

# **R/C** **MODELER**

THE LEADING MAGAZINE FOR RADIO CONTROL • MARCH 1967 • 50¢



**BILL NORTHROP'S**  
**BIG JOHN**

**FRENCHY LA JEUNESSE'S**  
**TIGER HYDRO**

**HAL deBOLT'S**  
**ENCORE**

**PLUS**  
**POWER & SAIL**

## A few words about me.

I am Electronic Engineer and this is my day job.

From tender age two things attracted my interest and I managed to have them in my life.

The first was electricity and the second the bluesky.

I've found the model airplanes hobby in October 1973.

I love the wooden structures from scratch airplanes and boats also.

I started collecting plans, articles, books and anything else that could help the hobby of many years ago and have created a very large personal collection of them.

Since 2004 I became involved with the digitization and restoration of them and started to share the plans from public domain with my fellow modelers.

Now after all this experience I have decided to digitize, to clean and to re publish in digital edition and free of all issues RC Modeler magazine from 1963 to 2005 and others books and magazines.

Certainly this will be a very long, difficult and tedious task but I believe with the help of all of you I will finish it in a short time.

I apologize in advance because my English is poor. It is not my mother language because I am Greek. I wish all of you who choose to collect and read this my work good enjoyment and enjoy your buildings.

My name is Elijah Efthimiopoulos. (H.E)  
My nickname Hlsat.

My country is Greece, and the my city is Xanthi.



## Λίγα λόγια για μένα.

Είμαι Μηχανικός Ηλεκτρονικός και αυτό είναι το αληθινό μου επάγγελμα εργασίας.

Από μικρός δυο πράγματα μου κέντρισαν το ενδιαφέρον και ασχολήθηκα με αυτά.

Πρώτον ο ηλεκτρισμός και δεύτερον το απέραντο γαλάζιο του ουρανού και ο αέρας αυτού.

Το χόμπι του αερομοντελισμού το πρωτογνώρισα τον Οκτώβριο του 1973.

Μου αρέσουν οι ξύλινες κατασκευές αεροπλάνων και σκαφών από το μηδέν.

Ξεκίνησα να συλλέγω σχέδια, άρθρα, βιβλία και ότι άλλο μπορούσε να με βοηθήσει στο χόμπι από τα πολύ παλιά χρόνια.

Έχω δημιουργήσει μια πολύ μεγάλη προσωπική συλλογή από αυτά.

Από το 2004 άρχισα να ασχολούμαι με την ψηφιοποίηση τους, τον καθαρισμό τους αλλά και να τα μοιράζομαι μαζί σας αφού τα δημοσιοποιώ στο διαδίκτυο (όσα από αυτά επιτρέπεται λόγω των πνευματικών δικαιωμάτων τους).

Σήμερα μετά από όλη αυτήν την εμπειρία που έχω αποκτήσει, αποφάσισα να ψηφιοποιήσω, να καθαρίσω και να ξαναδημοσιεύσω σε ψηφιακή έκδοση και ελεύθερα όλα τα τεύχη του περιοδικού RC Modeler από το 1963 μέχρι το 2005 και κάποια άλλα βιβλία και περιοδικά.

Σίγουρα είναι μια πολύ μεγάλη, δύσκολη και επίπονη εργασία αλλά πιστεύω με την βοήθεια όλων σας να την τελειώσω σε ένα καλό αλλά μεγάλο χρονικό διάστημα.

Ζητώ συγγνώμη εκ των προτέρων γιατί τα Αγγλικά μου είναι φτωχά.

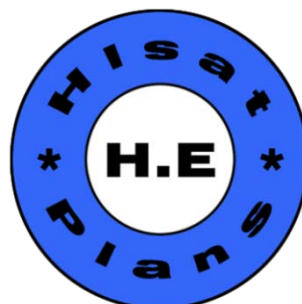
Δεν είναι η μητρική μου γλώσσα γιατί είμαι Έλληνας.

Εύχομαι σε όλους εσάς που θα επιλέξετε να τα συλλέξετε και να τα διαβάσετε αυτήν την εργασία μου καλή απόλαυση και καλές κατασκευές.

Το όνομα μου είναι Ηλίας Ευθυμιόπουλος. ( H.E )

Το ψευδώνυμο μου Hlsat.

Η χώρα μου η Ελλάδα και η πολη μου η Ξάνθη.



## **RCM Magazine Editing and Resampling.**

### **Work Done:**

- 1) Advertisements removed.
- 2) Plans building plane removed and hyperlinked.
- 3) Articles building plane removed and hyperlinked.
- 4) Pages reordered.
- 5) Topics list added.

**Now you can read these great issues and find the plans and building articles on multiple sites on the internet.**

**All Plans can be found here:**

**Hlsat Blog RCModeler Free Plans and Articles.**

<http://www.rcgroups.com/forums/showthread.php?t=2354459>

**AeroFred Gallery Free Plans.**

<http://aerofred.com/index.php>

**Hip Pocket Aeronautics Gallery Free Plans.**

[http://www.hippocketaeronautics.com/hpa\\_plans/index.php](http://www.hippocketaeronautics.com/hpa_plans/index.php)

**James Hatton Blog Free Plans and Articles.**

<http://pulling-gz.blogspot.gr/?view=flipcard>

**Vintage & Old-Timer RCM Free Plans.**

<http://www.rcgroups.com/forums/showthread.php?t=2233857>

**Contributors:**

**Scanning by ser001**

**Editing by Hlsat.**

**Thanks Elijah from Greece.**

# RADIO CONTROL MODELER

**n Dewey** Editor  
**ug Tucker** Assistant Editor  
**Thompson** Technical Editor  
**b Dance** Art Editor  
**ck Kidd** Technical Art Editor  
**ithleen Acton** Secretary

RCH 1967

VOLUME 4 NO. 3

## BIG JOHN O.M.T. ----- 7

*Bill Northrop's 1500 sq. in. biplane.*

## ENCORE ----- 21

*Class III contender by Hal de Bolt.*

## S.O.S. ----- 28

*"Stick-On-Switcher" for single channel. R. B. Wallace.*

## features

## RCM PRODUCT REPORT ----- 31

*PCS Digital Proportional System.*

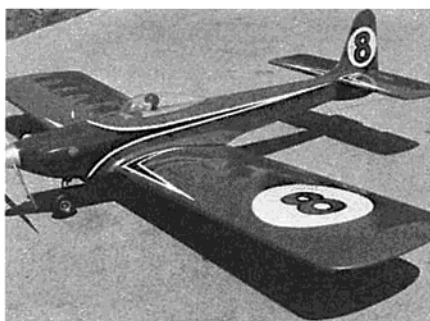
## WALT & WAGGER'S R/C DEFINITIONS ----- 33

## PROBLEM: LOST — ONE FLYING SITE! ----- 34

*A must for every R/C club. By Jack Josaitis.*

## THE TIGER ----- 50

*Competition hydro by Frenchy Lajeunesse.*



## departments

- 5 EDITOR'S MEMO
- 26 SHOWCASE '67
- 26 RCM ELECTRONICS
- 38 SUNDAY FLIER
- 40 CUNNINGHAM ON R/C
- 43 TOP OUT
- 47 POWER & SAIL
- 58 ROOSTERTAIL
- 55 KITS & PIECES
- 59 THE LAST WORD



## OVER

Bill Northrop's Big John — 1500 square inches of MonoKote covered biplane! A full winter's project.

R/C MODELER CORPORATION, Publisher. Editorial and Advertising Office, P. O. Box 487, Sierra Madre, Calif. 91024. Business and Circulation Office, 2401 East 17th St., Suite D, Santa Ana, Calif. 92701.

Subscription service: All subscription correspondence should be addressed to R/C Modeler Circulation Office, 2401 East 17th St., Suite D, Santa Ana, Calif. 92701. Please allow at least six weeks for change of address. Include your old address, as well as new — enclosing an address label from a recent issue wherever possible.

Editorial contributions: must be accompanied by return postage and will be handled with all reasonable care. Publisher assumes no responsibility for return or safety of art work, photographs, or manuscripts. Address editorial contributions to The Editor, R/C Modeler Magazine, P. O. Box 487, Sierra Madre, California.

Subscription rate: U.S.A. & Possessions one year, \$5.50. Two years \$10.00. Canada & Mexico, one year \$6.00. Two years \$11.00. All other countries one year \$6.50, two years \$12.00. Payment from all countries must be made in U. S. currency.

R/C MODELER MAGAZINE is published monthly by the R/C Modeler Corporation. Contents copyright 1967. All rights reserved. Printed in U.S.A. Second Class Postage paid at Sierra Madre, California, and at additional offices.

Ken Willard, Sunday Flier  
 Larry Kleinburg, Top Out  
 Ernie Murphy, Kits & Pieces  
 Chuck Cunningham, Cunningham on R/C  
 Cliff Rausin, Foreign Editor  
 Jim Whitlatch, Power & Sail  
 Ray Crites, Roostertail  
 Andy Dewey, Editorial Assistant  
 Bill O'Brien, Special Products  
 Joann Van Beber, Administration  
 Geoff Franklin, England  
 John J. Carroll, Ireland  
 Monte Malherbe, South Africa  
 Claude Bernard, France  
 Vindy Kreulen, Holland



## PRESIDENTS, PROPOSALS, PEANUTS and PUDDING

**W**E would like to start off this month's column by congratulating Cliff Weirick who has been elected to a two-year term as President of the Academy of Model Aeronautics. The 39-year-old radio control equipment manufacturer is a twice-crowned national aerobatic champion and a current member of the three-man team which will represent the United States in the 1967 R/C World Championships in Corsica. Cliff was elected overwhelmingly in a five-candidate race, capturing approximately 50% of the total vote with more votes than the other four candidates combined. Cliff's term of office began January 1, 1967.

Also elected as Vice President, representing AMA District II, which includes New York and New Jersey, was Art Schroeder Jr., 38, of Glen Ridge, N. J. Mr. Schroeder, an elementary school principal, has been active in all phases of model flying, and is involved in development of aerospace education.

A total of slightly over 2400 votes was cast for President, representing approximately 14% of the Academy's membership. This is about the same percentage cast in 1964, the most recent previous year in which an election was held for the position of AMA President.

RCM offers its sincere congratulations to both new AMA officers for their forthcoming term of office.

While we are on the subject of the Academy of Model Aeronautics, we would like to present the following proposal from the Northern Indiana Model Aeronautical Association, Inc., which formal proposal is designed to allow AMA members to have a more direct voice in the operation of the Academy:

To: AMA Headquarters, Candidates for AMA President, Model Publications, AMA Chartered Clubs

From: Northern Indiana Model Aeronautic Association, Inc.

Subject: A proposal for allowing modelers to have a more direct voice in

the operation of the AMA.

It has come to our attention that the organization of the Academy of Model Aeronautics is notably weak in its ability to handle requests from, and disseminate information to, the membership. We recognize that the core of this problem is the basic dislike of model builders for paper work of any kind, and their tendency to put off any duties which interfere with their time on the workbench. In the past the organization has tried to resolve this problem by channeling information through district vice presidents and, finally, through contest boards formed for this purpose.

The basic problem in this procedure has always been that Academy work came third for these people. They are generally first breadwinners, second model builders and third Academy officials. This has repeatedly caused the chain of communication to break and has interfered badly with the transaction of Academy business. We feel that there now exists a better method of communication between the modelers and headquarters which, if utilized, could reduce this problem.

The Academy now has over three hundred chartered clubs across the country which are composed of the hard core of interested, responsible modelers. Hopefully, these clubs meet at regular intervals to transact business, to communicate with other clubs and individuals and to gripe about the Academy. We submit that they also represent a forum for the transaction of Academy business that has been overlooked. They also offer a place where Academy officials can regularly meet with the membership.

We, therefore, offer the following proposal for the consideration of parties interested in helping to resolve the problems facing us.

1. A copy of all proposed rules changes will be sent to all chartered clubs at the same time they are sent to the contest board.

2. The chartered clubs will submit written opinions on these changes to their district contest board representative within 60 days of receipt of the notice.

3. A chartered club may request that a rules proposal be put to vote by the total membership of the chartered clubs if there is no action by the contest board within a period of four months after release of the proposal. If a chartered club requests such action, headquarters will circulate ballots to the chartered clubs for individual member vote, or give reason why such action is unnecessary. This response will occur within thirty days of the request for club vote. Thirty days after distribution of such ballots, the votes will be counted by headquarters staff and a two-thirds majority of the ballot received will effect acceptance of the proposal.

The purpose of this section is to eliminate the dead-end for rules proposals which now exists in the contest board. In the event of lack of interest or procrastination on the part of any of the various contest boards, their function will be usurped by the chartered clubs. Note that the total time required for this procedure is about six months. This should allow adequate time for discussion and communication prior to the membership vote.

4. Agenda of executive council meetings will be sent to chartered clubs at least sixty days prior to those meetings.

5. Written comments on the agenda will be accepted by the district vice presidents from the chartered clubs in their district until seven days prior to the executive council meeting. If the district vice president does not attend the meeting to represent these views, he must respond to the chartered clubs which have performed their service, telling what alternative action he has taken.

6. Items not on the published agenda of executive council meetings will be discussed only in meetings open to the membership at times and places specified in the announcement of the agenda. The reason for this procedure is to restrict the inevitable confusion of a general membership meeting on items of a repetitive nature, but to assure the membership that "secrecy" will not exist.

7. The president of the Academy is the elected representative of the membership to whom all correspondence regarding general administrative details should be addressed. The char-

(Continued on Page 6)

## EDITOR'S MEMO

(Continued from Page 5)

*tered clubs are in the best possible position to evaluate his performance, and should take an active part in the election of candidates to this job.*

*The above represent ideas which we think will contribute to the better operation of the Academy in its efforts to serve the membership. If rules proposals are necessary to implement these ideas, let's get them under way. If you would like to comment on any of the above, either pro or con, please feel free to do so.*

*Respectfully Submitted,*

*By unanimous vote of the Northern Indiana Model Aeronautic Association, Inc. (AMA chartered), Nov. 17, 1966*

*D. J. Lindley, Pres.*

*301 E. Elizabeth Dr.*

*Crown Point, Ind. 46307*

We urge all of you to read this proposal, submitted to AMA headquarters, and make your comments and suggestions on the proposal known to your AMA district Vice President. The proposal, as submitted, may not be a total answer to giving the individual member a stronger voice in his organization, but it is certainly a step in the right direction.

The 13th Annual Toledo R/C Conference, sponsored by the Weak Signals Club of Toledo, Ohio, is scheduled for February 25-26, 1967, at the Lucas County Recreation Hall in Maumee, Ohio. This annual affair is one of the finest of its kind in the R/C field, and one you most certainly should not miss if it is possible for you to attend. Here, you will see the latest and best in R/C equipment as presented by the largest number of R/C manufacturers ever assembled under one roof at one time. You will see equipment and accessories, many of which will be shown for the first time. You will also have the opportunity to meet the people that build the gear you buy and to ask them the questions you have entertained concerning their products.

You are also invited to bring your latest R/C model and enter the competition for trophies and prizes. Awards will be given for the best Class III design at the show, best Class II and I design, best R/C scale model, most beautiful model, best new idea in model construction for R/C, best R/C boat, best R/C car.

Plan now to attend — it's billed as the greatest R/C show on earth, which may well be true if it follows the pattern of the past Toledo conferences. For further information, contact the Weak Signals R/C Club, P. O. Box 5772, Station Wernert, Toledo, Ohio.

And if you miss it, don't say we didn't warn you!

A few months ago, we received a letter and photograph from our good friend, Windy Kreulen, in Rotterdam, Holland. I'd like to pass on a few excerpts from this letter, just in case you think your flying site isn't up to par:

*Hi, Don:—*

*I had some new experiences Saturday evening and Sunday that I want to write you about. The other week, in my shop, someone offered a brand new Min-X Pulsemite 1200 transmitter and superhet receiver-decoder plus two Rand actuators and an Annco motor control servo. He let me have it for \$133 so I bought it quick — particularly since you wrote so enthusiastically about this system. And, boy, you are right! This is it! Naturally I have flown pulse-propo, some 6 or 7 years ago, but didn't find it too nice with the clumsy home-made magnetic actuator and relay-pulsed transmitter. This new approach is grand.*

*I had a Top Flite Schoolboy, and due to its small size, used a home-made superregen receiver, a 50 ohm relay, and the actuator from your Pipsqueak article, along with two 500 Mah nicads. This was set up to operate from the Min-X 1200 transmitter. There was no wind, so I went in front of my home to test glide. All seemed okay, so I went a little further away in the pastures, watched by the cows.*

*The first test flight was almost perfect. The next flight, I put more fuel in the tank, and it was a beautiful flight. I wanted to test the glide, so I climbed high, and as the motor cut, I tried the controls to see whether or not I needed more rudder throw. All went so nice that I forgot to watch for the channels that run through these pastures, and . . . the model landed across a 21-foot wide ditch!*

*The cows in the meadow came running to see if they could eat the model so I had to partly undress and wade up to my chest in the filthy water in the ditch in order to save my new plane. After I got out of the ditch, I dressed up again, my shirt being quite wet, and we moved to another site. There I had three more nice flights. . . .*

*Well, as you once wrote in RCM, every new project gives one almost the same "thrill." I had almost as much fun with my big multi proportional model.*

*Sunday, there was too much wind, so we took the deBolt Rebel in which I have an RCM Digitrio installed. It was difficult to keep upwind, as there was plenty! And then it happened! I made a low pass, flying with the wind at a high speed, gave a very little up, and the wing on the Rebel being too flexible, the latter folded up. The fuselage went on by itself and I managed to cut the engine and spin the fuselage in with rudder and elevator to cut the speed as much as possible. The nose ditched in*

*another channel.*

*And I had to undress again . . . so this weekend I have been washed quite good. Somehow, I hate water, but if it comes to save my models . . . as I came home my wife sent me to have a bath again. . . .*

*Where I live it is 33 feet below sea level! And it is only 20 miles from the coast! Consequently, the ditches through all the fields are there to collect the water that is pumped out and over the dikes in order to keep the land as dry as possible.*

*In California it's different, eh? Cheers.*

*. . .*

*—Windy*

*Yeah, Windy . . . in California, it's different. If I could see the valley below my hill through all the smog, I'd drop you a note and tell you about it. Somehow, though, I've forgotten what's down there. I haven't seen it in a year or two. . . .*

We have received numerous letters from RC'ers around the country asking if we were going to answer the "attack on R/C" that appeared in the "Straight And Level" column, January, 1967 issue of American Modeler, as authored by William Winter.

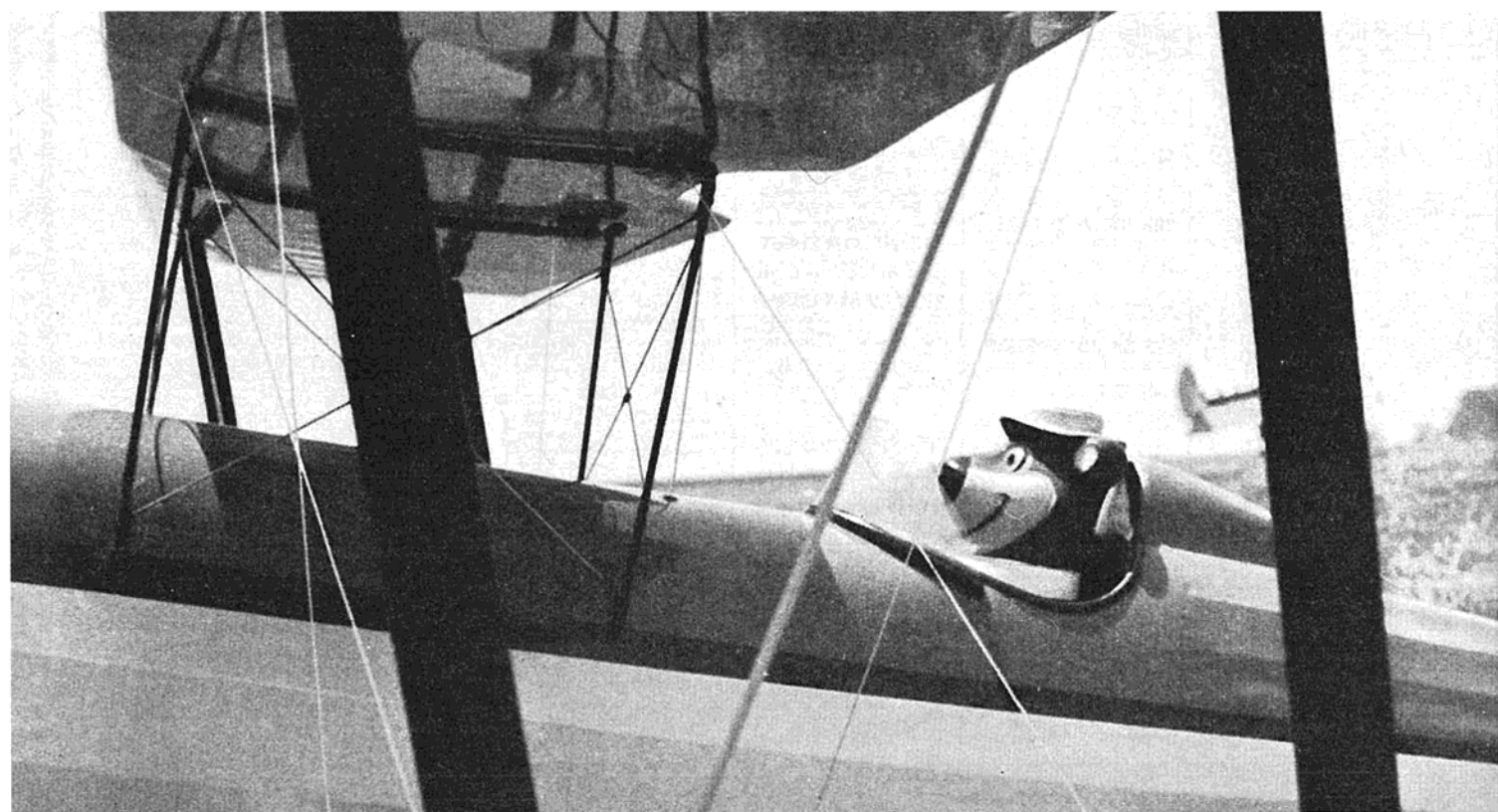
First of all, I do not feel that this editorial, by any stretch of imagination was an "attack on R/C," and any suggestion to this end is simply a misinterpretation of the author's intent.

Basically, the author had several definite statements to make — such as the fact that the other publishers were gearing their material to middle-aged modelers with flying machines which cost upwards of \$500; that the author of that column had flown R/C longer than all other editors put together; that there were more peanuts than elephants; that the proof of the pudding is in the eating; and that more balsa is sold for models outside the R/C field than is sold for R/C models.

So what's wrong with that? As one of the "other" publishers, we have always tried to gear our publication to the adult modeler, so the first statement is certainly correct. The second item, the fact that the author of that column has flown R/C for 285 years, the approximate cumulative total of experience of all of the R/C editors involved with the various publications, is a private matter between him, his birth certificate, and his conscience. The fact that there are more peanuts than elephants is certainly not a statement that could be interpreted as an "attack on R/C." Rather, it should serve to make pachyderms everywhere quite happy with their new-found social security. The next two statements comprise, at most, an old cliché, and one interesting bit of miscellany.

(Continued on Page 20)

Yogi Bear readies Big John O.M.T.  
for an early morning flight. Build a  
Big John and help stamp out balsa  
wood by buying it all!



**W**HEN Don Dewey asked me to write an article on Big John O.M.T., I consented but felt that in all fairness, my old RPI aeronautical engineering classmate and Theta Chi fraternity brother, Bolivar Q. Shagnasty should do the job.

Y'see, he actually sketched out the first B.J. one night back in 1942 when we were sitting around a table in Pete Simonian's Bar in downtown Troy, N.Y., guzzling beer and discussing the kind of airplane we'd like to own if we could design it ourselves. Well, old "Ball-Q" (short for Bolivar Q. You know, "Que-Ball" turned around) didn't exactly sketch it, you might say he "scratched" it. If the place is still there, one of those tables has the original layout for Big John carved by penknife right in the middle of the top. When a true genius gets inspired, he can't always wait for pencil and paper!

We lost touch with each other a few months later (both flunked Calculus IV and had to go to war) and it wasn't until a few years ago when, having seen my "Wild Child" article in RCM, that Shaggy got in touch with me. He's located somewhere in the hills of Tennessee now and runs a small outfit known as "Flying Stills, Inc.," whatever that is. I was sworn to secrecy as to the location of the general store where he picks up his mail.

Anyhow, it turned out Shag is still keeping a hand in the aero engineering field and he sent along drawings of the plane he's using in his business. It looked like a perfect R/C project to me, and being a biplane nut, I drew up model plans for the original Big John. Shag suggested the name because he wanted to preserve the memory of the rather unusual place where he did his best thinking, particularly on the upper level, he said.

Shag was tickled about doing the article, but was well aware of the fact that he had neglected English grammar and spelling in his school days. Don told him to give it a try, and if it didn't come off too well, he'd have me edit for him. As it turned out, I had to write the whole damn thing. Just to give you an idea, here is part of Shag's introduction:

"Cordin to my buddy Will back in Delywar, this hear R/C plain mite have made won guy reel happy, feller by name of Glen, out in Montyzumer, Idyho. Coarse that was when he had balser wood out the gazoo and wus attrying to get rid of it. Now hez havin a fit gitting any . . . and balser wood is skarse too.

"Anyways, Dawn Dooley (I'veer tawk t'her ona fone? Hope she's as purtty as she sounds.) asted me to right somethin about Big John so's y'all mite get inner-estid in bildin won. Coarse I tole him (er . . . her) y'all wood have a ruff time readin my ritin, caws my riting is rote rotten. (Li'l joke thar.)

**THERE'S JUST NO TELLING  
HOW FAR SOME GUYS  
WILL GO TO  
SUPPORT THEIR LOCAL  
HOBBY DEALER.  
HOCK YOUR WIFE, SELL  
THE FURNITURE, AND  
START IN ON THIS  
1500 SQ. IN. MONSTER.**

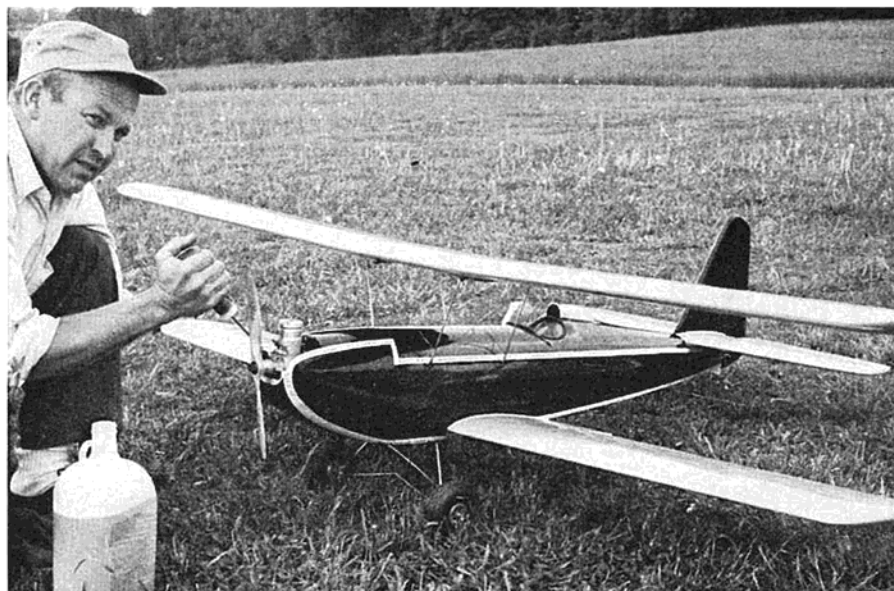


Tom Mahon of Carmichael, California, poses with his S.T. .71 powered Big John prototype.

# BIG JOHN O.M.T.

**BY  
BOLIVAR Q. SHAGNASTY  
AND  
BILL NORTHROP**





Graham Lomax and Micro-Avionics rig with Veco .61 powered Big John. With the surfaces shown, all maneuvers are very smooth, precise and unhurried. . . . The ship is extremely easy to fly, and though not a beginner's to build, is certainly an ideal ship for a beginner to fly.

"I spose sum of yew fellars mite like to gno (betcha thot I'd spell that 'thout the 'g,' dinya?) howscum I calls this plain Big John. Y'see, we got a sorta unusual place out back here an . . ."

Well, we've been through that once, but you get the idea. Shag said he'd settle for the by-line anyhow.

Big John O.M.T. is the fourth in a series. Actually, only two have been built to this size. The Duster was a 7/8 reduction, and Galloping John was a 40-inch version for single channel.

Starting with Shag's original idea, I've tried to evolve a nice big realistic biplane that doesn't short change on flying ability. The 13½ percent airfoil is one of the main contributions to the success of B.J. The increased drag of an extra wing has been the downfall of many designs. By using a thin airfoil, this effect has been somewhat reduced. This 1500 sq. inch monster booms along about 60 mph with an Enya .60 on 12 x 5 Top Flite and will do the whole AMA pattern within the allowed time.

Though most R/C biplanes are built and flown for pleasure rather than for AMA pattern (Yawn, ho-hum, and wake me up when the scale event starts), those who would enter contests find that taxiing maneuvers are difficult for a biplane on windy days. The upper wing usually scoops up air and fights the rudder and tail wheel to a draw. Consequently, the biplane taxis downwind until it runs out of fuel, range, or runway. Of course, you could add a nose gear (but I've found steering with wheel brakes to be quite effective and scale-like).

I purchased 3 surplus micro-switches (Kirkland's SAC switch sold by Ace Radio Control works nice, too), and mounted them on the elevator and rudder servos to operate WAG brakes. Full up elevator activates both brakes, and, if full rudder is applied while up elevator is held, the brake opposite the desired direction of turn is released. Although the tail wheel must have a very light centering spring, takeoffs into the wind are no problem. Cross wind takeoffs, however, require some tricky rudder work, but this would be the case whether or not the tail wheel is locked.

With the control surfaces shown, all maneuvers are very smooth, precise, and unhurried. You must fly through rolls, not just slap the stick over and count, "onetwothree." There is a definite need for proper application of top rudder, down elevator, top rudder. Overall, however, the ship is extremely easy to fly, and though not a beginner's to build, is certainly an ideal ship for a beginner to fly.

There is no such thing as running out of possible improvements. In case you want to start right out with some untried revisions I'm planning for this winter, here's what will be done:

Ailerons will be cut into the upper



wing. At this time, the decision to use push rods from the lower ailerons or add another servo to operate in parallel with the existing servo, has not been made.

The chord of both rudder and elevators will be increased by about  $\frac{3}{4}$  to 1 inch.

Tony Wilford and my old Trave-laire are to blame for these planned changes. Equipped with Min-X two stick propo and a Fox .59, the T-aire, with its barn door elevators and rudder is doing square loops ten feet off the deck, knife edge from horizon to horizon, and stall turns better than any contest ship I've ever seen. The Fokker style, aerodynamically balanced ailerons in the top wing only, however, aren't quite enough for snappy roll-type maneuvers. Incidentally, the T-aire flies inverted hands-off — undercambered airfoil and all.

One more comment, about the fat tail surfaces, and we'll get on with construction.

The thick symmetrical airfoiled fin and stabilizer is a page from Dick Allen's and Hal deBolt's book, and is the one significant aerodynamic design change from the first Big John, which had  $\frac{3}{8}$  inch flat surfaces. Whatever the explanation, be it high speed stalling of the old flat tail section, or the increased drag effect of the new thick tail acting like the feathers on a dart, Big John O.M.T. tracks through the air as smooth as a big jet at 25,000 feet.

By the way, in case you don't know, O.M.T. means One More Time. Just got tired of Mark II, Model B, and all that junk.

### CONSTRUCTION

Most every multi R/C construction article writer makes the assumption that his plane will only be built by modelers with a great deal of building experience. As a result, the writer usually says something like, "The Blivet Flea will be built only by modelers with a great deal of building experience (See? What did I tell you?), and therefore the construction notes will be limited to unusual features of the assembly, such as the  $\frac{3}{32}$  inch dural leading edge, the unique break-away fuselage aft of the wing, and the laminated condenser paper covering on the inverted V-tail."

Well, the assumption ain't correct! There are plenty of modelers on their way up the scale of difficulty who appreciate a little more than a casual "Oh,

you know how to do that," when it comes to areas that many of us take for granted.

Armed with Don's permission to hog some space, and with the idea that many model builders are going over their heads to tackle this monstrosity, I will attempt to tell all without making a book out of it.

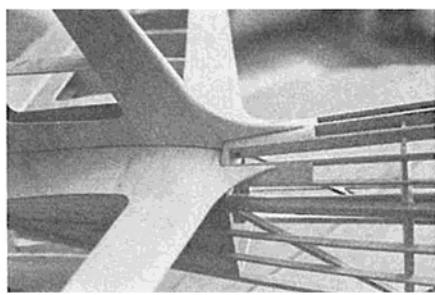
While building Big John, you must keep the same thought in mind that I did while designing the structure, "Build light and carry a contest balsa stick." (Thanx, Teddy.) For every extra ounce added to the tail, five ounces must be added to the nose to balance it out. Three extra ounces aft of the cockpit and it will take **one pound** of lead in the nose to counterbalance it! Anyhow, being a model airplane, not a girl, you don't want it to be built like a brick out-house or it'll fly like one.

Speaking of girls, let's start construction with the . . . er . . . empennage. You can count on one hand the number of heavy sticks that go into the whole tail section; rear stabilizer spar (1) and its hardwood doubler (2), rear fin spar (3), lower rudder hardwood insert (4). The remaining material is all medium or soft (Sig contest) balsa.

Copy the fin and stabilizer ribs onto tracing paper and transfer the patterns onto medium  $\frac{1}{16}$  inch sheet balsa using a "T" pin. Be sure to mark the centerline at ends of each rib. In order to provide added strength where stab is glued to fuselage, rib S-1 is made from  $\frac{3}{8}$  inch sheet. Draw in the rib shapes by connecting the pin holes. I use a Lindy Auditor's Fine Pt. ballpoint pen; in fact,



Big John . . . in the biplane form, the upper . . . er . . . wing is directly over the lower . . . er . . . wing. Building is copied from military spec's which designate upper . . . er . . . wing as for officers only. Spec MIL-TFD.



this is a fine instrument for all accurate wood marking.

Start actual assembly by pinning the  $\frac{1}{4}$  x  $\frac{1}{2}$  hard balsa rear spars and  $\frac{1}{8}$  x  $\frac{1}{2}$  medium balsa sub-leading edges over the plans. These must be blocked up with  $\frac{1}{2}$  inch scrap material to clear the big fat ribs. Don't forget the  $\frac{1}{8}$  x  $\frac{3}{8}$  inch hardwood doubler on the inside of the stab rear spar.

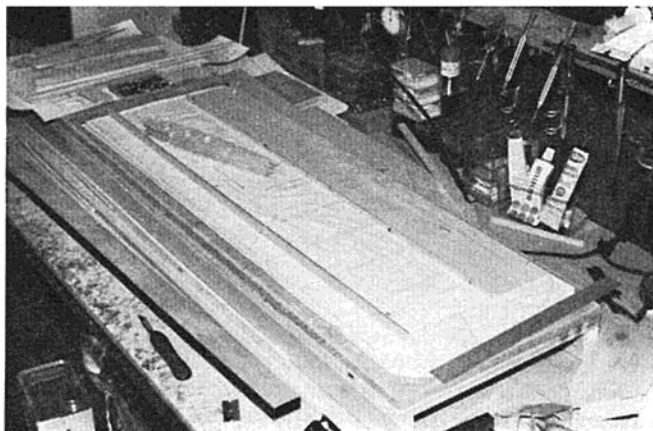
The secret of airplanes that fly "right off the board" is true alignment. To assure this, mark a centerline on the inside surface of all rear and sub-leading edge spars before pinning them in place. As you bevel and glue in the ribs, the spar and rib centerline marks can be matched for perfect alignment.

Install the  $\frac{1}{8}$  x  $\frac{1}{4}$  (elevator) and  $\frac{1}{8}$  square (rudder) spars on the "up" side, followed by the rear  $\frac{1}{16}$  inch sheeting. Bevel the sub-leading edge and install the  $\frac{1}{16}$  inch leading edge sheeting and center section sheeting.

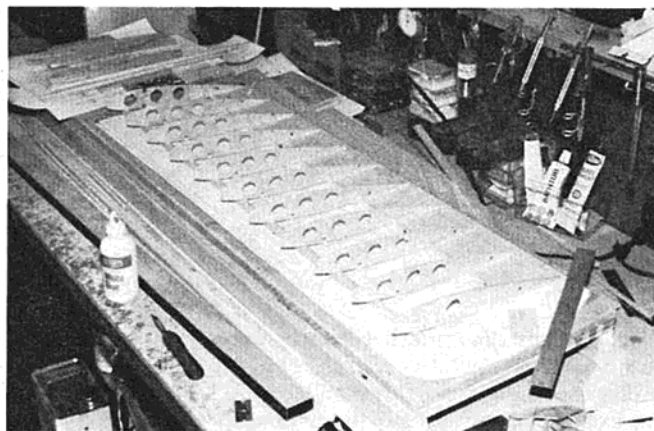
As soon as it is dry enough to remove all pins, turn the surface over, pin down again securely to the  $\frac{1}{2}$  inch blocks, and complete the assembly. Before "closing up" the fin, install the two stubs that key the pin to the stabilizer. Allow the completed structures to cure thoroughly before removing from the jig blocks. The  $\frac{1}{16}$  inch webbing is extra stiffening that may be unnecessary in such short spans, but the weight is negligible, so why not. Add the leading edges and soft tip blocks, plane and sand to a smooth contour and prepare for your favorite covering.

Rudder and elevators are shaped from  $\frac{3}{8}$  inch sheet soft contest balsa. The hardwood lower rudder insert accommodates the rudder horn and tail wheel coupling, taking all unusual loads (like crosswind landings and ground loops) off of the soft rudder material. The  $\frac{1}{16}$  inch ply inserts in the right elevator are essential for proper and strong mounting of the nylon elevator horn.

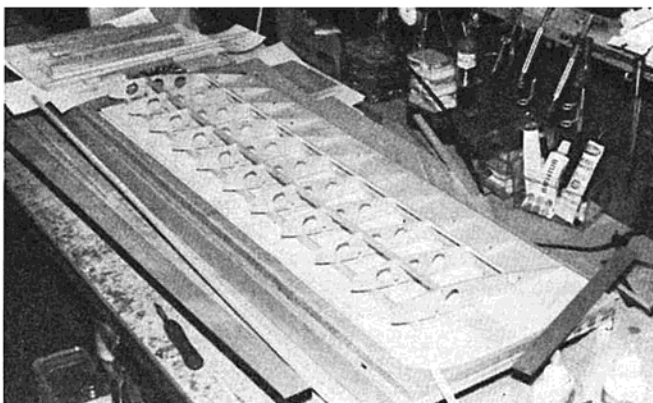
Tatone hinges were used on all tail surfaces, six on the elevator and three on the rudder. The bottom hudder hinge is installed just above the hardwood insert, the other half going into the fuselage tailpost. One obvious advantage to this hinge is that the control surfaces can be assembled after covering. Following Tony Bonetti's suggestion, stainless steel sewing pins are substituted for the brass wire included with



Jig strip, T.E. sheet, and bottom  $\frac{3}{16}$ " spar.



Ribs in place.



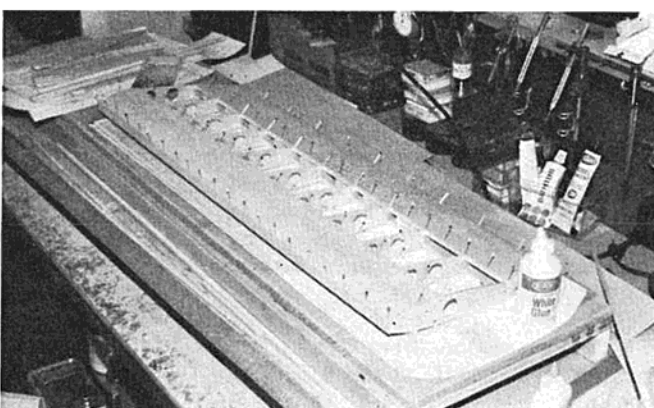
Top spars added.



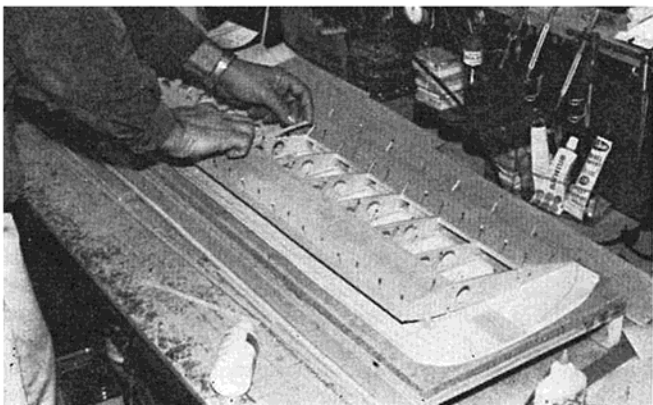
Rear webbing and sub L.E. added.



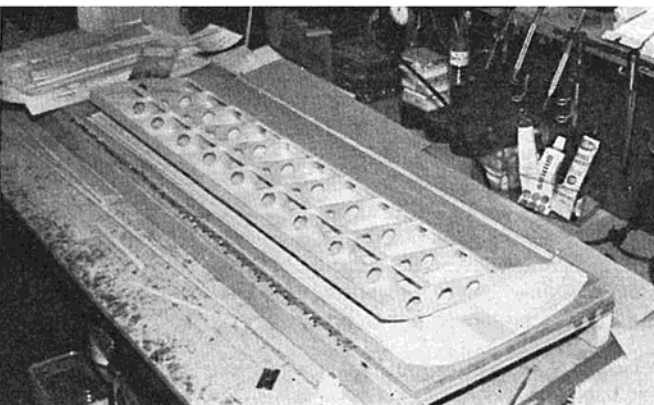
Tapering T.E. sheet.



Top L.E. and T.E. sheets added.



Cap strips.



Wing turned over and bottom  $\frac{1}{4}$ " sq. spar added.



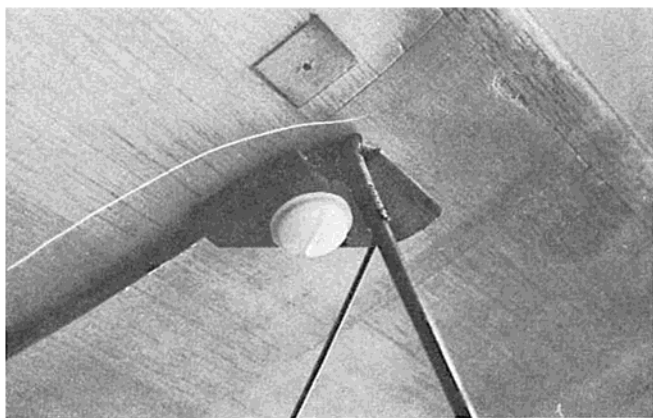
Front webbing, bottom L.E. sheet next.



Cutting away ailerons.



Mating up wing panels to center section.



Close-up of upper wing attachment.

the hinges. Leave heads on and bend other end after inserting.

If you want to follow my usual building pattern, let's tackle the wings next and get them out of the way. Actually they are easy to build, just tedious and there's too damn many of them. To make the job easier, all four panels are exactly alike and can be built over one plan. (No, Clyde, one at a time . . . one at a time.)

Simplest rib cutting method is delicatessen style, like slicing bologna. Transfer the rib pattern to a 4-inch thick block and cut it out on a band saw. Using spar stock as a guide, cut nice snug notches and sand the block smooth. Now set the saw guide fence for a  $\frac{7}{32}$  inch cut (This is where you depart from delicatessen style. Nobody can cut it **that** thin), and begin slicing. To keep the slices even, turn the block end for end occasionally, starting from L.E. and then T.E. Simple? If you don't own a band saw, it's worth the trip to a friend's house to do the job. The whole batch can be done in about an hour, give or take one beer.

If you like to torture yourself, make an aluminum template, and cut all 55 ribs one at a time. In fact, why not watch Batman at the same time and **really** suffer?

Just for the heck of it, I made a cookie cutter by grinding a sharp edge

on one end of a short length of  $\frac{3}{4}$  inch diameter electric conduit tubing and removed some excess wood from the ribs, as can be seen in some of the construction photos.

Although manufactured wing jigs may be used, the flat centersection could present a problem, so study the following method through first and then make your choice.

As mentioned before, all four outboard wing panels can be made over the same plan. They're all alike except that certain variations are required in order to come up with two left panels and two right panels.

After they come off the board, the panels you select for the bottom wing will have ailerons chopped out of them.

Place the wing plan on that absolutely flat surface of yours so the trailing edge line is right on the edge of the board. Slap on a piece of Cut-Rite plastic and we're ready for the first panel.

The trailing edge sheeting is roughly  $3\frac{3}{4}$  inches wide so that the usually curved 4 inch sheet stock can be trimmed with a metal straight edge. (If you build this one crooked, it ain't going to be **my** fault.) Lay the lower T.E. sheet on the plan and position it with a couple of pins. Now glue and pin the  $\frac{3}{16}$  square bottom rear spar in place along the front edge of the sheet. Angle the pins forward to clear the upper rear

spar which comes along soon. Put several ribs in place along the panel and position the  $\frac{1}{4} \times \frac{1}{2}$  jig piece that supports the ribs at the proper angle. Ribs should sit flat on the bottom T.E. sheet and just rest on the jig. Pin the jig in place and leave it there throughout the construction of all four panels. Glue all eleven ribs in place, using an  $\frac{1}{8}$  inch rib at whichever end will be the inboard tip of the panel. Using the dihedral braces as a guide, a jig may be made out of some scrap wood to tilt the inboard rib at the proper angle to mate with the center section. Dihedral is the same in top and bottom wing — one degree per panel (one inch at tip rib).

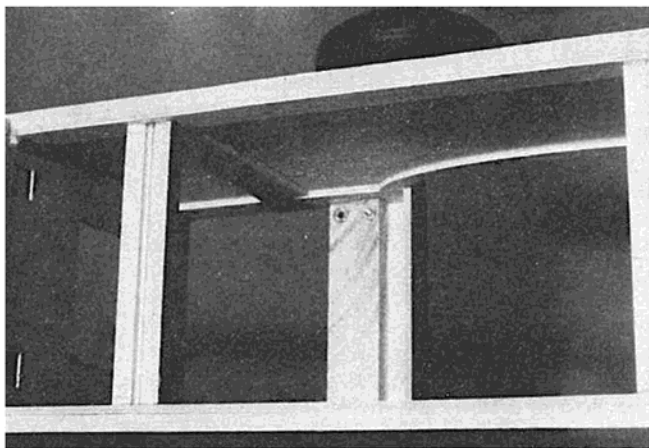
Next glue in the two top square spars and the sub-leading edge. It's easier to bevel the latter **before** you glue it in place. Install the  $\frac{3}{16}$  webbing pieces **behind** the rear spars. Grain direction is unimportant, but do **not** leave them out. The triangular boxes, formed by the sheeting and webbing at both leading and trailing edges provide the strong but light construction required for the relatively thin 13½ percent airfoil.

Now comes the reason for placing the trailing edge along the edge of the construction board. The bottom T.E. sheet must be tapered to accept the top T.E. sheet in a smooth, straight line. Delta Enterprises' 42-inch aluminum sanding stick sure comes in handy for this oper-

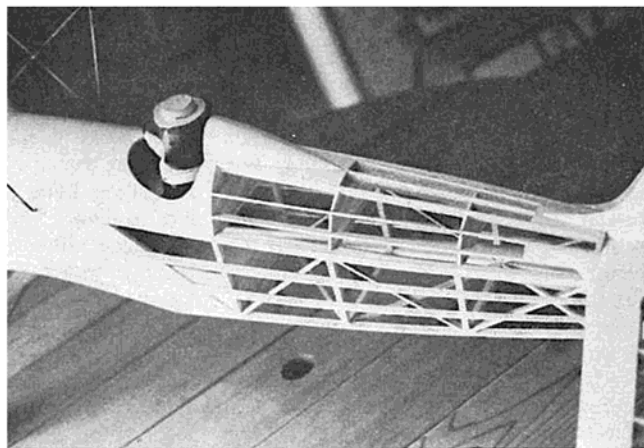




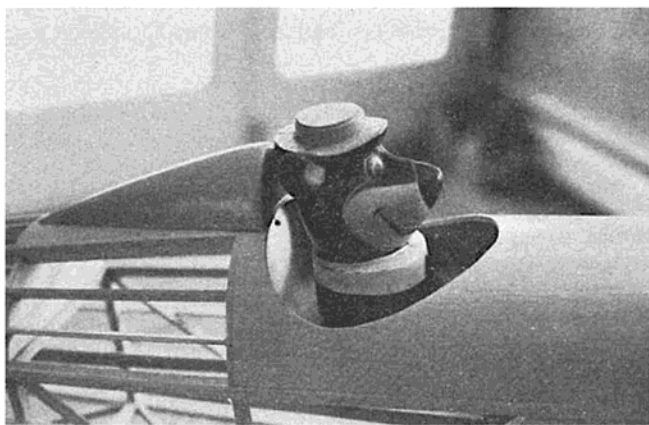




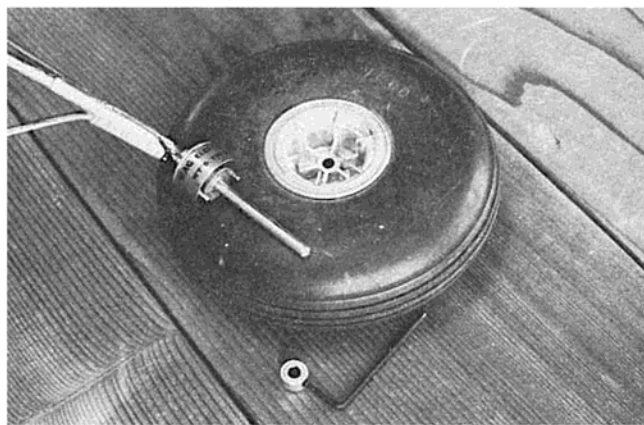
Top view of fuselage — cabane mount detail.



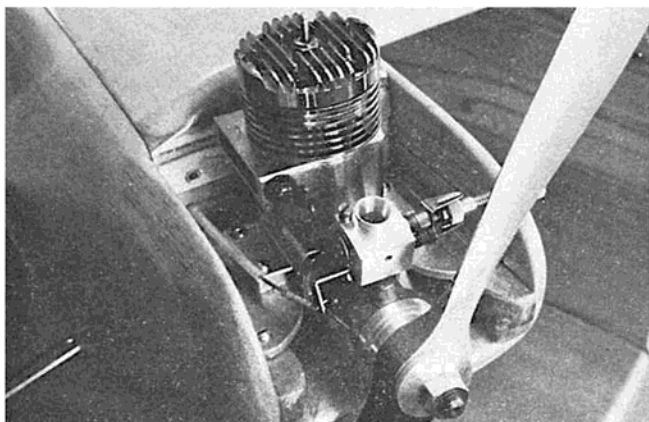
Completed fuselage — empennage assembly.



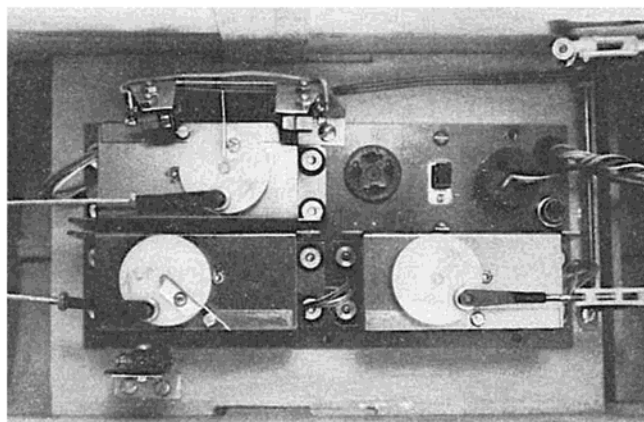
Cockpit detail and Yogi Bear.



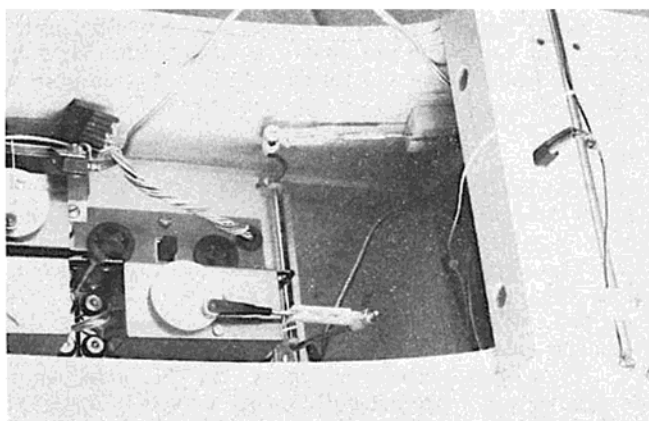
Veco 4 1/2" wheel lub. Grind out to accept wag brake.



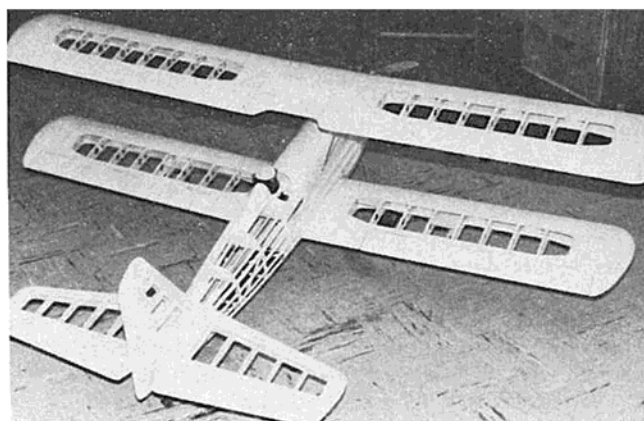
Enya .60 installed. Hatch hold-down plate minus screws.



Dee-Bee servo installation.



Another view of servo installation.



Don't tell the wife how much this one cost!

ation. By sliding slightly down the ribs and bearing down as the sander hits that bottom sheet, a nice blending taper will result.

The top T.E. sheet should be straight trimmed to size before applying, but the L.E. sheet only needs one edge dressed up. This edge is lined up with the front spar and the remainder can be trimmed off flush with the sub-leading edge later.

Keeping in mind which panel you're building, install cap strips on all but the three inboard ribs and the two outboard ribs. At this point you've done all you can on this panel until the glue is dry enough to lift it off. I say dry enough, because if you plan to turn it over and pin it down to continue work on the other side, O.K. Otherwise, leave it there until the glue is **completely** dry.

When you turn the panel over, lay it flat on the top T.E. sheet and slide it toward the jig piece until the forward top portion of the wing rests on it. Align it with the drawing underneath to make sure the wing won't be held in a warped attitude while it is being completed, and pin it down.

Final steps on this panel include the bottom front  $\frac{1}{4}$  square spar, the  $\frac{1}{16}$  inch webbing (ahead of the front spars), the bottom L.E. sheet, and the cap strips (except on three inboard and two outboard ribs, remember?). O.K., one down, three to go . . . Humph!

Let's assume you have survived through all four panels. Next job is to select the two bottom panels and whack out the ailerons. Using a straight edge, mark a line on the wing from the third rib out and  $\frac{3}{32}$  of an inch ahead of the aileron hinge line, top and bottom. Cut the sheeting on these lines. Now, using a pin and eyeball measuring, find and mark a line just outboard of the third rib. If you're lucky, when you make this cut, you'll just miss the rib. Rottsa ruck! You now have an aileron all cut out, but it's still attached to the wing by the ribs. I just happened to have an X-acto saw blade that had been removed from the backing and was cut down with tin snips to about  $\frac{3}{16}$  inches wide. Handy little tool! Sliding this through the cuts in the sheeting, it was a simple job to saw the ribs apart.

Using the straightedge again, cut the aileron back another  $\frac{1}{4}$  inch on the top surface and  $\frac{1}{16}$  inch on the bottom. Next, cut about  $\frac{3}{16}$  inch off the inboard end, and using the rib template as a guide, make and install an aileron rib. Shortening the aileron by  $\frac{3}{16}$  inch will provide  $\frac{3}{32}$  clearance at each end. Notch bottom sheet and install  $\frac{1}{16}$  ply rib with micarta horn attached.

The wing and aileron can now be capped off with  $\frac{3}{32}$  inch sheet. However, if you use insert-type hinges, it will be necessary to install balsa blocks to receive same before you close up the

works. The  $\frac{3}{32}$  inch O.D. tube and weld rod hinges used on the original do not require these blocks.

The two center sections should be built next. Use the same jig arrangement as for the main panels. Cut all rib noses back  $\frac{3}{32}$  inch before gluing ribs in place. Cut out and glue the leading edge dihedral braces to the sub-leading edge pieces, before gluing the latter in place.

Be sure to use hardwood blocks and plywood where specified. Hardwood that will be drilled and tapped to receive nylon bolts should be close grained wood such as maple, walnut, or oak. Use lots of epoxy when assembling these areas. When the "G's" start building up, these are locations where "think light" will kill you. Don't sheet the area between the front and rear spars yet.

Joining of the center section and outer panels is performed in the air, so to speak. Using a pointed blade, cut the root rib of each panel back  $\frac{3}{32}$  of an



inch from the sub-leading edge to clear the dihedral braces. Now stick each wing panel on and check the mating surfaces for a decent fit with the panels held at the approximate dihedral angle.

Glue the assembly together, using epoxy on the dihedral brace and white or cellulose glue on the butt joint. Use a generous number of pins to keep the panels lined up with each other, but avoid having any pins stick out on the underside so that you may pin the whole contraction down and jig the tip ribs up one inch.

When the wing assembly has set up thoroughly, the remaining dihedral braces may be added. Cut ribs away to clear the braces, apply epoxy or white glue, and slide into place. To avoid having rib pieces falling all over the place, install front braces first, wait until they're dry, then cut the ribs away for the rear braces.

Tip sheeting can be added now, and particularly after aileron linkage is installed in lower wing, all center section

sheeting may be completed. Only thing remaining is to install outer leading edges and tips. The tips are best carved and sanded to shape before attaching to wings. After shaping, I hollowed them out with a Dremel tool to about  $1\frac{1}{2}$  oz. (That balsa dust is great for your sinuses.) Vary the amount you remove in order to balance out any uneven weight distribution you may have acquired during construction.

Plans show locations of small rectangles of  $\frac{3}{32}$  inch ply which may be added to provide attachments for struts and nylon flying and landing wires, if you're inclined to schmaltz it up a bit. We'll get to that during assembly.

Well, if you're with me so far, the worst part is over. In spite of my partiality to biplanes, I hate to build wings. Although a fuselage does have symmetry as viewed from top or bottom, there is very little that is repetitious in the construction, and it provides lots of interesting challenges to a real model builder. (Smile, Len, baby. There are lots of model buyers and assemblers in this hobby, but we designers and **builders** did start the whole thing, didn't we?)

The basic fuselage side is simply a  $\frac{1}{4}$  inch sheet forward section blending into a built up as . . . aft end. No doublers are used up front, just stiffeners and the  $\frac{1}{8}$  ply top rails with holes cut out to receive the wing strut saddles. (Saddles were cut from maple and grooved on a table saw, but regular hardwood landing gear supports, grooved for  $\frac{3}{32}$  music wire will work fine. Cut holes in the rails to match whichever type you use.)

Build two sides over the plans before adding any stiffeners. The  $\frac{1}{4}$  inch sheet outline starts right at the nose, comes straight back just aft of the rear cabane struts, drops a  $\frac{1}{4}$  inch to receive the top longeron, drops again from C-1 down to D, runs along the top of the lower  $\frac{1}{4}$  inch square longeron, follows the curve of the bottom wing to the centerline of the L.E., comes an  $\frac{1}{8}$  inch in from the bottom and goes around the landing gear supports, and then picks up the solid straight line that slants up to the short curved outline of the nose. Whew, what a trip!

Protect the plan with Cut-Rite again and pin down the  $\frac{1}{4}$  inch sides. If you can get spruce (Sig has it. Besides, it should be easier to get than balsa these days), at least use it on the bottom longeron. It will resist a tendency to curve in under tension of a doped covering. The rearmost section, from G to the tail post has an inlay of  $\frac{1}{8}$  inch balsa set flush to the inside (watch your lefts and rights!).

When sides come off the board, add the  $\frac{1}{8}$  inch ply rails, the  $\frac{1}{8} \times \frac{3}{4}$  inch vertical stiffeners, the  $\frac{3}{32}$  inch wing opening stiffeners, and F-1. Check

(Continued on Page 18)

## BIG JOHN O.M.T.

(Continued from Page 18)

which side is which against those  $\frac{1}{8}$  inch balsa inlays at the rear end.

Sides are now assembled, starting with bulkhead B, the wing saddle pieces,  $\frac{1}{4}$  square pieces at section D, and the  $\frac{1}{4} \times \frac{1}{4}$  hardwood bottom wing retainer. To keep fuselage straight, assemble it upside down over the skeleton top view. Plans must be placed on the board so bulkhead B hangs over the edge. You'll have to wait for that basic assembly to dry pretty well before you pull the tail together and glue, using pieces F-8, since the body is sprung out in a sort of fat curve at sections E, F, and G. In fact, you will probably have to insert these cross pieces all at one time in order to make the sides meet at the proper angle at the tail post. Install  $\frac{1}{8} \times \frac{1}{4}$  diagonals in the bottom, from D to G, taking care that none are long enough to cause a force fit that could push the fuselage out of line. (Did you say I'm nuts on alignment? You bet!)

The hardwood landing gear blocks may seem too large, but a few hard landings of a 10 pound airplane will prove their worth. Both blocks are 5 inches long, making the ends flush with the outside of the  $\frac{1}{4}$  inch sides. Use'm plenty 'poxy when you put 'em in. Insert 5 inch lengths of  $\frac{3}{32}$  O.D. brass tubing in the wing strut saddles and epoxy in place.

Well, it had to happen sooner or later; we must now go on a bender — not booze — wire! Unless the cabane struts are formed, the front deck can't be completed, and the nose blocks can't be glued up and carved unless the front deck is finished, and the front deck — like I said, we must now go on a bender — not wire — booze.

Just in case you're in a hurry — or on the wagon — we bend wire. The secret of accurate wire forming is "start from the middle." For instance, let's do the front cabane strut. Measure in about  $9\frac{1}{2}$  inches from one end of a length of  $\frac{1}{8}$  inch music wire and make a tiny mark with a triangular file. Measure another  $5\frac{1}{4}$  inches and make another mark. This last length will be the part through the fuselage.

The handiest gadget I've ever seen for wire forming is called — you guessed it — "Handi Bender." Available in most hardware stores, it's an aluminum alloy casting with grooves across each end, and a series of holes in the middle. Several hard steel pins that fit these holes are also furnished. The grooves are  $\frac{1}{16}$ ,  $\frac{3}{32}$ ,  $\frac{1}{8}$ , and  $\frac{5}{32}$  inches wide and obviously hold the wire for bending. By placing pins in the proper combination of holes, a variety of sharper bends can be made.

Clamp the bender in a strong vise. Lay the  $\frac{1}{8}$  inch wire in the appropriate

groove so the  $5\frac{1}{4}$  inch part is in the groove. Line up the tiny mark with the edge of the groove and, applying pressure as close as possible to the mark, bend the wire as far as it will go. The idea is to bend **more** of an angle than is required. Try for 90 degrees here. Now grasp the wire about 4 or 5 inches out from the bend (the  $5\frac{1}{4}$  part still in place) and open up the angle slightly. This trick provides a nice clean, small radius bend with straight legs. Lift wire out of bender and lay over plan to check angle. Make minor adjustments until angle is correct.

Next comes something that's almost impossible to do right the first time. What you want to do is make the other bend  $5\frac{1}{4}$  inches away from the first and naturally match the angle. No problem. But, when you're finished, the whole thing should lie flat. Right? I bet it won't. No matter how hard you try, it will be a few degrees off. But don't blame yourself.

When wire is drawn in production, it is also twisted in the process. Now as you bend it, part of this twist tries to release itself. There's a chance you might be off just enough in the opposite direction to counteract this effect, but not likely.

Sooo — after you get your nice, carefully adjusted bends accomplished, you'll probably have to put one bend back in the  $\frac{1}{8}$  inch groove, with the  $5\frac{1}{4}$  inch leg sticking up, and twist.

Now you discover something else. The "bends" and "twists" are interacting. You get the wire nice and flat, in one plane (never mind, don't try to be funny), and one of the bends has opened up slightly. A little more juggling and this can be "tuned" out.

Next measure up each strut to the point where the two legs bend over toward each other. Since each bend gobbles up some wire, measure to a point a little beyond the bend. **Accuracy is not as important as consistency** here. Measure one leg, mark with the file and **mark the drawing** at the same point. Now flip the strut over and mark the other leg in the exact same spot as the first. When these bends are made, they will occur at the same length, even if they don't exactly agree with the drawing. When you are making the rear strut you will make the legs a  $\frac{1}{4}$  inch longer in relation to the front strut. The important thing is that the wing will sit straight and at the proper incidence even if the gap between upper and lower wings may vary slightly from the drawing. This variation is totally unimportant.

Before making the top bends, cut off all legs  $1\frac{1}{4}$  inches from the bend marks. For these bends of under 90° you may want to use the pins on the Handi Bender.

Make the curved  $\frac{1}{8}$  inch wire sad-

dles next. They do not have to follow the exact curve of the bottom surface of the wing, but the closer the better.

Now comes the most disagreeable part. You must cut your beautiful strut handywork in half! The idea here is that the fuselage may be completed, covered, and doped without interference from the cabane struts. Sure simplifies things.

Temporarily insert the strut legs into the brass tubing in the body and, using soft copper wire, bind the saddle pieces in position. Rest the top wing on the cabane in its approximate location to check the fit, and perform any slight adjustments necessary to make wing rest evenly on all four corners. When satisfied with the fit, solder all four connections. If possible, use silver solder for this work.

While you're on the wire bending kick, you might as well do the landing gear too. Follow the same procedure of working from the middle. Install the legs in the appropriate slots, fasten down with retainer plates, pull everything together and bind with copper



wire, check for alignment and again, if possible, silver solder all connections.

Now we can get back to fuselage construction. Install the front deck bulkheads C (four of 'em) and C-1 and insert the  $\frac{1}{4}$  square balsa stringer. Next glue bulkheads D and D-1 together, then install, along with rear deck bulkheads E, F, & G. Add the top center  $\frac{3}{32}$  by  $\frac{1}{2}$  inch stringer to assist in keeping them all perpendicular. Rear stringers are extra deep to prevent excessive sagging under tension of doped fabric covering. Also note that bulkheads E and F do not come out to the fuselage cross section. This is to avoid bumps in the covering. Install remaining stringers.

The front deck should be covered with two pieces of  $\frac{1}{8}$  inch medium soft balsa sheet. Trim to approximate size as shown on the drawing and start application by edge gluing each piece to the top longeron only. Pin in place and allow to dry thoroughly.

When ready to apply, spray the outside surface of one side with water and while it's soaking spread contact cement on the underside where ever it will hit bulkheads and the top center  $\frac{1}{4}$  square stringer. Also apply contact cement to these members. By the time

the contact cement is ready, the sheet will probably offer no resistance to bending and following the bulkhead curves.

Water spray the other side, curve it over and trim for a tight butt joint fit against the first side. Just before pressing this sheet into place with contact cement, run a bead of cellulose glue along the butt joint.

Now glue on the  $\frac{3}{32}$  by  $\frac{3}{8}$  inch side stringers and all covering fillers. These are pretty well explained in sections B and C. Taper stringers to blend into the tail post. Glue in and trim the  $\frac{1}{2}$  inch and  $\frac{1}{4}$  inch stabilizer saddle pieces. Install the  $\frac{3}{16}$  inch ply seat for the tail wheel bracket.

To build up the nose, you must revert to a childhood pastime known as playing with blocks — a whole mess of 'em! Since many of the joints will show up on the outside surface, it's best to stick to (sorry) cellulose glue. White and contact adhesives are rather troublesome to sand and dope over.

Here's the sequence of build-up: (1) Glue F-2 ( $\frac{1}{2}$  inch sheet) to inside of  $\frac{1}{4}$  inch sides. Rout to clear F-1 (2) Epoxy the  $\frac{1}{2}$  inch square maple (or equivalent) engine bearers in place. It's best to have marked their location on F-2 before F-2 is installed. (3) Glue in hatch



R. W. Knutson, Lodi, Wisconsin, with Big John. F&M 5, Enya .60.

stop F-6 on top of mounts. (4) Epoxy the  $\frac{1}{4}$  inch ply firewall bulkhead A in place. This is perpendicular to the engine bearers and butts up against F-6. (5) Glue F-5 filler pieces under engine bearers and then add fuel tank floor of  $\frac{1}{8}$  inch balsa — grain should run across fuselage.

(6) Fabricate an  $\frac{3}{8}$  inch aluminum engine plate, and locate and drill 6 holes for 4-40 plate-mounting screws. Most big engines should use 6-32 screws for mounting of engine flange to the plate. If you don't think that 4° right thrust makes any sense, leave it out. You can always make another plate later on.

Using the mounting plate as a guide, locate and drill holes in the engine bearers for the six 4-40 screws, and install steel 4-40 blind nuts. Now we can continue with the building blocks.

(7) Install  $\frac{1}{8}$  by  $\frac{1}{2}$  inch fillers under engine bearers ahead of bulkhead A.

"Squunch" the fillers down over the blind nuts, but avoid clogging up the works with glue.

(8) Install  $\frac{1}{4}$  inch sheet floor, followed by  $\frac{1}{2}$  inch sheet F-4, and finally the  $\frac{1}{2}$  inch sheet piece across the front.

(9) Sand the underside flush and glue on the  $\frac{3}{4}$  inch sheet chin block.

(10) Glue  $\frac{3}{8}$  inch sheet pieces F-3 and F-7 in place.

Before making the hatch, get out your trusty little axe and rough cut the whole big blobby chunk of blocks down to something that looks vaguely like the nose of an airplane.

The hatch can be made from a piece of one inch balsa to be hollowed out later, or it can be built up of a half inch slab with spacers. Hold in place while completing the sculpturing and sanding of the nose. When finished, sand  $\frac{1}{16}$  inch off the back end of the hatch and glue on a plywood plate. Epoxy  $\frac{1}{16}$  inch plywood to the front end to serve as a fuel shield and hold-down.

Before applying any dope, mix some epoxy, thin to brushing consistency, and coat the entire nose area, in and out, for fuel proofing. Thin Hobbypoxy Formula I or II with their thinner for this purpose. Works great.

At this point you're just about ready to cover, having consumed all the balsa wood within a 50 mile radius of your shop. Construction has taken so much magazine space that I'd just as soon skip on to final assembly, but just one comment. Don't go for the shiny, super-duper, 15 coat, auto-primer plus type finish. Big John should not weigh over 10 pounds, ready to go, unless you want to spoil the scale-like flying speed and be forced to hang on an industrial engine.

Radio installation should be no problem except that there's almost too much space in the fuselage. It's like standing in the middle of Grand Central Station and trying to lean on something. The simplest solution is judicious use of beaded foam packing material around the batteries and receiver (allow room for foam rubber around the receiver case). I epoxied side rails in place to which the servo board is bolted. Because of the fabric sides, the switch is mounted in the cockpit, right by Yogi's left . . . er . . . paw.

Final assembly will vary slightly depending on your attitude about your flying. I am of the go-for-broke school and prefer everything put on tight. Tail assembly is epoxied in place. (No covering or dope on the contact areas.) If you prefer rubber bands, add dowels to the fuselage, glue a hollowed hardwood block around the  $\frac{3}{32}$  wire connecting the elevators, and cut away a larger notch in the rudder to clear the latter.

The bottom wing has dowels epoxied into the fuselage fairing. Slide the wing into position and mark the spots on the

ply plate in fuselage where the dowels will go. Drill the holes above this about an  $\frac{1}{8}$  inch. Now, using a wood rasp, gradually elongate the holes downward, testing as you go, until the trailing edge of the wing can just barely meet the fuselage. Fill the area below the rear hardwood cross piece with balsa, so that it is flush with the bottom of the fuselage.

With the wing in position, mark the location of the trailing edge on the fuselage. Now measure from there to the center line of the hardwood crosspiece. Mark this distance on the top of the wing. The wing bolt holes should be 3 inches apart, or  $1\frac{1}{2}$  inches from the centerline. Drill pilot holes through the wing from the top, keeping the drill perpendicular to the bottom surface. (When these holes are enlarged to clear the  $\frac{1}{4}$  by 20 nylon bolts, the bolt heads will lie flat on the bottom surface. Hold it! Don't enlarge 'em yet!) Again place the wing in position and from the bottom, continue the pilot holes through the balsa filler and into the hardwood crosspiece. Now drill and tap the hardwood for the  $\frac{1}{4}$  x 20 bolts. Finally, enlarge the pilot holes in the wing, and slip it in place once more. The holes don't line up? Whatsamatta you, anyhow? Well, use that round wood rasp and fudge things a little, O.K.?

You guys with a barrel full of 64 bands to use up can simply shove dowels through the body, but you'll have to add balsa filler blocks before covering the body.

Slide the cabane struts in place and fit, bind, and solder all of the .045 cross wires in place, re-section C and side view. Protect that pretty fuselage from solder and flux while you're doing the job. Although the finished birdcage will wiggle slightly now, it firms up once the top wing is in place.

Cut out and solder in place the four  $\frac{1}{32}$  inch brass or steel corner plates. Since these go under the bent over strut legs and the  $\frac{1}{8}$  inch wire saddle pieces, the solder job is not critical on strength. Drill a hole in each to clear  $\frac{1}{4}$  by 20 nylon bolts.

Now with the bottom wing fastened in position, place the top wing on the birdcage with the leading edge  $1\frac{1}{2}$  inches ahead of the front strut, line up carefully with the bottom wing and (My, ain't that purty?) — and mark the bolt hole locations on the wing. Drill and tap the wing for the nylon bolts, being careful not to come through the top surface.

The rubber band boys are in trouble with the top wing unless they read through all this mish-mash first. The strut ends in this case are bent fore and aft rather than inward. The top curved saddle piece is made with about  $\frac{3}{4}$  inch sticking out beyond the leading and trailing edge. Actually the cut-out in

the center section T. E. should extend to the dihedral joint. Cut off the rear inner corner of the top wing panels and cap off as is shown for the center section. In this way, the top saddle wire will be 11 inches long.

The wings are independently rigid enough not to need any struts or rigging, but B. J. looks a helluva lot better in the air with them in place, and the method worked out requires only about two minutes for assembly at the flying field. If you could hear the wind whistling through there just once, you wouldn't leave them off.

If you decided to go the route, you already have the plywood fittings in place. They go in the bottom surface of the top wing and the top surface of the bottom wing. The struts are merely  $\frac{1}{4}$  by  $\frac{3}{4}$  inch balsa with  $\frac{1}{4}$  square plugs on each end. Make up a gimmick as shown on plans to obtain the proper length and angles for each strut.

Next, install small roundhead wood screws in each of the plywood fixtures. Slant the screws so that nylon will not tend to slip off. Tighten them down just enough so the nylon sort of pops under the head.

Four cables are needed and in case the rigging scheme is not clear to you, the cables go as follows: start at rear strut bottom, go around screw at top wing rear center, forward to screw at top wing front center, and back down to front strut bottom. The other cable in the same bay starts at bottom rear center, goes around screw at rear strut top, forward to screw at front strut top, and back down to bottom wing front center.

When first making each cable, tie a loop in the fixed end, hook it up and cut cable off about 3 inches past the last screw. Slip the adjuster on, tie a knot, and take up slack. Adjuster must be installed as shown or it will slip loose.

First flights indicated one more piece of rigging was required. On certain maneuvers, the wings tended to spread slightly, allowing a strut to occasionally pop out. Finally getting tired of making new struts which, even with longer plugs, would still get lost once in a while, I installed small screw hooks in the bottom rear and top front ply fixtures and stretched one number 32 ( $\frac{1}{8}$  x 3 inch) band between them. O.K. since then, and it whistles real great in the breeze.

#### Basic Materials

##### Wings

- 9 —  $\frac{1}{16}$ " x 3" x 36" med., front sheet
- 9 —  $\frac{1}{16}$ " x 4" x 36" med., rear sheet
- 9 —  $\frac{1}{4}$ " x  $\frac{1}{4}$ " x 36" hard, front spars
- 9 —  $\frac{3}{16}$ " x  $\frac{3}{16}$ " x 36" hard, rear spars
- 2 — 2" x 4" x 12" blocks (ribs), med.
- 4 — 2" x 3" x 12" blocks (tips), soft
- 5 —  $\frac{1}{2}$ " x  $\frac{3}{8}$ " x 36" med. L. E.
- 5 —  $\frac{1}{8}$ " x  $\frac{1}{2}$ " x 36" med. sub L. E.
- 1 —  $\frac{3}{32}$ " x 6" x 12" ply
- 1 —  $\frac{1}{8}$ " x 6" x 12" ply

- 10 —  $\frac{1}{16}$ " x  $\frac{1}{4}$ " x 36" cap strips

##### Tail

- 2 —  $\frac{1}{4}$ " x  $\frac{1}{2}$ " x 36" hard balsa (trailing spars)
- 2 —  $\frac{1}{4}$ " x  $\frac{1}{2}$ " x 36" med. (leading edges)
- 2 —  $\frac{3}{8}$ " x 3" x 36" contest balsa (control surfaces)
- 4 —  $\frac{1}{16}$ " x 3" x 36" med. sheeting & ribs
- 2 —  $\frac{1}{8}$ " x  $\frac{1}{4}$ " x 36" med. balsa (spars)
- 1 —  $\frac{1}{8}$ " sq. x 36" med. rudder spar

##### Fuselage

- 1 —  $\frac{1}{4}$ " x 6" x 36" med. balsa side
- 4 —  $\frac{1}{4}$ " x  $\frac{1}{4}$ " x 36" spruce longerons
- 2 —  $\frac{1}{4}$ " x  $\frac{1}{4}$ " x 36" balsa cross pieces
- 2 —  $\frac{1}{8}$ " x  $\frac{1}{4}$ " x 36" diagonals
- 3 —  $\frac{1}{8}$ " x 4" x 36" bulkheads & decking
- 2 —  $\frac{1}{8}$ " x 6" x 12" ply bulkheads and stiffeners
- 1 —  $\frac{1}{4}$ " x 6" x 12" ply firewall bulkhead
- 1 —  $\frac{1}{2}$ " x 8" x 36" med. balsa F-2 or
- 2 —  $\frac{1}{2}$ " x 4" x 36" butt glued
- 1 —  $\frac{3}{4}$ " x 6" x 12" chin block
- 1 —  $\frac{3}{8}$ " x 6" x 18" nose block sides
- 1 — 1" x 4" x 12" hatch
- 2 —  $\frac{3}{32}$ " x 4" x 36" deck and side stringers

##### Misc.

- 3 —  $\frac{1}{8}$ " x 36" music wire
- 1 —  $\frac{5}{32}$ " x 36" " "
- 1 —  $\frac{3}{32}$ " x 36" " "
- 2 — .045 x 36" " "
- 4 — gallons — elbow grease

## EDITOR'S MEMO

(Continued from Page 6)

So where's the harm? To my way of thinking, that article was simply a defense of that publication's editorial policy. In a day when even the large general interest "home" type publications are finding it difficult to survive against the numerous specialized magazines covering virtually every phase of interest, I might be trying to defend my stand, too. That's an editor's right and privilege. In fact, in our own field, I might be just as concerned if a specialized publication, such as RCM, dealing with only one phase of the hobby, could continue to run twenty more pages of material; consistently had a higher number of paid advertisers; and whose circulation growth evidenced a definite increase over my own.

The only trouble is that no one really cares except the individuals concerned with that publication. The ultimate consumer — the modeler, or RC'er — is interested only in the material that he finds between the two covers each month. He's not interested in peanuts, elephant, pudding, or circulation claims.

He's interested in good, solid material that he can put to use — material on how to build and how to fly.

And that's what we plan for all you middle aged cats — or elephants, as the case may be.

In closing, I guess that I owe Don Brown and Bill Northrop an apology. Bill, MAN's R/C editor, who infiltrated our ranks this month, pointed out the caption that appeared in the January Flight Line, which attributed the two teen-age girls as offspring of Don Brown and Bill Northrop. The following memorandum was received today:

Dear Don:—

To all those who might have read the January, 1967 issue of R/C Modeler, and to the other 95% of the RC'ers in the world who could possibly have heard about that screwy caption on page 48 of the reference issue . . .

We didn't even know Don Brown until 12 years ago. Julie, age 13, and DiDi (Edith), age 15, are definitely our daughters . . . Don's a good friend, but not that good a friend!

May the Big John of Paradise drop unmentionable matter on your crazy, mixed-up, blonde head!!

Frowningly yours,

Margie and Bill Northrop

I apologize, Margie. And Bill. And Don. And especially to Julie and DiDi. But, Bill, I could have sworn you said.

HAL de Bolt's

# ENCORE

**"... That Which Comes After."**

**A Pretty Good Mixture of Most of the  
Finer Points That Have Proven Attractive  
Over the Past Several Years.**

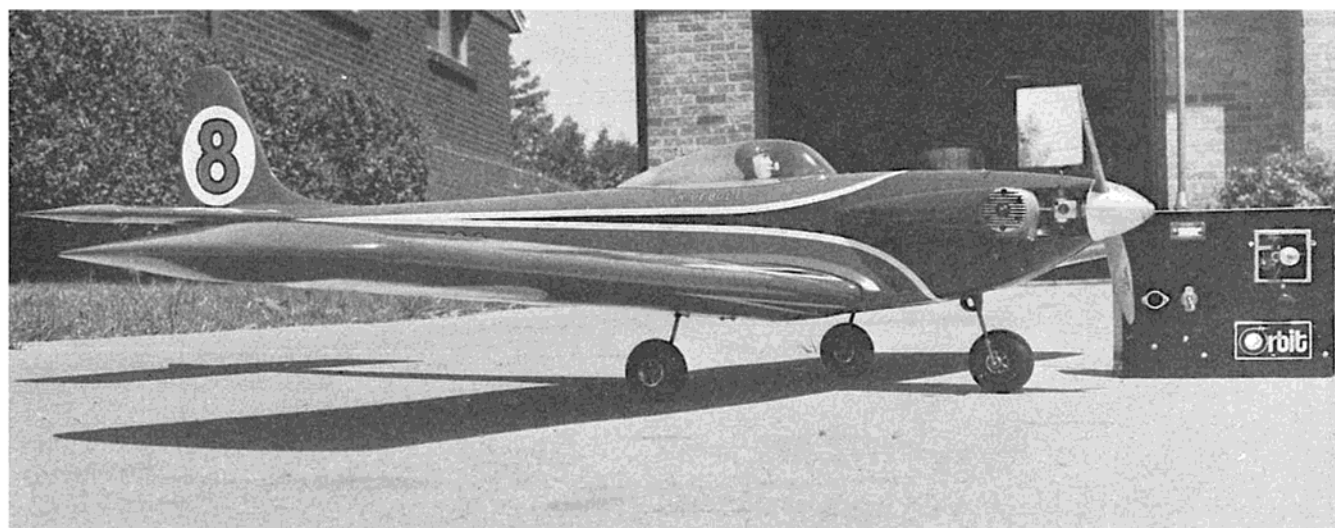
A POPULAR definition of the word "encore" could be "that which comes after," and usually encores are only demanded after some pretty sweet music! Finding interesting names for model designs these days is getting a bit rough, but frankly, I think it would be hard to find one more fitting for this design. This Class III bird is a pretty good mixture of most of the finer points that have proven attractive over the past several years. So, in a way, you could say that it is the aftermath, or perhaps, even the result of much hard work which has been put into the design and flight testing of many different designs during this period. Many of its predecessors were fancy, and even complicated, machines, but like many other things, when you know the answers it is usually possible to get similar results with something much less exotic.

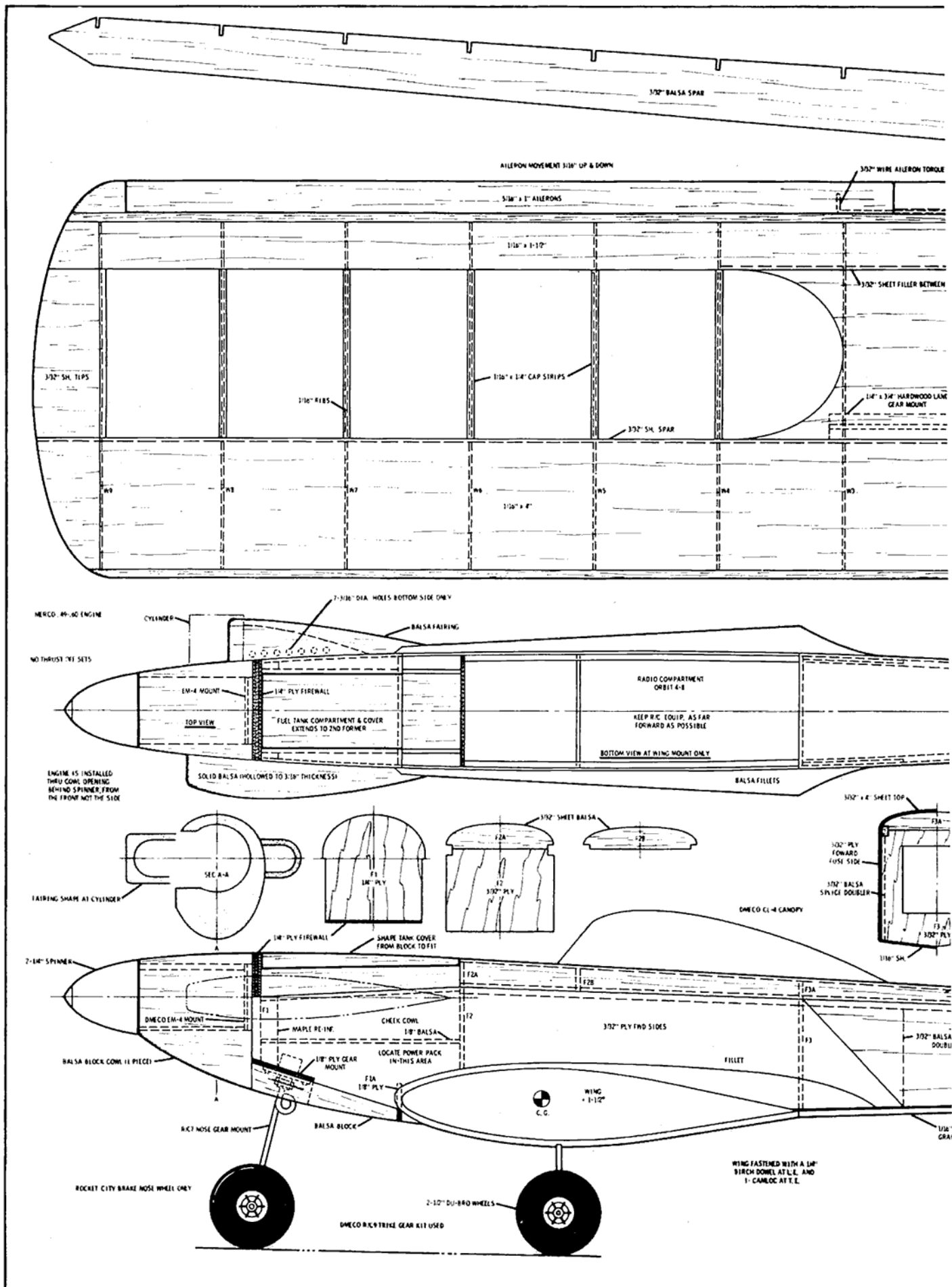
Last summer, when a new Class III model was needed for the Nats, a lot of thought was being given to the idea that a fully competitive Class III model could be designed that would not require the many hours of torture that usually goes into this type of endeavor. We had a pretty good idea as to what aerodynamics were required for a winning design, which left only the problem of getting these things into an airframe that would go together in a hurry — a "competition quickie," if you like.

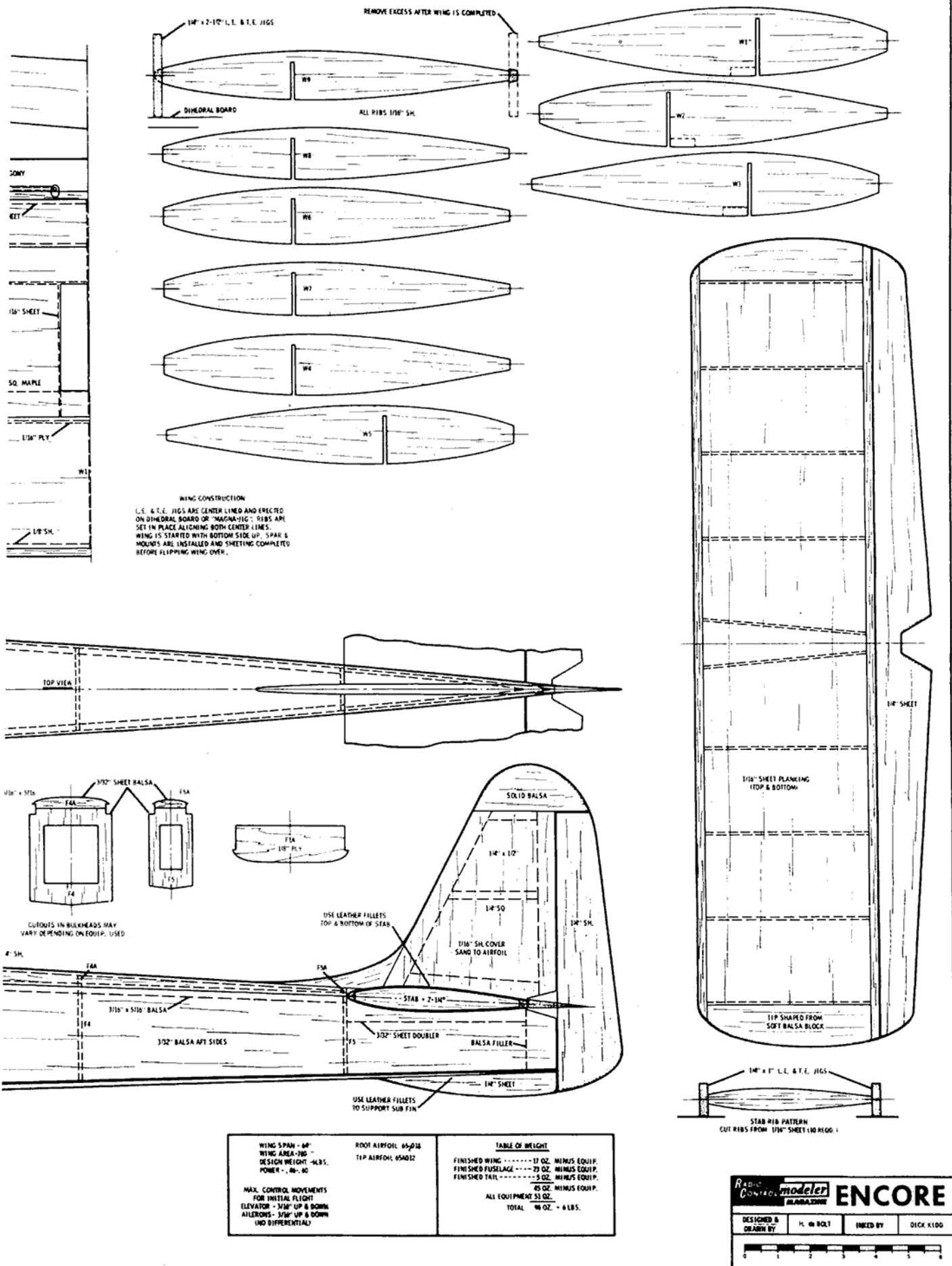
Now, to come back at you again, if you think choosing names for models is rough, how about trying to get a model, itself, to look different from the other guy's? With the stalemate that we now have in our contest flying, there is only one layout that consistently fits the bill — you just have to have a trike geared, low wing design to be "one of the boys."

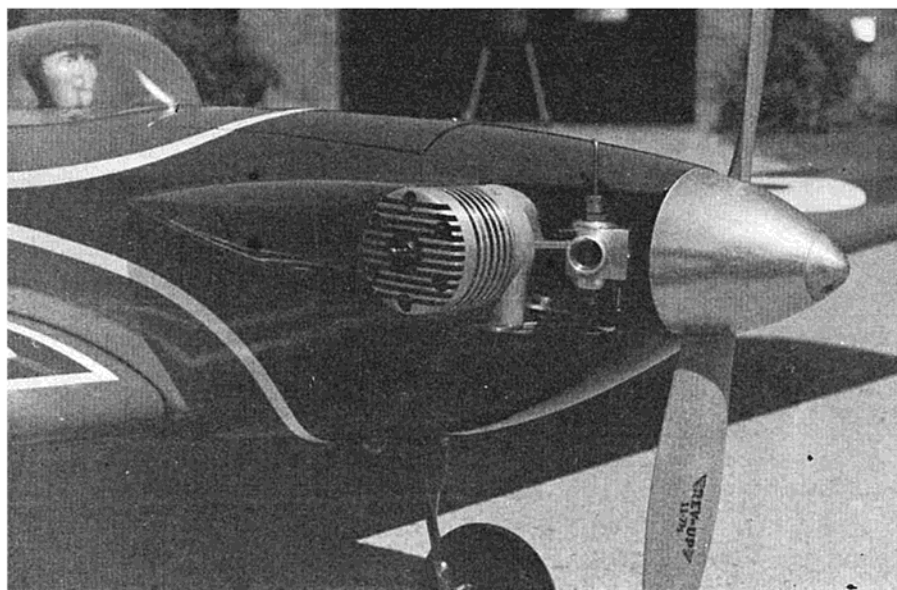
This same stalemate has brought us to the point where contests are no longer being won at the higher levels by ability or superior model design alone. Instead, it is circumstances which make you a winner or, alternately, an "also ran." Some circumstances you can create yourself. One of them is a "different" appearing model, as evidenced by the wide variety of designs which have shown up on the flying fields. One of the few remaining basic design ideas which had not been used was the "Goodyear" racer concept. These are cute and appealing airplanes which have a distinction of their own. It is true that they do not use three wheels, but perhaps we could start a trend in them with a trike-geared Goodyear type model. Laugh if you like! The truth is that there are some good aerodynamic reasons for following this concept, which brings us to the heart of this article.

If you do some checking you will find that the secret of the Encore is that it is a little bit lighter, somewhat larger in wing area, yet more compact than the average Class III design. The sum total of these criteria, from a performance standpoint, is increased maneuverability plus a higher flying speed. Additional maneuverability is an obvious asset, while a higher flying speed is also mandatory if you fly in heavy wind conditions. Normally, a higher flying speed is coupled with a higher landing speed, but fortunately this is not true of the Encore. The basically lighter weight, plus ample wing area, means that the landing approach can be made tail-low, adding both drag and lift, which work together to slow down the landing speed — somewhat similar to built-in flaps. I believe this is quite the opposite from most other designs which require a flat approach in order to prevent a troublesome stall. After watching this one fly, many modelers have asked how I liked the way my Merco .61 performed, only to be shocked to learn that it is only a









"puny" .49! It has been a hard job to convince them that the well used .49 was not, in some way, a "special" mill. What they have failed to realize is that power is not the only way to achieve a given speed. Efficient aerodynamics is often a much better method. Let's use the Encore as an example. Another design, similar in size, would normally use a .60 for power, which would mean 3 or 4 ounces of additional engine weight, plus a minimum of 12 ounces of fuel. With this one you save the weight of the heavier engine plus that of the fuel. In addition, the higher fuel consumption is costly and it becomes difficult to find room in the fuselage in which to squeeze the bigger tank. So you see that with a bit more attention to aerodynamics, you can not only use a smaller engine and reduce the fuel bill, but also fly faster and maneuver better! Hard to fight that? To be truthful, I must say that I occasionally have used a Merco .61 in the Encore, but I will be darned if I could see any difference between the two sizes when a good stunt prop was used. Going to a higher pitch and smaller diameter on the .60 would up the flying speed, but nothing else improved, so why fight it? I have found one advantage of the interchangeability, however, and that is when you know

that you will be flying at a much higher altitude than normal, it's easy to have your normal amount of power simply by substituting the .61 for the .49!

I don't believe anyone has found a better way to obtain maneuverability than with lift. You can try power and streamlining, both of which will help, but by far the best and most basic way is to have enough lift. Obviously, the superior way is to have all three — power, streamlining, and lift. It seems that with the inherent weights with which we have to contend, approximately 750 square inches of area does a good job on the normal model. Some have tried more and have been successful when the additional drag encountered did not eat up the available power. The problem with 750 square inches is that most designs with this amount of area run close to 72" in wingspan. Such a span means a correspondingly large fuselage and tail, ending up with a large aircraft. The large model, with its necessarily long moment arms, requires generous power. More often than not, this requires more power than even a .60 will provide. Thus, the tendency is to shorten up the radius beyond the "natural" inclination of the model, which results in sloppy maneuvers which are accepted by the pilot simply

because they are the best that can be achieved under the circumstances.

To understand what happens, you should realize that every model has a size of turning radius which is "natural" to it. For example, a Jap "Zero" could easily turn inside our WW II fighters. Perhaps the Zero would loop or turn with a radius of, say, 300 feet. When our P-40 tried the same turn, it was too tight for them and the pilot would either have to pay much closer attention to controlling the airplane, or else if this size was too drastic, the P-40 might even fall out of control. The difference would be that the 300-foot turn was natural for the light and compact Zero. When the P-40 entered the same turn the control action required to assume this size turn created drag which slowed it down. Its greater weight required more lift to keep flying which was just the opposite from what it was getting from the reduction in speed. The neutral turning radius of any airplane is one which uses the maximum amount of control action that can be obtained without going beyond the point of diminishing return with the drag created. As the drag is created, it not only slows the airplane down, but also creates turbulence which can have an effect on the stabilizing effort of the tail surfaces. An example with models would be a common effect which we have all seen — your model falling off or screwing out of loops. Quite often a good remedy is simply to open up the size of the maneuver. The apparent answer is that the amount of elevator used for the tight loop was enough to create excessive turbulence, which in turn, was creating an unbalance of forces on the two elevators, or else affecting the work of the vertical tail.

Aerodynamically, the smallest natural turning radius is created by two things — one being wing loading, and the other the reaction force created by the tail. Naturally, the lighter the airplane the less force it will take to turn it, thus when an equal amount of tail force power is applied to two airplanes of given size but different weights, the

*(Continued on Page 25)*



lighter airplane will turn more sharply since it has more lift for its weight. An airplane with a larger tail or tail moment arm than is necessary for good stability will not turn as tight either, since it requires more force to move the greater area, and in obtaining the force, the unwanted drag enters the picture.

The point of all this is to explain that there is an advantage to having a smaller, lighter, and more compact model. If you had all the power you could ever need, and all the sky in the world to work with, the advantage would not exist. Unfortunately, however, we are limited on power and we must fly within full view of the judges. Besides, if the model is smaller in overall size, it is a heck of a lot easier to carry!

We are all aware that airplane design is one continuous compromise. Usually we want to add something, but before we do, we have to consider that the addition will affect the rest of the design, with the result that we must consider whether or not the improvement achieved by the addition will offset the effects created by it. Fortunately, this also works in reverse. As an example, if you can reduce the overall size of the model you also reduce the weight of it. The lesser weight requires less power. The smaller engine uses less fuel. The smaller fuel tank is again less weight and more economical. When you get the cycle going in reverse it almost seems like it should "snowball" enough until you would not need an airplane at all!

The Encore has approximately 760 square inches of wing area, which appears ample for the weight of the equipment which must be carried. The advantage of the design is that this area is included in a span of only 64" and it still maintains a good, efficient planform. Obviously, the answer is the straight chord wing which packs in area that is lost in the tapered type. The 64" span, along with conservative moment arms, results in a much more compact design than is normal with this amount of area. The smaller overall airplane obviously takes advantage of the "snowballing" effect we just mentioned. In other words, you get the advantage of the big wing area in a smaller airframe. It's nice, of course, to have the advantage of a smaller engine and fuel bills, but more important to the contest flyer is the shorter "natural" turning radius. This means that you can fly the same size turns and loops as the other guy, and while doing it, **your** airplane will be flying well within its natural turning radius. The result is that your loops are smooth and require no correction.

So far we have spoken only of turns and loops. The remaining maneuvers are in the axial plane. Fortunately, the ability of a model to consecutively roll on an axis is governed by the control drag created in the maneuver, with wing loading and wingspan all more or less dependent on each other. It is important to maintain normal flying speed in this maneuver, or rather, to lose as little of it as possible. So, the less drag created the higher the speed will remain. If you use a high lift symmetrical section, the deflection of the ailerons in a level angle of attack can be compared to flaps. A small deflection will increase the lift of the panel drastically. Thus, in a roll, you can add considerable lift (thus reducing wing loading), simply by applying aileron control. If you also have a short wing span which requires less force to rotate, you will need less aileron movement and thus less drag. The combination of the increase in lift from the aileron flap effect, plus the lesser force required by the comparatively short span and the resulting minimum of drag, creates ideal conditions for our axial rolling maneuvers.

Would you believe that I have been trying to sell you on a compact design? I hope that you may have gotten the message because, above all else, that has been the lesson which I learned from the Encore.

Other aspects of the design come from experience. The wing uses a progressive airfoil which I have found to be more than worth the additional effort. A little review shows that the center foil is 18% and about the maximum lift available in this 65000 series. It has a fairly decent lift-drag ratio for an airfoil creating this amount of lift. The tip foil is a 65012, similar to the center, but thinner. The use of this foil at the tip does two things. Most important is that it is more stable than the center foil, which means that it will stall after the latter. Obviously, a good attribute on landing approaches, the tips will not tend to drop off as you slow way down close to a full stall. Its second advantage is that it has much less drag than the 18% section, which moves the aerodynamic center of resistance of the wing much closer to the center of the airplane. This means greater directional stability, which in pilot terminology, means positive tracking through the loops.

I have found it a definite asset to use wing fillets, especially with this airfoil. Apparently, at the speeds at which we fly, this airfoil creates conditions where it is not hard for it to start turbulating. The easiest place for the turbulence to start is at the fuselage junction. The fillets serve to smooth out the flow at this point and keep the turbulence from starting.

The Encore continues the use of a force arrangement which I have found to be most effective and one of the most outstanding advances I have yet seen in our modeling art. I don't believe that it is yet developed to its ultimate, but what we have now is so much better than what has been used before, it almost seems as though we can let evaluation take its course and obtain the additional benefits which may be there later on. I have said before that the ideal situation would be to have the tail force, or lift, exactly balance out the wings lift **at all flying speeds**, and whether upright or inverted. So much of our piloting is applied to keep the model flying level, a much easier way would be if the model would do this automatically for us. The Encore force arrangement comes awfully close to doing just that. It flies full bore with neutral elevator and flat out. Reduction in power can be drastic without any trim change required. The drag of the prop on full low engine requires some up-trim to keep the nose level, but if the engine is dead, very little, if any, is required for a level glide. Going inverted from the top or bottom of a loop requires only neutral elevator for level inverted flight. Rolling inverted requires a touch of down to bring the nose up as the roll is completed. Just why the difference I don't know at this time. I can say, however, that the range of flying speeds over which no trim change is required is the greatest I have seen yet. Don't be afraid that the drawings are wrong—there truly should be a  $\frac{3}{4}$  degree more positive in the stabilizer than in the wing!

The side mounted engine accomplished something other than the cheek cowl effect. Aerodynamically, the shorter you can have the nose moment arm, the greater will be both the stability and the maneuverability of the airplane. Thus, the idea is to keep the nose as short as possible. Unfortunately, we need the nose length for balance, along with the fact that we have been stuffing more and more into it! With this type of design we want to use a big bulky engine, a half pint bottle for fuel, and also a nose gear. At the same time we want to keep the size of the fuselage down for streamlining and place the center of that big bottle level with the needle valve of our engine. If you have given this a try, and then added a power pack on top of it all, you know what I am talking about! If I had my way, I would invert the engine, since this puts the entire engine within the normal cross section of the fuselage and thus creates the least amount of drag. However, it automatically lowers the needle valve and the fuel tank, leaving no room for batteries and nose gears. You can put it upright and have room for both, leav-

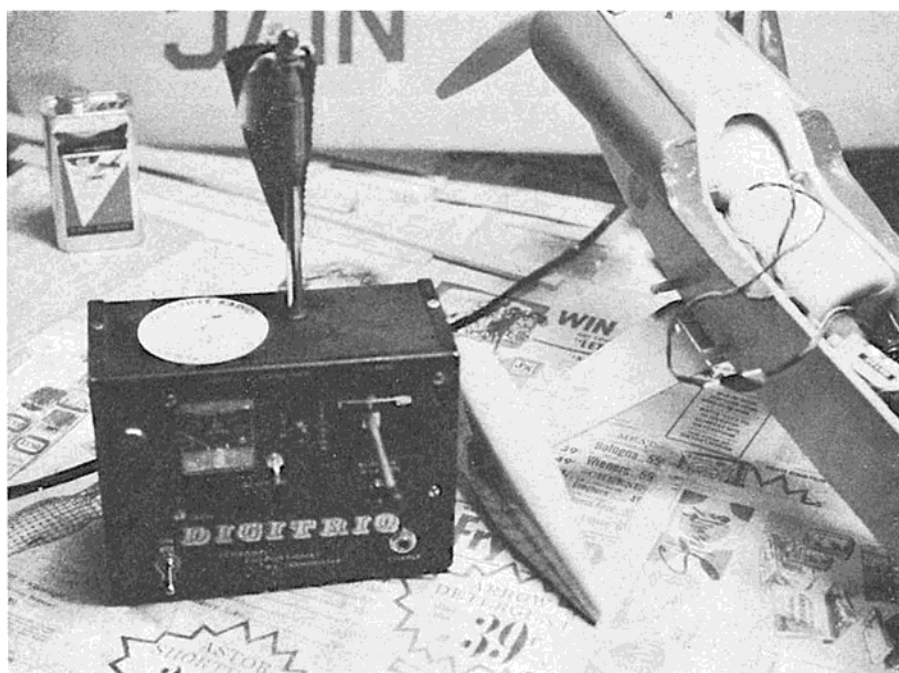
(Continued on Page 27)

# RCM

# ELECTRONICS

ED THOMPSON

RCM TECHNICAL EDITOR



An original Digitrio transmitter and Shoestring from RCM plans. Submitted by James P. Donovan, Fern Creek, Kentucky. Jim is secretary to Louisville R/C Club.

**H**OW NOW — SACRED COW?? Would you believe that William Winter, AM Editor, has flown R/C planes longer than all the other model editors put together? By my calculations that would make him at least 285 years old. In his "Straight and Level" column of January '67 he also points out that there are more peanuts than elephants. That's what I call brilliant editorializing. That statement will surely go down in modeling history as one of profound observance.

Now, here's an immutable law for Mr. Winter to digest. There are more modelers than editors and they don't like for editors to talk down their noses to them! There is also an old saying about giving a man enough rope, that sometimes comes true!!

And, now if everyone will bow their heads, I have a prayer:

*Oh wisest one of all modelers  
guide me in my endeavors to know  
when I am being taken in  
by fast-talking editors.*

*Protect me against those  
who would make me  
a middle-age slave  
to \$500.00 R/C models.*

*Help me to know  
that more balsa wood  
is sold for non-R/C models  
than for R/C.*

*Keep my ears attuned to the times  
so that siren songs won't sway me.*

*Never let me forget  
that there is*

*a great control tower  
in the sky to guide me. AMEN*

Judging is now complete for the RCM Second Annual Design Contest and I'd like to point out the results of the Electronics and Technical Design. There was only a 5-point spread between the top eight entries resulting in a 2-way tie for first place; a 2-way tie for second place; and a 3-way tie for third place. This is not because of poor judging but rather because of the excellence of the entries. It does point out that the judging criteria must be revised for the entries next year. How to do this is a problem. I have entered a few contests myself and always wondered how my entry was compared against others. I may be criticized for revealing the method used in the electronics and technical scoring this year but I feel that the people who submitted entries will welcome the information. It will be modified to prevent so many ties next year but will be basically the same. It will also help entrants next year know how to obtain maximum points.

## SCORING CRITERIA FOR ELECTRONIC & TECHNICAL DESIGN

Originality	0-10
Presentation	0- 6
Completeness	0- 6
Utility	0- 6
Practicality	0- 6
Technicality Involved	0-10
State of Art Advancement	0- 6
TOTAL	0-50

(Continued on Page 27)

I won't elaborate on how each item is scored but I think you'll agree that the odds of having as many ties as we had this year was more than coincidence. Some of the articles required four to five nights each to evaluate while others required approximately two hours. One advantage of this system is to allow a leveling of entries so that a simple item such as a 2-transistor piece of test equipment can be compared with a complete 50-transistor R/C system. Most of the entries received this year can be printed, with varying degrees of additional work on the part of the authors (some in fact were complete enough that additional work will not be necessary). Something that future entrants can keep in mind is that whether you win or not your entry may be selected for publication. Here are the names of the top eight winners and three honorable mentions:

**1st Place**

George L. Thompson, Sr.  
F. E. Carter

**2nd Place**

George L. Thompson  
L. Jack Weirshauser

**3rd Place**

Richard A. Frost  
Donald M. Andrus  
Duane F. Hartman

**4th Place**

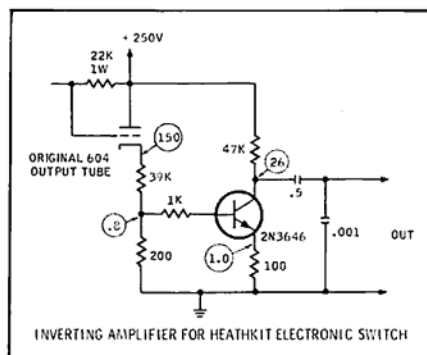
R. B. Wallace (from AUSTRALIA—only non-USA entrant)

**Honorable Mention**

William Eddy  
Gary E. Paar  
Robert Prichard

I welcome constructive criticism of the methods used in the interest of fair and equal judging. So, if you have any comments let me know.

Here is an item of interest for those of you who own a scope. I used the Heathkit Electronic Switch Kit for most of the Digitrio design and recommend it for those of you who want to look at two simultaneous (effectively) traces while troubleshooting or designing digital circuits. In its original form, it has a 180 degree phase shift so that positive pulses appear as negative pulses at its output, and vice versa. While this can be tolerated with sinusoidal waveforms, it is confusing with pulse work. I built an inverting amplifier into mine to correct this, using a transistor that has proven satisfactory. The circuit was wired point to point using existing tie points and I am sure you can figure out your own method. The drawing shows voltage checkpoints and lead dress is not critical.



Power Incorporated sent in a set of battery packs made especially for the Digitrio. These are 500 ma button cells encased in what looks like fuel-resistant black vinyl. Both packs have tabs for direct soldering without disassembly. I didn't receive a price list with the battery packs but I'm sure they will be reasonably priced as are all of their batteries. I re-cycled these batteries four times and each time the discharge amp hour rating exceeded the 500 mah advertised. I previously recommended the 600 ma pencils sold by Power Incorporated and do not hesitate to recommend these new button cell packs for the Digitrio. In general I prefer button cells to cylindrical cells for their smaller package size and reliability and have used them exclusively for the last eight months without failure.

When modifying the Digitrio to 4-channel operation the frame rate is decreased. This means that each servo is commanded at a slower rate. This will slow down servo response slightly due to the time constant of R16/17 and C4/5. This time constant can be increased by replacing R16/17 with 47K's if slightly faster response is desired. Also C9 can be reduced to .005 for increased resolution. I fly mine without these changes but worked them out for whoever may be interested. Also I have made some long-term tests with silicone grease on the wiper assemblies in the servos. I have found that cleaning of the wiper assemblies can be prolonged by a factor of 5-1 as long as excess foreign material doesn't get into the servo. The biggest advantage is the oxidation protection of the silicone grease. I'm sure a lot of you have let the Digitrio servos set for a couple of weeks or a month and found that when the set was first turned on the servos were erratic for the first four or five excursions. This is due to oxidation of the wiper assembly, and after a few "swipes" of the wiper, the oxidation was wiped off and normal operation was restored. I don't see much difference in the wear of the wiper fingers with or without silicone grease. In fact, I haven't found it necessary to replace a servo arm yet, with or without it. I now use

very light tension on the wipers along with the silicone grease and feel that wiper failure is highly overstressed. I have received many letters where a year of flying with light tension and silicone grease has been without failure. I do feel the servos (anyone's) should be checked periodically, and cleaned, if necessary. If you don't want to tackle this, yourself, get someone who knows what he is doing to do it for you or send it to the manufacturer for servicing. You would be surprised how much "crud" some servos can collect in six months of weekend flying. While you're at it perform or have performed preventive maintenance on the entire system. In short, it is to your advantage to give your system the best possible chance to perform reliably.

See you in California. WHO SAID, "THANKS FOR THE WARNING?"

**ENCORE**

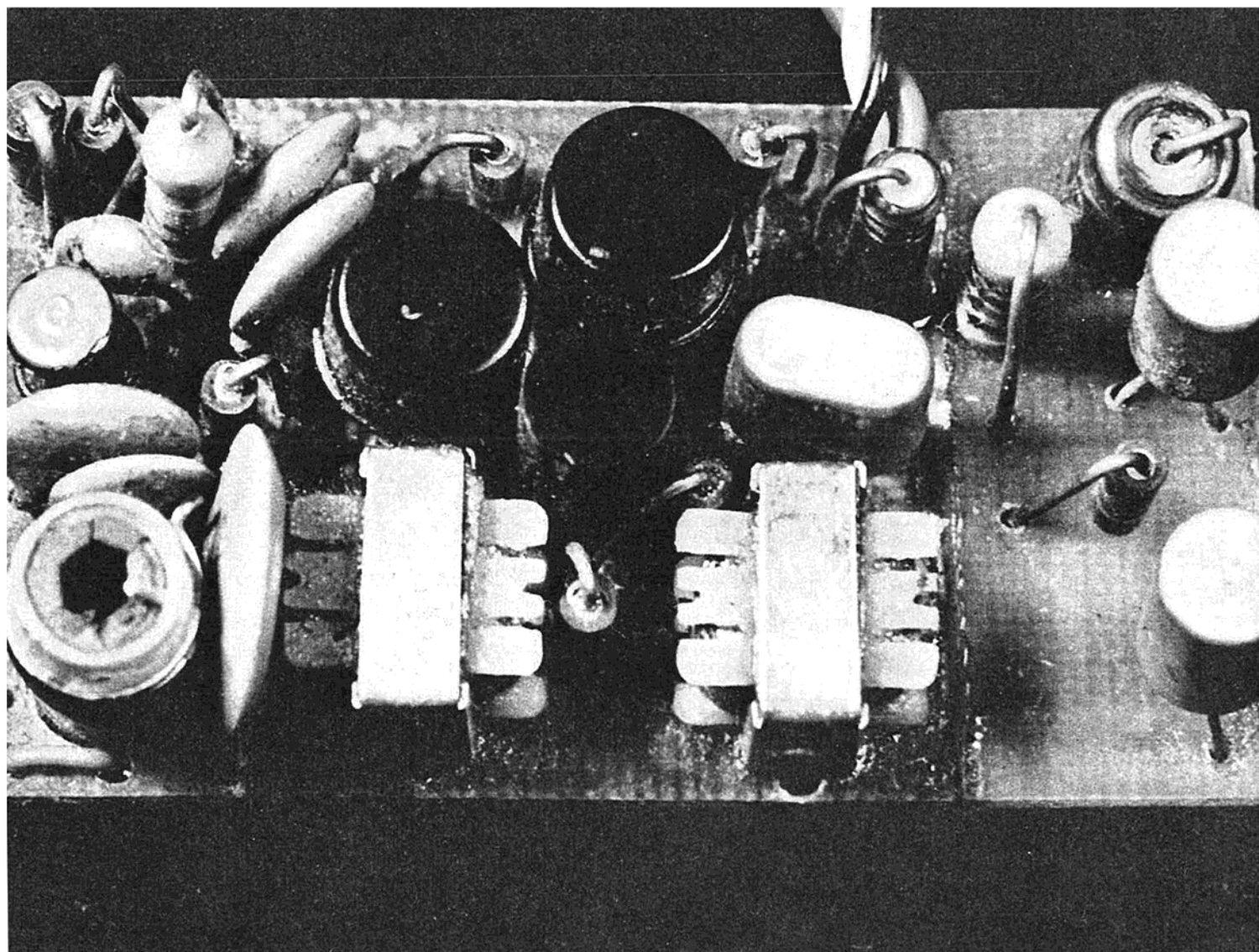
(Continued from Page 25)

ing the cylinder fanning the breeze. The compromise in the Encore is to side mount, which raises the fuel tank enough to slip the batteries under it, and at the same time, lets you get away with some fairing for the engine cylinder. So, you would seem to have the advantage of "Goodyear looks" with a cleaner airplane and the shortest nose moment possible.

I wish I could close this article by telling you to build an Encore and you would have the same airplane the winners of all the BIG contests used last year. Sorry about that, but I can't! I can say that it is a fine performing machine which should make any owner proud. It will go together quicker than most any other model of its type and is well proven in competition.

Oh, yes — it has won several regional meets, placed quite high in all others, and should have done well at the NATS and FAI, but then there were those "circumstances" . . .

Have fun!



"Stick-On-Switcher" epoxied to Controlaire 5 receiver (right). Coil has been modified on prototype for operation in Australia on 40-68 Mc.

# STICK-ON-SWITCHER

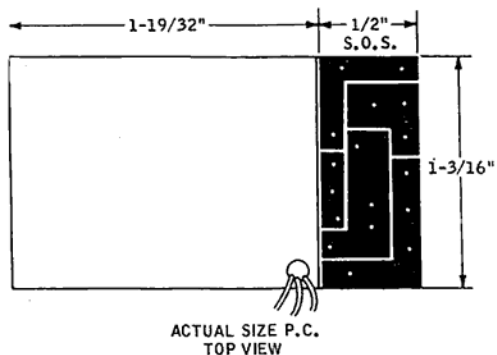
**From "Down Under," a "Stick-On" Switcher for Operating Motorized Galloping Ghost Actuators From Relayless, Single-Ended Receivers. By R. B. Wallace**

**H**ERE is something for the "Sport Flyer" which will give simple reliable control of pulse rudder or "Galloping Ghost" from any single ended relayless receiver. It will operate motorised actuators such as the Rand, Go-Ac, Mighty Midget, T-05 etc., and will also work magnetic actuators such as Adams, Septalette etc. Although I have only used this switcher coupled to a superregenerative receiver, it should perform equally as well with a superhet.

One big advantage — especially when small .020 or .049 sized planes are used — is the common battery supply, which is not limited to 3 volts. Any voltage you prefer may be used on the actuator and the maximum voltage on the receiver is still only 3.6 volts. My experience has shown that when using three "Niccads" on a 3 volt receiver such as the Controlaire 5 or Kraft K3VK the surplus "float" voltage above 3.6 volts, which remains after removing them

from the charger until a little use reduces the voltage to about 1.2 volts per cell, eventually causes the receiver to fail. This will not happen with this unit provided the initial setting-up is done with fully charged batteries.

During the last year or so I have had over 150 flights with my 30 inch .049 powered plane using this switcher, a Controlaire 5 receiver and four 225 MAH. "Niccads." The actuator was a Mighty Midget Motor operating pulse



rudder. I have also flown it using "Gal-loping Ghost" and have not had a single malfunction. The Adams actuator also works perfectly when wired as shown in the diagram.

### CONSTRUCTION

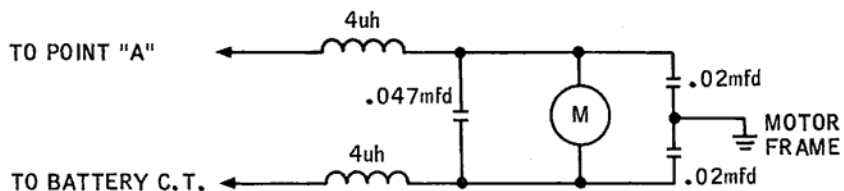
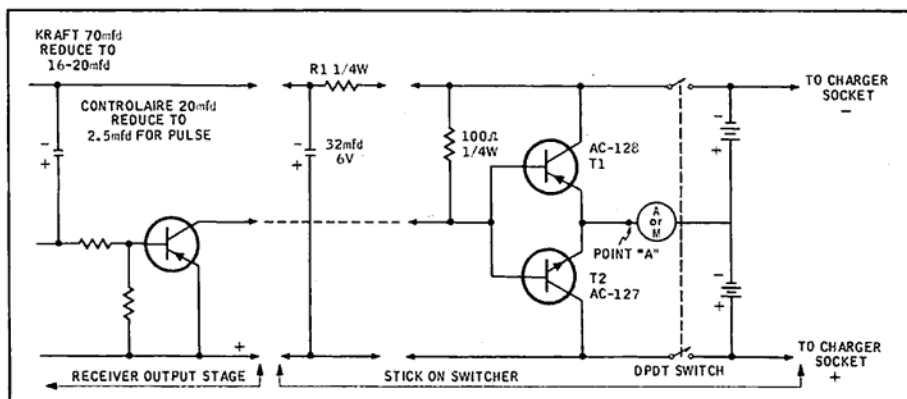
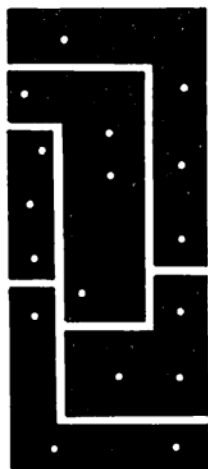
Construction is simple and can be followed from the twice sized P.C. layout shown. The completed unit may then be epoxied to the output end of the receiver, thus making a compact single unit installation. Connections from the switcher to the receiver are made with short lengths of hook up wire on the copper side of the board.

The AC127 (NPN) and AC128 (PNP) transistors used are manufactured in Australia by Philips Electrical Pty. Limited, but General Electric 4JX1C 1132 (PNP) and 4JX11C 1847 (NPN), Fairchild 2N 3638 and 2N 3646 or T. I. 2N 1303 and 2N 1304 should work equally as well. When using G.E., Fairchild or T.I. transistors to operate a motorised actuator, it might be as well to bear in mind their maximum ratings and include a current limiting resistor or a No. 43 pilot lamp at point "A" to keep the current through the motor circuit within those ratings. This is not necessary with the Australian transistors as they will stand upwards of 1 amp.

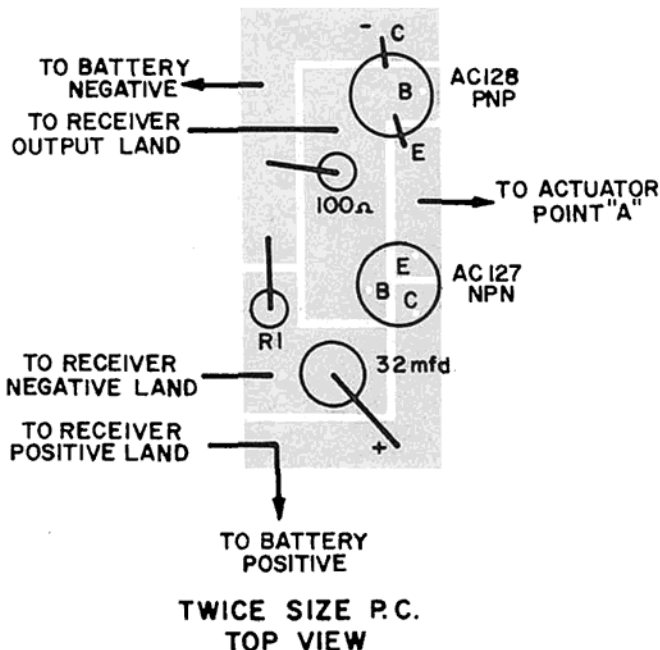
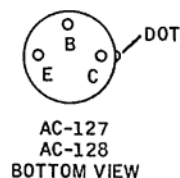
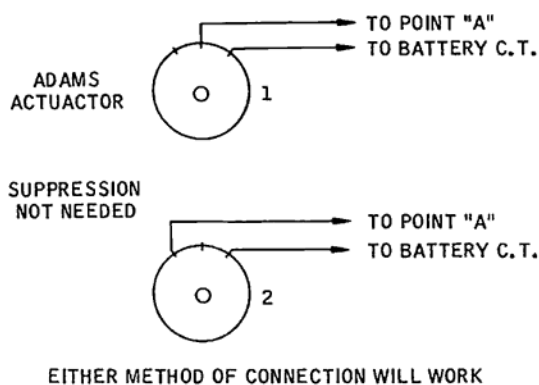
### SETTING UP

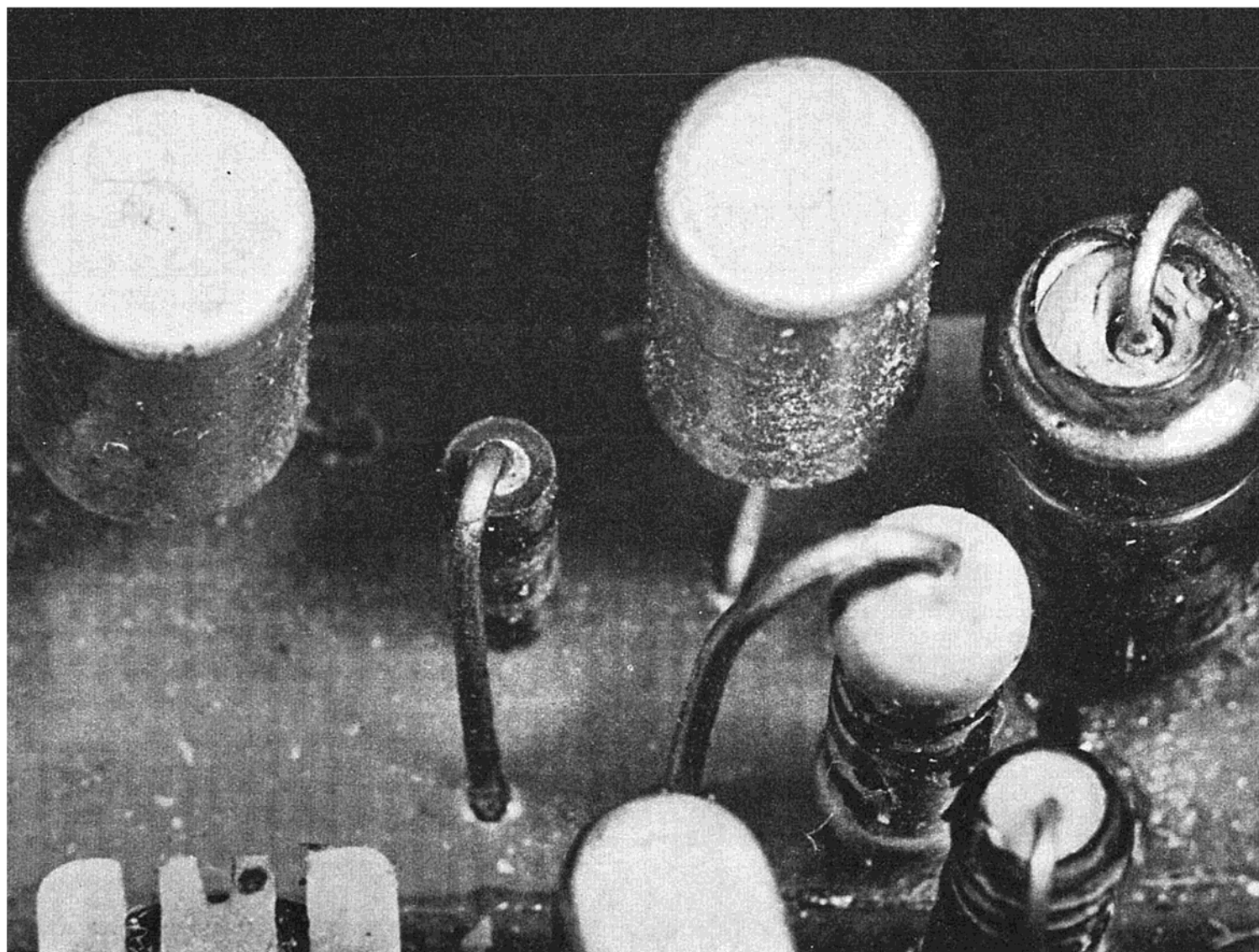
Insert a 1K potentiometer, set at maximum resistance, in the position

### Twice Size P.C. Board



MOTOR SUPPRESSION CIRCUIT





Top row, L to R: AC 128, AC 127, 32 Mfd. Middle row, L to R: 100 ohm (R-1). Bottom row, L to R: part of receiver — transformer, 2N229, 2.2 Mfd. electrolytic.

shown for R1, and place Voltmeter leads across the receiver positive and negative lands. Connect batteries and switch on. Gradually reduce the potentiometer resistance until the voltmeter reads 3.6 volts. Remove the potentiometer, measure its resistance and insert the nearest standard value resistor above the measured value in the position for R1. The value for my Controlaire 5 was 220 ohms. **NOTE:** It is important that the "Nicads" are **fully charged** before this setting up is commenced.

Should you propose to use a TO-5 motor with 1.5 volts each side, the 32 mfd. electrolytic and R1 may be omitted. These are only necessary when the total actuator voltage exceeds the maximum voltage allowable on the receiver.

#### ACTUATOR SUPPRESSION

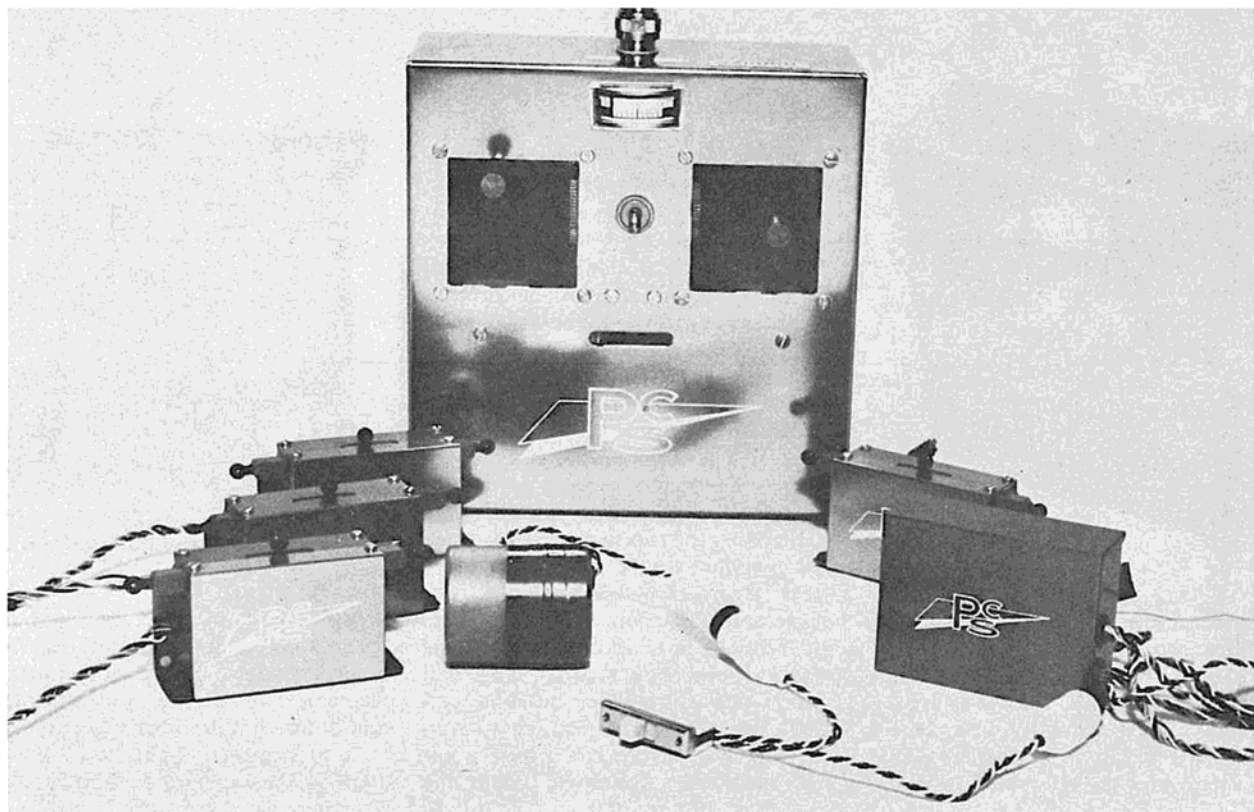
It is essential to suppress the actuator, otherwise the electrical noise will feed back into the receiver, causing peculiar

and erratic pulsing. Many circuits for suppressing the motor have been published in various model magazines. The one used on the Mighty Midget in my plane consists of an R.F. Choke in each motor lead, a .047 mfd capacitor across the motor brushes and a .02 mfd capacitor from each brush to the motor frame. I found that the R.F.C.s must have a very low D.C. resistance (not exceeding 1 or 2 ohms each). Higher resistance in this part of the circuit reduces the voltage across the motor and is detrimental to optimum performance. Mine were made from Ferroxcube-cored choke type VK2CO 10/3B rewound with 6 turns of No. 38 enamel wire. These cores are about  $\frac{3}{8}$ " by  $\frac{1}{8}$ " diameter with several holes running lengthwise. The Controlaire 4 uh R.F.C. would probably be satisfactory.

I found that the Adams Actuator did not need any suppression.

If you should try this Stick-on-Switcher I feel sure you will have many hours of reliable and enjoyable flying.





## RCM PRODUCT REPORT:

# PCS DIGITAL PROPORTIONAL SYSTEM

**T**HE announcement of Proportional Control System's entry into the proportional control field was generally received with mixed emotions. RC'ers, anxious to go proportional, but held back by limited finances, must have been tempted by the three hundred dollar price tag. PCS was offering a five channel control system at a price that, in some cases, was half the cost of competitors. The tune changed — could a \$300 system be any good? Psychologically, at least, reliability was measured in dollars and cents. We cannot say that we were not beset by these same suspicions.

Our decision to purchase a PCS was based largely on our knowledge of the individuals behind the company — Cliff Weirick, a top notch flyer, a national champion and long time RC'er, and Jerry Pullen, a pioneer in R/C electronics and digital circuitry.

Our system was delivered within two weeks after placement of the order. We were somewhat disappointed when the box had been completely unpacked, and the beautiful girl pictured in the ad was missing! The control system, however, appeared to be as nicely made as the girl, but certainly not the type to curl up with on a cold winter night. A quick call to

PCS advised us that she was not part of the package!

From a technical viewpoint, our review will be brief, since we feel that this aspect of any review generally tends to confuse rather than inform the majority of readers.

### Transmitter

The PCS transmitter is of the two stick variety, utilizing enclosed control sticks for the primary functions and a lever for auxiliary control (ours had open faced Kraft type sticks). An output reference meter is located on the front face, and a four section collapsible antenna is mounted on top via a screw-on connector, making it readily removable. The encoder portion of the circuitry forms five pulses, followed by a sync pause. The frame repetition rate varies with command given from 80 frames per second to 133 frames per second. In other words, each control position is transmitted at a minimum of 80 times each and every second and at a maximum of 133 times each and every second. The width of the sync pause is varied to control the auxiliary channel. The unit contains eleven quality transistors, and has an RF input to the final of

700 MW and an output of about 350 MW. Power is supplied by a 9.6V G.E. nickel cadmium pack, and the chargers for both the transmitter and receiver are built-in.

### Receiver

The receiver is superheterodyne with a sensitivity of 1 microvolt and a selectivity of 3 kilocycles. The receiver contains an effective noise rejection circuit. Temperature stability was checked through a range of 0-140 degrees F without a miss. The decoder portion operates by means of ring counter logic.

Receiver, decoder construction is single deck, with an overall case size of 2" x 3" x 1", and a weight of 4 ounces. The unit is factory tuned and sealed. Power supply is 4.8V, 500 Ma nickel cadmium.

### Servos

Kraft servo mechanics are used with PCS electronics installed. Resolution (centering) was accurate to less than 1% on the five servos tested. Total travel is  $\frac{5}{8}$ " in a linear motion, with three take-off points provided. Output arm thrust tested at approximately four pounds. Individual servo weight is 3 ounces.

(Continued on Page 32)



### System

As shipped, the PCS system includes transmitter, receiver, four servos, power supplies, built-in charger, switch harness and charge cords. All wiring is complete, ready to plug in and fly. As a convenience, two servos are supplied providing opposite travel with a given command, making installation to existing linkages extremely easy.

### Testing

Initial bench checks consisted of plugging the various components together, flipping the switches and watching all the servos home in on their neutral position. The transmitter controls were wiggled and twisted as we watched all the servos running smoothly and quietly back and forth.

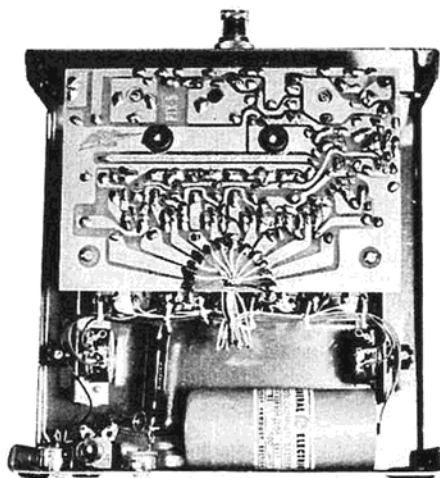
The system was quickly installed in our newly finished Antic. Following the instruction manual closely, we succeeded in doing most of the "don'ts." Perhaps the most flagrant violation was the use of full length wire pushrods on all surfaces — with metal keepers! Add to this the fact that the ship is literally held together with metal guy wires running every which way! On the bench, everything still checked out satisfac-

PCS transmitter evidences excellent workmanship and quality control.

torily.

If ever you are in doubt about a new piece of equipment, there is one sure way to check it out prior to flight — take it to a club meeting! What those guys did to our PCS! Phase One: remove the transmitter antenna and start walking — "Ha, ha, only six feet and she's starting to chatter." Phase Two: install antenna but have it collapsed — "That's better, 30 feet and still solid." Then someone suggested coiling the receiver antenna inside the ship (Phase Four), range reduced to 25 feet. By now we were convinced, but the members had other ideas. Phase Five: "Hey — how about wrapping the antenna around the servos?" Range still 25 feet with transmitter antenna collapsed. This should be enough to convince the most diehard "propo-is-no-good" reed flyer. Not so! From the corner came another idea — "What happens if you leave the receiver antenna wrapped around the servos and then stick that noisy old electric drill down in the compartment . . . running? Bet it won't work then!" Needless to say there were no takers, but since we always fly with an electric drill and long extension cord, we agreed to try it. Under these adverse conditions, the system continued to operate with no loss of range or control! Maybe not a very scientific test, but nonetheless convincing. Not only did we get a unanimous approval to fly it, but also two more systems were ordered within the club!

Field checks proceeded without incident, as did the flight — in spite of us, our Antic, and all of its wires. With the exception of a brief checkout in a full multi stunt ship, the PCS has remained in the Antic (as have the wires and full metal linkages!). This combination has



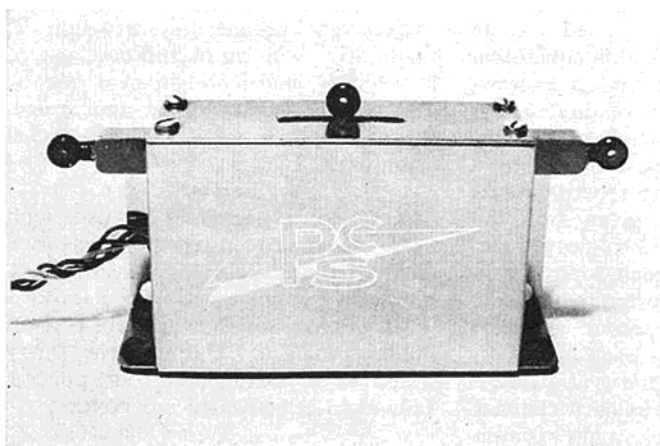
logged well over five hundred flights without the slightest or briefest loss of control, under any and all conditions of weather, temperature, and R/C traffic, and before hundreds of spectators.

Our toughest flight test, however, came at the Indiantown Gap Invitational, when we were called upon to fly, along with six other ships, in a pouring rain. The preciseness of control was demonstrated with low passes, inches from the ground across an entire field, along with touch and go's on one wheel, and placing the ship between two obstacles ten feet apart (the Antic wing-span is 7 feet!).

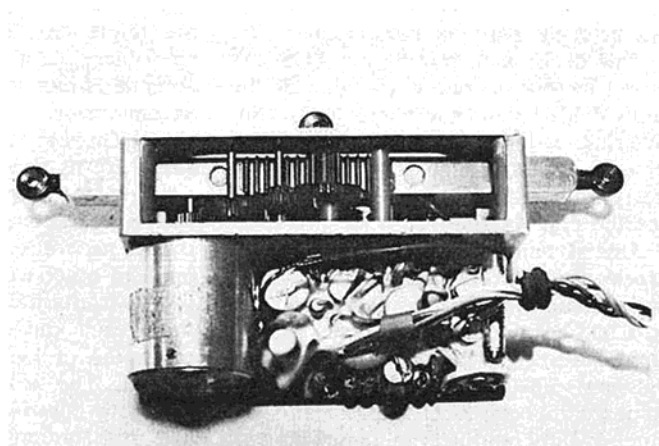
In all, five PCS systems have been under scrutiny. Only one of the five has been returned for service. This was due to accidental damage, otherwise known as "pilot error!" The system returned for service made the trip across country and back, was duly repaired, and was in the air, once again, the following weekend! We would assume that either PCS is giving superb service, or alternately, has very little service work to perform. Or, perhaps a combination of both.

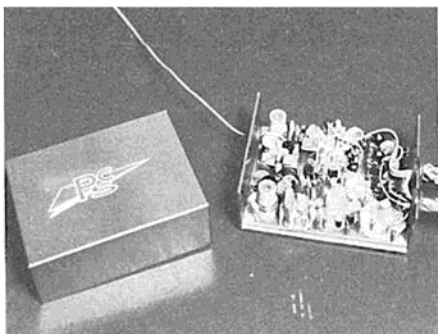
It should be mentioned that one of the systems, that belonging to Ray Smith of

Proportional Control System's digital servo.



Internal shot of the PCS servo. Note epoxy compound to protect components.





Interior of PCS receiver.

the DCRC, experienced some "glitching" during the glider altitude record. Verified range when the glitches occurred? A mere four and one half miles! How's that for a range check?

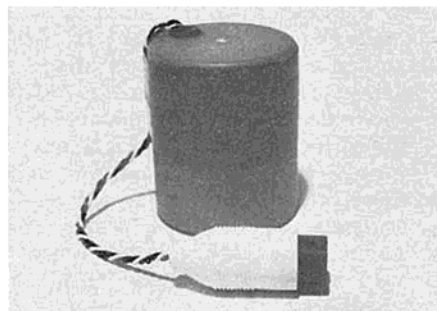
#### Prices and Availability

The PCS five-channel digital system is priced at \$299.95 for the complete pre-wired system. Available on either the 27 Mc, 52 Mc, and soon the 72 Mc bands, deliveries vary from one to three weeks, through your dealer or factory direct.

#### Findings — Recommendations

Our primary concern in equipment reviewing is performance. Our testing, although not proof positive, has shown the Proportional Control Systems' PCS-5 to be outstanding in performance, reliability, quality, and price. We understand that some difficulty has been sustained by a few PCS system fliers with regard to servos. Virtually every case has been traced down to dirty servo feedback potentiometers, and for this reason, a Servo Maintenance Manual is now available for the Kraft and PCS servo. The symptoms which indicate that this maintenance is necessary are a mild hunting of the control surface under engine vibration or a failure of a servo to neutralize accurately while flying. This condition is not dangerous insofar as a loss of control is concerned but indicates that servo "pot" cleaning is required. The Maintenance Instructions provided with each system should be followed after extended system use, and the manufacturer recommends this service to be performed in the area of each 75-250 flights.

PCS battery pack.



# WALT AND WAGGER'S R/C DEFINITIONS

BY LOREN DIETRICH

**Airplane:** A heavier-than-air machine which obviously is.

**Aileron:** A hinged surface on the wing of a multi-control airplane; also, a black line on a single-channel airplane.

**Balsa:** An extremely light substitute for gold.

**Block:** What a part is made from after ruining six sheets of  $\frac{1}{16}$ " gold. (See **balsa**)

**Cessna:** A manufacturer who makes a large model of the Goldberg "Sky-lane."

**Crash:** Termination of a flight. (See **airplane**)

**Delta:** An airplane which goes like everything and looks like nothing.

**Dinner:** A cold, gooey substance which was served too soon on flying days.

**Elevator:** A Galloping-Ghost device to give proportional porpoising.

**Field:** A place for the take-off. Landings occur elsewhere. (See **crash**)

**Flutter:** A loose, vibrating control surface. Not to be confused with "pulse-proportional" systems which are highly sophisticated.

**Galloping-Ghost:** Known as the "Poor man's multi," or the "Rich man's single-channel" depending upon whether you fly multi or single channel.

**Girl:** Since I took up R/C, the definition of this term has slipped my mind.

**Hinge:** An awkward device which binds-up control surfaces, messes up the finish, and breaks. Functions like a dethermalizer.

**Incidence:** An angle which the designer cautions you not to change, which is O.K. with you because you don't know what it is anyway.

**Inverted:** A maneuver which puts the wheels upward.

**Junk:** Results of landing upside-down. (See **inverted**)

**Joker:** The spectator who informs you it would be neat if you flew two airplanes from one transmitter, etc.

**Kiss:** Means nothing in R/C. (See **Girl**)

**Landing:** Maneuver in which a 5 foot airplane contacts a sphere 8000 miles in diameter, after which the pilot smiles knowingly.

**Lb:** Abbreviation for "pound." Example: the airplane is 2 lbs. overweight, 4 lbs. overweight, and so on.

**Motor:** An electric device which rotates, as distinguished from engine which usually doesn't.

**Monoplane:** A biplane which flies better

now that you took that other d...n wing off.

**Noise:** Produced by a neighbor's motorcycle; not to be confused with the healthy bark of a model engine.

**Nosewheel:** A bent, flat wheel which doesn't steer right.

**Order:** A few cents' worth of supplies obtained from the hobby dealer. Example: \$4.00 worth of batteries, \$9.95 model kit, \$6.00 worth fuel, etc.

**Obnoxious:** A joker who asks why the tail wiggles like that, mister.

**Proportional:** A control system which does not wiggle the tail. All **obnoxious** jokers saw one of these once, and how come you don't get one?

**Plug:** An ingenious device for making an intermittent connection.

**Quits:** What you are going to call it, by George, if it doesn't work this time.

**Radio:** A wireless device which enables an airplane to crash in different places than it would otherwise.

**Receiver:** The part of the radio which "hears" signals. Examples: my receiver is picking up interference, my receiver is picking up motor noise, and so on.

**Stabilizer:** A horizontal surface which serves as a mounting place for the **Vertical Fin**, thus assuring that both will be misaligned simultaneously.

**Skid:** In the case of an airplane which sits on two main wheels and the tail, the **Skid** is usually the nose.

**Tail:** Report made to wife concerning flying session: i.e., a lie.

**Tank:** Container in the airplane where fuel is stored prior to being squirted on the fuselage.

**Un-:** A prefix which means "not." Examples: my aileron servo is **unplugged**, my batteries are **uncharged**, R/C makes me **unhappy**, etc.

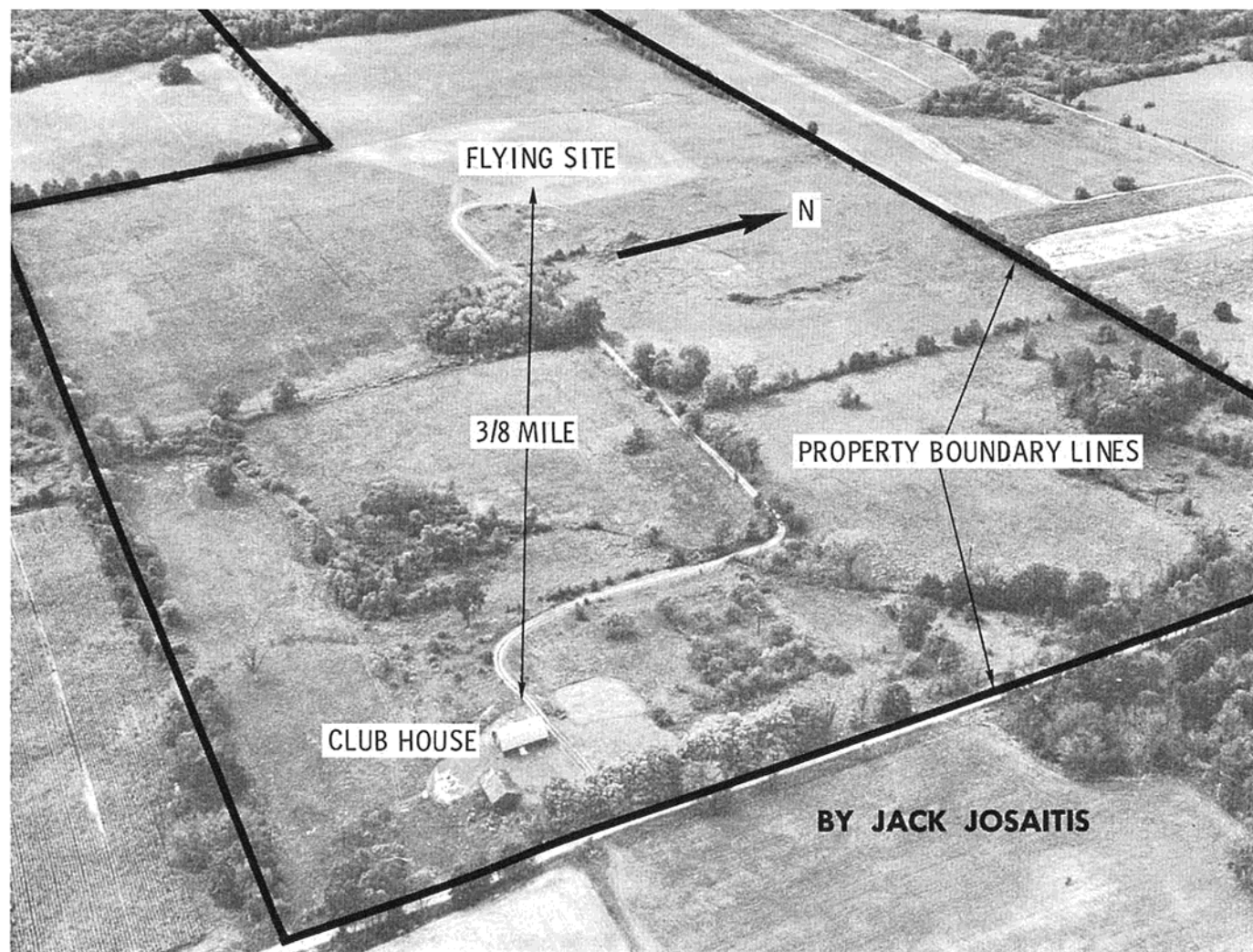
**Versatile:** A man who has many interests and skills, such as building R/C, flying R/C, talking about R/C, reading about R/C.

**Wheel Retainer:** A device for dropping a wheel in flight.

**X-Ray:** A means of seeing the interior of an object. Similar to **Crash**.

**Young People:** What we have to get more of into the hobby, as soon as we finish the next airplane.

**Zzzzzzz:** Encouraging sounds emitted by non-hobbyists, while I tell my fascinating stories about that low turn I made over the tennis courts when suddenly the engine. . . .



Overall view of Midwest R/C flying site. 112 acres, 1500 ft. across by 3900 ft. deep. Actual flying site about 500 ft. sq., grassed and mowed short.

## PROBLEM: LOST ... ONE FLYING SITE!

**W**HAT happens to a club of enthusiastic radio control modelers when they lose their biggest asset — the club field? This was the question to be answered by the Midwest Radio Control Society of Detroit, Michigan, in the early spring of 1963.

We had been notified by the owner of the property on which we'd been flying that adjacent homeowners were complaining of not only noise, but a host of other things, the ultimate aim of which was to get us out of there. We'd been flying there before most of these homes were built, but since we were leasing the land by verbal agreement, there was nothing left but to vacate the property. We had put a lot of money and good old fashioned sweat into our flying site over the past five years, and having somewhat settled down to this particular area, the boot came as quite a shock and at the worst possible time.

For the most part, our flying season begins sometime in April and gradually picks up momentum as the days grow

warmer. Our "invitation" to move out came toward the latter part of April. This meant that in order to have another field ready for the season, already upon us, that we were going to have to move FAST! On top of all this our annual Midwest R/C Jamboree had been scheduled for the first weekend in June — notices had already been sent around to fliers and hobby shops in the neighboring states. This meant, of course, another mailing to let those previously notified that it was necessary to cancel the contest because of the loss of our flying site. We had also accumulated a number of prizes from manufacturers we had solicited (bless them!) and these too, were sent back along with a note of thanks for their help.

Our club is like most others — there is a certain group within it that does most of the flying, and usually, it is this same group that must do most of the work when it comes to keeping the field in condition, organizing contests, or arranging for the usual social activities.

Naturally, then, the project of finding a new place to fly and establishing a flying site fell on these people. The membership at large was invited to get into their cars and report anything that looked suitable for a site. The area had to be somewhere between thirty to forty acres in size, relatively free from trees, and at a far enough distance from residential areas where the engine noise would not bother anyone. Our former field had been located on eighty acres of flatland about thirteen miles from our meeting place. The actual takeoff area had been about 250 feet square of hard packed dirt with two years of oiling on it. Trying to find a duplicate site that could be leased within a twenty-mile radius proved to be more of a job than we had bargained for — there just weren't any!

During one of the informal meetings that always takes place after our regular meeting, one of the stalwarts suggested the "idea." Why not buy a field? If you are aware of what property can cost near a large city, you'll be able to

imagine the guffaws this suggestion drew from the rest of the crew! But the idea of being able to have a permanent flying site, the possibilities of our own clubhouse, and all the things that go with it, put this group to thinking, and before the evening had ended, it was decided that we would again go out, much farther if necessary, and do our inquiring with the possibility in mind of purchasing, rather than leasing, some land. And so the search was on!

We found out that this particular phase of the operation required considerably more searching than we had anticipated. It took far more than just three or four fellows climbing into a car and driving around. We methodically took county maps, laid out areas, and literally covered the area road by road, asking farmers, checking real estate offices in each area, and following any and all leads. Our most ambitious explorer, Jim Northmore, reported that in one day of hunting, he had used three tankfuls of gas. We confined most of our looking in the general area of expressways out of town, so that if it were necessary to go some distance, the expressway would at least cut the traveling time, if not the distance, to a minimum.

The real estate offices proved to be the best approach, and before long, we had appointments to look at several plots. These were inspected, and the findings returned to the club at the next meeting. But the major problem was yet to be tackled — even if we should find what we wanted from the acreage offered to us, just how were we going to finance this project? Our club had about \$900.00 in the treasury which wouldn't even come close to making a down payment. We also felt that we should put a ceiling on just how much we wanted to spend so that we could promote the funds. After checking on a few of the sites offered to us, it became obvious that it was going to take about \$12,000.00 to swing this kind of a deal and come up with anything useable. Quick mental arithmetic told us that with fifty members, this would mean every man coming up with \$240.00 — and it seemed highly unlikely that each member could — or would — go this far.

We therefore presented the club with a dual plan for purchasing if the right property should become available. Plan #1 was based on purchase via land contract which basically consists of a down payment, the mortgage payments being 1% of the mortgage, and the balance paid off at 6% per annum over the following eleven years. Plan #2 was a bit more ambitious — to put as large a down payment as possible, and to pay the mortgage off in three years. Both proposals were presented to the membership at the next meeting and the inevitable followed — a number of the



Above, left: the field before preparation — 1963. Above, right: site preparation commencing.



non-flying members began to wonder if it really was necessary to purchase a field, a few decided the easiest way out was to quit — and did so. On and on the discussions went, until even the organizers began to wonder. By this time, we were well into June and the flying season that we had anticipated all winter began to pass away. It became quite obvious, that unless we were able to get out of the seemingly hopeless mire of finance, that the 1963 flying season would be lost. Not only that, but every meeting showed us that our membership was getting smaller all the time! Obviously, when you haven't got a flying field, you haven't got a club!

We began to get a few calls from real estate agencies that we had contacted, and again looked at several pieces of property. One of these appeared somewhat suitable and after all those long hours of searching, a few of us were ready to take anything — but the layout of this parcel was such that it was extremely narrow and long. Some of us decided to look a bit further, and another call from the same real estate agency led us to a piece of property that appeared to be just the spot we needed — if anything, it was much larger than was needed, 112 acres, but it included a 30' x 50' concrete block barn that was just begging for transformation into a clubhouse. The price was \$16,800.00 with a required down payment of \$4,800.00, a bit more than we had originally wanted to pay, but we were more convinced that **this** was the spot we wanted. It began to look as though the entire project was lost when it was suggested by one of us that we contact as many club members individually as possible and ask them for a pledge of \$350.00 each for the down payment. Perhaps it would be easier for a fewer number to purchase and own the property which in turn could be leased back to the club as a whole. We felt that a minimum of fifteen people who could immediately put up \$350.00 each would give us our \$4,800.00 down payment with a buffer

of \$500.00 remaining for expenses. Three men took the responsibility of contacting each and every club member personally, and the results were encouraging — thirteen fellows agreed to go along with it! But two more were still needed before any action could be taken. Within a week, we had a former club member interested strictly because of the investment angle of the deal, and another member who had previously dropped out during the earlier financial hassle also thought this a good investment, and thus completed our fifteen required subscriptions. Each of the fifteen members received and agreed to the following program:

### 3 Year Program for Purchasing Field with Minimum of Fifteen Member Corporation

Description of Site: 112 acres of farmland approximately 7 miles southwest of Howell. Acreage is rolling with flat area suitable for development of flying area. Property includes 30' x 50' cement block barn, ideally suited to club house, worth approximately \$3,500.00. Electric lines are in with meter installed. Telephone service is available. Zoning has been checked by a real estate attorney, and no impediments exist.

Cost of site: \$16,800.00

Method of Purchase: Based on a minimum of fifteen members.

Down payment due July 18, 1963.

\$350.00 x 15 — \$5,250.00

\$4,800.00 down, \$300.00 costs.

\$200.00 Misc. Balance: \$12,000.00

1st Payment due July 18, 1964

\$300.00 x 15 — \$4,500.00

720.00 Interest

\$3,780.00 Principal

1st year balance: \$ 8,220.00

2nd Payment due July 18, 1965

\$300.00 x 15 — \$4,500.00

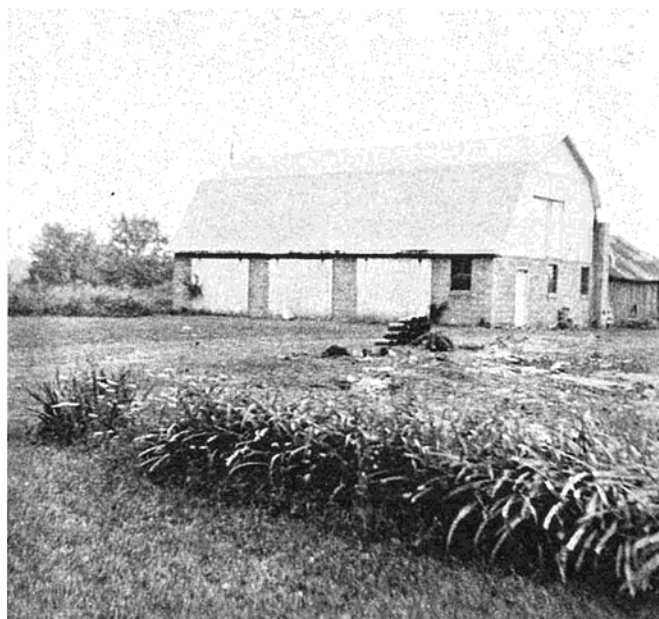
493.20 Interest

\$4,006.80 Principal

2nd year balance: \$ 4,213.00

3rd Payment due July 18, 1966

\$297.72 x 15 — \$4,465.78



Left: The barn in 1963. Above: The restoration complete, the barn becomes a clubhouse in 1966.

252.78 Interest

\$4,213.00 Principal

3rd year balance: 0.00

The next immediate step was to make an offer to purchase the property which in turn had to be accepted by the owner. Before any legal work could actually take place, the group of fifteen had to have a name and had to organize as a non-profit organization. Since the property was located on Dutcher Road, the name chosen was "Dutcher Associates Incorporated." The incorporation act, as well as all the legal ground work, was left in the hands of a **competent** real estate lawyer hired by the group. By the middle of July the transaction was completed. We now had the site — all that was needed was to prepare a landing strip.

One of the main reasons for choosing this field over several others offered to us was that it was not completely flat. This might seem incompatible with the basic idea of using the property for a flying field, but we wanted a spot that we could eventually make into a family recreation area. The land is rolling, yet the area chosen for the flying site was quite flat. But it was necessary to get a bulldozer crew to level a 400' x 400' spot near the top of a sloping piece of the property to put us far enough away from trees on all sides. Even at that, one cluster of six or seven trees had to come down so that approaches are clear in all directions. The one important consideration that remained was the preparation of the actual surface itself. Our previous field had been treated with many applications of oil which eventually gave us a good hard surface that was ideal for any type of ground maneuvering. On the other hand, it was extremely dirty, not only on the models, but on the fliers' clothes. Several of us had flown off grass fields belonging to

other clubs, and although it takes some getting used to after flying from a perfectly flat grassless strip, we decided to grass the Dutcher field as well. We were a bit appalled when we began to figure the price of grass seed and fertilizer for a 400' x 400' area — this amounts to almost 4 acres! Our first quote for seed and fertilizer was about \$600.00, but by a bit of judicious shopping, we were able to do it for \$304.00. Of this amount, \$178.00 was for 200 pounds of Kentucky blue grass and 200 pounds of creeping fescue. The remaining \$126.00 was for fertilizer. The fertilizer was spread by the local co-op for a very nominal fee, but the 400 pounds of grass seed was spread with a 24" Scotts seeder by the DAI members themselves. The total cost of putting in the flying field, including a road from the clubhouse to the landing area as well as several minor grading and filling jobs around the clubhouse was \$1,220.00. Of this amount, the Midwest Radio Control Society, Inc., paid approximately 2/3rds, as they would if they were leasing land from anyone. Dutcher Associates, Inc., paid the remainder which are regarded as property improvements.

All of the preceding article was written in August, 1963, with the intention of getting our message across to other clubs in the country facing the problem of getting a flying site. But then we thought it best to see what actually has happened to the "great venture!"

We're happy to say that the program was a complete success — the property was paid off in July, 1966! This is not to say we didn't have our share of problems during these past three years. One of our first calamities occurred upon the resignation of one of the original fifteen members just before the second payment was due. An emergency meeting of the

group was called, and we decided that instead of selling to a new fifteenth person — who at this time was pretty hard to come by — we would pick up this extra share ourselves, and so it meant a bit higher payment scheduled for the remainder of the three years. The second payment was made on schedule, and then reveling in our success, we decided to make an honest to goodness clubhouse out of the barn — and it was a barn — solid cement block structure, but no floor, or running water, and the rest of those unpleasant conveniences! A building committee was formed to get prices on concrete flooring, septic field, necessary plumbing, and interior remodeling. We would like to say that we intended to do the work ourselves, but this just wasn't possible as most of us worked six days a week, plus the added problem of transporting building materials from Detroit. It was unanimously decided to have the majority of the work done by local contractors, and what we were able to do ourselves, we would!

This clubhouse work proved to be about \$2,000.00, so an assessment was made of all now fourteen members, and they came through 100%! A concrete floor was poured in 1964, separate toilet facilities for men and women installed, and the 3 large sliding doors on the front of the building were removed and replaced by a double door and two windows. The pump on the 80 ft. deep well was replaced and supplies all our water needs. The best thing that came out of the clubhouse improvements was the change in attitude of the wives, who until this stage, were a bit reluctant to spend a Sunday at a flying field. Four picnic tables, three barbeque grills, lawn chairs, etc., were purchased and the clubhouse became a picnic area on weekends!

It was quite apparent by now that we



From a sheer investment standpoint, we do not think we could have done better! The original purchase price of the property in 1963 was \$150.00 an acre — and included the building! Today, the real estate company that handled the transaction says it is worth \$250.00 an acre — plus the building, which of course has been considerably improved. So, using round figures, we've escalated a \$20,000 investment into a potential \$33,000.00 over a three-year period. This undoubtedly would hold true anywhere land is purchased near an exploding metropolis.

The flying field is kept in tip-top shape with a Massey-Ferguson tractor purchased in 1965 by the field owners and a six-foot mower furnished by the club. With this rig, it's possible to mow the flying area in a couple of hours and the result is much as you would see on a well kept golf course. In addition, the tractor is used to keep the roads on the property in condition.

Our current project is the purchase of an additional 10 acres adjacent to our land which will in effect square off the property. A committee of private pilots within our group is investigating the possibility of putting in a landing strip for full size aircraft and to check further to see what federal help, if any, is available towards this end. Future plans will include the installation of a couple of control line circles and perhaps a simple go-cart track. There has been talk of a swimming pool, but since we have a nice sand-bottom pool only two miles away for our use, this hasn't been a big issue. There is still a lot of work before us, but enthusiasm is running high and within a few years, we hope to have made ourselves an area that may be a model for many others across the country!

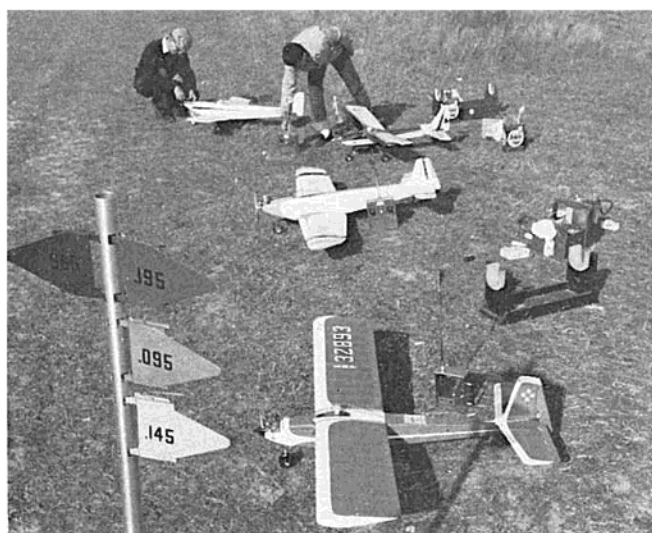
were still going to have to spend more money to continue our program, and since we were using less than 10% of our 112 acres, we began to wonder if it was feasible to share-crop a portion of the unused acreage to help the strained financial situation. Here's a classic example of how we actually lost \$650.00 our first season! We had talked of government subsidies and someone had volunteered to "check into it," but somehow never did, until after our first and only sharecropping experience! One of the local farmers agreed to put in a corn crop — he would do all the plowing, planting, harvesting, etc., and we would get 1/3 of the yield. Sounded great! Visions of acres of corn at \$2.00 a bushel were conjured up in our minds, and we could almost see a check for \$500-\$700 being handed to us at harvest time! We did not take into consideration the

fact that the farmer would break a leg and get the crop in late, nor did we have any idea a 2-month drought could make any difference. When we received our \$55.00 check that autumn, we thought it was still better than nothing — until a talk with the local U. S. Agriculture Dept. proved that we could have received \$750.00 in corn subsidies — had we applied for it! Needless to say, we put in our application for not only the corn program, but a wheat subsidy as well, and last year we realized \$948.00 from these subsidies which more than covered our taxes and insurance plus gave us a bit of reserve funds for future improvements. We've been told it may be necessary to farm a portion of the property in order to be able to qualify for future subsidy programs, but as yet, we've been unable to get anything definite on this.

View of flying site — 1966.



Frequency flags clip to Tx antenna.



# SUNDAY FLIER

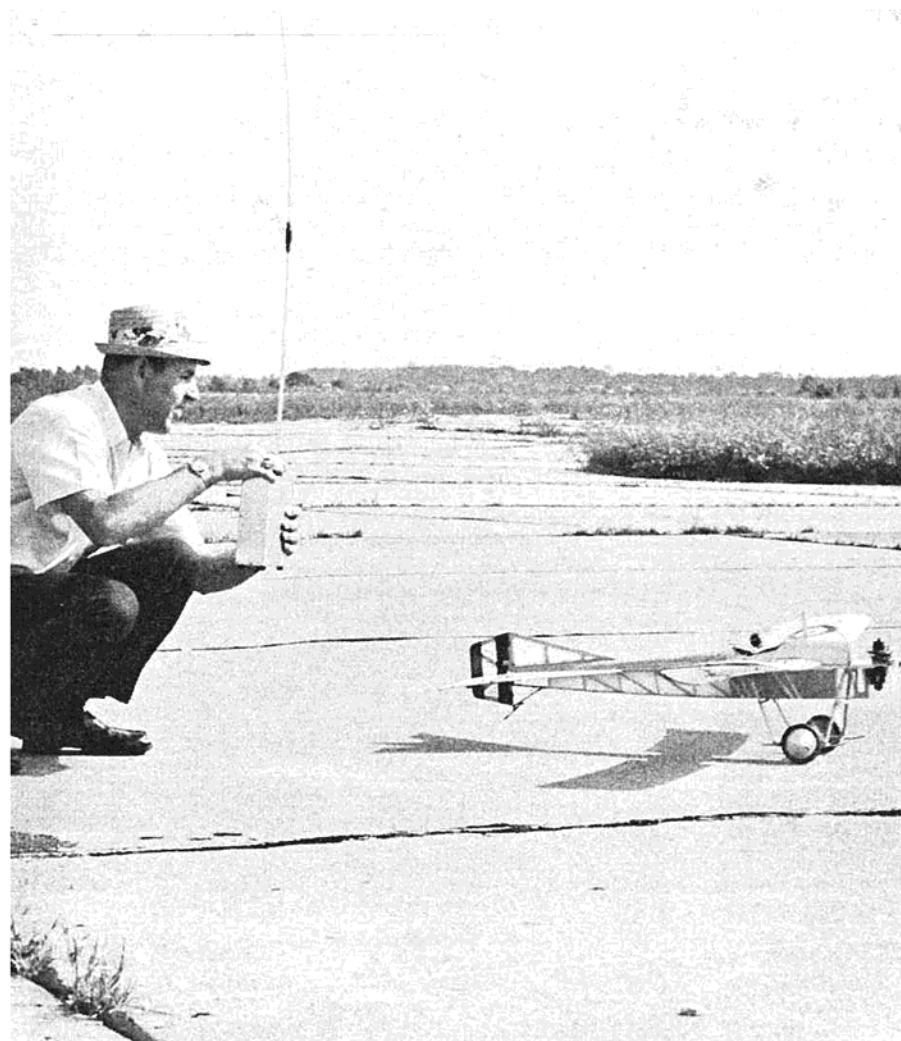
KEN WILLARD

## LETTERS.

Boy, do we get letters! And do we enjoy them? You bet your life we do. So keep them coming, and you'll get an answer eventually, either through the mail, if you enclose a stamped, self-addressed envelope, or in the column. Many of you have similar problems; those are the ones that we like to answer in the magazine, because there probably are others, who haven't written, but are bugged by similar circumstances.

Next month I'm going to tackle one of the most recurring questions I receive — "How does Galloping Ghost work?" This question has been asked hundreds of times — and answered by others, many times. I'm going to take a stab at it from the Sunday Flier viewpoint — no technical jargon. I'll just try to explain all that flopping, which is so confusing.

This month, though, I want to share some wonderfully nice letters with you. Especially a couple from the ladies.



Don Orr, Norfolk, Va., launches his 1912 Blackburn Monoplane as Ed Avera looks on. Galloping Ghost with Rand LR-3. U. S. Navy photo.

You know, they play a pretty important role in the life of an R/C modeler, so we should pay attention to them — maybe even more than we already do.

One of the contributions from the ladies came to me through that excellent club newsletter, the BLIP of the Radio Control League of Orange County — which, in turn, "stole" it from the Hawaii R/C Club newsletter.

Like the BLIP, we want to help out, so to give Mary Thorne some worldwide fame, it's a pleasure to receive her article from the Hawaii R/C Club:

**My Husband — The Modeler**

*My husband is a modeler and it has meant both fun and frustration.*

*He has "baked" his airplane in my oven, kept his paint in our refrigerator, soaked balsa in the tub, washed rubber bands in the sink, stolen — I mean, borrowed — measuring spoons, dessert cups, Saran wrap, and one pair of eight inch cake tins. (On that one, he said he took it because I had two that size and only one of all the rest!) He has put us in debt, robbed us of weekends, lost his temper, begun to mumble about "servos" in his sleep, littered our john with model magazines, used the dining room table to build on, made me sit in the back seat of the car so a fuselage could ride up front, and aggravated my allergy with glue, dope, and Hobby-Poxy.*

*A salesman at the door of our apartment in Maryland looked at the scene behind me and asked politely — "How old is your oldest?"*

*"23!" I snarled!*

*Thinking back over the past five years, I have scrounged up some parts of model aviation that I really like. The summers of 1961-65 we traveled all over the East Coast on weekends to model shows and contests. I saw a lot of countryside and got to eat out! We climaxed our excursions with a trip to the National contest last year. We even stayed in a motel. I especially liked the Blue Angels in the air show there.*

*Meeting other "model" wives has given me the chance to sound off to sympathetic ears. Modelers and their families generally are very nice people.*

*I do like learning about the hobby and helping whenever I can. The companionship we enjoy at those times I would not trade for anything.*

*Of course, I still don't know an elevator from an aileron, and I expect anytime now he'll trade me in on a new model, but until then I take comfort in knowing there are other wives putting up — as cheerfully as possible — with the same shenanigans.*

*— Mary Thorne*

Now all I've got to figure out is how I can get to Hawaii to thank Mary, and the club, for an excellent contribution to R/C modeling! (Editor's note: Forget it, Ken!)

And here's another — this time from down Georgia way. Mrs. Don Pruitt, of Warner Robins, writes:

Thanks to artist Bill Polvogt for creating the cartoon for the September issue of RCM — and thank you for putting it on the cover. My guess would be that there are quite a few modelers' wives just like this. Perhaps seeing this cover (if only when they get it out of the mail box) will shock them into taking a closer look at their attitude.

My husband got back into modeling after we married ("ukies" when he was a young boy) and I have had a nose and ten thumbs stuck in everything he's done. At first, I was all questions and pretty much a nuisance, I suspect. But now (after a year and almost 8 months) I can talk modeling and carry on with construction when a heavy overtime load at work cuts into the time it takes to "be ready for next weekend."

We started out with U-Control and I tried my hand at flying but I got dizzy and fell down. Being quite pregnant at the time, we thought it best to wait about my learning to fly! Then, by the time the baby came and got big enough to cart out to the field all day, Don got the R/C bug. Of course, it took him a few months of weekend flying to get enough confidence to teach me!

Then — hallelujah! We built an easy flying Class II ship, got Grandma to babysit and off we went for my first try at the controls! The first thing I wanted to do was a loop. Well, it looked more impressive than just flying straight (and I wanted to show off), and sounded easy enough — give it some motor and hole up — and you know, it worked! It might not have been exactly round but it was a loop, and oh, what fun! If any of the married modelers want to get their wives interested in the hobby, they should con the little lady into flying just one loop and I'll be willing to bet they have to fight to get the controls back!

Unfortunately, our day ended in disaster. We lost plane and radio when the elevator pushrod broke — just as I was pulling out of another loop. But Don convinced me it wasn't my fault and it would have happened if he had been flying. So, now, a month and a half later, I'm about to get over the shock and am itching to get out and try again.

I would like to see more wives interested in the hobby because I think women are naturals for building, once they understand what all the parts and pieces are for, and that they will all go together and end up as an airplane. We girls have smaller fingers to get in smaller places, you know — besides it's extremely relaxing to build models since you just have to get your mind off everything else to do a good job.

Anyway, what I started out to say several hundred words ago is — keep trying to get the ladies interested. Some-

thing this much fun shouldn't be monopolized by you men. And, incidentally, I think husbands would have a brand new twinkle in their eyes for a modeling helpmate.

Now I have to get busy on my Fokker Triplane I'm building to enter in the State Fair.

— Mrs. Donald E. Pruitt

All we can say to you, Mrs. Pruitt, and to you, Mary Thorne, and to thousands of others like you is — "We, here at R/C Modeler Magazine love you — and we're gonna' do something about it — soon!"

Now for a change of pace, here's a letter from, of all people, an airline pilot who's honest about his flying! Models, that is! You'll get a real charge out of his progression from "stupid control line pilot" to "idiot R/C novice!"

At the moment I find myself in somewhat of a quandary over several points which I've been seeing in my sleep the last few nights. One of these problems is who to get that can help me, and the other is that I've become, in about two weeks, a damned interested individual in model building and flying. I shall attempt to put you in the general picture and hope that someone from your magazine will be kind enough to drop a line my way with a few pearls of wisdom.

Firstly, a word about me, the human. I am a Canadian living in Switzerland and working as a pilot on the Caravelle for Swissair. No, I'm not a Captain — just a first officer. We do all the work and the captains make all the money. I have learned the hard way within the past weeks that, even though I'm a pilot, I am a stupid, ignorant fool when it comes to model airplanes in all shapes and forms! I have many hobbies, such as skin diving, sky diving, and photography, and if anyone had told me that I would ever get interested in model planes I would have said it was as possible as flying the Caravelle to the moon. However, I have two young children, always talking about planes, so one day a couple of weeks ago, I saw a Cox Super Cub with .049 engine completely assembled and ready to fly for not too large an investment. Ah! thought I, the kids will get a big kick out of this, and of course, I shall have absolutely no trouble in flying it. What a laugh! After a few attempts to show my kids how clever their Dad was, the Super Cub looked like something that had escaped from the Boer War. The second Super Cub, I must proudly say, showed my true abilities and I flew it quite a lot before it was completely ruined. Unfortunately, by this time the bug had started to nibble at my stupid hide, and it was no longer "for the kids."

My next purchase was a swept back pusher job which flew 95% of the time at the point of stall. I filled in the aft

section of the sweepback with cardboard and performance was somewhat improved. After that I got the bright idea to mount a second engine in tandem, and much to the amazement of all my neighbors, and myself, it flew reasonably well after the CG was changed slightly. These two models had been of the all-plastic type, ready-to-fly sort of thing. Now, deeply imbedded in my hide, the formidable bug made me buy a build-it-yourself kit of very amateur standing which my children were strictly forbidden to touch during construction.

All went well — it flew well — looked . . . well, not terribly well, but okay. During all this activity I was thinking about radio control and its wonders. Being more ignorant about this than even the control line stuff, I picked my first, and well worth it, copy of R/C Modeler to learn all about everything. So I read things like "proportional," "pulse," "reeds," "escapement," "servos," "four channel," "six channel," and hundreds of other little interesting things that I had not a clue as to their meaning.

Not giving up easily, I searched out some people that know a bit more than I do and at least got some basic info and now have an idea what a servo does and what proportional control is. (Might mention here that it would be worth some thought to put in a small section in your excellent magazine that might aid the true beginner and ignoramus like myself.)

It appears that this proportional thing is here to stay, but all your ads are in the \$400 plus range, which is slightly out of my present reach. However, one set caught my eye and I would be eternally grateful if you would provide me with more information, in layman's language please — remember, you're dealing with an idiot — on this system called the Galloping Ghost, which claims to be proportional with more than just rudder control and at a price I can meet. I feel that I want something with more than simply rudder control, preferably rudder, elevator, and throttle. In my opinion, it is a waste of money to get something which is not going to be sufficient for your needs after a month or so. I'm prepared to go up to roughly \$180, but the big thing is — is Galloping Ghost all it claims to be or would I be better off with something like a Matador and Midas and forget proportional?

I thank you in advance for your kind assistance to an idiot novice, and assure you that you've got one more reader in Europe.

— Ken Moreash

Take heart, Ken. We all went through it, one way or another. And, as I said earlier, we'll try to help you in figuring out Galloping Ghost.

Next month, for sure.

# CUNNINGHAM ON RC



**L**AST month we started to investigate the business of incidence and decalage, and how they were related to model aircraft design and performance. We put off this discussion until this month, as there was not enough room left to explore these subjects.

For our first investigation we will go into only the full house multi ship with a symmetrical, or semi-symmetrical airfoil. Class II ships also fall into this category, but we will not go into rudder only, or single channel aircraft until later.

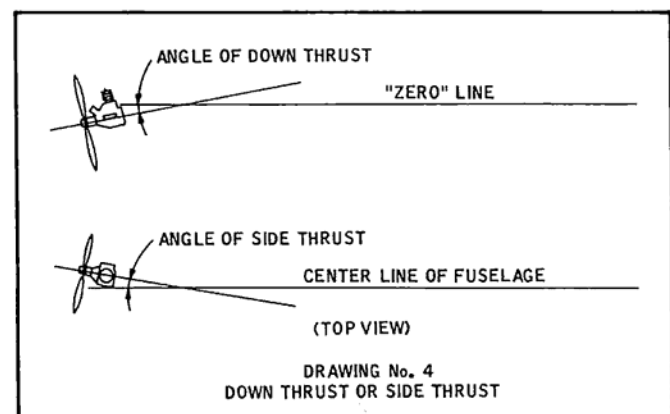
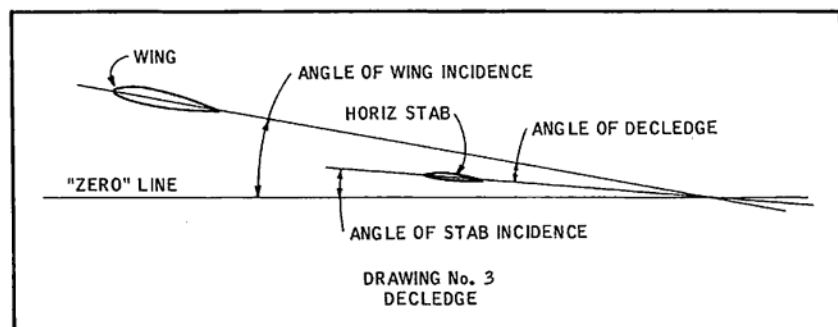
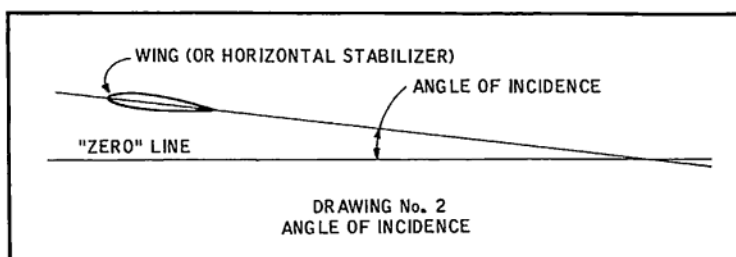
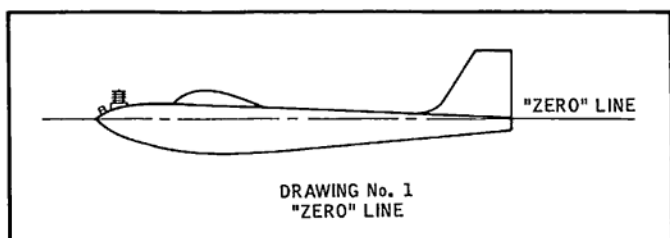
Figure 1 simply shows the line along the fuselage side that we will call the "zero" line. We will reference all of our other surfaces to this line. It is also called the "water line." This line is on each aircraft regardless of fuselage design. Don't worry just where it is, just accept the fact that it is there.

Figure 2 shows the angle of incidence of the wing, or of the horizontal stabilizer. This is the angle created between a line passing through the center of the wing airfoil or the tail airfoil. Generally speaking, for a full house multi ship (either reeds or proportional), this angle should be zero degrees, or at most, not more than two degrees. If we are designing an aircraft with some degree of "hands-off flying," then we want to use a little incidence to give the wing a chance to pull itself out of a dive, or to keep its nose up a little. Most multi ships will fly better with no incidence in either the wing, or the horizontal stab. Incidence in the horizontal stab is to be avoided like the plague. Think of stab incidence as simply one big trim tab and you will easily see just why the stab should be at zero. Positive incidence will give you the same effect as a down elevator trim and the reverse for negative incidence. (Positive is with the leading edge higher than the trailing edge.)

Figure 3 shows the angle of decalage. This is the angle formed between the zero line of the wing and the zero line of the horizontal stab. Again, for a full house multi, this angle is best if it is zero. In the past, most multi ships were designed with an angle of incidence for the wing of four degrees and a decalage angle of two degrees. The resultant ship usually had to fly with a large amount of downthrust to counteract the increased lift of the wing. There was a good reason for this, however, since the engines that we were using then were generally a .35 or the early .45's, and flying in ships of the size or larger than today's craft with .61 engines. These aircraft had to depend on the wing for much more lift than is needed with today's extra power. If you were to fly a ship with a large decalage and a large engine, the chances are that you would have to work overtime on the elevator trim levers to keep from either climbing



Joe Bridi with his Piper Twin Comanche, 2" = 1' scale. Weighs 13.5 pounds and is powered with two Merco .49's. Beautiful flying model. Photo by Claude McCullough.



too much, or diving too much, depending upon engine speed.

Figure 4 indicates downthrust and side thrust. We have briefly touched upon down thrust, and its use. It is generally used to overcome too much lift generated by the wing in a positive attitude. In our single channel discussion we will see just why this is needed to make a proper flying single channel ship. For multi work, stick with the experts; shoot for a zero setting of wing and tail and engine. You may have to vary this somewhat based upon total weight, etc., but you will have a much cleaner flying aircraft with zero settings.

So much for the description; now it is time to get into the trimming portion and to see how and why we have to vary these angles in some cases. Let us assume that you are ready to test your new creation and that we are going to try and trim it out for best results. Also, let us assume that your ship is of the simple type like an Instructor, a Falcon, or the Professor, and that you have built it exactly according to the plans. The first thing that we need to check is the balance. Does it balance where it should? Always balance with the fuel tank empty. Next, set the aircraft up on the dining room table and block up the fuselage until the chord line of the

wing is exactly level. Measure the leading and trailing edges with a ruler until you are satisfied that they are horizontal with the table top. Now, measure the leading and trailing edges of the elevator. If the ship is a zero zero ship (zero wing and zero stab), then this, too, will be even. If the wing has positive incidence then the leading edge of the stab will be down. Check the plans by drawing lines through the chords of the wing and stab to see what this design angle should be. Measure to see if you have built this correctly. If you have, then go on to the next step. If not, correct it before trying to fly. It is easy to get screwed up here, so take some time (remember, F.L.?). Next, check the thrust line of the engine, both down and side. Some down-thrust will not hurt, even if the plans did not call for it, but up thrust can be poison! Set it zero or down, as the plans show. Bundle up all of your goodies and head for the flying field for test flying.

Fire up the monster and let's get it airborne. Watch the climb out . . . is it climbing too steeply, does it turn to the left or the right? Is it diving? Watch out! Ok, back up. Did you set all of the control surfaces to neutral and then check out the trim to see if you had both and up and down trim setting? If you

did, then let's take apart the flight and see what things are happening, and why. Have a partner write down your impressions of the flight as you go along, such as climb in high engine and dive in low, right or left turn, and so on. It is amazing how many times, back on the ground, you will have forgotten which way the ship turned in the air and a log book will be an invaluable aid to getting at the heart of the problem.

Let's assume that the take-off was reasonably smooth, and that once in the air, the ship had a definite left turn and tended to climb out at neutral stick. With the engine on high the climbout was terrific, so you put in some down trim to counteract this. When you chopped throttle the ship suddenly dived toward the ground like a homesick rock. In addition, it was very erratic on elevator. Sounds like a bunch, so let's get the ship back on the ground and set about making corrections.

First, a climb in high engine and a dive in low after making trim setting to offset the climb is a good indication that you have an upthrust condition. Check the engine mounting and pack the bolts until you have a definite down thrust, say about two or three degrees. You can take it out later, if it is too much. If, on the other hand the ship dived on high engine, and after up-trim, it zoomed on low setting, then you had too much down thrust and the engine was holding the ship down. Think about the reaction of your ship to power and you will see what up or down thrust can do. Also, the ship went to the left on take-off. This could be caused either by side thrust, offset rudder, or out-of-trim ailerons. (Let's overlook warps and misalignment and assume that your building job was perfect!) Check the setting of the rudder and aileron and then make sure that you did not build any left thrust into the engine. Torque will take the aircraft to the left and a left thrust setting will only compound the torque situation. Either a zero setting or two to three degrees of right thrust is correct. With larger engines in sleek ships no side thrust is needed, but with smaller engines and bulky ships side thrust will definitely help overcome torque at low speeds. The next check to see just what might be causing a turn problem is to determine if it is caused by the rudder or the ailerons. The easiest way to tell this is to roll the ship upside down and check the turn. If it

turns in the same direction while on its back as it did upright, the turn is caused by the ailerons. If the turn is in the opposite direction, the rudder is the culprit and you can correct accordingly.

A tail heavy, or nose heavy ship, can cause many problems in trim, and at times are hard to spot. The best way to cure these problems is to never let them get started! Always check to see that your ship balances where it is supposed to. If it is a home design and you are worried about the balance point, balance at 35% of the wing area and you will be safe. (This is the point at which 35% of the wing area is ahead of this point and 65% aft of the point.) A too nose heavy condition will be evident in that it takes an excessive amount of up trim to keep the ship flying in either high or low throttle, and the reverse is true of the tail heavy condition—too much elevator down trim to keep the nose down.

If you didn't check for incidence, but pitched it anyhow, then you can tell by the flight characteristics just wherein the trouble lies. If you have a positive incidence problem then the ship will want to zoom out of a dive, or to zoom upon an application of high power from a cruise setting. Negative incidence will react just the opposite—it will tend to tuck under all of the time and you will have to fight a diving condition all through the flight.

Now, what if you have a ship with up thrust, it's tail heavy, the wing is at positive incidence, and you also have left thrust and a warped rudder. Well, if you get it back on the ground in one piece, then take the time to give it the once over, eliminate as many of the problems as you can by visual inspection, and then look into each of the others one at a time. All out-of-trim ships can be licked, provided you have enough flights before a crash.

Another very common problem is either too short an elevator horn, with too much elevator movement, or too much elevator area, and again too much movement. The most ideal situation is a long horn with a medium large elevator. This combination will give you a smoother flying ship than will one with a short horn and small area. In trimming out your ship, start out with a long horn and with the push rod at the outermost hole. Gradually work in until you have the best combination for your type of flying.

A good way to test for proper elevator setting is in inside and outside loops. The inside loop with full elevator deflection should be full and round and not too tight. If you have too much up elevator the loop will be too tight and the finish of the loop will be lopsided. Too much down elevator and you are liable to stall-out inverted, at the bottom of the loop and snap into a spin. Work on

getting the correct setting until your loops are the same size, upright and inverted. If you use a horn position too short, you will have too quick an elevator, and you will be forever overcontrolling your ship. This is very evident on landing approaches where it is hard to set up for a landing. Too quick an elevator will give you a fit on landing and cause you to balloon and possibly stall out and crash.

Before we get off of the subject of trim, it is a good idea to let your ship run out of fuel on an early test flight so that you can see if it reacts the same way with power off as it did with power on. This test will indicate very quickly if the trouble is in the engine or in the aircraft itself.

A few words on design. If you are going to design it yourself then you only have yourself to fall back on when making corrections to the finished product. Kits are another matter. Some are just right out of the box, while others leave a little to be desired.

One of the most common design faults is in the vertical stabilizer. If this is too small you will have trouble coming out of a spin, and if too large, the ship will have a Dutch Roll tendency (yawing from side to side in a high speed dive). Also, a too-small rudder will show up in slow speed handling as the ship will be slightly unstable.

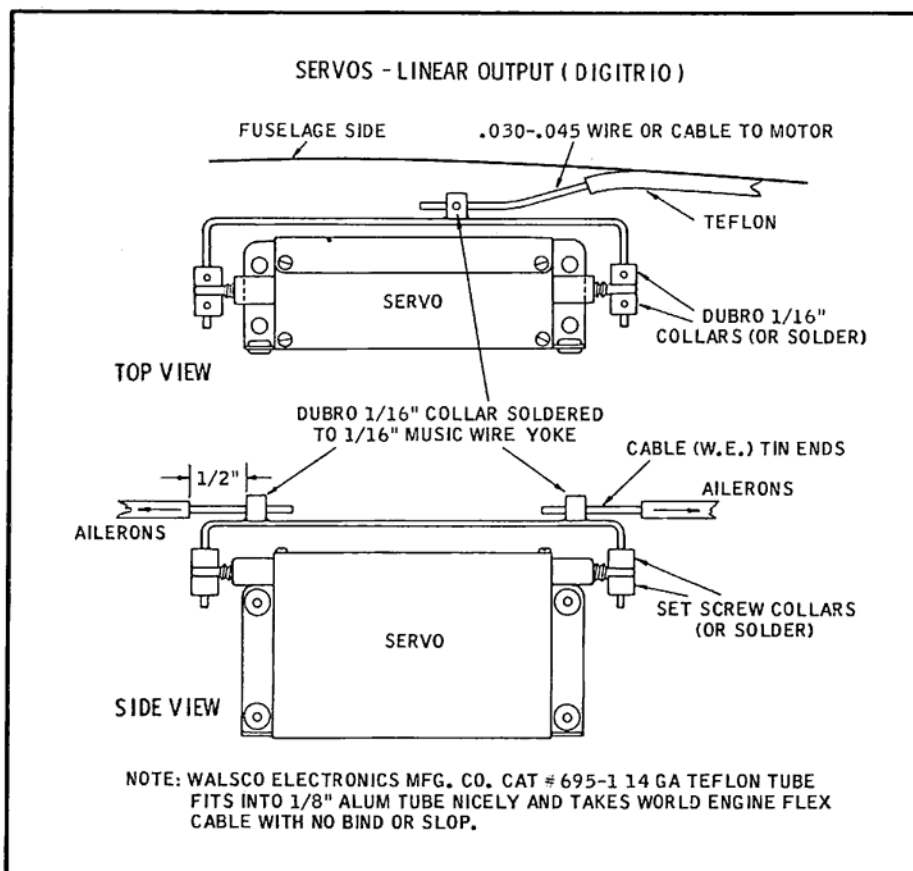
Another trim factor that we have

overlooked so far is in the position of the ailerons. If the ailerons are positioned exactly the same, then you should not have any turn problems, but are they drooped, or are both of them "up" somewhat? Drooped ailerons provide a little better lift as they are working as flaps, but do you want this? With the ailerons up you are dumping some lift and so getting less from your wing than you should. The best position for the ailerons is to be exactly a part of the wing—an extension of the airfoil.

The amount of aileron throw is another facet of trim. Some like a quick rolling ship while others like a more sedate roll rate. Set them for your method of flying. If in doubt, start slow and work up to fast roll rates.

We have only touched on the surface of trimming out a ship, but if you will think about each function in a logical manner you will see that everything responds to a given action. In trimming you only need to find out what the motivating force is and then to trim for it. After a little practice it will become second nature to take the bugs out in the first few flights and then to settle back to enjoy life for the rest of the time.

Next month we will take on the design requirements and trim settings of single channel ships, rudder-only crafts, and galloping ghost airplanes. 'Till then, have fun!



F. J. Charavay's excellent method for throttle linkage from your proportional servo.



JERRY KLEINBURG



Tadpole X — Phil Roy's outstanding Class I creation shows results of 7-year development.

with demonstrations of their pattern art which could spark a lot of interest. It's hoped members of the R/C industry will contribute in sponsoring the flyers and we take this opportunity to also ask Class I and II flyers and others interested to aid in this project and thus make it an overall enterprise. Doing so will help assure Class I and II remain dynamic and vital in R/C's competition picture.

When the discussion of broadening R/C FAI flying was broached here some time back, we were aware that FAI class F3C (Mono-controlled Aerobatics) was governed by a set of rules based upon needs of the mid-'50's. Since then, of course, American activity has evolved in extracting greater aerial performance from planes provided with only a minimum of control surfaces. This was brought about by providing for the fuller use of existing and available radio technology and equipment to refine the flying art in competition. This is a mighty important point since very often we tend to lose sight of what R/C competition is aimed at achieving — mastery of an aerial object in making it perform precise and pleasing maneuvers in order to demonstrate physical and coordinative skill as well as aerobatic artistry of the flyer controlling the object. . . .

AMA pattern classes — I, II, and III — require the skill demonstration on an incremental basis, that is, call for greater precision based upon the number of aerodynamic surfaces working upon the 3 basic control axis of the aircraft. Mechanical or electro-mechanical control devices — in light of broadly available and employed equipment — are not a primary competitive factor of the aerobatic skill demonstration. In the days when equipment was home built, equipment capability was an important element in the competition structure since mastery of radio gear and actuators was rare and therefore worth rewarding. For this reason equipment was defined in the rules so as to align various combinations for equitable comparison. Since then, competition has moved almost universally to "commercial" equipment and the focus of AMA rules has consequently moved to spotlighting the performer — a more logical position if a true "sport" classification of R/C competition is to be achieved. (Incidentally, the same factors hold true for "builder of the model rule" and helps explain pressures for its modification. However, the problem there is a little more complex in view of the close relationship of flying art to aircraft design and construction and also because "home building" is still widely practiced among active competitors and therefore remains as an important influencing factor in competition.)

(Continued on Page 44)

"**W**E are particularly interested in your official, unofficial, and personal thoughts as to what we (all clubs) should be trying to accomplish with our contests. I feel that if we could coordinate all this energy, the contest season, in terms of regional areas could have a unified pattern and purpose. Perhaps the idea of regional qualifying contests could gradually be reinforced until it becomes part of an official program. Questions have to be answered as to which club contests are to be so designated and how they might qualify for this honor."

This is a portion of a query sent John Worth, AMA Director, by Herb Abrams — the Rand actuator man — as he asked about possible avenues of progress for R/C competition programs. The letter went on:

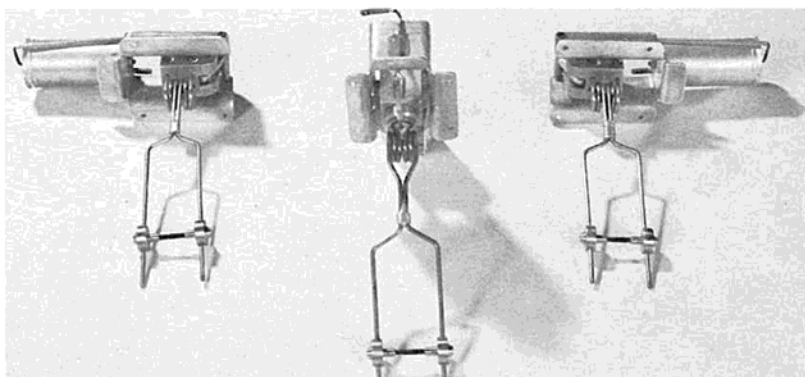
"The Detroit Radio Club is known for its members and contests and is anxious to be planning for next year. There has been considerable discussion pertaining to the need for our invitational contest late in the season. It is obvious we are groping for a purpose. I'm sure other clubs are doing the same. . . ."

Concern for R/C's future is well taken by Herb and the Detroit Club and it is shared by others who also see the need for a practical formula of action regarding contests. Since the sport is growing rapidly and has become a permanent and major part of the aeromodeling picture, the desire to bring increas-

ing "purpose and pattern" into the activity is natural and will become more vocal until the need is more fully satisfied. It is hoped AMA will recognize the need for study in this matter and will initiate action in tune with the desires of RC'ers. Herb would also like to hear from others on the subject of bringing about a series of nationally coordinated R/C contests and activities . . . 8909 Hubbell Ave., Detroit, Michigan, is his address.

#### FAI and CLASS I

Dale Willoughby, in his CHANNEL CHATTER (Dec. 1966 Flying Models), joins in stressing the value of Class I and II in international competition and suggests commercial sponsorship of Jackie Gardner and Bill Thomas (winners in I and II at the 1966 Nats) to send them to the 1969 Internats to compete. We heartily agree since it's always been contended here that a broadening of R/C interest is important for all phases of the sport and that the competence of Gardner and Thomas — as well as others — could be valuable in helping to achieve such a goal. For this reason it's strongly urged that the upcoming 1967 Internats be used as a springboard to a full-fledged competition by arranging to send the two to Corsica to provide first hand evidence of what the two classes are capable of doing as well as showing our own faith in promoting these other classes in competition. It's a sure bet that Gardner and Thomas could impress Europeans





Jon Board shows a belly view as well as the top of his daddy's Goldberg Skylane. Pair are from Houston, Texas.

## TOP OUT

(Continued from Page 43)

In any case, efforts in TOP OUT to stimulate international competition recognized as an important step modernization of FAI class F3C rules to reflect current conditions. Rules changing, however, must occur at an appropriate time, and efforts to do so may best proceed after adequate flying demonstration has created sufficient interest. This is why the present request for financial support is important if progress is to be started and realized in 1967 . . . so that a meaningful competition under revised

rules could occur in 1969. In Jackie Gardner and Bill Thomas we have two dedicated flyers who excel at their specialties and upon whom we may depend to "sell" Class I and II flying. This is the time for action — actually not much time does remain. Send no money now, but send your pledge right away. AMA will be asked to receive these special contributions once enough has been pledged to do the job. This is an important opportunity and a chance to broaden the horizons of R/C. Send pledges direct to me at 2512 W. Craig Pl., San Antonio, Texas. We'll report fully on results. . . .

### EQUIPMENT PROGRESS

**I**N looking over various areas comprising the planes and parts picture, it's not difficult to spot an area that's bound to come in for a healthy share of field experience and broader acceptance during 1967. We're referring to retracting landing gear, long on the verge and now, perhaps, arrived. RC'ers have been conservative with regard to yo-yo gears. Lightness vs. ruggedness, cost and dependability, complexity and maintenance, make up the elements flyers weigh when facing up to the question — to raise, or not to raise? Several retracting systems have come along in the past several years and while all have received respectful attention, widespread use has yet to happen. Latest entry — and a promising one at that — is Cletus Brow's honker from Hobbs, which Cletus calls the Brow Pneumatic. Here's the rundown on its long development based upon information forwarded by Cletus:

Development started in 1963 and progressed to installing a set in a modified Explorer which placed 5th in Class II in the 1964 Dallas Nats. Since then

development has focused on refining the design to produce a retracting gear simple and easy to install which would give consistent use with very little maintenance or upkeep. Latest use of the Brow Pneumatic at major contests saw 3 sets at the Chicago Nats and the FAI Finals in Ted White's EL GRINGO, Jack Butler's CRUSADER, and Cletus' SAVAGE. Ted has used the gear for two years, giving it a thorough test in that time and says the EL GRINGO flies a lot better with retracting gear. In comparing the Brow Pneumatic with the electric variety, Ted found the pneumatic more practical for the amount of use he gives his planes. No extra batteries were involved, the pneumatic was lighter, didn't affect engine run, and didn't cause any digital noise. Jack Butler, who has used the Brow gear during 1966, found they helped achieve "clean" maneuvers and provided "swell wing cutouts for a hand hold on the bottom of the ship."

Other flyers using retracting gear (Don Lowe and Zel Richie) stay with them for the improved aerial performance gained with a clean flying configuration. Ed Thompson and Bernie Murphy of RCM's staff are also satisfied Brow gear users having put a couple sets through their paces. Here's what Cletus has to say about operating and construction details:

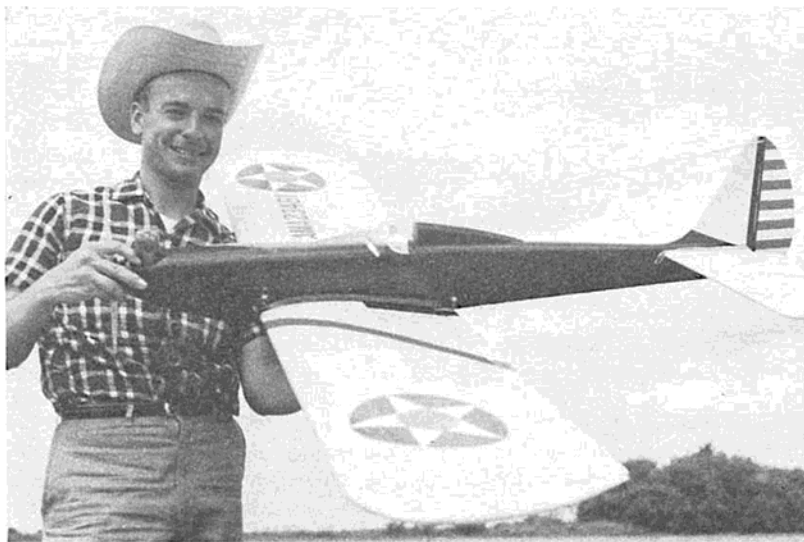
"I've heard a lot of talk about where to tap the engine for more pressure — some believe it's best to tap under the carburetor on the bottom of the case. The reason for this is to use the intake hole in the shaft to time the pressure and suction stroke. With the reed check valve furnished with this system it's not necessary to tap there. In fact, it's the worst place because a bottom tap pumps



Two 'down under' men compare notes. Cletus Brow (l.) gives Don (Phoenix) Lowe's original retracting gear design close scrutiny. Both are pioneering practical development of an effective yo-yo landing gear.



Corpus Christi Aviation Day salute had R/C demonstration by local flyers and San Antonio ARCS. C of C officials, M. D. Miller, Gene Davis, and Les Paulson (kneeling, l.) receive briefing from Ray Corder, CCRC, Harry Pullen, ARCS, and Ed Desha (kneeling, l.).



"Qualifier" — a Jerry Nelson design — is 3-year-old competition plane of Lt. Joe Gross, an outstanding flyer. Does very well on Veco .45 and Orbit propo.



Corpus Christi R/C club and planes took part in Salute To Aviation. Newly formed, club uses super regen equipment.

a lot of fuel in the system and is terribly messy besides wasting fuel. Most engines have a place already drilled for a pressure tap. They are all above the crankshaft and are OK. My engine didn't have this hole, so I took the back-plate off, drilled a #38 hole in the center, tapped a #5-40 thread in it to accept a #218 Perfect spray bar assembly. First though, the spray bar is cut in half, screwed into either half of the hole, tightened with a lock nut, and finished by filing the fitting smooth inside. This makes a very good pressure fitting arrangement on the few engines that aren't equipped to power pneumatic gears.

"The reed valve supplied with the gear is made out of a Cox #1035 Pee Wee .020 reed and a tank assembly. The bell is removed and the reed connected to a leadout eyelet soldered to a washer. All this is then assembled inside a short piece of 1/4 inch surgical tubing. The resulting one-way check valve is the best yet for timing pressure and it'll work no matter how fast — or slow — the engine's turning. Besides, it's very small in addition to being serviceable.

"The system works on 4 psi pressure to hold the wheels tight inside the airplane. Most engines have at least 5 and some as high as 9 pounds of crankcase pressure. Pressure over 4 psi is a safety factor to keep the wheels up during high G loads and maneuvers. The retraction cycle takes about 3 seconds to pick the wheels up and only one second to lower and lock! I've seen the time when this quick response was very handy — currently available electric actuated sets take a lot longer. Units are made of aluminum blocks, and frame, steel pins, and cylinders of steel and brass. Plungers are automobile wheel cylinders, oiled with silicon and require absolutely no maintenance. Wheel axles are adjust-

able for height and width. Axles and struts are locked in place with Allen screws and the whole system may be easily taken apart if necessary.

"I do a lot of flying and get around to as many meets as possible to try to wear a set out. My present set is over a year old and has survived a total crash of an El Gringo. It only took a new cylinder on the nose unit and the frame needed a little straightening to put it in first class shape again. This same gear was flown at the Chicago Nats as well as the demonstration flight at the FAI Finals in Oklahoma City. The gear may be folded up inside the plane for handling and transporting simply by pushing the lock and folding the wheels up out of the way. The whole gear system features 3 separate wheel units complete with all tubing, fittings, and instructions. Each unit is small in size (1 1/8 in. x 2 1/2 in.), and all components weigh less than 14 oz. which means only a net gain over conventional fixed gear of 6 to 8 ounces. Width and height of strut units are fully adjustable with push-pull steering per the usual method from inside the plane. Each unit fastens in with only 4 screws from the outside and they may be removed in about a minute each.

"I strive to give fast and good service. I hear very little comment — people don't often take time to tell you if things are working OK. William Jackson, a young fellow in California, recently did, however. He received a set on Saturday and before a week was up I received a letter saying he had flown them! I don't see how he installed the gear that quickly, but he said when he took off the first time and pushed the switch the wheels went up and he almost forgot to fly his airplane! About a month afterward he bought a second set. In all, I think I have a very good system — perhaps the best — and certainly the

most proven. At present there are more than 30 sets in operation around the world."

Cletus, who's found in Hobbs, New Mexico at 2022 N. Acoma St., sells his custom-made gear direct for only \$55 and provides complete operating poop together with wing cutout templates to speed the job of making a neat installation. It sounds like a good project for 1967 for aerobatic fans as well as scale buffs.

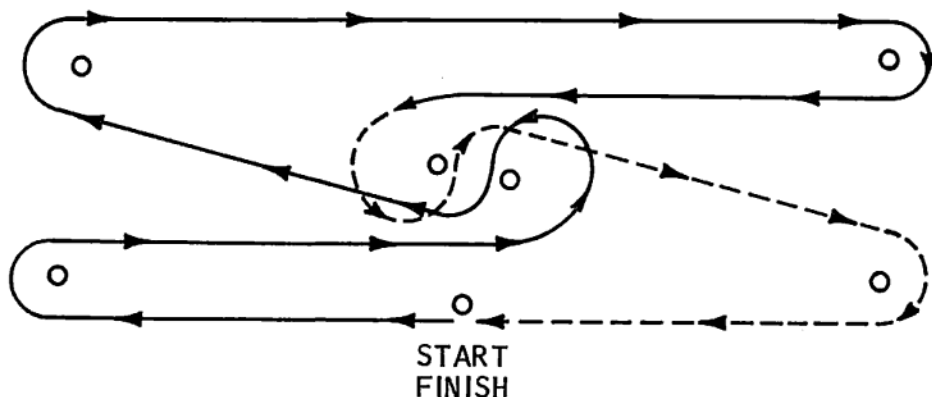
#### AROUND THE CIRCUIT

● The passing of Paul Runge's Grid Leaks is lamented by many who have been its staunch fans over the years. As a house organ for ACE RC, it did that job and then some, helping beginner and expert alike and covering the many-sided RC spectrum competently. Unexpired subscriptions are being filled with an equal number of American Modeler, which has given rise to a bit of pique, especially from AMA members who already receive the magazine. Despite this, many look for the return of Grid Leaks as ACE continues its growth and area of leadership in the RC industry.

● A note for Al Wiltz tells us Custom Products, whose Happy Wings are well known, has reorganized and is active again. Al, along with Johnny Agee have linked up with Bob Lien and Jim Kirkland in the New Orleans based enterprise which developed and marketed a number of RC specialties in addition to the popular foam wings.

● While in the New Orleans neighborhood, CCRCC's "The Flyaway" newsletter tells about Dan Gregory's new creation whose maiden flight report read, "Straight up, straight down!" Dan called it the "Blunderball," which figures. . . . On another note, it was Ben

(Continued on Page 46)



## TOP OUT

(Continued from Page 45)

Fernandez who won class I at the CCRCC annual fall meet using his McCoy 19 ship and carrying a Kraft S/C receiver. Ben and his brother are LSU undergrads who like 'experimenting' with escapements — between football games, that is.

- From the NJRCC "Printed Circuit" Bill Antione offers the following DIDJA-NO: "It's rather difficult to get much fuel into a tank when the fuel line's not connected . . . Also difficult to clean the resulting mess out of the radio compartment!"

"When a balsa surface is dented (prior to painting) a drop of water in the dent and heat from a soldering gun will cause the wood to expand and fill the blemish . . . If you hold the soldering iron there too long you are back where you started, only this time you'll need more water to put out the fire!"

- San Antonio's ARCS have a new slate of officers who have taken on the task of continuing the growing development of the club's activities. Capt. Rex O'Conner, the new president, fig-

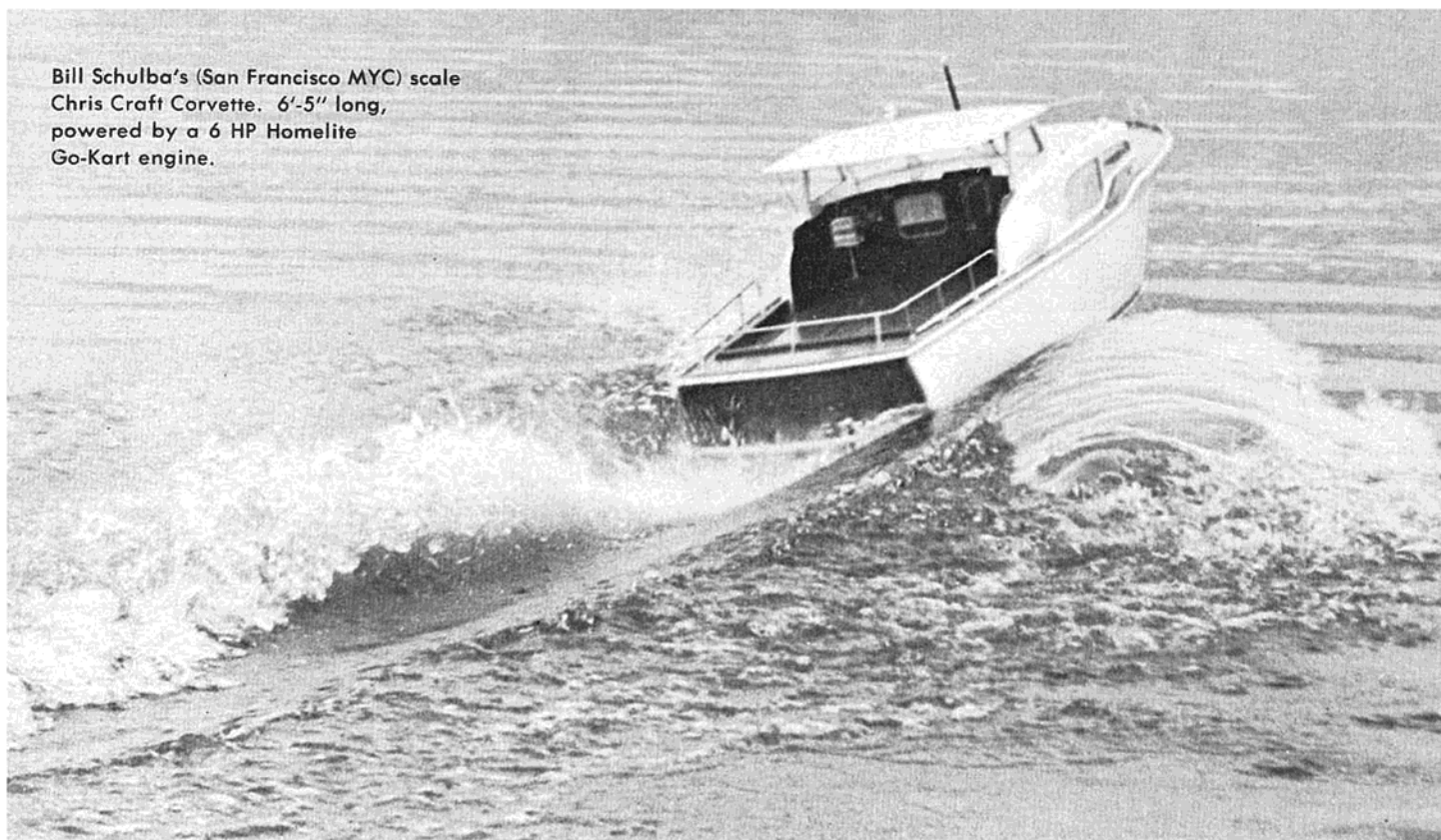
ures he's made a career of heading ARCS outfits, blanched when we mentioned the Pittsburgh and Amarillo clubs. It happens to be a popular set of initials among RC clubs and Rex is a popular and affable RCer — so it might happen, with an assist by the Air Force, who currently lets Rex fly its nice jets at Randolph AFB. Joining Rex are Jerry Jackson, Bill Hollenbach, and Don McClusky who fill the VP, sec'y, and treasurer posts respectively. Incidentally, the club's newsletter, the CON-DENCER, was recently launched with Bill Hollenbach as chief scribe. Latest club outing came in October when a helping hand was given the Corpus Christi RCers during their city's Salute To Aviation Day. Ray Corder's Corpus Christi group still operate a large number of super regen radios which were helpless against the 27.255 mHz transmissions the National Guard used for traffic and spectator control at International Airport, scene of the Aviation show. The ARCS, mainly using propo, had no trouble, with the PCS and Logic-control equipment giving a good account among the crowded radio airways. We predict an accelerated migration from super regen by the Corpus Christi group after witnessing what the latest propo gear can deliver. M. D. Miller, Gene Davis, and Les Paulson comprised the Aviation Committee of the Corpus Christi Chamber of Commerce who worked with Ray Corder to bring about the RC demonstration which attracted more attention than the full sized planes did. . . .

- As reported in the January FLIGHT LINE, Larry Leonard topped class III at the Las Vegas Annual contest, beating Ted White in the stiff breezes blowing through Railroad Pass. Larry also placed a respectable 8th in the FAI Finals, all of which indicates this young flyer (he runs a Northridge California hobby shop) has developed into a competitor deserving attention, like maybe a picture. Since El Supremo (modestly known as Fearless Leader) and Doug Tucker insist on trying to take pictures without film(?) we'll help out with one we managed at the FAI Finals last September.



Larry Leonard — 1st at Las Vegas, 8th in FAI Finals. Young talent. Kwik-Fli with Kraft propo and VECO 61.

Bill Schulba's (San Francisco MYC) scale  
Chris Craft Corvette. 6'-5" long,  
powered by a 6 HP Homelite  
Go-Kart engine.



# POWER & SAIL

BY JIM WHITLATCH, RCM BOATING EDITOR

**B**EFORE getting into the technical aspect of R/C boating, I would like to issue an appeal for help. Help, that is, for the many prospective R/C boaters who have been writing and asking where they can go to see boats actually being run; where to go to meet with an active R/C boat club; and who to write or call in order to get started in this phase of our hobby. If you will send the location of your lake, pond, or puddle; the day, or days, you run there; the meeting place and dates of club meetings, and if you want it published, the name or names of club officers, we will publish a list which I know will do a lot to bring more modelers into our hobby. We're counting on you to help out!

Here's a start: Los Angeles' site is Harbor Lake on Vermont Avenue, just south of Pacific Coast Highway. The Los Angeles City permit allows R/C boat operation to run from 9:00 A.M. to 1:00 P.M. on Sunday.

The Modelers Club of West Los Angeles meets the second Wednesday of each month at the Penmar Recreation Center Building, 1341 Lake Street, Venice, California.

We would like to publish a complete list of such information for all clubs in a forthcoming issue of RCM, so get your data in as quickly as possible.

News Flash! Fearless Leader is building a hydro! That's right, and you guys had better look out 'cause Dewey's making loud noises about beating our (censored) off! I've got a bet with him that he never gets it in the water. Have to give him credit, though — he dived in all the way! A big three point racing hydro with a Rossi .60. Don and his Assistant Editor, Doug Tucker, are showing signs of becoming more interested in R/C boating. Let's keep 'em that way! Send in articles, pictures, technical tips, and help encourage and enlarge the R/C boating coverage.

The last two R/C boat meets of the year, in California, were held in October and November at the home pond of the Blue Dolphins, Lake Woollomes, in Delano, California. The October meet was really a result of the Modelers Club problem with the weeds in the Legg Lake site normally used for their mid-

Summer get-together in July. Due to this factor, they had to postpone the Annual event and then move to the Delano facility. Thanks to the Blue Dolphins' hospitality and assistance, the meet was a tremendous success. The events included Open Speed Obstacle, where all engine classes and hull types compete against each other around a course of six buoys with both left and right hand turns. This is the most popular of all events on the West Coast, and is a test of speed, turning ability, reliability, and probably more than anything else, the skipper's skill! Accompanying this article is a diagram of a typical Speed Obstacle Course.

We have found that it is a great equalizer, since in many instances, a .29 or .40 powered boat beats the bigger .60 simply because it can turn more sharply, staying upright while maintaining a sharp left turn. The distance between buoys can be varied to suit the pond, with the long straightaway usually measuring 200 to 300 feet. The middle two buoys that "separate the men from the

(Continued on Page 48)

## POWER & SAIL

(Continued from Page 47)

boys" are ten to twelve feet apart. The Pirates of Los Angeles used a similar course with two laps required — the first starting from the right, which gave more right hand turns, while the second lap required starting from the left. Try it — it's a ball!

The other events at the Modeleers meet included Two Lap Speed with two engine classes of .00 to .40 and .41 and over (all hull types combined); a Beauty Event for boats which were able to record an official time in the Speed Obstacle Event (to prove they could run); a Gasoline Ignition Speed Obstacle for Cabin Cruisers (to give the scale boys a chance to compete against each other); and last, a Multi-Boat Racing Event with three engine classes — .00 to .20, .21 to .40, and .41 and over. These were run with a LeMans start — all boats on the beach, engines dead, then at the starting signal, all contestants start engines and launch as fast as possible. Another "equalizer" since many of the hottest boats with the hopped-up engines running a pressure fuel system take longer to start!

And now for a few pictures. The first is of the Modeleers Club banner at the Lake Woollomes Meet. Note all that "foot on the bench boat talkin'" going on — at least half the fun of model

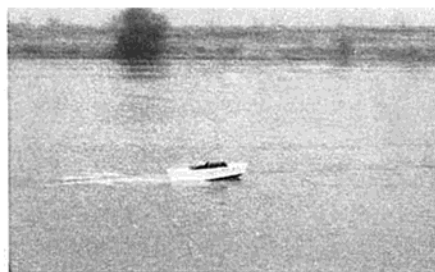


boating! One of the most active and successful competitors on the Coast is Frank Snowden of San Francisco. He runs fiberglass ski boats manufactured by Bara-Boats of Pacifica, California. "Bara" stands for Joe Barazoto of the San Francisco Club who is a real "old pro" of model boating. His kits are proven performers and easy to assemble as well. I'm building one of his .60 size craft called the Macko. Hope to have pictures as well as construction and running tips in next month's Power & Sail. Here's a pic of Frank Snowden (left)



and Joe Barazoto with their fiberglass ski boats. The big one is Rossi powered while the smaller SK-29, powered by a ST .29 holds the IMPBA record. Joe holds the "in between" size for .40's.

One of the hottest and, at the same time, most versatile small boats I've ever seen is the new kit by Norco, called the Avalon. Jim Gale of the Modeleers Club was first to run one, with Steve Muck getting the bug after seeing Jim's perform. Between them, they monopolized the small engine class in Gas Precision Steering and Speed Obstacle events, so Roger Norsikian of Norco decided to kit the model. It's a honey! Sharp, crisp hardwood with all parts sawed out. If you want a proven performer in the .19 class, get your order in — Roger can only make so many! This is Steve Muck's prototype Avalon at the Modeleers Meet, and of course, he took home trophies with it.



Getting back to the Modeleers meet, there were 110 entries by over 30 contestants. Here's how they came out:

### Open Speed Obstacle

Frank Snowden, 44.0 seconds, Rossi .60, fiberglass BaraBoat

Steve Muck, 47.0 seconds, Veco .61, original ski boat

Jack Brockman, 50.1 seconds, .60 powered SK-Daddle

### Two Lap Speed

(.00 to .40)

Jim Whitlatch, 35.3 seconds, S.T. .40, ski boat

Dick Norsikian, 41.1 seconds, S.T. .40, fiberglass original ski boat

Karl Offerman, 41.2 seconds, S.T. .40, ski boat

(.41 and over)

Frank Snowden, 35.1 seconds, Rossi .60, BaraBoat

Del Park, 36.5 seconds, Rossi .60, original Hydro "Cobra"

Jack Krohn, 39.1 seconds, McCoy .60, original ski boat

### Gasoline Ignition Speed Obstacle — Scale Cabin Cruisers

Tony Chiboucas, 111.2 seconds, Chris Craft with two cylinder engine

### Multi Boat Races — LeMans Start

(.00-.19)

Steve Muck; Jack Krohn

(.20-.40)

Steve Muck; Jim Whitlatch; Bob Foley

(.40-.60)

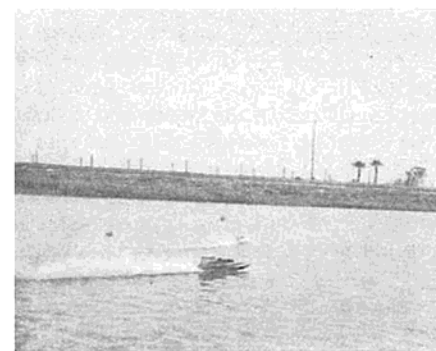
Frank Snowden; Jack Brockman; Steve Muck

The Western Associated Modelers (W.A.M.) Council of R/C Boat Clubs Annual Meet was held November 5-6 at Lake Woollomes, Delano — same ideal running conditions that the Modeleers enjoyed there in October. The Contest Director was George Robertson of the Santa Maria Thunderboats, and he's to be congratulated on an outstanding meet. On Saturday, the events were: Gas Precision, Open Speed Obstacle, and Three Lap Speed in two engine size classes. On Sunday, the Multi Boat Racing was divided into three engine size classes. Of course, one of the highlights of the annual Fall W.A.M. Council Contest is the Saturday evening get together, officer election, and rule changing session. To very briefly summarize the several hours of "friendly" discussion — Steve Muck was re-elected Commodore; Jim Henry, Vice Commodore; and Dick Carey, Purser. The Council also voted to make the engine size classes almost identical to the IMPBA. Now that the IMPBA has the same hull classes as W.A.M., namely hydro and monoplane, the two organizations are very close to uniformity — certainly a step in the right direction.

The trophies at the W.A.M. meet were of the practical variety — ashtrays and pen holders, thanks to Mrs. Dorraine Offerman of San Diego who made the wise selection.



One of the surprises of the meet was Steve Stevens' Sidewinder, all rigged up to turn corners! And turn it did! Steve took home two trophies with a hull that everyone thought would only set straightaway records — and he wasn't using his "record" prop, but an Octura X-55! This same prop has been working well on Del Park's new hydro. Also used by Tom Nicklin, the X-55 doesn't



seem to lift the tail as much while digging better in the corners.

The Winners Circle looked almost the same as it did a month previously at the Modelleers Meet. Here are the results of the W.A.M. Council Meet:

#### Open Speed Obstacle

Dick Norsikian; "Colonel" Jim Sorrell; Jack Brockman

#### Gas Precision Steering

Dick Norsikian; Steve Muck; Jim Gale

#### Three Lap Speed

(.00-.40)

Jim Whitlatch; Frank Snowden; Steve Muck

(.41 and over)

Jack Brockman, Frank Snowden; Lewis A. "Steve" Stevens

#### Multi Boat Racing

(.00-.20)

Jim Gale; Steve Muck; Jim Henry

(.21-.40)

Steve Muck; Jim Whitlatch; Bob Foley

(.41-.60)

Frank Snowden; Steve Stevens; Jack Brockman



The photograph of the winners shows, in the back row, L to R: Frank Snowden, Dick Norsikian, Steve Stevens, Jim Sorrell and Bob Foley. Kneeling, L to R: Jim Henry, Steve Muck, Jim Whitlatch, Jack Brockman, and Jim Gale.

Doug Tucker of "The Magazine" attended the meet and sat in at the evening meeting. And from all indications, the "bug" must of bit him!

Another announcement at the Council Meeting was a tentative list of California West Coast Boat Meets. If changes in dates, or additions should be made, we will list them as the months go by.

Gary Preusse of G.E.M. Models is sending RCM a Super Challenger with a hopped-up TAS engine. I'm anxious to show West Coasters how this rig runs. After being so impressed with them at the Wheeling Internat's, I've been trying to promote one for competing against the hot ski boats. We'll be reporting on this one.

We recently received a new K&B .40 rear rotor engine. An understatement would be — "very hot!" The prototypes won all the marbles in U-Control Rat Racing at the Model Airplane Nationals. It is a double ball bearing job with rugged crank and rod, aluminum piston with one ring hanging on the top corner of the piston. It looks like magic when

you look in the exhaust port, but the ring is "L" shaped so that it is held in by the lower horizontal edge sticking in a groove. There is very low tension in order to reduce friction. The airplane boys are also using this mill in Good-year Pylon and they do scream! I'm throttling with an exhaust baffle, but the standard K&B carb-throttle can be adapted into the rear case in lieu of the racing stack supplied with the mill. Tom Perzentka of Octura Models has made available a beautiful collet-flywheel-universal set-up for the K&B's. They have always been a problem since the crank was only a 1/4" stub sticking out the front. Tom's new collet deal is just like the excellent ones he makes for the 3/8" Rossi stub shaft.

A note from Gary Preusse of G.E.M. informs us that popular interest has created a demand for a scaled down Thunderbolt I. I haven't seen the .19-.29 version yet, but if it's as good a machine as its big brother, it will be a winner!

I mentioned earlier that I was working on a fiberglass Bara-Boat kit. It is beautiful! Complete with bottom and top hull fused together, our version has a "built-in" green metal flake paint job. The latter is down in the glass, too, not just laid on top to get scratched off. We're setting this project up as a construction article for you, including how to mount a Veco .61, Rossi .61, and also a twin Rossi that Steve Stevens is building up for this job. The latter is definitely a "different" mill — two big Rossi's sit side by side and are geared to a ball bearing jack shaft with a 20% over-drive. Alternate firing, of course.

For some time now, I've been wondering why my little ski boat noses down so bad when it turns sharply left. The torque reaction should twist it so that the right side of the boat goes down, but this isn't what's happening. When it flips, it's because the nose has dropped, or been pushed down, and then the left hand chine seems to catch. The prop then comes out of the water and it does what might be described as a "flat spin."

Anyway, I suddenly remembered back to school days and the basic laws of physics. I looked up gyroscopic action and re-action and there was the answer! If you have an encyclopedia or physics handbook, look it up. What it all boils down to is that we're turning the shaft, or pivot point, of a gyro. And when you turn the shaft of a counter-clockwise rotating gyro to the left, you achieve a resultant force, or "couple," which pushes the front down and lifts the rear. When you turn right, the "couple" works to raise the front and push down the rear. And now that you know what causes it, Whitlatch, what

are you gonna' do about it? H-m-m-m... well my twin-geared-together-Rossi's turn clockwise, while the jack shaft, gear, flywheel, prop shaft and prop all turn counter clockwise, so they will balance each other out and I won't get this "couple" effect. Ain't that neat?

In fact, if my usual luck runs true to form, it will probably cancel out it's ability to turn at all! We'll see.

Saturday, November 19, 1966 — Tie sail-off racing was held at Puddingstone Reservoir by Fleet #1 (Los Angeles area) under Regatta One-Design R/C Model Yacht Association rulings. Sailing was conducted over a triangular course in very light, spotty winds. In addition to resolving existing ties established during the past racing season, other skippers present were able to engage in sailing competition.

The pair of previous major regatta ties that were broken resulted in a first and second place by Charles Donnelly and REGATTA One-Design model yacht manufacturer, Matt Jacobson, respectively. An alert 12-year-old racing skipper of real sailboats, James Scott, Jr., of Los Angeles won out in the existing tie for first place with Charles Donnelly, established in the Regatta One-Design competition during September, 1966. Young Scott's near-flawless sailing on that date effectively put down a number of other adult skippers including his father. His own brand new REGATTA One-Design yacht carried latest Dynafail servos and a "full" system allowing individual sheeting control of jib and mainsail. Rudder was a self-neutralizing Royal MKSN.

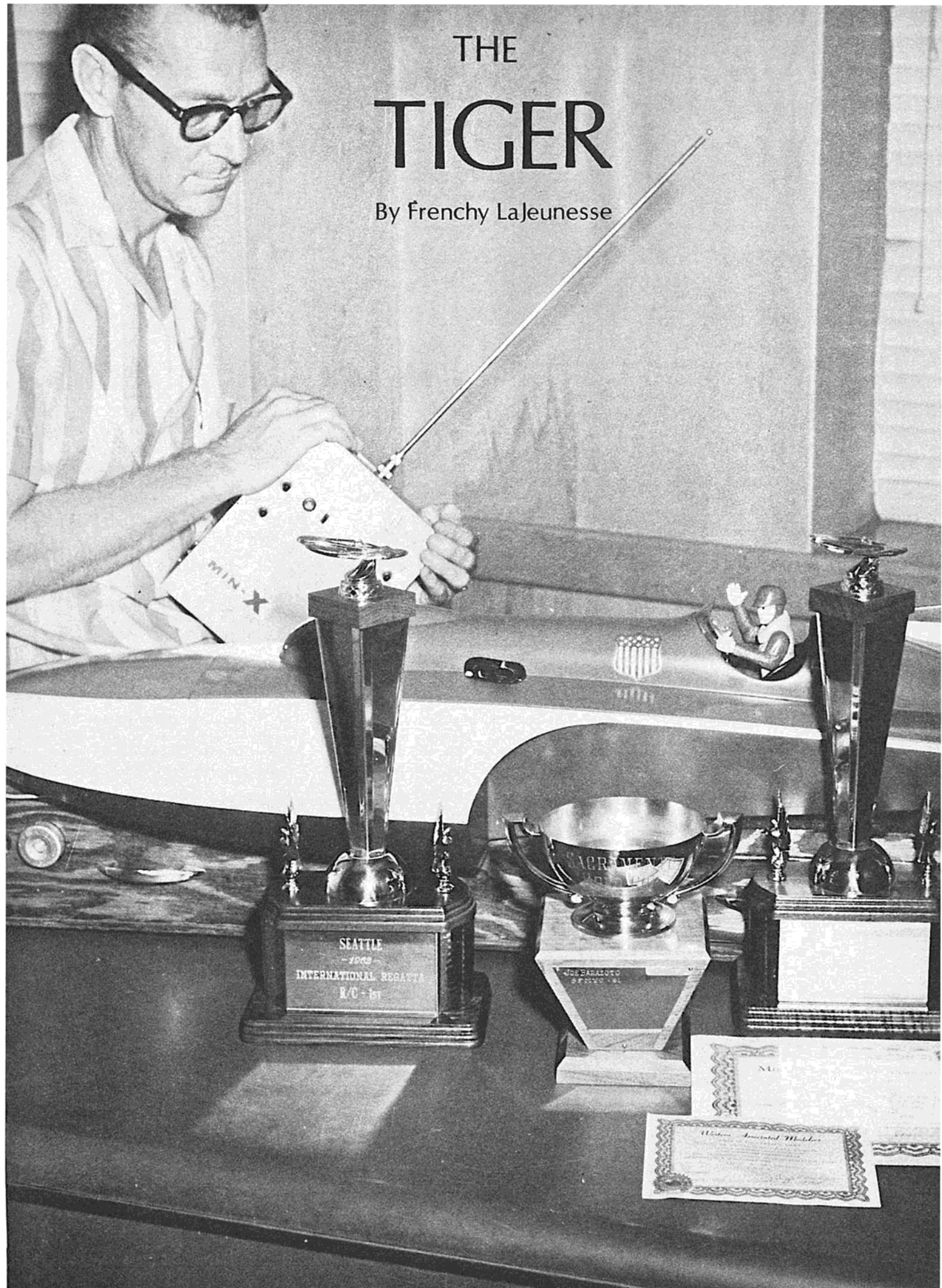
During the day's informal racing, RCM's own special project man, Bill O'Brien, sailed another new REGATTA One-Design yacht with a Dynafail sheeting system to a first place 10-point tie with the seasoned Donnelly and his slick REGATTA #16.

The Regatta One-Design R/C Model Yacht Association is presently working out continuing activities for the 1967 season and preparing a working set of racing rules, class information, etc., on the REGATTA One-Design model R/C yacht. Other clubs in R/C sailing may obtain a complimentary copy of same by writing to the Association, c/o Mr. Gordon Wallace, 901 Amherst Drive, Burbank, California 91504.

We'll close Power & Sail by thanking you "too few" letter writers and contributors for your support, suggestions, and criticisms. Drop us a note, photos of your projects, hints and kinks, and construction articles to: Power & Sail, R/C Modeler Magazine, P. O. Box 487, Sierra Madre, California 91024.

# THE TIGER

By Frenchy Lajeunesse





*"... Designed for Both Oval and Straigtaway Competition, the Tiger Will Give You the Same Action As the Big Unlimited Hydros — Planing, Prop-riding, Roostertail Walking."*

**I**F it's a tiger you want, just build this hydro and it will give you all the action you can handle! The Tiger will more than justify your efforts in the construction of this high performance competition machine. It is designed for both oval and straightaway competition racing, and to accommodate .60-.65 engines, the keynote being rugged construction with no sacrifice in performance. The Tiger will give you the same action as the big Unlimited hydros — planing, prop-riding, roostertail walking, etc. — yet the stability of the model allows it to be run full-bore in waves up to 6" high. As to scale, these 6" waves would be equal to approximately  $4\frac{1}{2}$  foot waves to the big hydros — a condition that would prove impossible for them.

The Tiger has become one of the most exciting of all model boats to date. Proven unsurpassed in construction and all-around performance in one year of racing, this hydro was the former straightaway speed holder of an IMPBA record 34.5 MPH and WAM 36.5. It won both IMPBA and WAM oval races. Also to its credit is the miniature Gold Cup Trophy which it captured by winning all three heats with three first places. During its year of competition it was also the winner of the overall high point perpetual trophy for that year.

Until a few months ago, the Tiger was shelved due to a lack of an adequate proportional system which would allow it to be run safely in confined areas. The speeds attainable with this hydro far exceeded the amount of control available with conventional RC reed equipment. In fact, its potential speed limit has never been reached. Now, with the advent of all the new proportional systems commercially available, and especially since there is a very fine digital system in kit form, namely the RCM Digitrio, this tiger can be released from its cage and tamed for the ring of racing.

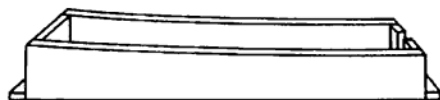
Another advantage of the design is

that you don't have to be a master machinist with a fully equipped shop in order to build this hydro. All of the hardware is commercially available. Octura Models can supply all of the hardware, plus a wide selection of props in plastic, aluminum, brass and stainless steel. By using one of the new proportional systems coupled with one of the new .60 to .65 mills developing 1.3 to 2.0 H.P. at 16,000 to 20,000 RPMS, you can be literally off and running!

So there you are — there's no excuse now, with all this going for you. Get with it, and you, too, can have a real tiger by the tail — one of the most complete high performance hydros in existence today!

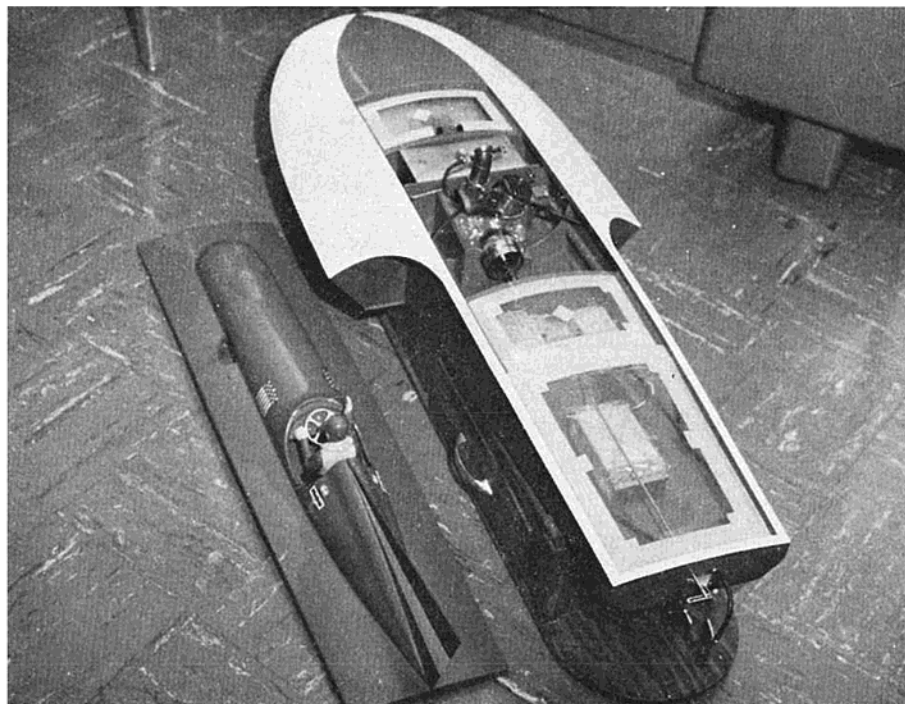
#### Construction

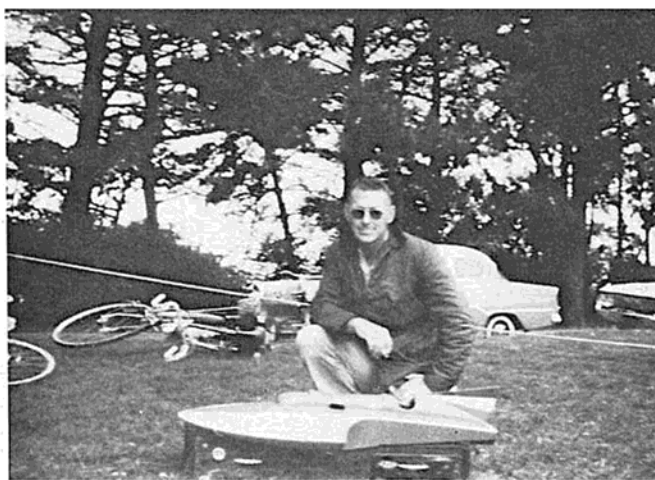
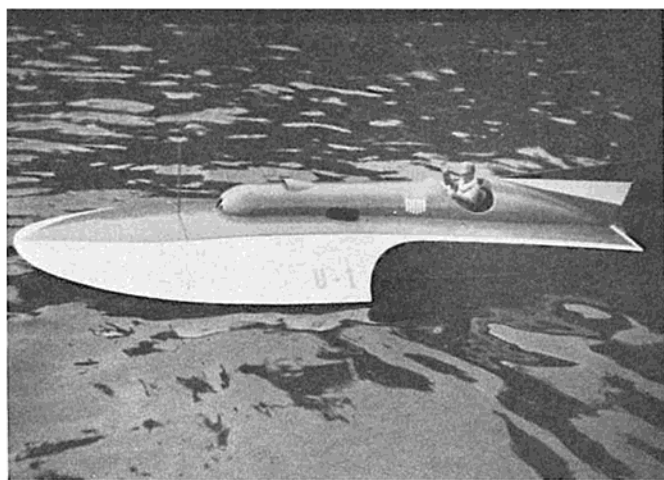
1) Make construction jig per sketch. This will become your boat stand after completing construction of hull. Take two pieces of pine  $\frac{3}{4}$ " x 6" x 48" and trace out the curvature of the bottom of hull, and with inside of



sponsons, allowing for thickness of hull sides.

- 2) Trace out the half rib frames on paper (templates-patterns). Fold on center line and cut. This will give you an equal rib template both left and right of CL.
- 3) Lay out all patterns; bottom, side, and rib frames, transom, fin, trip chime, etc. Arrange patterns so that all parts can be cut from the three pieces of  $\frac{3}{32}$ " birch plywood. **Note:** Do not cut away heavily marked lines. Leave these lines so that each part may be shaped and mated precisely.
- 4) With care, cut out hatch frames #4, 5, 6, and 7 from the top of rib frames #4, 5, 6, and 7 by using a razor saw.
- 5) Do not cut out hatch frames from





#3 and #8 rib frames as the dotted lines on rib frames are used as a location where the #9 and #10 hatch frames are located when hatch is in place.

- 6) Trace and cut outside hull frames, leaving heavily marked lines intact.
- 7) Pre-assemble all parts in their respective positions. Rib frames and hull side.
- 8) Tap or tack  $\frac{3}{32}$ " bottom to jig. (Note: Titebond glue is recommended.)

**Step #9** Glue  $\frac{1}{4}$ " x 1" maple Keelson into position, using #4 to #8 rib frames to center Keelson.

**Step #10** Glue  $\frac{1}{4}$ " x  $\frac{1}{4}$ " spruce running spars to edge, top of, bottom.

**Step #11** Slide preassembled hull frame down around the bottom and check fit. If all line up, glue and tack hull side frame to the side of jig in position.

**Step #12** Glue rib frames to bottom and hull sides.

**Step #13** Glue  $\frac{1}{4}$ " x  $\frac{1}{4}$ " spruce running spars to top of side frames and rib frames.

**Step #14** Cut balsa blocks to fit into bow and sponson tip as indicated in plans, and glue. Shape balsa blocks to contour of hull and sponson tips. These blocks are very important, they give added glueing area for the planking.

**Step #15** Shape and sand stringers to frames.

**Step #16** Plank sides of sponson.

**Step #17** Plank bottom of sponson.

**Step #18** Plank trip chimes. **Note:** Re-glue all joints.

**Step #19** Using liquid styrofoam, fill all sponson and bow compartments between #1 and #2 rib frames, and #2 and #3 frames. Liquid styrofoam gives added glueing area for planking, strength, and water tight compartments also. **Note:** Important, follow the styrofoam temperature instruction closely so that you will get the proper density (expansion).

**Step #20** Cut maple engine mounts beavies  $\frac{3}{4}$ " x  $2\frac{1}{4}$ " x  $3\frac{3}{4}$ " and drill holes for mounting Octura's aluminum engine mount.

**Step #21** Drill and tape Octura engine

mount for your engine.

**Step #22** Assemble mount bearers to Octura engine mount using Octura's "T" large blind nuts, glue and screw to engine mount frame 4-A.

**Step #23** Glue in engine mount. Assemble to hull also using screws through bottom and rib frames. Make glue fillets around. Mount bearers.

**Step #24** Glue hatch cover together.

**Step #25** Plank top of hull and hatch cover with  $\frac{1}{8}$ " x 6" x 48". Soak planking in hot water for the double contour bending. Soak till pliable, then pin, clamp down with tape or rubber bands till dry and curve is set in the balsa.

**Step #26** Re-glue all joints again in hull and hatch.

**Step #27** Glue all pre-formed planking to its formed position. Leave excess planking extend  $\frac{1}{2}$ " overlay; pin, tape or rubber band down.

**Step #28** Trim and sand off all excess edges, ends of planking, using sanding block; leaving all sharp edges . . . sharp! Bottom hull, sponsons and transom, especially surface that is in contact with the water.

**Step #29** Re-plank (laminating) transom with  $\frac{3}{32}$ " plywood, covering all exposed ends of planking.

**Step #30** Carve engine cowl and cockpit cowl sections as one piece. Slot groove for fin  $\frac{3}{32}$ " plywood. Shape bottom of cowl to top of hatch cover. Drill air scoop hole.

**Step #31** Sand and fill hull, hatch and cowl for preparation for fiberglassing.

**Step #32** Fiberglass hull, hatch and cowl separately, using 2 oz. fiberglass cloth.

**Step #33** Sand hatch cover and cowl.

**Step #34** Glue cowl to hatch cover and make fillet between cowl and hatch.

**Step #35** Prepare all surfaces for painting, filling and sanding.

**Step #36** Wipe all surfaces down with a lint free rag, using acetone.

**Step #37** Paint with 'Copon.' A resin paint is highly recommended as it does not require a prime coat. And is fuel proof and extremely thorough. Hobby poxy may also be used. **Note:** Pad top

of boat stand with felt.

**Step #38** Locate and drill hole for drive shaft and stuffing box.

**Step #39** Install engine into mount.

**Step #40** Assemble complete drive unit from engine to prop, through hull bottom.

**Step #41** Check alignment and strut location. At this point make certain that stuffing box is free and clear of hole through bottom (not touching). You will also notice at this point that the strut does not fit flush with bottom of hull. This is natural, as this strut is at 10° and the drive shaft angle for this model is 8°. Naturally it is desirable if you could make a custom strut to the correct angle.

**Step #42** Now, with hydro hull upside down, bottom up and full complete drive unit assembled to engine, apply excessive amount of resin or epoxy glue to bottom of strut plate. Position strut in its location letting strut plate settle naturally — seeking its correct alignment corresponding to engine.

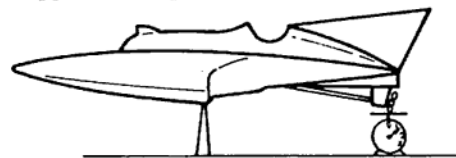
**Step #43** After epoxy has set, drill strut plate holes, bolt and nut securely, and glue.

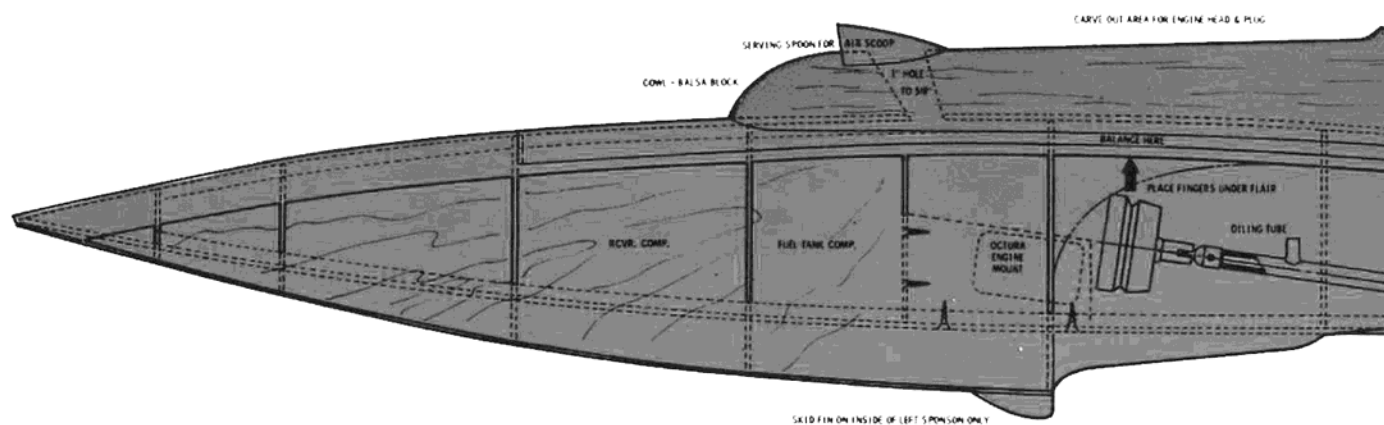
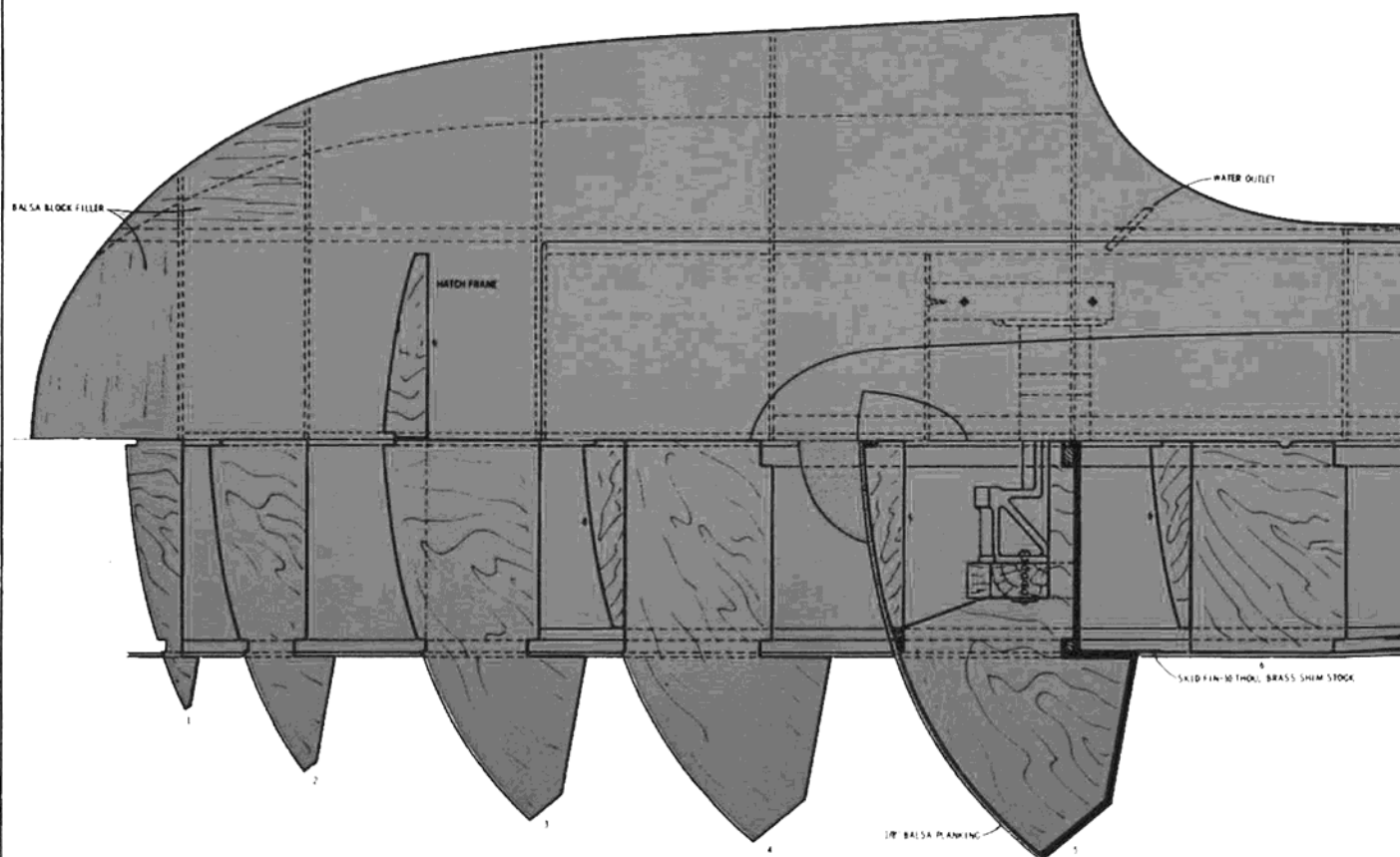
**Step #44** Now epoxy in stuffing box.

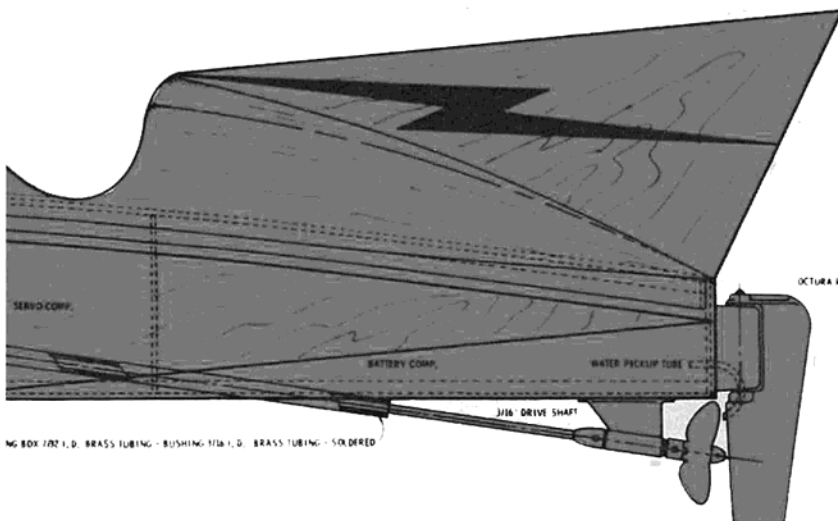
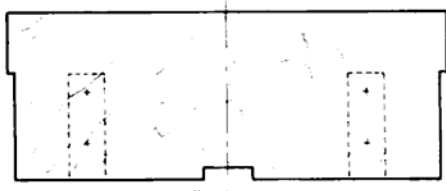
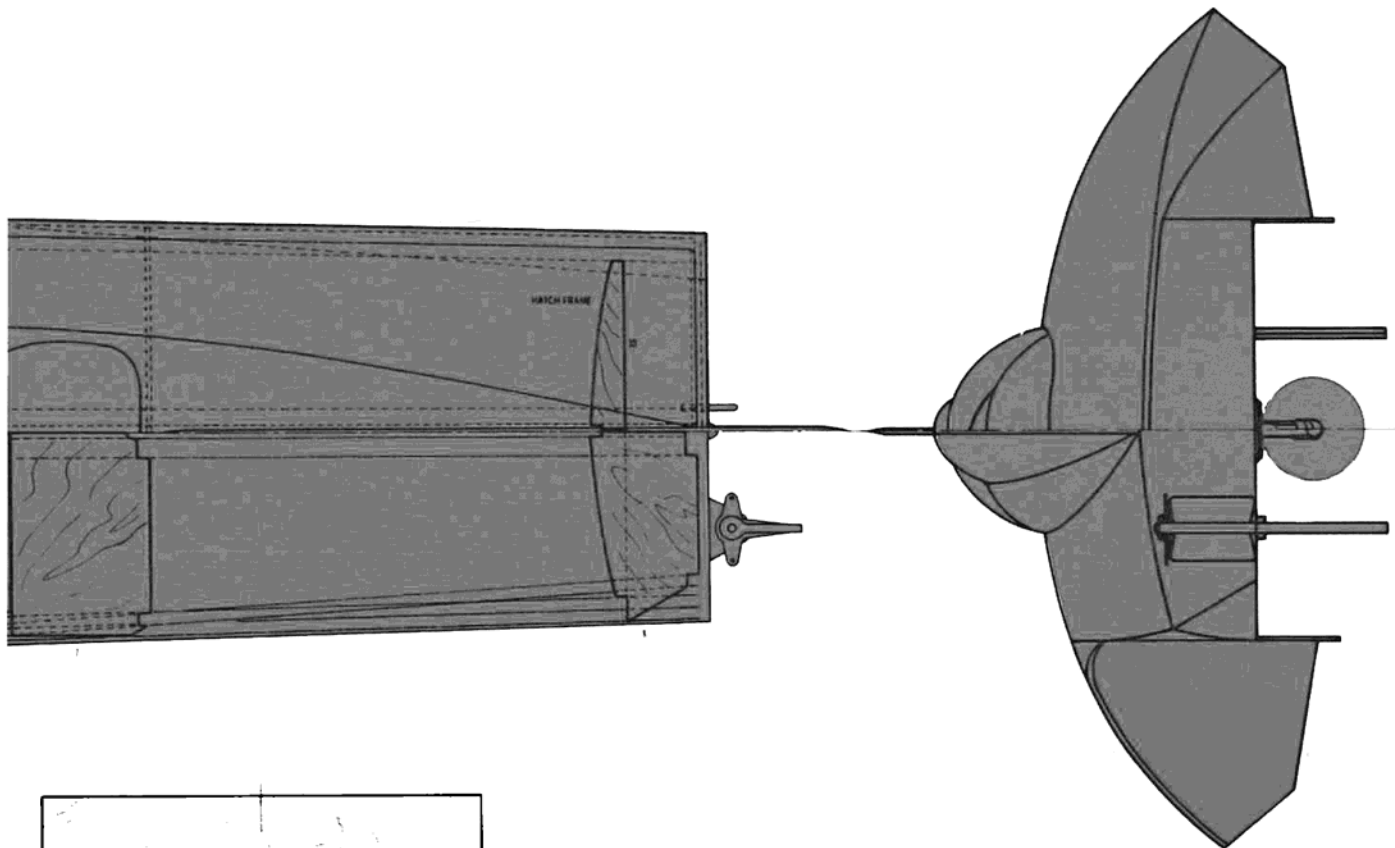
**Step #45** Install rudder assembly to transom and water pick-up. Note location on plans. Rudder position optional, can be offset 2" from left of C/L.

**Step #46** Cut skid fin from 10" brass shim stock and attach to left inside sponson only with contact glue, "Goo."

**Step #47** Install R/C System. Note it is very desirable to make a water tight compartment in hull or a water proof box to house complete system. Always put your receiver in a heavy plastic bag. Surround the receiver with sponge rubber and another plastic bag. **Note:** Weight on prop while installing R/C gear should be approximately 1 1/4 lbs. supported at sponson heel, "pivot."



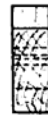




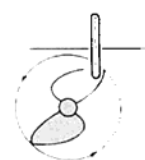
NG BOX 1/2\"/>



ENGINE MOUNT BEARING



OCTURA RUDDER ASSEM. 2002



WATER PICK-UP - RELATION TO PROP

<b>Radio</b> <b>C</b>		<b>modeler</b> <b>MAGAZINE</b>		<b>TIGER HYDRO</b>	
DESIGNED & DRAWN BY	FRENCHY LA JEUNESSE	INKED BY	MIKE CROWLEY		

# KITS & PIECES

BERNIE MURPHY



Bob Saltsman with his beautiful Grumman Gulfhawk. Proof positive that some do build from RCM plans. Incidentally, this is Bob's first ship in 10 years!

**I**N the last issue, we raced the clock through the construction of Vic's Custom Models' 78" Great Lakes. The construction proved to be so quick and simple that we decided to look at still another of their kits.

This time we have selected a kit more suited to the "average" flyer — the 67" Convertible Trainer. This ship sports one of the most easily constructed airframes that we have had the pleasure of building. The entire wing is built from a total of forty-three parts (twenty-five of which are ribs) and can be assembled in less than two hours! (One hour, if you are fast!) Construction is begun by pinning down one of the trailing edges and gluing a rib into each end. The leading edge is glued to these two ribs, and then the remaining ten ribs are cemented into place. Slide in the two pine spars and glue where they pass through each rib. Add the wing tip block, and one panel is completed. Quick? You bet! The other panel is built the same way, and of course, is just as quick. Remember — one left and one right!

The fuselage is equally as quick and simple. The wing saddle doublers are first glued to each side. Then the engine bulkhead, the rear bulkhead, and the tail block are glued to one side. Half inch corner triangles are glued into place and the other side added. The forward section top and bottom are added (flat  $\frac{1}{4}$ " sheet) and, when dry, the tail end is pulled together and glued. One-eighth

inch sheeting on the rear top and bottom, and the fuselage construction is finished!

The stab is built-up of leading and trailing edges with  $\frac{1}{4}$ " x  $\frac{3}{8}$ " ribs glued up on a flat surface.

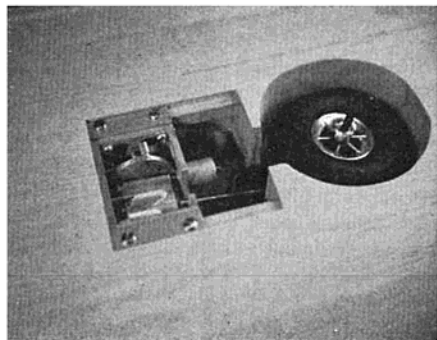
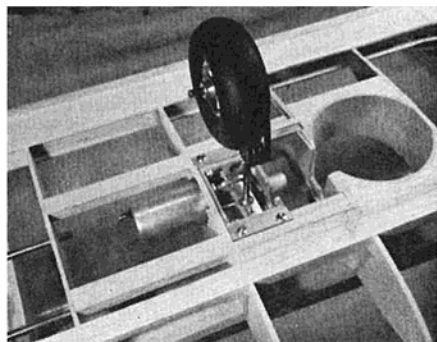
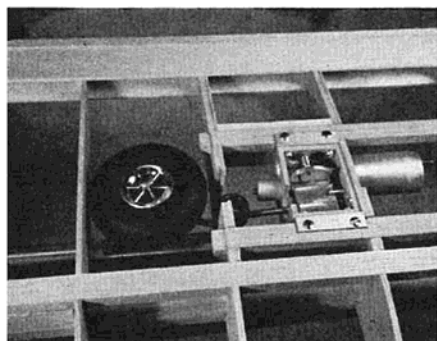
With enough working space, and an ample supply of pins, the entire basic construction can be completed in one evening. This leaves only the joining of the wing halves and wing center section planking, plus final sanding, for the next session. The entire airframe was completed in less time than has been spent on some of the "ready-to-fly" varieties! A radial engine mount has been shown on the plans, and the Super Tigre tank mount is ideal, since it takes care of mounting the engine, the tank, and the nose gear, if desired.

The Convertible Trainer kit is a Class II ship (rudder, elevator & motor); however the wing trailing edge is designed to accept strip ailerons with no alteration. The gear mounting plate is large enough to allow placement of the landing gear for either conventional or tricycle configuration. With a .29 to .35 engine, the Trainer is just that! With the addition of ailerons and a larger (.45-.60) power plant, it becomes a good sport-competition machine. Convertible? And how!

The Convertible Trainer is available from Vic's Custom Models, 618 Cowpath Road, Lansdale, Pennsylvania, for \$19.95.

As usual, we are running behind schedule, and have not completed the Elnic retractable landing gear installation and flight tests. We had intended to rip out the wing of an old ship and install the new landing gear system. After a thorough check of the retracting mechanism, which included putting the gears through many, many operation cycles without failure, we decided to build a new ship in which to install them. Thus, we are behind schedule.

A new VK Cherokee has been started, and to date, the wing has been completed with the Elnic pneumatic gear installed. For simplicity, the rail mounting was chosen. Modifications to the Cherokee wing consisted of cutouts for the mounting rails, the addition of plywood rib doublers, and the building of wells into which the wheels fold. The photographs show how this installation and its modifications were accomplished. Hopefully, the ship will be finished be-



fore the next issue rolls around.

The Elnic gear, itself, has passed every test that we have been able to think up. Perfect cycling without a failure, either to retract or extend and lock. Shock tests in all directions caused no damage. The only tests left will determine whether there could be electrical noise transferred to the radio gear, and what, if any, effect the pressure take-off will have on the engine. The noise factor appears unlikely, since most surfaces are isolated. During testing, some stiffening of the piston seal was evident below 25 degrees F, causing a pressure leak. The leak appeared to be sufficient to cause engine failure. Upon returning to warmer temperatures, normal operation resumed. The manufacturer is attempting to remedy this situation, but from our viewpoint, if you must fly below 25 degrees — don't retract your wheels!

The primary drawback with motor driven systems heretofore available has been the possibility of getting the wheels out of synchronization, thus being unable to retract or extend all of the wheels at the same time. With the pneumatic system, synchronization ceases to be a

problem, since all wheels retract at the same time from engine crankcase pressure. Any loss of pressure, intentional or otherwise, releases the gears, and they extend and lock. A big plus!

The Elnic retractable system is available direct from Elnic Precision Products, P. O. Box 4294, San Fernando, California, at a cost of \$73 per set of three.

Here's one for the "how-to" department from our mailbag:

"Dear Bernie:—

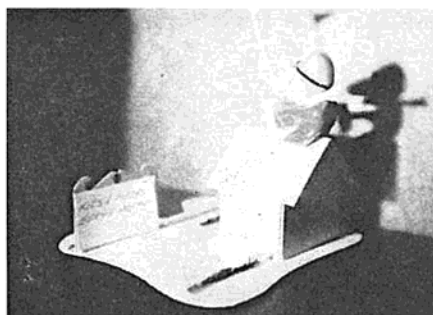
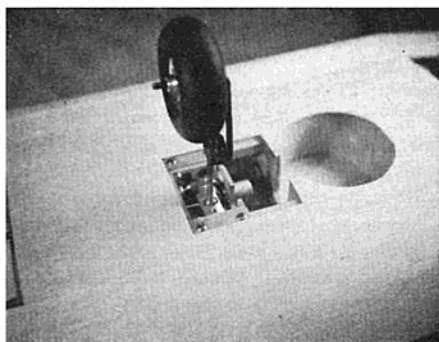
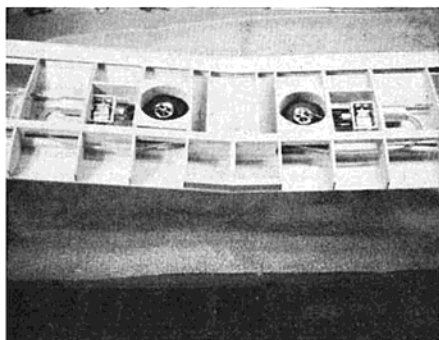
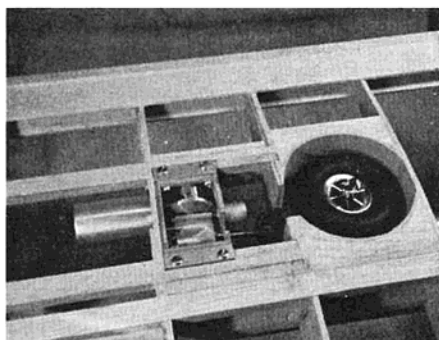
"Could not help but notice your article in the December '66 Kits & Pieces in regards to finishing. This method has worked well for me for years — almost step by step — including the thinned dope bit.

"I have always found steel wool aggravating to work with and have found a good substitute. It is called Scotch Brite clean up pad, manufactured by the 3M Company. Scotch Brite is made of nylon, is easier, safer, and does a better job than steel wool. Available in most hardware stores, a pad about 6" x 9" costs around 50c. Cut into quarters, a pad will do a couple of good sized airplanes. Scotch Brite comes in

was new to us, so we tried it. Wunderbar! After years of picking steel wool splinters from our fingers! The stuff is great! What makes it worse, my wife has been using it in the kitchen for years (ever since she got a piece in a box of soap powder). (Editor's note: That's also where she found Bernie — a soap premium.)

From Charles Rector of Fredericksburg, Va., comes another method of terminating standard cable. He suggests threading  $\frac{3}{32}$ " brass tubing using a 3-48 die. The cable is simply inserted into a short piece and soldered. Threading of the tubing is simplified by inserting a piece of  $\frac{1}{16}$ " tubing and tack soldering to lend support. An entire length of tubing can be threaded, and short pieces cut as needed.

For axles on aluminum landing gears, Charles uses 10 penny nails. The nail is threaded with an 8-32 die to a point where a nut will bottom on the threads and allow just enough clearance between it and the nail head (which makes a neat hub) for the wheel. The end is inserted through the gear and another nut locked on. An excellent suggestion, and stronger than most 8-32 screws!

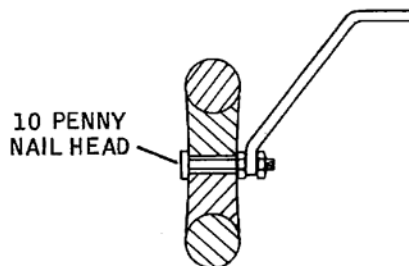


three colors, designating grits — grey is fine, red is medium, and green is coarse. The red is best for all-around use, especially open areas. It can be rinsed clean and used over and over, leaving no splinters or slivers, just a nice satin finish.

"Another note — one may go just a few simple steps beyond your 'Sunday Flier' finish and put it into the Super Duper Class. After the pigmented dope has dried, a few light spray coats of clear are added, then rubbed down with rubbing compound. Let cure a few days and give it a good wax job."

Norman McCormack  
Hillcroft Drive  
Boston, N. Y.

Norm's suggestions are both excellent! The idea on finishing is the same one we use, but had cut a little short in order to keep within the realm of a "good" finish. When you start rubbing, little imperfections that would otherwise go unnoticed can become quite noticeable. A good finish cannot hide poor workmanship, and the better the finish, the more prominent the flaws! The Scotch Brite



By the way — for you newer modelers: the simplest way to cut thin-walled brass tubing, such as we use for modeling, is to roll the tubing under a #11 X-Acto blade, exerting slight pressure to score. The tubing can then be broken cleanly at the scored mark.

Some months ago, we suggested the use of fiberglass tubing for pushrods. These were generally available only as fiberglass arrow shafts. We have received samples of fiberglass tubing from Crawford Products, 65 Maplewood Drive, San Rafael, California, sold as R/C pushrods, and retailing at 65c each. They are 31" long. The fact that the rods, wrapped only in paper, managed to cross the country via the U. S. Mail without damage, is surely a tribute to their strength! In all, eleven sizes are available, ranging from .25 to .35 inches, outside diameter. In addition to using them as pushrods, these fiberglass tubes are also excellent for wing dowels and torque rods. How about scale exhaust stacks? These should be appearing at the local shops shortly, or may be ordered direct with an additional 25c for handling.

Color fast and washable sew-on club patches are available from Emblems, Inc., 12505 Feldon Street, Silver Spring, Maryland 20906. These are excellent quality embroidered patches, custom made in the colors of your club emblem. Sizes available range from 3 to 9 inches. Prices vary, depending on size, number



of colors, and quantity, and may be obtained by submitting a color drawing of your club emblem. Delivery time is approximately 30 days. No charge for quotes.

Nemo Hobby Distributors, 4720 Peck Road, El Monte, California, has come up with a Kwik Fly fuselage by Hamilton Enterprises, called a Ply Fly. The entire outer fuselage shell, excepting the bottom surface, is drawn and formed from a single sheet of  $\frac{1}{32}$ " plywood. Formers, doublers, where required, wing saddle, and even nose wheel mounts are completely installed. Even the throttle and nose gear pushrod tubes are installed. A superb piece of workmanship. The Ply Fly is available, less canopy, for \$21.95. Also available MonoKoted with canopy at \$24.95. These should also be arriving at your dealers, if not already in stock.

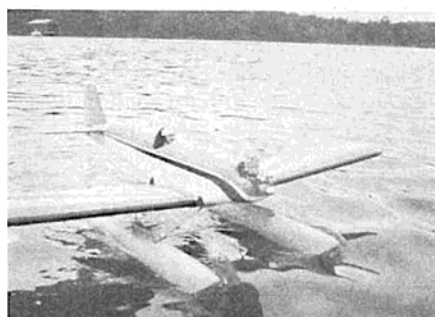
Don't forget the Toledo Conference, February 25th and 26th, at the Lucas County Recreation Hall, Maumee, Ohio. We'd like to see you there. Contact the Weak Signals Club, P. O. Box 5772, Station Wernert, Toledo, Ohio, for more information.

Our masthead photo is of our place card for our club banquet. An avid member, Joe Davis, made not one, but twenty odd models of Snoopy and his doghouse, one for each couple attending.

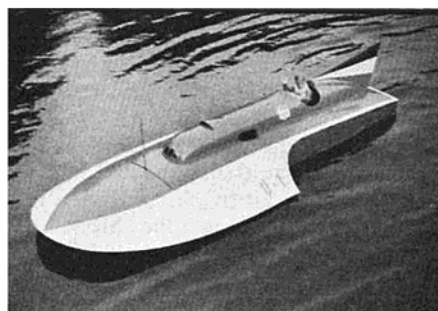


## Stardust is coming

Since El Supremo has recently required a Top Security Clearance for entrance into RCM's new suite of editorial offices, and absolutely forbidden any photos to be taken inside that sanctuary of the oracle, Don Rivera has captured the picture in pen and ink. We are printing same for your enlightenment!



Charles Donnelly (l), winner, and runner-up Matt Jacobson in REGATTA One-Design yacht competition.



## TIGER

(Continued from Page 52)

**Step #48** Now complete all loose ends, install tank, push rods, hatch locks, (keys), exhaust stack, etc. A large serving spoon makes an air-scoop. **Note:** A whip antenna is highly recommended. **Step #49** When your hydro is completed, lubricate stuffing box, strut, etc. **Note:** always balance your props. For an out of balance prop can cause havoc with your R/C system. Vibration effect in Rec. components, reed, relays, servo's plug, switches, battery connections, wiring, etc. Check all battery under load, trans, rec. Servo's. As to R/C manufacturer instructions, follow to the letter. Range check, etc. Now it's time for a shake-down run. Start engine with leather thong. At low & medium throttle. While engine is running, check to see if water is circulating through. Turn on receiver, open up throttle to Hi, to Lo noting that **NO** vibration is affecting R/C system. Check rudder control.

**Step #50** A brass prop, approximately 2" dia. x 2" pitch with large blade area is recommended to start with. A brass prop allows you to trim down the diameter and to re-pitch easily. Match your prop to your engine to allow full torque H.P. and R.P.M.'s. **Note:** Always make it a habit to check rudder control before releasing boat. At low throttle release this Tiger. Get fully acquainted with your hydro before letting it out at "full bore." Always keep in mind to use low throttle if you get confused, or if unexpected trouble arises.

### Step #51 GO!

#### MATERIAL LIST

##### Sig-Birch Plywood

3 pieces  $\frac{3}{32}$ " x 12" x 48"; Hull-sides, Rib-frames, Fin, Trip-chime, Transom

##### Sig-Balsa

4 pieces  $\frac{1}{8}$ " x 5" x 48"; Planking, Hull-top, Hatch cover

2 pieces 2" x 3" x 36"; Cowling

1 piece 2" x 3" x 12"; Bow-block

##### Sig-Spruce

5 pieces  $\frac{1}{4}$ " x  $\frac{1}{4}$ " x 48"; Hull & Hatch Stringers

## Maple

- 1 piece  $\frac{1}{4}$ " x 1" x 36"; Keelson
- 1 piece  $\frac{3}{4}$ " x 4" x 5"; Engine Mount Bearers
- 1 pint White glue, Weldwood or Presto-set
- 1 quart Liquid styrofoam
- 1 quart fiberglass resin
- 1 yard 2 oz. 48" w. fiberglass cloth

## HARDWARE

- 1  $\frac{3}{16}$ " dia. piano wire — drive shaft
- 1  $\frac{7}{32}$ " inside dia. brass tubing — stuffing box
- 3 Stuffing box bushings  $\frac{1}{2}$ " x  $\frac{3}{16}$ " I.D.
- 1 Water jacket; Octura; Kool Klamp
- 1 Flywheel; Octura; .60
- 1 Engine mount; Octura; .60
- 1 Universal set; Octura; 10F - 610 M
- 1 Streamlined shaft collar; Octura; 6SSC
- 1 Drive dog; Octura; 6D
- 1 Tail nut; Octura; 6DN
- 1 Thrust washer set; Octura; 6TB
- 1 Rudder assembly; Octura; 2002
- 1 Strut; "B" 10° angle
- 1 Set (4) large; Octura; "T" nuts



# The Roostertail



The Official Publication of the  
International Model Power Boat  
Association  
General Office:  
3638 S. 61st Court, Cicero, Ill. 60650

NOW that the IMPBA Regatta results, and the listing of the IMPBA records are out of the way, it is time to get down to new business. In order to improve the interaction of model boat clubs, and to promote R/C model boating, the Roostertail will carry a running calendar of Regatta's, and a listing of running sites. All IMPBA clubs should send in their request for Sanction dates and Regatta dates to R/C Modeler Magazine, Power & Sail, P. O. Box 487, Sierra Madre, California, as soon as possible. The Roostertail will take the copies of the sanctions approved and work out a calendar to be published in the April RCM and subsequent issues. The listing of the model boat running sites will involve the clubs furnishing RCM the location, name, and approximate times and dates when they will be running. This listing will allow those individuals who are interested in R/C boats to observe our boats and to ask questions regarding their construction and operation. You may not realize it, but we are hard to find! We know of many instances where dye-in-the-wool model boaters have worked for years without knowing of a model boat club a mile or two away!

Model boating is in dire need of up-to-date information. Some of the more urgent items are:

1) Electric or electro-optical methods of stopping stop watches and electronic timers. The human factor in timing must be eliminated, and to our knowledge, only the California clubs have been able to solve the problem. How about it, men? Can't you draw up your device and send it in for publication?

2) A method for achieving needle-valve control. It is known that several individuals are using mixture control. With multi-boat racing gaining in popu-

larity, and the length of run increasing, the desirability of peaking up the engine while the boat is running free is a most desirable feature.

3) Hull design and construction details are wanted by all of us. The books that are available for this aspect of our hobby are so out of date as to be nearly useless. The evolution of hulls is proceeding at such a rapid rate that only by using the magazines, and especially R/C Modeler, can we spread the information rapidly.

4) Finer points on alignment of engines, drives, and struts. The tether element in the IMPBA managed to advance the mechanical alignment and design of the engines and drives. To our knowledge, very little has been published regarding the fine points, clearance, angles, and play required for maximum performance.

5) Surface props. The use of surface props is increasing, but here, again, little is known and less has been published.

If you are wondering why the airplane boys have such a wealth of information, it is because they contribute it to the hobby. As an example, the editorial offices of R/C Modeler have 118 articles on hand on various R/C airplane subjects, and 1 on hand for model boating! We could do a lot better if we tried harder and would put a little more effort into writing, photographing, and drawing up our projects. You don't have to be a professional writer, by any matter of means — that is why RCM has a staff of editors — just get all the information down!

Maybe this suggestion will get some response. As a lot of you know, it is getting difficult to get more than one or two heats or time trials in during a large regatta. Why not restrict the big regattas to multi-boat racing? The spectators would enjoy it more, and, after all, we are trying to run faster than the other boats anyway. Perhaps we could use the Speed Obstacle Course outlined in Power & Sail this month, thus allowing all engine classes to compete. By the time 1967 is over, we had better find some solution to the problem!

At this time, the Roostertail has not been informed as to the location of the 1967 IMPBA Regatta. This is the slow part of the model boat season, but we will try to get more in next month.

Provided we have your help!

**NOW IS THE TIME  
TO JOIN THE  
I.M.P.B.A.!**  
**DETAILS ON PAGE  
55 OF THIS ISSUE.**



## THE LAST WORD



GEORGE HAYNES, U.S.A.



WINDY KREULEN, HOLLAND



"..... ANYTHING THAT GOES UP — — — — —"

