

# R/C Soaring

D I G E S T

Vol. 3 No. 7 JULY 1986



**Phantom KIT REVIEW**

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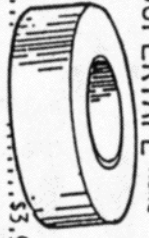
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# VALLEY FORGE FOURTH ANNUAL SAILPLANE CONTEST

August 23 and 24, 1986

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DID YOU EVER FEEL THAT THERE JUST AREN'T ENOUGH HOURS IN THE DAY TO GET IN ALL THE ACTIVITIES AND WORK THAT MUST BE DONE? YEP, YOU KNOW THE FEELING ALL RIGHT...AND HERE IT IS AT 11:00 PM ON THE DEADLINE DAY FOR THIS MONTH'S RCSD...AND I'M TRYING TO FIGURE OUT HOW TO CRAM INTO THIS EDITORIAL ALL OF THE THINGS I WANT TO TELL YOU ABOUT.

I JUST GOT BACK FROM A MEETING OF THE MONADNOCK PILOTS' ASSOCIATION, AND BOY IT WAS FUN! THERE WERE ABOUT 50 OR SO THERE, AND WE HAD LOTS TO TALK ABOUT. A GOOD PROGRAM ON AEROBATICS BY JIM PARKER (WHO ALSO TOWS SAILPLANES AT SUGARBUSH - ONE OF THE BEST SOARING SPOTS IN THE EAST), WITH A MOVIE ON AEROBATICS BY THE CANADIAN FILM BOARD. THE FOOD WAS CATERED, AND THE PIECE DE RESISTANCE WAS FRESH STRAWBERRIES ON VANILLA ICE CREAM!

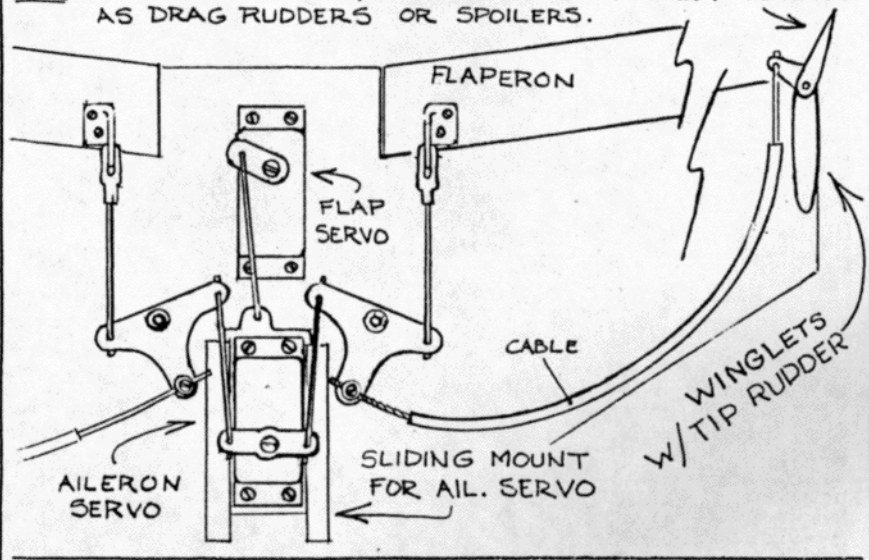
OH YES, BACK TO THE EDITORIAL. I'M PLANNING TO HAVE RCSD AT THE IMS SHOW IN PASADENA, CALIFORNIA NEXT JANUARY - AND MUST MAKE THE BOOTH ARRANGEMENTS NOW. JUST GOT OFF THE 'PHONE WITH JERRY SLATES OF VIKING MODELS - AN RCSD ADVERTISER - AND HE TOLD ME ABOUT SOME OF THE NICE NEW DESIGNS HE IS MOULDING, AND WILL SOON HAVE AVAILABLE FOR YOUR INTEREST AND ENTHUSIASM -- INCLUDING A COUPLE OF REAL SURPRISES. AS HE TALKED TO ME, HE DESCRIBED THE GERMAN SB-10 WITH 4-METER SPAN THAT HE WAS LOOKING AT. HE ALSO SENT ME SOME FANTASTIC PHOTOS OF THE INTERNATIONAL SLOPE RACE, AND I'D LIKE TO SHOW SOME OF THESE IN THE MONTHS TO COME.

HAVEN'T MADE A CONTEST YET THIS SUMMER, IN SPITE OF MY PROMISES, BUT - PLAN TO ATTEND THE ONTARIO GRAND PRIX OVER THE FOURTH OF JULY WEEKEND...AND HAVE REGISTERED (BELIEVE IT OR NOT) TO FLY MY NEW 2-METER BIRD ON SATURDAY.

PEGGY AND I ARE THINKING ABOUT THE COMING WINTER SEASON IN NEW HAMPSHIRE, AND HAVE JUST ABOUT DECIDED WE'D LIKE TO FIGURE OUT A WAY TO SPEND IT IN FLORIDA OR ARIZONA...WHICH MEANS RENTING A PLACE, STAYING WITH RELATIVES IN TAMPA, OR BUYING A TRAVEL TRAILER (AND TOW VEHICLE) AND RESERVING A SPOT. THAT, OF COURSE, WOULD MEAN FIGURING OUT HOW TO EDIT, PRINT AND DISTRIBUTE RCSD FROM THERE. IF IT CAN BE DONE, I'LL DO IT...JUST WAIT AND SEE!

MY NEW (1970) CHEROKEE 140 IS FLYING BETTER AND BETTER (OF COURSE IT ISN'T ME THAT'S GETTING MORE FAMILIAR WITH IT...HAH!). LAST NIGHT PEGGY AND I WENT UP FOR A FLIGHT, AND AS WE ACCELERATED DOWN THE RUNWAY AND INTO THE AIR, WE LOST ALL AIRSPEED, RATE OF CLIMB, AND ALTIMETER INFORMATION. INSTANTLY, I RECOGNIZED THE SYMPTOMS OF MUD WASPS FILLING THE STATIC PORT WITH MUD. FORTUNATELY, I'D FLOWN MANY TIMES WITHOUT THOSE INSTRUMENTS BEFORE, SO BY USING RPM INFO, VISUAL CLUES, AND SOUND, WE MADE A QUICK TRIP AROUND THE PATTERN, LANDED AND CLEANED OUT THE PITOT HEAD. AS WE SUSPECTED - CHOCK FULL OF MUD. NEVER A DULL MOMENT! TOMORROW AFTERNOON, OUR GOOD FRIEND BOB GRACEY IS COMING TO VISIT AND IS BRINGING A GNOME AND A PROPHET WITH HIM. WE'LL SPEND THE WEEKEND SOARING - WEATHER PERMITTING. I'LL TELL YOU ABOUT IT NEXT TIME. MEANWHILE, HAPPY SOARING..... JIM

NOTE: WHEN FLAPS DEPLOY, TIP RUDDERS BOTH DEPLOY OUTWARD AS DRAG RUDDERS OR SPOILERS.



TIP RUDDERS FOR FLYING WING/SWEPT WINGS: This is Ty Sawyer's idea for linking flaps or flaperons to drag rudders. System uses sliding servo mixer and C/L type bellcranks.

## KIT REVIEW

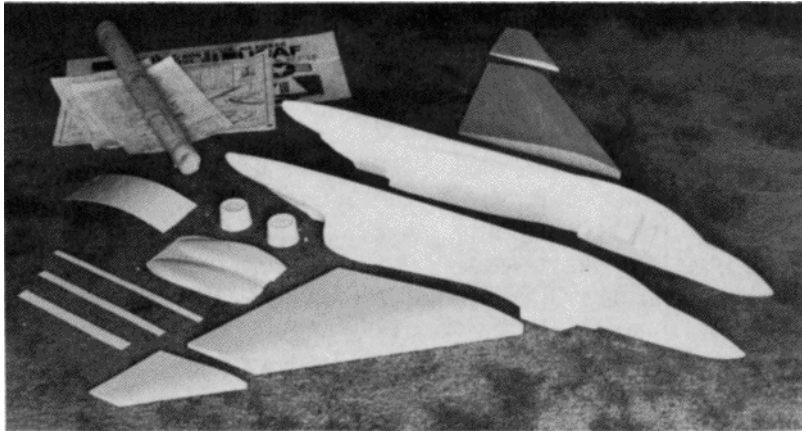
### PHANTOM F4 SLOPE GLIDER

MFG. By: Howard Metcalfe Models  
Southampton, England

Written By: Harry Finch  
5273 Vista Del Sol  
Cypress, CA 90630  
714-821-1635

I anxiously open the boxes and quickly overview the contents. My first thoughts; "Doesn't look to complicated, lots of detail sheets and plans. Damn, even if this thing never flies, its going to be a world beater at bench racing".

As you can see from the first photo, the kit includes two vacuum formed plastic fuselage halves, obeeche sheeted foam wings (unsheeted blue foam wings are also available) a super set of self stick graphics, full size plans and instructions.



The plan also show built up balsa wings if you prefer. I chose to use the obeeche foam wings, the quick and easy way out.

I spent about three hours reading all literature, studying the plans and selecting the various pieces of balsa wood and hardware

required to complete the construction. In this way I sort of walk through all of the building steps mentally. It saves a lot of time in the long run.

The only unusual assembly step in this entire kit is in joining of the fuse halves. Reinforcement strips are provided which are applied to the inside with contact adhesive. It works o.k. and its easy to pull them off and start again if things don't exactly align. However, the contact cement I used did not set up firmly enough to maintain permanent alignment. I then applied thick C.A. to the seam from the outside. It worked perfectly.

The tail feathers and aileren are solid balsa, quick and easy. Lots of room inside fuse for control rods and radio gear.

Ready for the finish. I experimented with various paints on some of the plastic fuse scraps and discovered that automotive lacquer primer (P.P.G. Primer 32 Gray) worked best. This material must be sprayed but I am sure that various other paints would also work, be sure to experiment on scraps first.



Obeeche covered wings are probably best covered with an iron on covering. I opted to paint this entire model to best achieve the overall seale look. Grain filling on obeeche can be a real pain. Many things don't work or they add lots of weight. I have found the following method to work just fine.

I spray a mist of water on one wing surface and then spread a thin slurry of 3M WALL REPAIR COMPOUND or MAGIC MODEL FILLER over the entire surface and proceed to treat the entire wing. Let dry and sand with 220 grit paper on a sanding block. You remove nearly all the filler except in the grain. This method adds almost zero weight, its cheap and easy, I love it.

Apply one coat of the gray lacquer over the entire model. Let dry and sand off almost all of this first coat and then apply one final coat. The nose cone, exhaust vents and canopy outline are painted on in contrasting gray and black. Cut out and apply the various graphics. By golly it looks great.

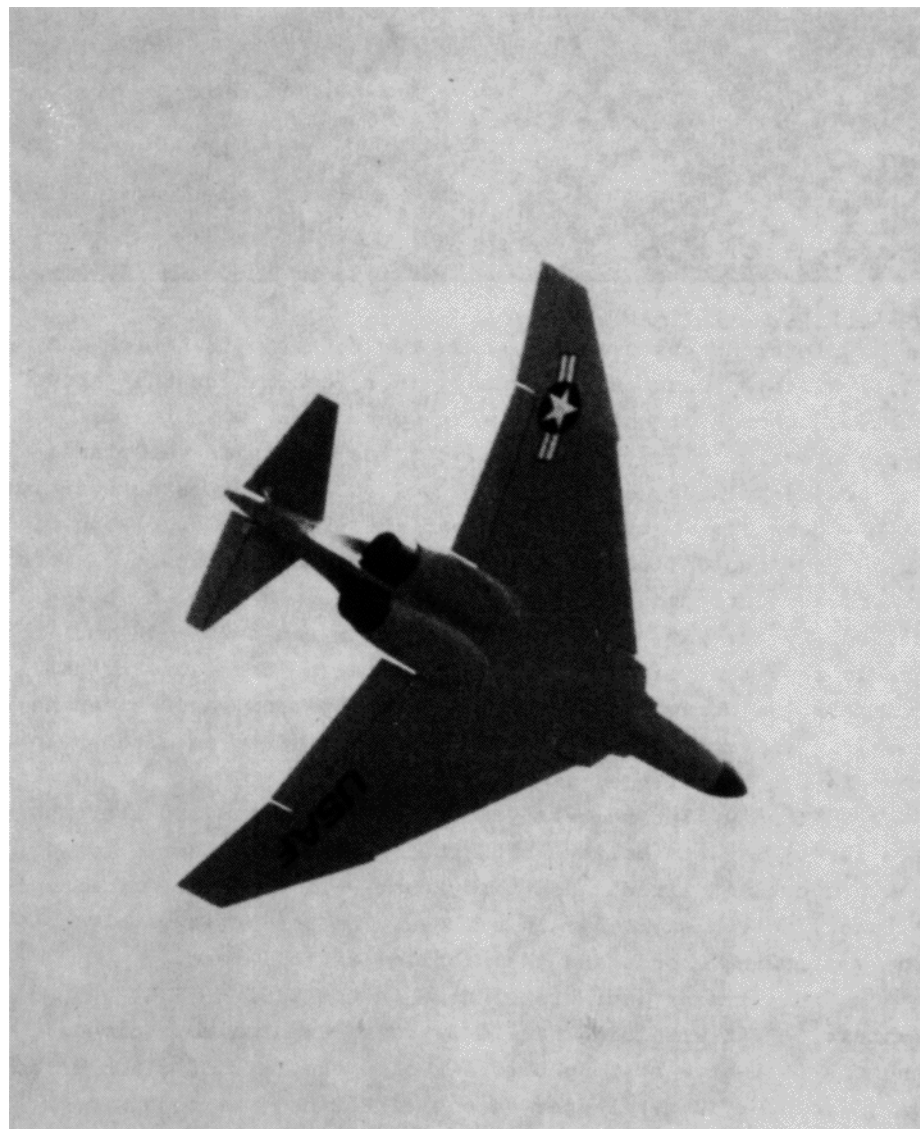
Pre-flight check. Weight ready to fly with 225 MAH battery was 24.7 oz. This gives a wing loading of 11.4 oz. per square foot. Last check of C.G., directing of control movements etc. All seems well.

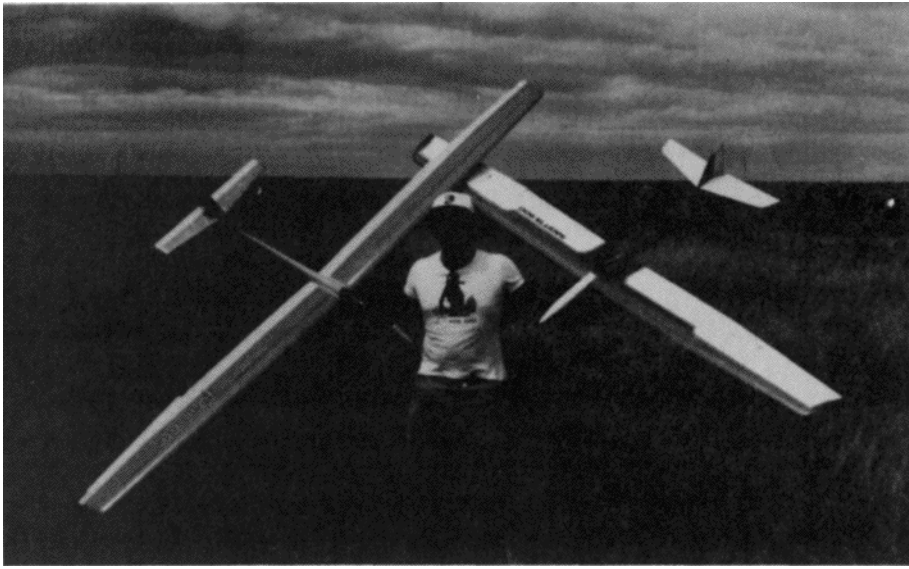
Ready to fly, nervous time, I call my friend Ralph, "meet me at the slope, the phantom is ready to fly", he thinks I have finally flipped out completely.

Every one at the slope was very impressed by the scale appearance. I win all the bench races as we wait for the wind velocity to build up.

Finally its reading 10 to 15 knotts and I decide to launch. Very nervous time. Hot damn she's off and flying like a bat out of hadies. I settle down, adjust trim, real good, stable, good control response.

This is not a glider for the novice but can surely be handled by the average aileren pilot. It is really impressive in the air. It flies best in heavy lift, penetrates like a dart. I'm off to point Fermin, Torrey Pines, get me a ticket for Hawaii, I'll hitch hike to the north shore.





#### Letters from Readers

Dieter Eberbach lives in Kempton Park, South Africa and flies RC sailplanes in the extraordinary conditions that abound there...photos of which will make most of us "weak thermal" types drool with envy. Dieter also flies full-size sailplanes and powered planes, so is quite involved with things aeronautical.

"Dear Jim: Last weekend I had the privilege of flying with Bruce and Arnold (local pilots who enjoy and practice the sport of cross-country soaring), and I took some pictures which are included. By the way, the lens on my Pentax was a 28 - 80 mm. Arnold is a top-class pilot...and I hope to learn some tricks from him. He brought out "Mossie 2", or Sparrow, and as can be seen, it is very large but flies very well. I am sure the pilot makes a big difference, as well!

"Firstly, let me tell you that we live at 6,500 feet above sea level; hard to believe but true, which means that a lot of the production "airies" don't fly that well up here. For example, Flinger, Multiplex LS-3, Alpina, etc. The reason is mainly due to the small wing chords and the profile (airfoil) etc.

"This summer (our winter here in the U.S. -- JHG) we had fantastic lift with big Charlie Bravo's (Cumulonimbus clouds)... and the full-size soaring pilots reckon the rate of climb on some days was over 10 meters per second!!! For us, the models do well; I flew my Sagitta for 1 hour and 20 minutes on one hi-start! The flying out here has been great, although it is always better during the week than it is on weekends!

"Now to the Gentle Giant. I promised the crew not to tell too much about the details, but the basics are as follows: MOSSIE TWO: Span 5 meters; length 1.8 meters +/-; Weight - FAI maximum; wing -- four sections -- totally homebuilt aircraft. When Bruce told me it can go 350 yards on hand launch, I had my doubts, but No Bull! Bruce, being 6'3", helps on launch...plus the ground effect...and the fact that Arnold is tops at flying only one to two feet off the deck. Arnold calls Bruce and myself 'reed' fliers, the way we pulse the box. Anyway, it's all part of growing up! Ha, ha.



"One of the few production gliders that flies well is the Flamingo. It's great to fly, but I must make a plan with the airbrakes, as they don't work too well. Bruce is flying a one-design called 'Froos'. Although bought from somebody else, it flies well, and should make a great cross-country racer. Bruce and myself home-made the wings of my Multiplex LS-3 longer, and they now come out at 4.1 meters, with a bigger chord at the tip. It should fly a hell of a lot better.

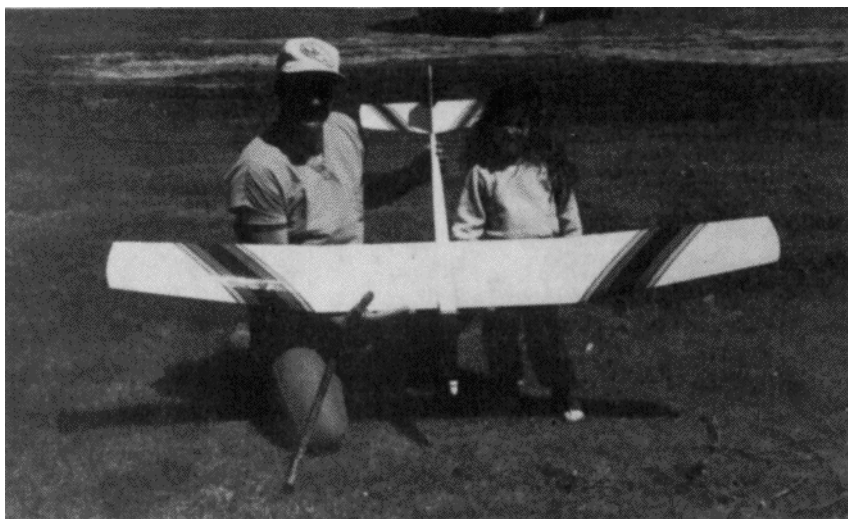
"Well that's about it from the men in the jungle. Best regards, (signed) Dieter & crew. P.S.: daytime temps 85-90 degree Fahrenheit.

Should any of you wish to correspond with Dieter, you can write to him at 51 Highveld Road, Kempton Park 1620, Republic of South Africa.

More Letters from readers.....

ELLIOTT J.W. BOULOUSE (advertiser in last month's RCSD) writes with a real problem...his town zoning board. They have 'raided' his workshop and told him to cease and desist. He has many, many orders for sailplanes to be built from kits and plans...all of them sent in by you in response to his ad...and, frankly, he is overwhelmed. Elliott tells me that he is going to try to finish the projects on hand, but that he can't contract for any more until he settles the problem with the town fathers. Apparently, they don't want a 'business' conducted in a residential neighborhood, in spite of the fact that there are several going already near Elliott's home. The fact that Elliott 'burns the midnight oil' disturbs some of the neighbors, when they see his shop open into the wee hours of morning. Not that there is any noise involved -- they just don't want him to build models. I will let you know when things have settled down and he can do business again. Meanwhile, he can build only his own planes - for himself - without violating the town regulations.

\*\*



ELLIOTT J.W. BOULOUSE AND DAUGHTER TORY POSE WITH BOB MARTIN PUSSYCAT SAILPLANE THAT BOB BUILT AND FLIES REGULARLY AT HIS HOME IN MORGANTOWN, PENNSYLVANIA

THREE OF ELLIOTT'S "FLEET" OF SAILPLANES AND POWERED AIRCRAFT. ON THE LEFT : WINDFREE (MARK'S MODELS) WITH RAINBOW-STRIPED WING COVERING ON NAVY BLUE BACKGROUND; BOB MARTIN PUSSYCAT COVERED IN WHITE WITH ORANGE WING STRIPES AT RIGHT REAR; AND, IN THE FOREGROUND, THE VENERABLE HOBIE HAWK COVERED IN SOLID OPAQUE ORANGE.

DAVID HOUK sends in his 'fan mail' for two of RCSD's advertisers: Lee Murray and Ron Carter. Lee makes the airfoil templates and Ron makes the spoilers. Here's Dave's letter.  
Dear Jim,

Please forgive the long time period between correspondence.

Enclosed is my subscription renewal. Keep up the fine magazine.

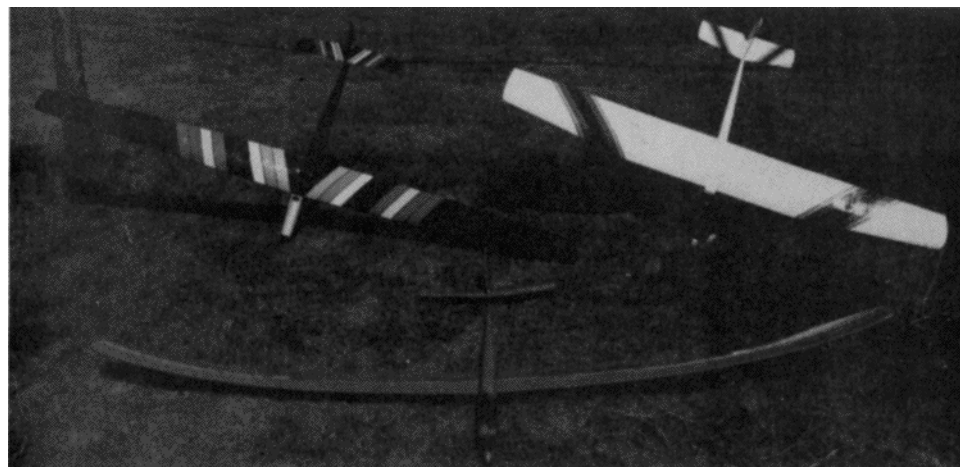
You have asked for some input about your advertisers.

I have had experience with two. First is Lee Murray. Not only does he reply promptly, but he has a fine line of software also. I have not tried his laser-cut airfoil templates. I am also pleased to say that Lee has allowed me to do some program conversion to MSDOS for him. It can be quite a challenge at times. Second is R/C Design and Development. Again the response was quick and his Spoilers are very nicely done. Being a Moldmaker/Machinist myself I notice fine workmanship. I highly recommend both of these companies.

My Sagitta with modifications has come along very slowly due to time commitments. All of the modifications that we discussed, except the Eppler 214 airfoil, have been included. I am currently preparing for covering. The one major snag that I have developed is with the radio gear. I have had 2 Futaba S-133 servos on order for 6 months. This seems like an incredible time period to me. At the Toledo Expo, Futaba said that all distributors have them in stock ready for shipment, however, my dealer has checked with the 2 major distributors in the States and they do not have any, nor do they have any idea as to when we can expect them. Have you experienced or heard of these difficulties in your area? I am currently contacting the main office of Futaba to try and rectify this situation.

Well, that's about it for now. Here is a CAD generated LSF Logo I thought you might like. Thanks for your efforts with R/C Soaring Digest.

Sincerely, David Houk Jr.

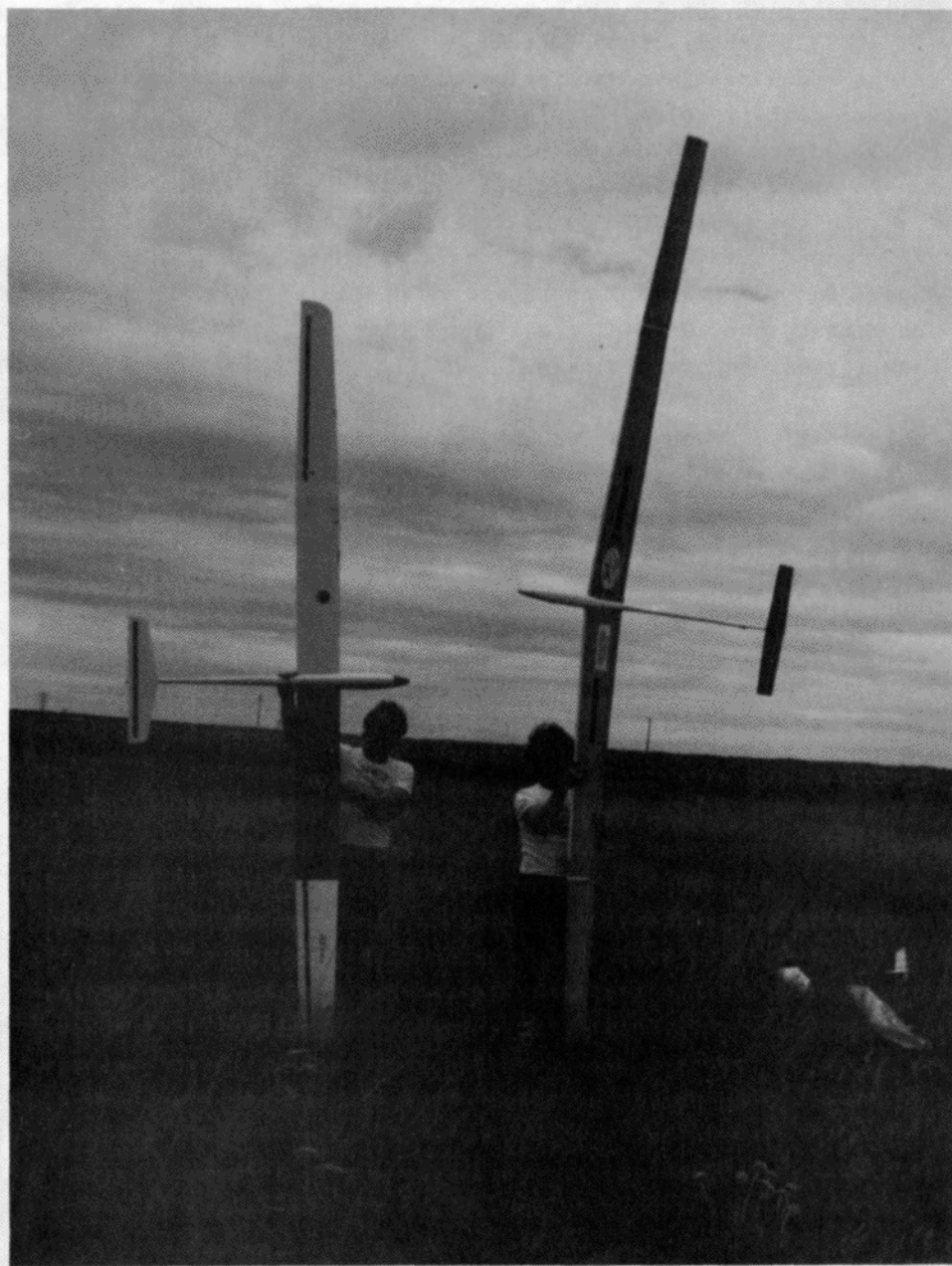
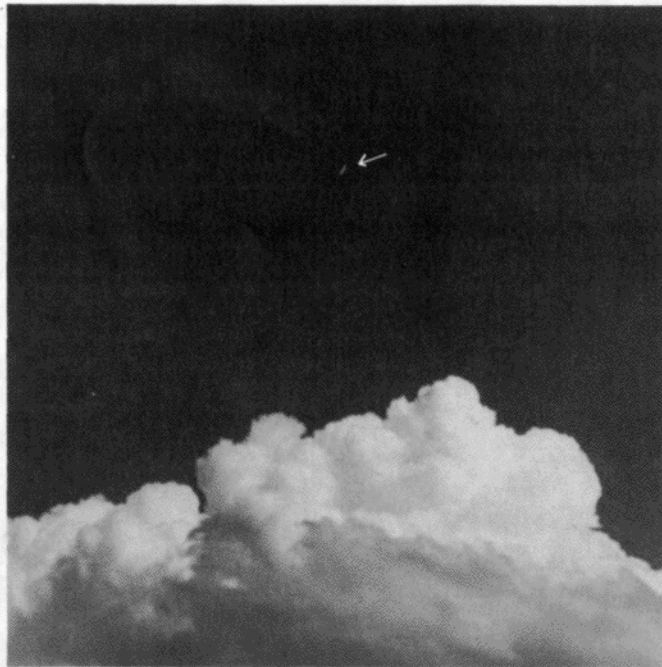




Look at those skies, guys! Anybody want to try South Africa in their winter conditions? Would you believe a 5-meter glider taken with an 80mm. lens could look so tiny?

Dieter Eberhard ("myself" as he noted on the photo) holding his Flamingo (colored pink, what else?) in his right hand, and the Sagitta (metallic blue and white) in his left hand. The Sagitta appears to be a "600" but I could be mistaken.

Bruce and the "Mean Machine" (yellow wings, white fuselage, red tailplane, and dark blue or black spoilers. Note typical flying clothing for 85 - 90 degree temps.



Bruce and Arnold compare wingspans...look at the span and aspect ratio of the MOSSIE TWO. At 4.1 meters, the "Froos" is almost dwarfed. Bruce's machine has dark blue wing panel, but is otherwise white or light grey. He has 'dayglo' orange stripes on ailerons and tailplane to help orientation at high altitudes.

Still more letters...

BRUCE ABELL writes to tell me that I have gotten a few things wrong with my description of the proposed Australian 2-meter contest rules. Here's a correction: ANY NUMBER OF CONTROL FUNCTIONS can be incorporated, but ONLY TWO servos used. There can be mechanical linkages cascading off the two BASIC servos.

In the April RCSD, page 13 item 5 should read (4th line): "20 minutes total" (not 30 minutes as printed). Line 1 of item 7 should include the word "not" after "Model is". Okay Bruce, sorry about that, but thanks for calling it to our attention. Let me know if the proposal is passed.

\*\*\*

Incidentally, Bruce has 'whomped up' a new airfoil having these "ideas" incorporated:

1. Root section - 12% thickness/chord ratio; undercambered aft of the main spar; Phillips entry; peak of top curve at 30% of the chord.

2. Polyhedral break: 10% thickness/chord ratio; bottom surface same ordinates as root; peak of top curve at 33% chord.

3. Tip Section: 8% thickness/chord ratio; bottom surface differs by flattening from main spar to trailing edge; peak of top curve at 35% chord. He says: "I've already built several wings utilizing all the above parameters except the variation of peak location. The ideas seem to work very well in practice. I use NO WASHOUT other than aerodynamic washout created by the change of thickness/chord ratio from root to tip, and the change in lift characteristics created by the change from undercamber to flat lower surface at the tip. The models utilizing this system respond almost immediately to rudder input due to decreased drag at the tip, so I feel I have partly carried out Dr. Horten's idea of "unloading the wing tips".

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Finally, Peter Carr, NSS President for 1986, wrote to me as follows:

"Would you please do me a small favor? At the Toledo show I met a fellow who flies slope at home in the Republic of China. I gave him some issues of SAILPLANE and a bumper sticker for his briefcase; and we exchanged business cards. About four days ago, he sent me a letter and four beautiful pictures of himself and his buddies flying off the ocean cliffs. HE WANTS TO EXCHANGE LETTERS WITH OTHER SLOPE PILOTS and asked that I spread his name and address around. I would like you to mention it in RC Soaring Digest.

I'm sure Lin will be grateful.

Mr. LIN HOUNG-WEN, c/o Kwang Ying Trading Company, 78 Su-Wei Road, Taipeh, 10619, Taiwan, Republic of China.

" Last week I flew the new 2-meter sailplane which is a copy of Helmut Lelke's HEIDI, and was built from the info on the cover of RCSD! It has flaps, ailerons, tow hook, rudder and elevator. The original HEIDI didn't use rudder, but I like to fly rudder separate from ailerons. The ship weighs out at 11 oz./sq. ft. and has 3 degrees of dihedral. I'm very pleased with it, but will have to start the learning curve again, as it is very hot!! The GOBBLER is still going good, but is very different from HEIDI... and so it goes.

"Hope your flying season is progressing, and I still hope to meet up with you for a go at "Thermal Wars" some day!! (Signed '73' Pete).

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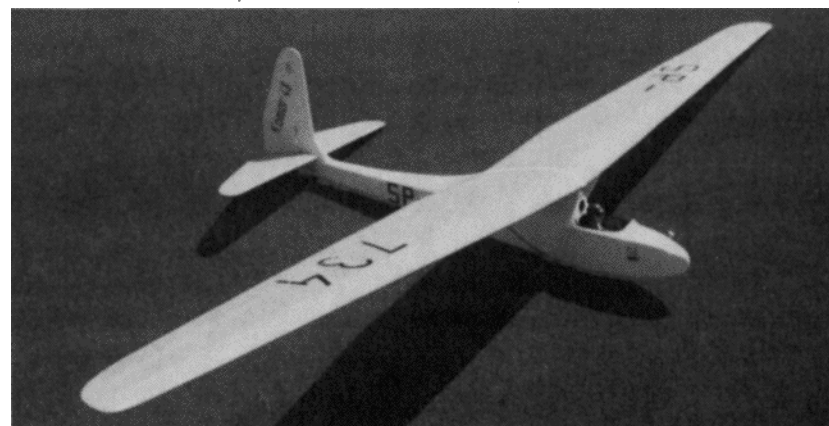
(For those of you who aren't radio amateurs (Hams), the number 73 means "best wishes"...JHG).

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#### ANNOUNCEMENTS AND SUCH ... and SOARCES, TOO

THE WORLD'S VINTAGE SAILPLANES is to be published by Kookaburra Technical Publications Pty Ltd, P.O. Box 648, Dandenong 3175, Victoria, Australia. The actual title is THE WORLD'S VINTAGE SAILPLANES 1908 - 45, and represents a colossal, monumental work by well-known soaring pilot and author Martin Simons. A special concession offer from the publishers ONLY is available to all readers who send 2 International Reply Coupons (available from your local Post Office) to the above address. In return, the publishers will airmail you a free color brochure describing the book in detail, price information, and full particulars of how to order.

A nice letter accompanied this announcement, with some photos of sailplanes, (a couple of which are shown here) from Geoff





Pentland who says: "My Komar 48 has a span of 104" and was built from original plans. A beautiful, stately floater, this Polish sailplane has many long soaring flights to its credit. It's four years old and still going strong! The group photo shows 3 Grunau Babies, a Sperber Junior, an Olympia, Kite, Kirby Prefect, Kirby Cadet, Komar and Kestrel...at a scale contest in Australia. Vintage jobs, mostly scratch-built, completely dominated."

Geoff, our readers and I thank you for the fine letter and pictures of how it's done in Aussie. There is a great increase of interest over here in vintage sailplanes these days, and full-size enthusiasts, as well as modellers, are restoring and flying the 'oldies but goodies'. In fact, I'd like to include more and better information in RCSD about this phase of sailplane flying.

As a start, anyone interested can write to the VINTAGE SOARING ASSOCIATION, c/o Mai Scott, Lovettsville Airport, Lovettsville, VA 22080. Mai is the wife of Jan Scott, pilot and vintage enthusiast, who edits BUNGEE CORD, magazine of the Association. Any serious scale enthusiast and vintage sailplane buff, owes it to him-or her-self to find out more. Jan was THE person who almost single-handedly, brought the Horten brothers back into the limelight (and friendly relations with the U.S.). He also owns and flies, at his own airport, several vintage machines.



Letters (continued)...

My friend Ferdinando Gale, from Baveno, Italy has written a very interesting letter about several subjects, but the one I was most interested in has to do with stability. He has been reading the various articles in RCSD, and wanted to pass along his comments. "Ferdi" has been instrumental in getting numerous soaring seminars and workshops going in Italy, and has also done considerable work at the wind tunnel in Varese...a gliding and soaring center for both full-size and smaller sailplanes. Here's his letter (in part):

" My first 'electric' is a kind of motor glider with wheels for ground take-off. It will be enormously underpowered, as I have only small electric motors, and will have to choose the most powerful one out of the five that I have. This plane will be for me just a kind of learning exercise about electrics. Another model is envisaged -- a Horten-type tailless, which is far away anyhow. At the moment, I have only completed the aerodynamics calculations. You might be interested in hearing that the center portion of the swept wing is equipped with a flat-bottom American airfoil -- the MZ 5411 -- designed by the dean of American modellers - Frank Zaic ( a lifetime friend of mine ) while the outer panels have a reflex-type airfoil. This 'foil and the related 'rudderon' will be tested at the MEG low-speed tunnel first (also, the MZ 5411 has been extensively tested there). I will keep you posted, and will send a picture and description as soon as flight tests of my first electric are done.

" In connection with the fine article 'Stability and sailplane tuck' by David Fraser (RCSD, April '86), I have a few comments to offer which are detailed on the attached sheet. Please feel free to publish them or to waste them! Also attached is a condensed "soaring report from Italy;"If you like it, publish it, if you don't like it, just W.P.B. it!

"Shortly, I will resume slope soaring -- as soon as the snow melts -- (Ferdi lives in northern Italy). Last Saturday (mid April) we had 20cm. of snow at the 300m altitude that is only ten minutes from home, but Sunday and Monday we had beautiful sunshine.

"One thing I am going to prove is that the fuselages of our sailplanes - generally speaking - are too long. For years I have been slope soaring a glider with a tail lever arm equal to 5 M.A.C. (mean aerodynamic chords). Last year, I chopped 1 M.A.C.-length off the fuselage and flew without any problem (rudder and elevator only). Now, I have further reduced the fuselage length, and the new tail lever arm is only 3 M.A.C. Aerodynamical calculations and hand launching have so far indicated that there is no problem as

Ferdi Gale letter (continued)...

far as static longitudinal stability is concerned, while maneuverability is definitely improved. Once tested on the slope, I will let you know 'real life' results.

"(Concerning your request for information) I must say that although I have some 800 airfoils in my computerized sections file, the FX 60-100S does not show up. I suggest you ask Dipl. Ing. Dieter Althaus (about it). Professor Wortmann died last year, and Althaus has been so kind to answer a letter of mine which I had sent earlier this year to Dr. Wortmann. I have the 'Stuttgarter Profile Catalog'; if you are interested in other Wortmann sections, just let me know. Best regards (signed) Ferdi.

SAILPLANE STABILITY .....Ing. Ferdinando Gale

In connection with the fine article by Mr. David Fraser, "Stability and Sailplane Tuck" (R/C SD #4, April 1986) I would like to mention how the static longitudinal stability is dealt with by many Italian aeromodellers, not only for sailplanes, but for any type of flying models from rubber jobs to scale four-engine reproductions. The method which we have been using for decades is known as "Crocco's Graph" -- and was "invented" by the Italian aviation pioneer, Professor Arturo Crocco.

Between WWI and WWII, the Crocco method was extensively used for the preliminary trimming of many aeroplanes, still on the drafting board, in Italy and in other European countries -- since Professor Crocco's textbook had been translated into several foreign languages. For instance, this writer knows for sure that (in addition to Italian aircraft) Crocco's Graph was used by the designer of the Rumanian interceptor-pursuit I.A.R. 80 -- a man I happened to meet many years ago.

From every textbook of applied aerodynamics, we learn that - in addition to an increasing stabilizing moment (which is positive or negative according to the convention taken for signs) - a static margin is necessary in order to guarantee an adequate static longitudinal stability (S.L.S.). We can determine with satisfactory accuracy the aerodynamic centre (A.C.) of the wing, while the aerodynamic centre of the complete sailplane is not easy to assess.

Crocco's method allows us to determine the A.C. of the complete sailplane, and - consequently - we can shift (on the drawing board) the center of gravity to obtain the desired static margin. By definition, the static margin is just the distance between the plane's aerodynamic centre and the centre of gravity.

16 It takes about 20 minutes to draw Crocco's Graph; alterna-

Sailplane Stability (continued).....F. Gale

tively, as I do, it can be done with a simple program in BASIC (I am using a Spectrum ZX 48) just in a couple of minutes. It takes longer to describe it than to draw it by computer! If the editor of this DIGEST has no objection, I would be happy to describe Crocco's methods, along with a working example. (Please do...JHG).

"For different values of longitudinal dihedral ( that is, the difference in incidence between the wing and the stabilator with respect to the flight path) one can determine:

1. Location of the aeroplane's aerodynamic centre (A.C.)
2. The value of the stabilizing moment coefficient
3. An empirical indication of the amount of static margin required, as a percentage of the M.A.C.
4. Extreme limits of the centre of gravity

What is nice about this method is its extreme simplicity and reliability, since it has been used for decades for both full-size aeroplanes and flying models as well.

"By applying Crocco's method -- using aerodynamic coefficients  $C_l$  and  $C_m$  -- corresponding at various speeds (that is, at various Reynolds Numbers) one can verify whether the craft is statically stable at all flying speeds. However, this procedure is seldom necessary: as, so far, our experience has indicated that if a sailplane is stable according to the Crocco Graph, it remains so for the complete flight envelope.

"As far as the "tucking under" problem is concerned, I can only formulate the hypothesis that it is due to excessive (at high speeds) lever arm between wing and stabilator. For years I have been using an "all around" slope sailplane having a lever arm equivalent to 5 M.A.C.'s. Last year, I chopped away a piece of the fuselage, reducing the length to 4 M.A.C.'s...and the plane flew as well as before (rudder and elevator only) with no problems. For the forthcoming season, I have further reduced the fuselage length to 3 M.A.C.'s. Calculations and hand launchings have so far indicated that the S.L.S. is more than satisfactory, while maneuverability is definitely improved.

"In 'real life' soaring; that is, on turbulent hills near the Alps, if results confirm this, then we can give credit to the above-formulated hypothesis.

"For years I have been advocating short fuselages for our sailplanes; all Italian modellers who have chopped away a piece of fuselage tail lever arm have been satisfied: quicker response, and higher maneuverability at all speeds. More data should be collected before one can say that this could be a cure for the 17

"tuck" problem...which we have seldom experienced.

"P.S.: The lever arms mentioned above are all taken from the leading edge of the mean aerodynamic chord.

\*\*\*

(Ferd, you have left us "hanging"! What about a copy of the Crocco Graph for RCSD? How about a copy of your program in BASIC that we can use to do the calculation? Where can we find more about this to really get down to work and do some designing?...JHG).

#### THE DEATH OF A NEW SAGITTA OR THE WRITTEN WORD AS PSYCHOTHERAPY

by  
-- JACK SASSON --

(WITH THANKS TO THE LONG ISLAND SILENT FLYER NEWSLETTER...JHG)

"There it is - couldn't get it any higher up that cottonwood if I tried. It pretty much disintegrated as it smashed through the branches - like so much cheese through a grater...looks like some kind of ridiculous wind chime, the sun reflecting off the Monokoted wing as it hangs suspended by the servo wires...yellow, purple, yellow, purple, yellow...Then a dark cloud envelopes me as I remember what a dog it was to build that SAGITTA wing - the hours of cutting, fitting, sanding and - of course - it had to have carbon fiber, full sheeting and ailerons.

"I hadn't flown an aileron-equipped ship before, and the difference was nothing less than miraculous. No more wallowing into turns, anticipating, reacting, then waiting. You push the stick and it happens...NOW! A sloppy turn is the result of your poor coordination of the elevator, rudder and ailerons, rather than a sluggish rudder showing a bent-up wingtip, thus kicking the bird around. And what a whole new world the SAGITTA had opened up. Now, instead of packing it up when the wind picked up, I could slip in a few more ounces of lead and go wave hunting. I vividly recall one of the first contests of the 1985 season watching Matt Sheldon's ship penetrate and explore the same wall of wind that never allowed my ballasted-up OLY to progress any farther than where the winch left it, but here was Matt ascending some invisible stairway, specking out and returning to nail the pin as I hiked back some 200 yards from the spot to retrieve mine.

"It happened in just these conditions; a GENTLE LADY was caught in the first gusts and taken over the leeward ridge to its demise; a Standard-Class gasbag of unknown parentage struggled to maintain position, then flipped around and landed over a small rise. I put 8 ounces in the 'GITTA and up it went, off the line, a couple of down stab clicks and like a javelin it picked up speed: slowly at first, but then fast into the wind. There it was - THE WAVE - God, look at it go up! Okay, let's crab a little; left - now an easy turn right - and still going up! The wind speed drops...thermal...okay, try a

turn -- yeah, it's going up -- over my head now, but turning nicely; now behind me and very high. The wind blows again, but harder, and I fear having to fight to get back, but a few clicks of down and here it comes, not down - but forward - right into that wave and up again. So this is what those faster 'foils can do! I think of all those blustery winter days that I can now fly in. About 28 minutes into the flight the wave has left and I'm returning low...and the joy of that flight has me excited...so how 'bout a roll for fun? Hey, not bad...Pow! My eyes still can't believe it stopped that quick -- but there it hangs.

"As I drive to Eldorado Canyon in search of a climber to pull my toy down, I have lots of time to think about flying the OLY again perhaps not unlike the transition from a Porsche to a VW -- and time also to decide next time to try foam for wing construction. It seems too much planning, preparation and building to be destroyed so fast to keep on building in wood, so here's something new to learn. The fuselage is okay, so maybe some sort of PHOENIX can rise out of the rubble that the climber is lowering down to me...let's see...how about a 112" wingspan, flaps, glass-covered foam..."

\*\*\* \*\*

(Jack, we've all experienced similar things, but how I enjoy reading your prose; especially "wall of wind" , "ascending some invisible stairway" , "a standard-class gasbag of unknown parentage" , all good stuff. I hope you write some more and get it published because it's fun to read ... and you express so well what we all have felt. I hope by now that you're flying your new foam-winged 'GITTA, and that it's even better than your first. How about doing something for RCSD? -- JHG).

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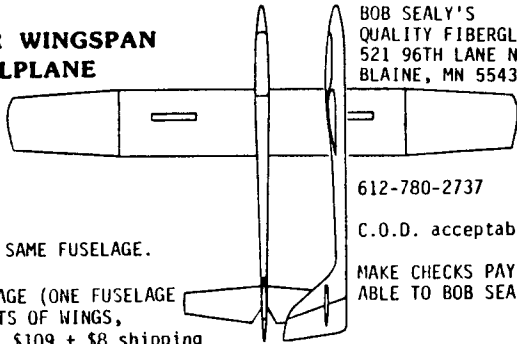
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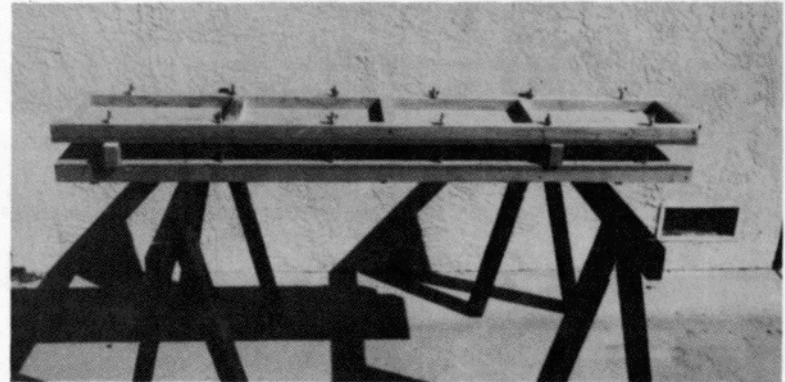
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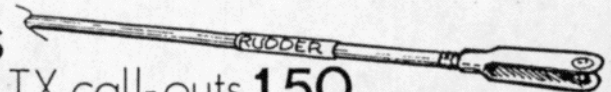
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