the wing panels about 1/2" past where the cloth stops. When this has cured, use the perma-grit to sand off any rough spots and try to blend the resined area into the wood of the wing as best as possible.

10. Now that you understand the process, cut a sheet of 3/4 oz cloth a little larger than the left bottom wing panel measured from the center out to the tip. Mix resin in an 18 drop to the ounce batch and brush it into the cloth. No tape should be needed as the light cloth drapes very nicely when saturated. Go right over the center section again. When this dries, once again, knock off the edges and repeat the steps for the bottom right panel. I KNOW you went around the leading and trailing edges and tried to adhere some cloth to the top of the wing. Remember the trick is to overlap all important joints for strength.

11. The bottom of the wing is now complete. Repeat the process for the wing uppers and that's it!

12. Sometimes before next month, get the fuselage and other componants glassed and rough sanded. I think you've got enough to chew on for now!

I seem to remember telling you that this method is not easy, however, once you become used to the process, you can glass an entire airframe in a matter of a few days. From there on, it gets better.

A--C

Abell	Bruce	17 Ferguson St	Cessnock 2325NSW	Astrl
Allen	Ken	5515 Widgeon Ct.	Dayton, OH	45424
Almquist	Kevin	3555 Bellaire Av	Whte Bear Lke,MN	55110
Anderson	Norman	1213 MI. Hugh NE	Albuquerque, NM	87112
Apt. 319	c/o Gordon	5 Tudor City Pl.	New York, NY	10017
Arana	Jerry	114 Corinne Ave.	Santa Cruz, CA	95065
Astle	John	7004 Quailwood	Bakersfield, CA	93309
Auerbach	Charles	80 Yale Road	Hartsdale, NY	10530
Auerbach	Bedrich	439 Jefferson St	Lansdale, PA	19446
Avent	George C.	PO Box 949	Kingstree, SC	29556
Averill	Buzz	9117 La Brnca NE	Albuquerque, NM	87111
Bach	Sam	2752 Norwood Ave	Cincinnati, OH	45212
Bailie	Brian	43 Vahlsing Way	Bobbinsville, NJ	08691
Bardolf	Daniel	2054 Westfield	Scotch Plains,NJ	07076
Barnett	Alan	4868 S. 28th St.	Arlington, VA	22206
Barnett	Steve	1226 D Hase Dr.	Honolulu, HI	96819
Barry	Doug	2111H The Colony	Burlington, NC	27215
Bartch	Jim	5101 Buchanan	Warren, MI	48092
Bassett	Alton H.	73 Harriet Dr.	Princeton, NJ	08540
Bean	Copley R.	581 Santa Maria	Salinas, CA	93905
Becker	Ken	3174 Lansdown Ct	Pleasanton, CA	94566
Becker	Bob	PO Box 355	Kent, WA	98032
Beckett	Tony	Harringworth Rd.	Rutland LE15 9HZ	ENGLA
Beere	Rof W.	30 Diamond Head	Corte Madera, CA	94925
Belt	Allan	2404 Calumet Ter	Lexington, KY	40504
Benincasa	John J.	463 Winter St.	N. Andover, MA	01845
Bennett	E. G.	910 Fairmile Rd.	W Vncvr, V7S 1R3	Canad
Benson	John	29 Thames St.	Newport, RI	02840
Berger	Helmut	58 McNicoll Ave.	Will Ont M2H 2A8	Canad
Bergman	J.	8 Chatham Pl.	White Plains, NY	10605
Black	Ron	746 River Drive	Norco, CA	91760
Blakeslee	Byron	3134 Winnebago	Sedalia, CO	80135
Blanch	Harmon	PO Box 646	Petersburg, AK	99833
Blood	Thomas	1134 Brentwood	Geneva, IL	60134
Bohmer	James	7152 Bride Water	Worthington, OH	43085
Bollin	Dr. E.M.	2932 San Xavier	Sierra Vista, AZ	85635
Bonar	Charles	2674 Raymond	Signal Hill, CA	90806
Bonnell	Rich	5263 24 Ave. N	St. Petersbrg,FL	33710
Borg	Alan	7266 Alder Spgs.	San Jose, CA	95139
Boss	George W.	3519 Bendingo Dr	R.P. Verdes, CA	90274
Boucher	Bob	13311 Beach Ave.	Mar. Del Rey, CA	90292
Brock	James	PO Box 124	Amboy, WA	98601
Browneye	Cliff	3047 Grenada SE	Grand Rapids, MI	49506
Buchle	Edward	260 Blue Rock Rd	Millersville, PA	17551
Buice	James W.	800 8th Ave-#106	Fort Worth, TX	76104
Bunnell	Roy	6119 W Willamett	Kennewick, WA	99336
Burgess	Edwin	438 Franklin St.	Lansdale, PA	19446
Burnstein	Bob	11 Cecil Crest	Yonkers, NY	10701
Buster	Warren	645 Camino Mnzns	1000 Oaks, CA	91360
Byrns	Edson	116 Dewey Avenue	Fayettville, NY	13066
Camp	Van	8800 SW 57th Ave	Portland, OR	97219
Campbell	William	20 Lilly Pond La	Katonah, NY	10536
Caro	Francis	10 High Court	Little Falls, NJ	07424
Carolla	Paul	Shut Road	Newtown, CT	06470
Carr	Pete	326 Little Ave.	Ridgway, PA	15853
Carter	Ron	1525 S 400 E #33	Springville, UT	84663
Cartwright	R.W.	18 Southmont	Little Rock, AR	72209
Casey	Donald V.	1900 S. Eads St.	Arlington, VA	22202
Chambers	Terry W.	4801 S Poplar Dr	Columbus, IN	47201
Champine	Robert	205 Tipton Road	Newport News,VA	23606
Cheney	Bob	Box 42	Jackson, NH	03846
Chernoff	Max	P.O. Box 8857	Madeira, FL	33738
Chitty	Steve	Rt. 3, Box 349	Easton, MD	21601
Christensen	Craig	16550 Lynch Path	Lakeville, MN	55044
Christensen	Scott	2635 Wabash	Chicago, IL	60616
Christian	William	1604 N. Chestnut	Arlington Hts,IL	60004
Cibere	Joe	1541 Clle Artiga	1000 Oaks, CA	91360
Clem	Charles R.	1671 Amhurst Way	Concord, CA	94518
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Coleman	Bernie	7200 Middlebury	Charlotte, NC	28212
Coles	Joseph	Box 1072-C RD #1	Mt Holly, NJ	08060

C --G

Collins	Frank	4421 SE 13th Ave	Cape Coral, FL	33904
Conley	Max	1547 N Bayshore	Nokomis, FL	33555
Connell	Martin	15 Phoenix Dr.	Mendham, NJ	07945
Connolly	Jerry	1478 Padres Dr.	San Jose, CA	95125
Cooke	Goeffrey	11311 S. Ewing	Bloomington, MN	55431
Corrado	Lazzari	Casella Post-651	30120 Venezia	Italy
Cotten, Jr.	Fred L.	6632 Banbury Rd.	Jacksonville, FL	32211
Craig	John E.	4711 W Bradck 30	Alexandria, VA	22311
Crowley	Dick	16413 E Stanford	Aurora, CO	80015
Cutter	Weston	1169 Veronica La	Mendota, MN	55118
Cyr	John L.	2316 Hayes	Ames, IA	50010
Dahm	Donald L.	1131 Rue Calais	Slidell, LA	70458
Dalman	John A.	Rt 2/Bx 222-10-A	Nixa, MO	65714
Darling	Clark	R.D. 3 Kentview	Carmel, NY	10512
Davey	Theodore	1 Wood Lane	Malvern, PA	19355
Davidson	Dave	1113 Naples Dr.	Orlando, FL	32804
Dech	Jack	5150 Golden Hill	Colo Springs, CO	80907
Deck	Jim	553 Ravine Drive	Valparaiso,IN	46383
Depue	Edmund E.	5863 Pageanty St	Long Beach, CA	90808
DeWitt	Michiel	8418 Birchcroft	Dallas, TX	75243
Dietrich	Jack	540 Fairview Ave	Colonia, NJ	07067
Dingee	Robert	1 Florida Ave.	Bronxville, NY	10708
Dodgson	Robert	2904 SW Camano	Camano Islnd, WA	98292
Dorton	Doug	Box 387	Salt Lake Cty,UT	84110
Douglas	Ian	PO Box 232	Claremont, CA	91711
Dreher	Ernest	5084 Fullwell	Brnby,BC V5G 1P2	Canad
Drennen	Don L.	532 N.W. 45th	Oklahoma City,OK	73118
Drury	Richard	1195 N Patterson	Goleta, CA	93117
Duino	John	657 Greengate St	Cornona, CA	91719
Dvorak	John	1638 Farrngdn Ct	San Jose, CA	95127
Dworkin	Spencer	Box 583-Mill Dam	Huntington, NY	11743
Dye	Fred J.	2707 Vlmnt #310D	Boulder, CO	80302
Ealy	Jim	The Hill School	Pottstown, PA	19464
Eckstine	Jack	236 Quail Lane	Lanoka Harbor,NJ	08734
Edmonds	Terry	1 Lakeview Knoll	Iowa City, IA	52240
Edwards	Dr. Gary	2780 NW Forest	Beaverton, OR	97006
Eggers	Duane	554 Elm Street	Prescott, WI	54021
Eiche	Erik	6080 Tranquille	RchmndBC V7C 2T1	Canad
Elias	David	475 Tqusta Dr #4	Tequesta, FL	33458
Elsner	Edmund E.	30 Crestland Ter	Doylestown, PA	18901
Esmond	Tom	545 Mars Hll 108	Knoxville, TN	37923
Ettel	Cal	3 Castle Dr RR2	Florissant, MO	63034
EuDaly	Ron	1901 S Goyer 155	Kokomo, IN	46902
Farmer	Larry	1095 Western Dr.	Colorado Sgs, CO	80915
Fass	Peter	One Williams 1-G	Lake Grove, NY	11755
Festag	William	2534 N Mountain	Claremont, CA	91711
Firestone	Jim	Box 689	Colstrip, MT	59323
Fisher	Al	4454 Hollyhock	Ft Collins, CO	80526
Folkening	Dale	1039 College #6W	Wheaton, IL	60187
Frakes	Larry	5611 Middlecoff	Huntngtn Bch, CA	92649
Fraser	David B.	1335 Slayton Dr.	Maple Glen, PA	19002
Fredette	Wayne	17841 67th Ave	Tinley Park, IL	60477
Fredrick	Ron	32430 Gloede Dr.	Warren, MI	48093
Friedman	Col Leon J	112 Heatherstone	Amherst, MA	01002
Friend	Bill	RR 1	Ney, OH	43549
Fritz	Michael	9173 Panama Ct	Ypsilanti, MI	48197
Galway	Robin	28 Cramer Dr.	Nepean K2H 5X5	Canad
Gauer	Frank	1801 Andrews St.	Tustin, CA	92680
Gayman	Herben E.	727 5th St.	Vallejo, CA	94590
Gee Lee	Chai	2810 Jamboree Rd	Newport Bch, CA	92660
Geisen	Edward A.	22168 Barbacoa	Saugus, CA	91350
Gengenback	Karl	133 Transylvania	Woodbury, CT	06798
Gibson	Jim	1738 SE 159th	Portland, OR	97233
Gilchrist	Ray	7 Harlowe Ct.	Whtby O L1N 6V3	CANAD
Gill	Bob	15 Heatherbrook	Kirkwood, MO	63122
Gillburg	George	1704 Hodges Ave.	Bakersfield, CA	93304
Gillespie	Bill	9316 85th St.	Ed Alta T6C 3C8	CANAD
Gollattscheck	Mark	404-B Cocos Pl.	Honolulu, HI	96818
Goodwin	Don	318 W. Center	Medina, NY	14103
Goughnour	Don R.	RD. 2 Box 112	Red Lion, PA	17356
Gracey	Bob	Box 451	Morristown, TN	37814

G--K

Grady	James R.	6039 Barton	Shawnee, KS	66203
Granger	Dr. Ed	43 Wembly Rd	Rochester, NY	14616
Green	Warren R.	11823 172 Ave NE	Redmond, WA	98052
Gressman	Tom	614 Daisy Lane	Oconomowoc, WI	53066
Griffith	Earl	1523 Woodland	Wichita, KS	67203
Grigg	John	6387 Badger Dr	Lockport, NY	14094
Gsell	Roland	PO Box 426	Mt Holly, NJ	08060
Guarino	Jerome L.	3320 Cedar Grove	Richmond, VA	23235
Gwartney	Carl	1515 Knoxville	San Diego, CA	92110
Haehnel	Chip	54 Seavey's Lndg	Scarboro, ME	04074
Haertel	David	5765 Virginia	Claredon Hls, IL	60514
Hall	Jim	833 McDonell Dr.	Gahanna, OH	43230
Hallett	Rol	65 Somerset Ave.	Pittsfield, ME	04967
Hamilton	Jack H.	11216 Sesame St.	Dallas, TX	75238
Hamlin	Mike	PO Box 960	Gray, ME	04839
Hannah	Bill	613 Walnut	Derby, KS	67037
Hansen	David	1133 Richards St	Salt Lake Cty,UT	84101
Hanstad	Dick	1501-A Coffee Rd	Modesto, CA	95355
Harden	Kale	3184 Brunswick	Palm Harbor, FL	33563
Hardy	Al	3414 Crest Lake	Crps Christi, TX	78415
Harold	Robert	519 N. Youlon St	West Salem, WI	54669
Harper	George L.	820 Coliente	Barstow, CA	92311
Harris	Ray D.	3149 Jersey So.	St Louis Park,MN	55426
Harrison	Jack	RD 1, Box 560	Pittstown, NJ	08867
Hart	Gordon	100 Summit Terr.	Cliffside P., NJ	07010
Hauff	Leonard	7-11 147th St.	Whitestone, NY	11357
Haumersen	John P.	104 E Central Pk	Davenport, IA	52803
Haycroft	George	611 Hatherleigh	Louisville, KY	40222
Haynes	Bob	125 Catalina Ct.	Kerrville, TX	78028
Heacox	Frank	11632 Flamingo	Garden Grove, CA	92644
Headrick	Don	E 3834 18th Ave.	Spokane, WA	99203
Henderson	Larry	412 Woodlake Rd.	Virginia Bch, VA	23452
Hendricks	Dorian	4221 Robertson	Sacramento, CA	95821
Hervat	Joe	4406 17th Ave.	Kenosha, WI	53140
Hinkle	Ed	110 Country Club	Lexington, NC	27292
Hinman	Stan	1135 Via Montoya	Camarillo, CA	93010
Hoeffler	Michael	4 West St.	Northboro, MA	01532
Hoisington	Doug	22615 Baracotta	Saugus, CA	91350
Holland	Charles	PO Box 21892	Columbia, SC	29222
Holman	Howard	7550 Orchard #58	Riverside, CA	92504
Holmes	Fred	816 Oaklawn Dr.	Columbia, MO	65201
Honor	Howard	4102 W Lancaster	Milwaukee, WI	53209
Hsu	John G.	1305 Stockton Ct	Gilcrest, CO	80623
Hudson	Steve	1030 Barbour	Norman, OK	73069
Iazzetta	John H.	R.D. 4, Box 117	Milford, NJ	08848
Iffland, Jr.	Earl E.	3 Beecher St.	Torrington, CT	06790
Ihlenburg	Walter G.	PO Box 7375	Jacksonville, NC	28540
Iwasaki	Wayne	3344A Francis St	Honolulu, HI	96815
James	Terry	562 Pembroke W	Pem Ont K8A 5P3	Canad
Jelinek	John	Box 505	APO New York, NY	09185
Jenkins	William	PO Box 408	Lynchburg, VA	24505
Jenning	Ron	635 Chelsea Pl	Newport News, VA	23603
Johnkoski	Vince	826 Sweet Acres	St. Albans, WV	25177
Johnson	John	3414 87th Street	Lubbock, TX	79423
Jones	Dave	5621 Michelle Dr	Torrance, CA	90503
Jones	David W.	2703 Lincolnwood	Evanston, IL	60201
Juschkus	Ray	7 Evergreen Ave	New Hyde Pk, NY	11040
Kaiser	Maurice	2010 Sherrelwood	Denver, CO	80221
Katagiri	Dave	848 SW 132nd St.	Seattle, WA	98146
Kay	Pepper	5704 Dugan Ave	La Mesa, CA	92041
Keene	Wayne	6 Rockridge Rd	S. Natick, MA	01760
Keer	Leonard	1305 Stockton Ct	Gilcrest, CO	80623
Keller	Howard	300 Pelham #26	Greenville. SC	29615
Kendall	Archie R.	3608 W Bancroft	Ottawa Hills, OH	43606
Kennedy	John	20 Clark Way	Longmont, CO	80501
Kent	Randy	8605 Fairhaven	Dallas, TX	75227
Khan	Raja Sabri	56 A S Sea View	DHS Karachi	PAKIS
Kincaid	Leon	PO Box 16107	Colorado Sps, CO	80935
King	Ron	4936 Hartford Av	Beltsville, MD	20705
Kish	J.P.	1607 S Ola Vista	San Clemente, CA	92672
Knight	Gerald	360 Bunting Rd	St Cat O L3M 7L6	Canad
Knowles	Johnson	6102 Raleigh	Garland, TX	75040

K -- N

Koch	Stanley	180 Carnavon Pky	Nashville, TN	37205
Kournikakis	Bill	404-906 F Duchss	Saskatoon S7K6K3	Canad
Kozel	Thomas	37 Chetwynd Dr.	Paoli, PA	19301
Kozumplik	Mike	RR 4 Box 353	Bryan, OH	43506
Kozumplik	Nick	Box 201, R. 1	Bryan, OH	43506
Kunath	Tom	8209 Gridley Ave	Wauwatosa, WI	53213
Kutcher	Joe	31 Kelsor Dr.	Poquoson, VA	23662
Landers	Scott	3411 Clare J58	San Angelo, TX	76904
Landreth	Dean	1446 S White Ave	Pomona, CA	91766
Lange	John	1700 N. 37th Ave	Stone Park, IL	60165
Larkin	Bruce	4231 Sweetbriar	Saginaw, MI	48603
Larsen	Orla	On The Rocks Ldg	Wilmington, VT	05363
Leach	Gale L.	1315 Carpenter	Bellbrook, OH	45305
Leamy	Bob	324 Crawford Ter	Union, NJ	07083
Ledat	Erwin	5511 E Broadway	Brnby,BC V5B 2X8	Canad
Lefkowitz	Joel	15 Carpenter La.	Bloomfield, CT	06002
Lelke	Helmut	191 Middle Road	Southboro, MA	01772
Lemel, M.D.	A. L.	315 Calhoun St.	Charleston, SC	29401
Lennon	A.G.	487 Oakville Rd	DDO QUE H9G 1M1	CANAD
Leonard	Bernard H.	23 Shaffer Lane	Bristol, VA	24201
Lewis	Steve	2412 Brannan Pl.	Santa Clara, CA	95050
Lightfoot	John	66 Second Ave	Rondebosch E7700	SAfrc
Lombard	Dick	2825 Old Town Rd	Bridgeport, CT	06606
Longenecker	Richard S.	519 S. 24th St.	Allentown, PA	18104
Lounsbery	Walter	Box 115 Rt.1	Viola, KS	67149
Loyet	Rich	2928 Indiana Ave	Granit City, IL	62040
Lucas	George M.	PO Box 286	Georgetown, KY	40324
Mackay	Robert	5438 Quentin St.	Philadelphia, PA	19128
Madden	Richard	3004 Pebble Crk.	Anniston, AL	36201
Maine	Ray A.	2499 Oak	Eugene, OR	97405
Manning, Jr.	Edward	1822 Wickham	Royal Oaks, MI	48073
Martin	Kevin	7015 SW Juniper	Beaverton, OR	97005
Mason	Edmund	Rt 6 Box 6319	Nampa, ID	63651
Matyi	Anthony	21-02 Quail Rdge	Plainsboro, NJ	08536
McBride	Jacky S.	324 W Vanderbilt	Oak Ridge, TN	37830
McCullum	Rick	420 Indiana	Salem, IL	62881
McGowan	Ray	2661 Adrian St.	Napa, CA	94558
McKellar	Harold	5069 Joyce Dr.	Saginaw, MI	48603
McLean	Peter	Sam Hill Rd	Worthington, MA	01098
McLinden	Robert	PO Box 437	Lomont, PA	16851
McMillan	John	80 Ravine Park	W Hll O M1C 2M6	CANAD
McQueen	Ian	2-18-7 Kami-Meg.	Meguro-Ku, Tokyo	Japan
Meadows	Ted C.	PO Box 1370	Hendersonvle, NC	28793
Meissner	Gary	3020 Chance Dr	Florissant, MO	63031
Melvin, Jr.	John M.	1805 Inverness	Lakeland, FL	33803
Messetler	George	13 Vermont Ave.	Congers, NY	10920
Metze	Scott	255 Avenida D.M.	San Clemente, CA	92672
Meyer	Ray	1737 Wendell Ave	Schenectady, NY	12308
Michael	Bob E.	806 N. Colorado	Wichita, KS	67212
Miller	Bruce	P.O. Box 96 RD#1	Atglen, PA	19310
Miller	Blaine	411 Tidewater Dr	Orlando, FL	32806
Millsom	R.	37 Dolphin Crc.	Whle Bh/NSW/2107	ASTLA
Minderjahn	Ralph	4345 L Street	Philiadelphia,PA	19124
Minhora	Dennis	5236 Plz Aleman	Santa Barbara,CA	93222
Mitchel	Sean	289 Molino Ave.	Long Beach, CA	90803
Mitchell, MD	Reginald	7047 Catalpa Rd.	Frederich, MD	21701
Modich	Mark	2121 Bonnie View	Royal Oak, MI	48073
Montgomery	Nelson	9748 Heather Cir	Palm Bch Grdn,FL	33410
Montgomery	Lee	1091 Hickory Trl	W. Palm Bch, FL	33411
Moore	"Jackie"	4412 Don Felipe	Los Angeles, CA	90008
Moore	Richard R.	244 Gum Hollow	Oak Ridge, TN	37830
Moore, Jr.	Everett	#3307-4 Seasons	Winter Park, FL	32792
Moran	TJ	2687 Dorking Pl.	Santa Barbara,CA	93105
Mott	John	4564 Normandy Dr	Lesle, IL	60532
Muller, M.D.	J.	2551 Blue Grass	Indianapolis, IN	46208
Munger	Ed	828 Troon Trail	Worthington, OH	43085
Murphy	Thomas	285 Mill Road	Staten Isl., NY	10306
Murray	Lee	1300 Bay Ridge	Appleton, WI	54915
Musinski	Glenn P.	02 Belden Ct.	Agawam, MA	01001
Myers	Gerald E.	PO Box 284	Redway, CA	95560
Narby	Stan	19372 Wildwood	Brooksville, FL	33512
Nealis	Barry	12 W. Delaware	Medford, NJ	08055
Nel	Paul	P.O. Box 45	Claremont 7735	SAFRI

N -- S

Nelson	Ken	2545 W Camden Pl	Santa Ana, CA	92704
Ng	Richard K.	4514 Hollyridge	San Antonio, TX	78228
Nielsen	Finn	Capt. Rollbolls	DK-900 Hjorring	Denmk
Nigg	Donald	P.O. Box 9227	Palm Springs,CA	92263
Nikkel	Clarence W	Rt. 9, Box 401-A	Bakersfield, CA	93309
Norwood	Bob	Rt. 10, Box 175	Athens, AL	35611
Novoszad	Peter	Marchetstrsse 59	A 2500 Baden	AUSTR
O'Leary	Stephen	317 Vllge Run W	Encinitas, CA	92024
Off	Ted	6489 Foothill Rd	Ventura, CA	93003
Olsen	Ray	1725 E. Gary St.	Mesa, AZ	85203
Olson	Neal	1120 Clayton Way	Gladstone, OR	97027
Palethorpe	Tony	13058 Pine Cone	Grass Valley, CA	95945
Parker	Kirby	2302 Easton	Richland, WA	99352
Parry	Dr. J.	1252 Michigan	Columbus, OH	43201
Paryz	Roman	6 Rollingwood Dr	Lancaster, NY	14086
Peltz	David	20450 Celtic St.	Chatsworth, CA	91311
Penton	D.N.	Box 308	DeQuincy, LA	70633
Perfect	Rick	RD #4 Box 121	Reading, PA	19606
Peterson	Alan	826 Altos Oaks	Los Altos, CA	94022
Pettigrew	Bill	112 Beverley Ave	Mon Que H3P 1K7	CANAD
Pfost	Stan	1481 Howll Brch.	Winter Park, FL	32789
Pike	Leon	RR1	Lowman, NY	14845
Pitcher	Jack	4408 SE Knapp	Portland, OR	97206
Pizzo	Albert	54E Tanager Rd.	Monroe, NY	10950
Podpalka	Leslie	168 Strawbrry Hl	Woodbridge, NJ	07095
Popko	Edward	28 Maverick Rd.	Woodstock, NY	12498
Porter	Jim	100 Bonnie Blvd.	Hudson, IA	50643
Proch	Gary	PO Box 8054	Lancaster, PA	17604
Proefrock	Paul	10337 Somerset	Alta Loma, CA	91701
Pruss	Dan	131 Pennington	Plainfield, IL	60544
Pugh	Jim	26715 40th Ave S	Kent, WA	98032
Pyle	Kent	211 E. Jefferson	Clinton, MO	64735
Rackow	Peter L.	1801 E. Girard	Englewood, CO	80110
Radoci	Joseph	6224 Fair Oaks	Baltimore, MD	21214
Raffuse	Ray	1449 K S.R.A.	Anchorage, AK	99502
Rebeck	Mark	31932 Cle Winona	San Juan Cap, CA	92675
Reilly	John	10811 Glenway Dr	Houston, TX	77070
Renskers	Richard H.	1010 Coolidge St	Tupelo, MS	38801
Reynolds	Randy	122 E. Uintah	Colo Springs, CO	80903
Rice	George	1757 W. Nicolet	Banning, CA	92220
Richards	Jim	46-321 Auna St.	Kaneohe, HI	96744
Richardson	Pete	933 Magallan St.	Costa Mesa, CA	92626
Richardson	Wayne	453 Old State Rd	Berwyn, PA	19312
Richardson	Martin	7130 Claybeck	Huber Heights,OH	45424
Rifkin	Gilbert	18 Carmen Drive	Nanuet, NY	10954
Rindfleisch	Herbert	425 Hazel Dr.	Berea, OH	44017
Rocklitz	Gary	2805 Highland Dr	Burnsville, MN	55337
Rockwell	L. E.	2500 Clark Lane	Redondo, CA	90278
Rodgers	Dan	611 Connecticut	Norfolk, VA	23508
Rodriguez	Dr. David	104 W. Main	N Manchester, IN	46062
Rogers	Hugh J.	888 Kennet Court	Columbus, OH	43220
Roll	Michael J.	38955 Vista Dr.	Cathedral Cty,CA	92234
Rollin	R. David	309 E 5th St #3	Duluth, MN	55805
Romanauski	Mitch	328 Utah St.	San Francisco,CA	94103
Rondeau	Robert W.	73 Main Street	Brattleboro, VT	05301
Rosner	Kurt	Sugar Loaf Str R	Boulder, CO	80302
Rouse	Harold	1811 N Calhoun	Liberal, KS	67901
Salas	R. Pito	95 Hibbert St.	Arlington, MA	02174
Sarles	Carmen	611 Newman Cres.	Whitby LlN 1M7	Canad
Saunders	Vernon	117 Fort Worth	Hampton, VA	23669
Sauvin	Paul	16 Merritt Ave.	White Plains, NY	10606
Scalise, 22	Via Aldo M		00135 Rome	Italy
Scarpelli	Joseph	3566 Trent Ave.	Cleveland, OH	44109
Schneider	Erich	#4-777 W Queens	N VC, BC V7N 2L5	Canad
Schow	Skip	8170 Electric Av	Vienna, VA	22180
Scidmore	Allan	5013 Dorsett Dr	Madison, WI	53711
Scofield	William A.	5 Linwood Terr.	Clifton, NJ	07012
Sealy	Bob	521 96th Lane NE	Blain, MN	55434
Searcy	Marshall R	PO Box 1508	Porterville, CA	93258
Sears	Paul	PO Box 518	East Dennis, MA	02641
Sebastian	George	Box 633	Langhorne, PA	19047
Seemann	John	809 Ocean Rd.	S. Lake Hgts, NJ	07762
Sheaf	Fred L.	Rt #4, Box 101-C	Greenville, TX	75401

S--W

Sherliker	Bob	2486 Folkway Dr.	Miss.,Ont L5L2J6	Canad
Shipp	Alden	R.R. 1 Box 251A	Quincy, IL	62301
Short	Howard E.	PO Box 711	Lancaster, CA	93534
Sigvertsen	Jene T.	4825 B-cock 1004	Inv Grve Hgts,MN	55075
Silberbach	Michael	PO Box 1686	Chinle, AZ	86503
Simons	Martin	13 Loch Street	Stepney S.Autrla	Autrl
Slates	Jerry	2026 Spring Lke.	Martinez, CA	94553
Sleeman	Ray	77 Anna St.	SSM ONT P6B 3S7	CANAD
Smarte	Gene	RFD #1, Box 717	Hancock, NH	03449
Smiley	Everett	5355 Brierwd Cir	Littleton, CO	80122
Smith	Roger	RR 1 Box 433	Bethel, CT	06801
Smith	Victor	114 Walsh St.	Oceanside, CA	92054
Smith	Stephen	29 Cree Ave.	Scarborough, Ont	Canad
Snow	Joe	10 Beverly Dr.	Gaylordsville,CT	06755
Spackman	Glen	22 Lynda Ave.	Paparangi/Wellng	NZlnd
Spear	Charles	253 Holly Lane	Mocksville, NC	27028
Spezesk	William J.	1112 Simonds Rd.	Williamstown, MA	01267
Sprague	Keith A.	311 Laurel Ave.	Lindsay, CA	93247
St. Clair	William E.	9134 Stevens, So	Bloomington, MN	55420
Staton	Ralph W.	175 Louisiana	Oak Ridge, TN	37830
Steele	Bob	10173 St. Joe Rd	Ft. Wayne, IN	46815
Stein	Ron	808 Mill Grove	Audubon, PA	19407
Stevens	James R.	28520 Montereina	San Pedro, CA	90732
Stevens	Curt	24692 Nympha	Mission Viejo,CA	92691
Stevenson	John	4070 W 30th Ave	V'cvr BC V6S 1X5	Canad
Stinson	Tony	P.O. Box 531 NSW	Brookvale 2100	ASTRL
Stokely	Herk	1504 N Horseshoe	Va Beach, VA	23451
Stratton	Gordon	255 Brevoort St.	Kew Gardens, NY	11415
Strona	Paul	245 Panio St.	Honolulu, HI	96821
Struck	Henry	RFD #2	Lyme, CT	06371
Stubbs	Roy	19829 89th Pl W.	Edmonds, WA	98020
Stump	Mike	351 Marble St.	Cadillac, MI	49601
Styles	Geoffrey	9655 Lindenbrook	Fairfax, VA	22031
Swenson	Ross	14934 Easter Ave	Apple Vlly, MN	55124
Tamez	Julian	PO Box 90901	Houston, TX	77290
Thomas	Ben	1740 Aberdeen	Winston-Salem,NC	27103
Thomas	James	740 Collage Ave.	Holland, MI	49423
Thompson	Orland	RT 4, Box 222	Alexandria, MN	56301
Thorpe	John	PO Box 842	Monument, CO	80132
Thrush	Brian	RD 2 Box 20	Summerville, PA	15864
Thureson	Glenn	17534 S.E. 135th	Renton, WA	98056
Timberlake	Dan	1105 Betty Lane	Modesto, CA	95350
Tinker	Neil	35 Cairnside Cre	Wil ONT M2J 3M9	CANAD
Townsend	Duncan	11015 12th SW	Seattle, WA	98146
Trockels	Bob & Ede	2800 Ln Lexingtn	Hatfield, PA	19440
Troxell	Kenneth	12504 Circle Dr.	Potomac, MD	20854
Troy	Jeff	Y-12 King of Prs	King-Prussia, PA	19406
Truitt	James K.	9226 Cliffmere	Dallas, TX	75238
Turner	Dick	77 Daily Drive	Camarillo, CA	93010
Turner	Ron	59 Tiago Ave.	Tor ONT M4B 2A2	CANAD
Tuthill	Chet	24709 Ridge Rd.W	Novi, MI	48050
Typond	Don	259 Herman St.	Hackensack, NJ	07601
Tyrie	Jim	29 Smith Road	Bedford, NH	03102
Underwood	Donald L.	125 Marilyn St.	Holliston, MA	01746
Van Geldern	George	95 Edgemont Rd.	Katonah, NY	10536
Van Nostran	Kris	NAMTD 1003 NAS O	Virginia Bch, VA	23460
Veatch	David	8380 Grnsbro 914	McLean, VA	22102
Vescera	Ralph	P.O. Box Q	Edison, NJ	08818
Vierling	Ray	14039 Mathews Dr	Woodbridge, VA	22191
Voce	Pat	7941 White Blvd.	Abilene, TX	79606
Wakie	Robert	1228 69th Street	Brooklyn, NY	11219
Walbank	Sean	29 Acreman St.	Shrbn,Dor DT93PD	Engld
Wald	Corky	11500 Grey Cl. S	Cottage Grve, MN	55016
Warner	Frank	BX97 N210 Spokne	Newport, WA	99156
Warwick	John	309 Sunfish La.	Virginia Bch, VA	23456
Wass	Steve	2342 Harbor Dr.	Pt. Pleasant, NJ	08742
Wasserman	Dr. Alan	Haviland Hollow	Patterson, NY	12563
Waters	Rolland	716 Heman #3-5	St. Louis, MO	63130
Watson	David	1352 Pte. Claire	Sunnyvale, CA	94087
Watt	Coulter	167-15 12th #9-C	Whitestone, NY	11357
Weaks	Dan	175 5th Av #3344	New York, NY	10010
Webb	Kevin	335 Shockley RD	Auburn, CA	95603
Weierich	Jimmy	1800 Main St.	Vestal, NY	13850

W--Z

Weigle	Philip	4250 Crown #T-94	Denver, CO	80239
Weil	Richard	3 Clarinda Ct.	Vermont SV. 3133	ASTLA
Weseman	Gary L.	4408 Stanolind	Midland, TX	79707
Wetzler	Clifford	3343 W Whitendle	Visalia, CA	93277
Whitson	Max	P.O. Box 6607	Bakersfield, CA	93386
Wickwire	Peter	303 N. Baldwin	Portland, OR	97217
Williams	Jimmy L.	94-1058 Paha #3	Waipahu, HI	96797
Williams	George N.	140 W. Michigan	Battle Crk., MI	49017
Wilson	Edwin E.	6910 Lake Storm	Louisville, KY	40291
Wilson	Paul J.	R.R. #1	Middletown, IA	52638
Wise	Ken	1520 York Av 20A	New York, NY	10028
Witt	Elbert	1 Cayuse Lane	P Verdes Pen, CA	90274
Wolk	Irving	2161 Barnes Ave.	Bronx, NY	10462
Woodard	Wesley D.	107 Fairway Lane	Sherrill, NY	13461
Woodward	Stanley	67 Pine St.	Natick, MA	01760
Wyckoff	Rick	256 Edward Ave.	Trenton, NJ	08610
Yasui	Hiroyuki	2-17Yagra Shikma	Himeji 672	Japan
Zahner	Ernest	57 Knott Drive	Glen Cove, NY	11542
Zaic	Frank	16915 Kinzie St.	Sepulveda, CA	91343
Zarling	Ron	10529 W. Arch Av	Milwaukee, WI	53224
Zeisloft	Milton	526 Gates St.	Philadelphia, PA	19128

Giordano	Mario	Via Scalise, 22	00135 Rome, ITALY	
Kelberman	Samuel	5 Tudor City/319	New York, NY	10017

SEASON'S GREETINGS & HAPPY SOARING

Jim