R/C MODELER

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

PROFESSIONAL TIPS ON HOW TO ORGANIZE AND CONDUCT A GOODYEAR RACE!

PRECISION PATTERN
AIRCRAFT
DESIGN
By Ben Herman
and Jack Capehart

BUILD A 3-BAND
R/C CRYSTAL CHECKER

SPECIAL FOR BEGINNERS
CHAMPION
EVERY SUNDAY

TOLEDO
A COMPLETE TOUR
OF THE '67 TRADE SHOW

LEIF THELIN'S 'SPIGGEN' RADICAL SWEDISH MULTI

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 ψηφιοποίησης τους, τον καθαρισμό τους αλλά και να τα μοιράζομαι μαζί σας αφού τα δημοσιοποιώ στο διαδίκτυο (όσα από αυτά επιτρέπεται λόγο 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.(Η.Ε)
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

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

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Thanks Elijah from Greece.

RADIO CONTROL
MODELER

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1967 VOLUME 4 NO. 5

features

departments

;OMING NEXT MONTH!

.020 POWERED GLIDER FOR SPORT SOARING

COMPLETE HOW-TO ARTICLE ON FOAM WINGS

REX TAYLOR'S "SWEEK"

GOODYEAR RACING: PART II

R/C AERODYNAMICS: PART II

"DICKIE-DOO" .15 POWERED OUTBOARD HYDROPLANE

PLUS MUCH MORE!

ON SALE MAY 10TH

ıVER

yanne Mays poses with Byron Trent's Acro-t. Aircraft has over fifty coats of dope. oto taken at Daytona Beach by Chuck rel.

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off Franklin, England
hn J. Carroll, Ireland
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ıude Bernard, France
ndy Kreulen, Holland

EDITOR'S MEMO

The Valley Flyers R/C Club, Inc. is establishing a fund to help the members of the 1967 U.S.A. Internats team defray the expenses that will be incurred by the team members on their upcoming trip to Corsica, France, and to outfit all members with appropriate shirts denoting them as the U.S.A. Internats Team of 1967. All contributions will be receipted and a complete listing of disbursements will be published at a later date.

Our team consists of Phil Kraft, Doug Spreng, and Cliff Weirick, plus a team manager/captain. These men are the top three flyers in this country and they certainly deserve whatever support we are able to give them. It has been estimated that a round trip to the Internats plus living expenses cost in the neighborhood of $1200.00 per man. There should be enough interested modelers and model clubs in the country to at least defray part of this expense. Please send all contributions to: Valley Flyers Inc., c/o Frank Kagele, 23401 Welby Way, Canoga Park, California 91304.

Any excess money will be turned over to the AMA "Dump the Deficit" fund. Please make all checks and money orders payable to: Valley Flyers Inc.

●

With the tremendous growth of interest in R/C scale, I'd like to pass on a letter from our good friend, John Maloney at World Engines:

Dear Don:

I see that you are going to do a book "The Challenge of Radio Control Scale." I, personally, have always felt that radio control scale is probably the ultimate in our hobby. I have the original Pietenpol Air Camper that appeared in Grid Leaks. This was to be printed in my newspaper before I abandoned the paper. I still get a terrific kick out of flying this airplane model. It is flying now for about three years without serious mishap.

I have also been present at the Nationals to watch the R/C Scale event for many years. During some of these years, many modelers would come out on the line with brand new airplanes and try to fly them. More often than not, these model builders were poor flyers and we saw a lot of beautiful models crash because the builder was not a good flyer.

Anyway, the purpose of this letter would be to suggest that the R/C Scale rules be changed to permit a team effort. If a team of two men could make an entry, there is a good chance that a good flyer could team up with a good builder to alleviate some of the carnage we see on the flight line.

We have team efforts in rat racing, team racing, and other "U" Control events. Why not extend the courtesy to the R/C Scale model builder?

Yours very truly,
WORLD ENGINES, INC.
John Maloney

●

On the international scene, two new model magazines have made an appearance. The first is "Modelli e Sport," an Italian language general model publication that is quite excellent. Italian speaking R/C modelers who might be interested in this publication are invited to write Modelli e Sport, c/o Leopoldo Pergher, via Sighele 2, Trento, Italy.

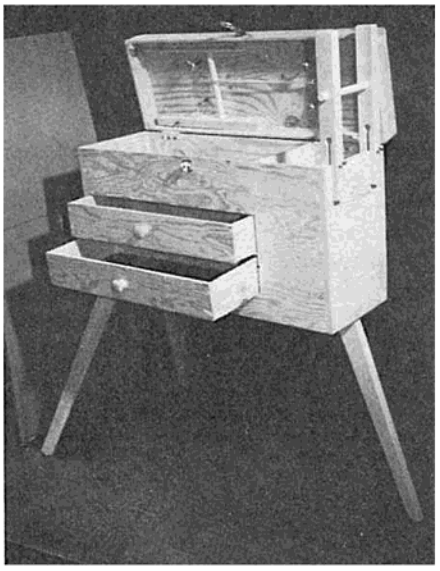
Radio Modelisme is the second new general model publication. Published by Radio Modelisme, 21, Rue des Jeuneurs, Paris 2, France, it is an extremely well-done and informative magazine. French speaking modelers are invited to write for details.

Congratulations and welcome to both new magazines.

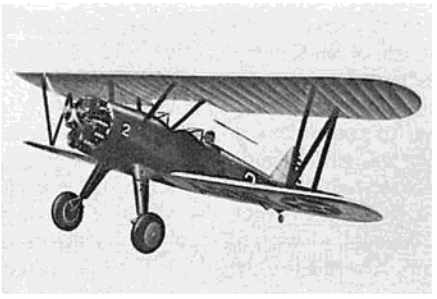
●

The February issue of RCM featured Col. Jack Albrecht's scale Kawasaki-Hein. Unfortunately, we failed to mention that the lovely young lady on the cover was 18-year-old Sandy Featherstone, whose father, Claude, heads up the F.A.A. liaison to NORAD. I wonder how many of our scale readers noticed that the cover transparency was accidentally reversed?

HITHER AND YON



One of the hits of the recent Chicago Trade Show was the built-up prototype of **Sterling Models, Belfield & Wister Sts., Philadelphia, Penna. 19144,** new R/C kit FS-20 — the Stearman PT-17. This will be a fully scale giant R/C kit that should prove to be one of the most popular releases of 1967. Scheduled for full production in the near future, the PT-17 will retail for $39.95. For further information, **Circle #8 on the Reader Service Card.**



Micro-Molding Co., 2917 Edith Lane, Fort Worth, Texas 76117, has produced a Nylon Pushrod Exit Guide that will really trim up those unsightly pushrod exit holes in the side of your fuselage. Precision molded, these units retail for 45c per pair and have been tested, and are approved and recommended by RCM. For further information, **Circle #9 on the Reader Service Card.**

Ace R/C Inc., Higginsville, Missouri 64037, who has pioneered in pulse proportional systems for 14 years, has announced a combination package for galloping ghost fans that takes the best of available components and puts them into one first class package. Included is the GG transmitter by Dick Jansson, coupled with a specially modified CitizenShip SSH superhet receiver, the Rand GG pack with the LR3 actuator and new 600 ma sintered and vented batteries, and a dependable Mallory M1603 9-volt transmitter battery. The Ace GG package is completely prewired and requires only installation in the aircraft. Weight of the receiver with GG pak, GE nickel cadmiums, hooked up and ready to install, is approximately 7 ounces. The Ace GG package will handle planes up to .35. No. 10G1 GG Package, complete, is $125. For further information, **Circle #10 on the Reader Service Card.**

SHOWCASE '67

(Continued from Page 8)

oughly tested these items and found them to be of most exceptionally high quality. Available in kit and built-up form from your dealer, they are among the finest items of their kind we have seen. Instructions provided are step-by-step and photographically illustrated so that no assembly mistakes can be made. Tested, approved and recommended by RCM. For further information, **Circle # 7 on the Reader Service Card.**

CUNNINGHAM ON R/C

EVERYONE who can remember when Lucky Strike Green went off to war can also remember when those small shiny things were called "condensers." Today, they're called "capacitors." I was first exposed to them as something to hook up to my Ohlsson .23. It wasn't until later that I found out what they did, and that my Dad's car also had one under the hood. Sometime after this some character came along and decided to change the name. I don't know why he did it, but suddenly the old familiar name was gone, and a new one took its place. Don't look now, but that same gremlin (now, there's another "out of date" word) has sneaked upon the scene and made off with one other old standby, the megacycle. Suddenly it is now megahertz. What it is, I don't know, in fact, I couldn't even tell you what a megacycle is, or was. Just shows to go ya, don't depend on anything anymore! One of these fine days we'll wake up to find that the long suffering inch, foot, and yard nonsense has also been tossed on the trash pile. Progress — it's something!

●

Marion Vann, from Goldboro, North Carolina, wrote us an interesting letter not long ago. The answers to his letter and the thoughts that went along with it are the basis of this month's column. Most of us have a pretty good idea just how to install radio gear, or do we? Pity the poor beginner that hasn't ever seen a set of radio gear installed — he really is up the proverbial creek! Probably the greatest single asset that a magazine such as RCM has is that it serves as a clearing house of ideas, and can pass a tip or a hint around the world. I, for one, often forget that everyone isn't an old hand at this game, and that what may seem simple to one, is a big problem for another. Marion's letter opened my eyes to this: ". . . All this talk about noise interference has got me a little confused as to what accessories to use. First of all the nose gear which came with the Falcon is already installed. However, it rattles like a can full of marbles. I have a set of Top Flite nylon gear blocks which I ordered. Would you advise using the original gear with these mounts? Since the nose block is already installed, the only way I can see to do it is to mount the new blocks on a separate piece of plywood and glue it to the original firewall. Will it matter if the gear is moved aft with this method? If this method is best, what size plywood do you recommend? What glue is best? Should the original spring nose gear arm be used? Is there any danger of a nylon type nose gear arm damaging the servo through shocks transmitted during a rough landing? How is the best way to reduce travel to the nose gear . . . ?"

You get the idea, Marion's letter was three pages long, and there isn't room to reproduce all of it here, but the questions are good and valid, so in order to leave room for some answers, I'll condense them into brief inquiries.

"Should a nylon 90° aileron bell crank bind on its insert nylon bearing? Which hole is the right one to use in the 90° bell crank? How do you attach push rods to bellcranks? Should I use a clevis at every hole in a bellcrank, or a servo? Should I use a nylon clevis at the control horns? Can the receiver be mounted directly over or under the servos? What size foam should encase the receiver? If you wrap the receiver in plastic, will it overheat? Should you put the batteries in foam? In a plastic bag too? How do you route the antenna on a high, or shoulder wing aircraft, run it back over the servos and then out behind the wing? What do you do if the antenna is longer than the aircraft, loop it back on itself and tie it there?

"Finally, I used to be contented using one glue such as Aero Gloss on my control line models. But now there is white glue, contact cement, epoxy glue, fast and slow model cements, etc.; what do I use, and where. . . . What glue should be used to attach such items as motor mounts, fuselage doublers, etc. . . . wing sheeting, nose block and so on."

Lots of questions, and some other that didn't get listed above. Now, let us dig into them and see if we can establish some sort of a norm for gear installation. It can be easy, and should not present too many problems.

Proportional radios brought the noise business home to many of us, and we were doing many, many things with reeds that we simply can't do with propo gear. One of these is metal to metal contact. I know that a lot of radio sets

(Continued on Page 7)

claim to not be bothered by noise, but they all **can** be affected by it, so let's eliminate the potential instead of worrying about it. First, do away with the nose gears that rub metal on metal. Perhaps you can insulate the wire with a piece of teflon tube, but eliminate the metal-to-metal. Use nylon blocks wherever possible. They're strong, light, cheap, and do a darn good job. Use a nylon tiller — there are several on the market. The biggest drawback to most tillers is that the set screw is a little small, but you can fix this by a trip to the hardware store for a larger set screw and a tap. Reducing shocks to the rudder servo is a little harder. The easiest way is a loop in the wire, or a reduction bellcrank located between the rudder servo and the tiller. A spring loaded wire is a good idea. If you get too sloppy a linkage to absorb the shock, though, you have a tough time steering. Probably the easiest to use is the wire loop. Moving the location of the nose gear will not hurt the ground handling of the aircraft. By this I mean a small movement, of an inch or so. Use a thick enough piece of plywood to take the shock of landing. A ¼" piece is plenty strong, but a ⅛" piece simply won't stand up to many hard landings. Use epoxy glue to install this piece of plywood.

If you have an aileron bellcrank that sticks on its nylon insert, take it back and get another, or else sand down the insert until the bellcrank rotates freely. You must not have any binding points at any place in your control system. One of the best and easiest methods for bellcrank installations in wings is to use a Williams Brothers 90° bellcrank, tapped for a machine screw and then threaded on this screw in the wing. It won't come off, and makes a nice free moving crank. Wire attachment in the wings can be done in one of four ways, either by using a clevis such as a DuBro, a keeper collar or clip, bending a right angle in the wire and then soldering a washer to it, or by making a Z bend in the wire. To me, the Z bend is the best, you don't spend extra money on clevises, or keepers and it can't come off. Soldering is ok, but again you have the problem of solder coming off, or of getting the wire too hot, thus causing the nylon crank to melt.

A very simple method of attaching all gear is to use a wire bend at the servo end (in this case, a right angle bend) with a keeper or a clip, such as Rand's new clips, to safety the wire in place. If you are using strip ailerons, then use a kwik-link from the bellcrank to the aileron horn (again, Rand has a new, noiseless piece of hardware to use here, a torque rod bearing). Use a nylon connector at the aileron horn. If you are using conventional ailerons, then use the bellcrank as mentioned earlier and then use a kwik-link from the bellcrank to the ailer-

CUNNINGHAM ON R/C

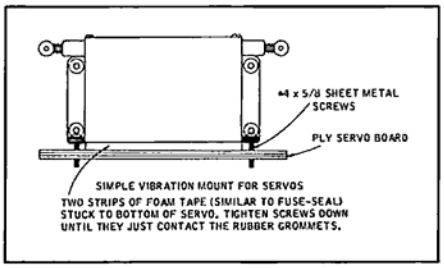
(*Continued from Page* 6)

on horn. Always use nylon control horns. At the rudder and elevator surface, use nylon control horns with kwiklinks for adjusting. Try and eliminate as many bends as possible in the pushrod. Keep the rod straight if possible.

Mounting the receiver and batteries in the aircraft is generally a chore. With the emphasis on today's small multi ships, there isn't much room to provide good protection to the receiver, but by fitting and shoving, you can get it into a small ship. The receivers are smaller, but we seem, or at least I seem, to try and protect the receiver more all of the time. I usually tape shut the receiver with masking tape, then strap on two pieces of ⅛" plywood to add a bit of strength, wrap this in saran wrap, and then put this into a box of foam. The thickness of the foam should be at least ½". I wrap this again in a baggie. The receiver is then protected from dust, fuel, vibration and hard knocks, but it does take up some room. The batteries should be packaged in a similar manner, wrapped in foam, then into a baggie. Fuel can do a lot of damage to a battery pack. Neither the receiver, nor the batteries will "overheat" so don't worry about this aspect.

You can place the receiver under, or over the servos, in front or in back of them. The important thing to remember is to route the antenna away from any power wires, away from any pushrods, and away from any switches. Where do you put it on a high or shoulder wing aircraft? This is a problem, but the best idea is to get it out of the fuselage as near to the receiver as you can, and remember, slip a piece of fuel tube over the antenna wire and into the hole in the fuselage to act as a bumper. Route the antenna out of the fuselage on the side away from the exhaust, take it under the wing dowels and then to the top of the rudder. If you have wire left over, don't double it back upon its self, but loop the wire around the rudder post and then take it to one side of the elevator. Tie the antenna wire to the structure with rubber bands to give it its own shock mount. You must exercise a great deal of care to see that the wire doesn't exit near the throttle push rod, or the nose gear push rod. On some sets this can be deadly. Always inspect this installation carefully; it can save you much trouble later.

Marion's question on glues and adhesives may have several answers. Most of us have long since forsaken many of the old line model cements in favor of the new adhesives. With so many fine glues on the market, there is no wonder that this becomes a problem. I did use white glue in many places, but with the coming of Titebond glue, have switched almost exclusively to this now. At the firewall and in places of great stress, use epoxy cement. For fuselage doublers use a good grade of contact cement. For wing construction use Titebond, as well as for installing blocks, cross sheeting and the like. If you have run across a Lanier plastic kit you will find that he recommends the use of GE Tub Seal or silastic in many places. This may have many uses in balsa models too, in fact, on my ship I plan to glue on the balsa stab and rudder with this material. It is supposed to be as strong as epoxy, and yet stand shocks.



SIMPLE VIBRATION MOUNT FOR SERVOS
TWO STRIPS OF FOAM TAPE (SIMILAR TO FUSE-SEAL) STUCK TO BOTTOM OF SERVO. TIGHTEN SCREWS DOWN UNTIL THEY JUST CONTACT THE RUBBER GROMMETS.

Hobbypoxy and a tube of model cement make a good addition to the tool kit to use on the field, as they both are fast drying and can often save a trip home from flying in the middle of a perfect day.

Speaking of the Lanier kits, I recently purchased one, since I wanted to see what all of the fuss was about. All that I can say is, it's true. I bought the Bronco, added just the bare minimum of extra trim, a pilot in the cockpit, and in about ten hours was ready to fly. This would have been a shorter period of time, but my hands are too big to get into the nose to install the landing gear and I cussed over this part for an hour. For the man with limited time that wants a real flying machine, this is it! Fly? It'll fly the pants off of almost anything in the air. It's a shame, 'cause in a few short years I'm afraid that the do-it-yourself balsa ship may become a thing of the past, and we'll all suffer for this, but as of now, the plastics really are something else.

The other day I received a new starting gadget from Delta Specialties, a foam case and protected glow plug clip. All that you have to do is install a D size nicad and you are in business. It works fine, and is just the ticket for restarting your engine down on the landing strip if you gunned for take-off and the blasted thing died. You can stuff this little battery in your pocket and go on about your flying. Also tried out the new Epoxybond Adhesive Putty; it's great for fillets, it won't sag, run or drip, it stays put. Some of my friends have claimed that my ships look like I use sandpaper for covering, but with this putty, even I can get a smooth fillet.

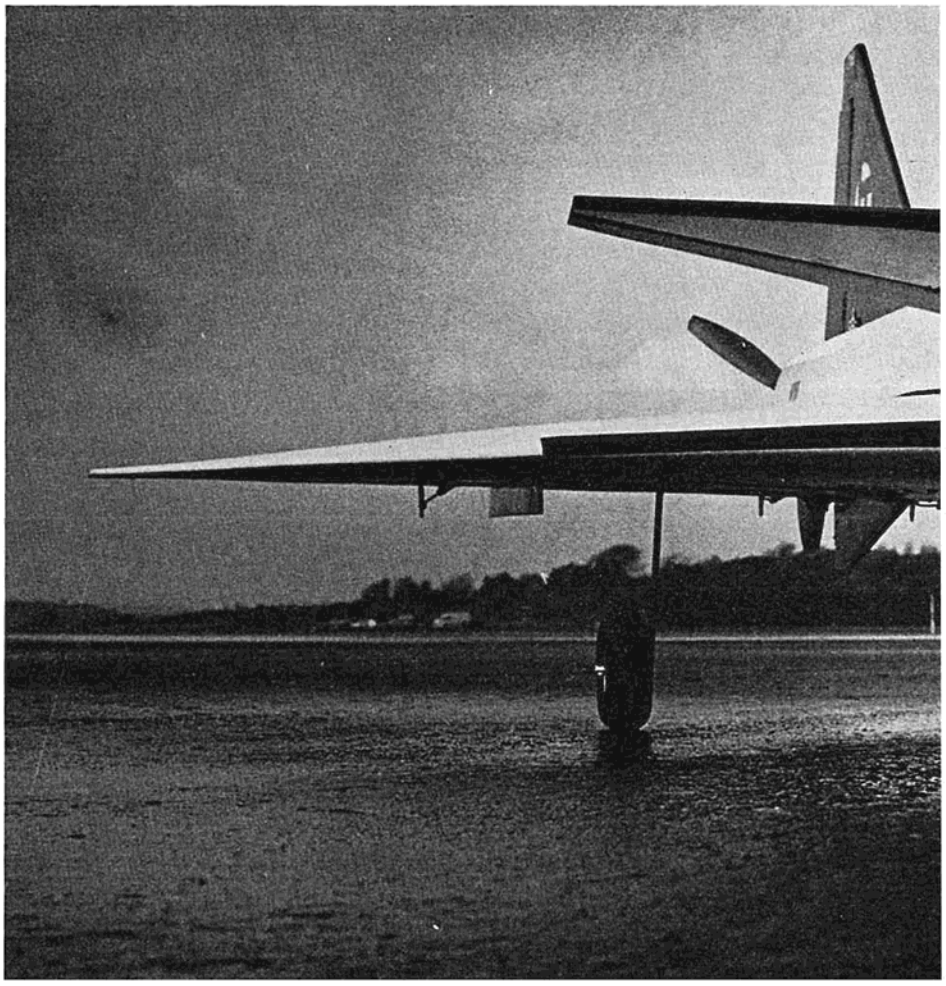
While on the subject of new products, Herb Abrams at Rand keeps coming out with new goodies. I mentioned earlier his keepers and torque rod support, but have also tried his hinges and they are works of art (you know Art . . . he works in Herb's back room). Have you ever considered just what a terrific task it is to run a modern hobby shop? Each month brings out some new gadget that is just right, so more stock, more inventory and more headaches. What I'm waiting for, though, is a good plastic prop in the 11x7½ range. This is something that we really need, and have needed for years. Especially with the Lanier Bronco. It has a mighty short gear for non-paved fields!

Several months ago we went into the subject of vibration and at that time I designed a servo mount that would eliminate a great amount of this vibration. Since that time, I've developed a much simplified method of mounting servos to minimize the vibration shown in the drawing. It works nicely and is easy to apply and doesn't take up much space.

Until next time, Keep 'em Flying!

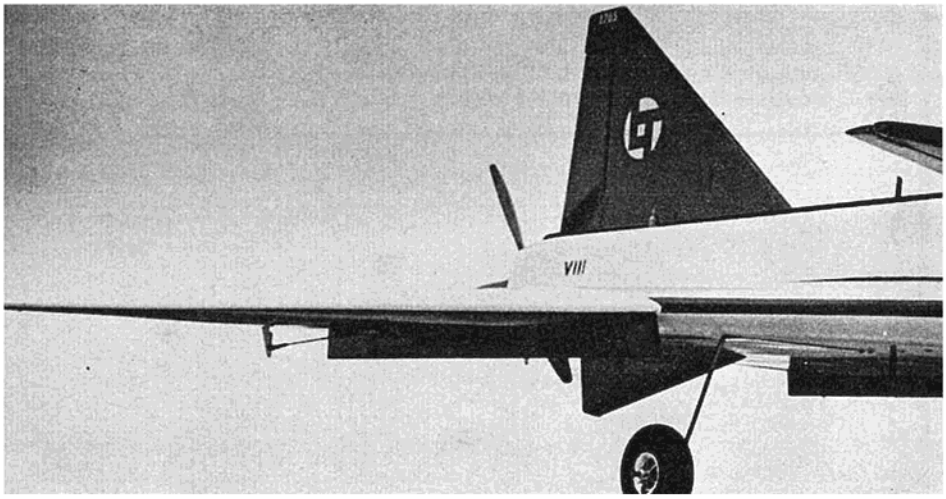
I FELT very honored when Don Dewey phoned me in Sweden and asked if R/C Modeler could publish the 'Spiggen,' and I'm very grateful that he, in this way, made it possible for me to contribute a design which I hope others will find interesting. The model is, perhaps, best suited for those who like to have something to play with between their contest models. The intention has not been to make a creation on one or another direction, but just to build an airplane. Mainly it is designed for sport and showflying, but it has also shown attributes which indicate that it can even be used for competition with only minor modifications. This doesn't mean that you have to be an expert to be able to handle it, but it calls for some experience. Not in flying, perhaps, but you do have to make a landing, and in that moment you must be bright and clear about what measures to take. One should at least know something about how the ailerons work. Thus, when one aileron is down its panel goes up and vice versa. Except for the elevator, however (as we have all learned at one time or another!) When **it** is down, the whole thing will go **down**! Otherwise this model is calmer, smoother and more stable to fly than an ordinary multi. The speed, however, is slightly higher. But with the flaps, at the forward wing, trimmed full down, and with compensated down elevator, it could be flown even at extremely slow speed. I'm sorry, that you can't experience the enormous thrill I felt at the first take-off with a brand new design. The question finally was — Could it fly at all? Maybe I was a bit scared in the beginning, evolving from test flights with models in smaller scale. Now I remembered all too well how tricky they could be. But, I'm sorry guys, this moment is gone. With flaps trimmed half down — full throttle — and the CG at the right position, she will, at about 1 — feet, first lift the nosewheel and go so for a while and leave the runway with grace. This can't be described, it must be seen. All you have to do on take-offs is stick around and watch! This lucky sequence is entirely free. Not until a moment later, at a safe altitude will you have use for your transmitter.

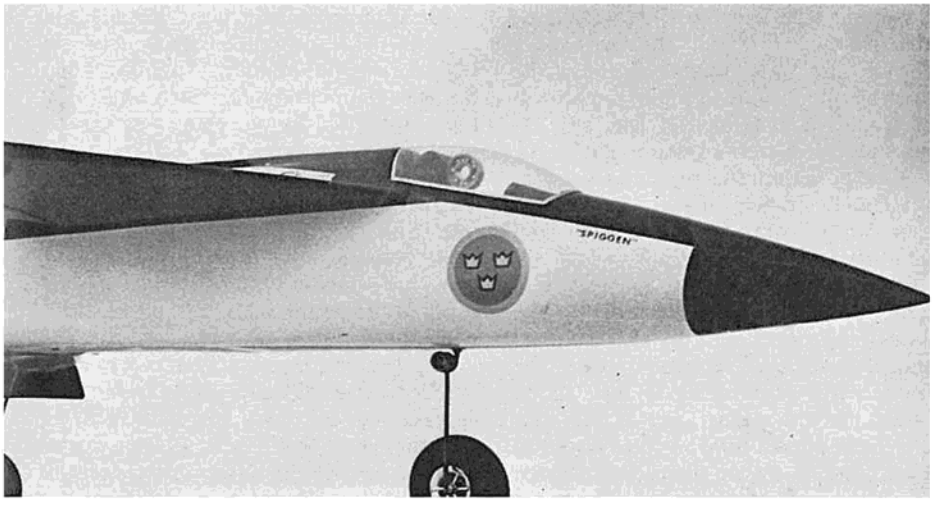
Now, incline her just slightly — the speed will increase — and she will make a nice turn because of the front trim. Straighten her up and take in the forward wingflaps slowly and compensate in the beginning with the elevator. The plane shortly will achieve normal cruising speed. Now, you can start to play. But, don't do any outside loops at once. To be able to do that, you have to let the forward wing flaps go further up about ½". I will recommend that you arrange the linkage so that the flaps preferably cannot go negative in at least your first 20 flights. A mistake here, at low altitude, will be fatal. This ship is quite



SPIG

FROM SWEDEN, LEIF THELIN'S





easy to fly, although the landings can be a bit tricky in the beginning. When landing, trim the flaps half way down, cruise with ¼ throttle, make a wide approach and fly very flat. Keep the nose slightly down with the elevator, and at about 2 yards over the runway, take up the nose slowly. She will go down on the main gear with the nose high, and go so until you close the throttle fully. She is wonderful to watch, at this moment. In case of a motor cut-out when flying, take the elevtaor down, half way down with the front wing flaps, and keep the speed up. This type of airplane will not fall out as an ordinary plane, but it glides like a stone at slow speeds and with the nose high. (And the wheels make such ugly holes in the bottom of the wing. I know!) Otherwise, it is probably just this type of airplane which has the greatest advantages at low speeds, thanks to the added lifting capacity from the both wings.

The forward wing is, of course, interesting and amusing to use. In fact, I use it so often, that I have chosen to maneuver it with the throttle lever. This also gives more receptive control. The forward wing is an effective working trim panel and, in that respect, a subtle regulator of the speed. You cannot, for instance, make a loop with the front flaps alone. In that case, the plane will take an angle of attack which corresponds to the angle of the flaps and the speed. Of course the flaps are also very effective in combination with the elevator. The roll is enormously fast with full turn on the ailerons, but is very smooth and controllable in normal conditions. The rudder has, however, very little effect in high speed, but beware, it is sensitive in lower speeds, above all when the front flaps are down. The effect of the elevator is, however, quite normal. Then, when you are satisfied with all the "ah-ah ah-ah ah-ah's" and "oh-oh oh-oh oh-oh's" from the spectators behind you, you can load your ship up with rockets — and let go. It's very impressive.

Here I should perhaps give you another reason for not decreasing the speed too much at low altitude. Earlier planes have made you used to the propeller-stream over the rudder surfaces, but here, in its absence, the effect of the rudders decreases faster than usual at slow speeds. In return you have a clean and neat model to exhibit when landed.

And that was why it all began. Since my first R/C model I have been contemplating over the possibility of building something with the engine in the tail, just to get rid of the propeller stream and the fuel and oil over the entire model. Not to mention all the wiping off it causes. In the course of years I have made a lot of experiments with small planes in balsa or cardboard. The new creation was on the whole quite clear to me, when I saw a picture of what our

Leif Thelin fuels up the Spiggen at the start of a morning's flying session. Take-off sequence photos on opposite page

Tired of R/C "look-alikes?" The "SPIGGEN" is an exciting first in a series of challenging new designs to be published in RCM . . .

new jet-fighter SAAB-37 "VIGGEN" was going to look like. Then it was decided. The design I had up till then was more like your XB-70 (but smaller) but, being a patriot, the choice was not hard. I only had to move the front wing back and give it delta-form, break the leading edge of the main wing and modify the fuselage, similar to the shape of "VIGGEN." Then the smaller scale model experiments started all over again. That was last winter. We had more snow than usual here in Sweden at that time, but thanks to the snow I could make several more tests with each model than expected. The models were almost indestructible with that soft, white mattress on the ground. But, gosh, what a flopping and what searching for that small strip that indicated the place where the model had gone down. But, perhaps it was the smallest model of them all, which really persuaded me that the project would be possible. It was only 2" long and completely of wood, and made in as exact scale, after my latest version, as I could. It flew like a dream. The other models were in 1:2 ½ scale and had a Pee-Wee in the tail.

In the end of April the new plane was ready. And then, as a contrast to the winter, followed one of the warmest summers we can remember, and the productivity went to zero. But, to be honest, just the appearance of this new plane scared me a little. I wasn't used to it yet, and a strong suspicion started growing — could it fly at all? The radio outfit had previously been installed in another plane, which I was to compete with during the summer. Anyhow, when the last competition for the year ended the outfit from the old plane was moved over to the new one.

At last, the day had come when there was no excuse and not one thing left to test. She had to be taken up. And it is those feelings prior to this moment that you, unfortunately, never can experience, at least not with this design. **IT FLIES!**

The engine I use is a Merco .61, with a reversed crankshaft. It may not be necessary in the USA, but here in Sweden, you can't find any 9" pusher props in wood or 3-blade nylon. Alternately, I had to change the rotation of the crank-

shaft. Now I can use Tornado's 3-blade 9-6 propeller, or inlet and glue two 9-7 or two 9-8 wood propellers together to 4-bladed. Hobbypoxy works fine here. The fuel system gave me some problems initially, due to the feeding length, which results in great differences in level in varied situations. With one more needle valve from an OS-throttle as a restrictor and a small reserve tank on the fuel line behind, the fuel system now works perfectly. As a consequence the throttle now works surprisingly well. The air bleed hole for the extra air intake is sealed. The tank is placed in the wing and has two air intake tubes, one up and one down. From the clunk goes another shorter tube with a brass tube at the end to be connected in the fuel line. The tank is filled through the upper tube, and if you compress the lower tube when the tank is full, you can easily get the fuel back to the engine.

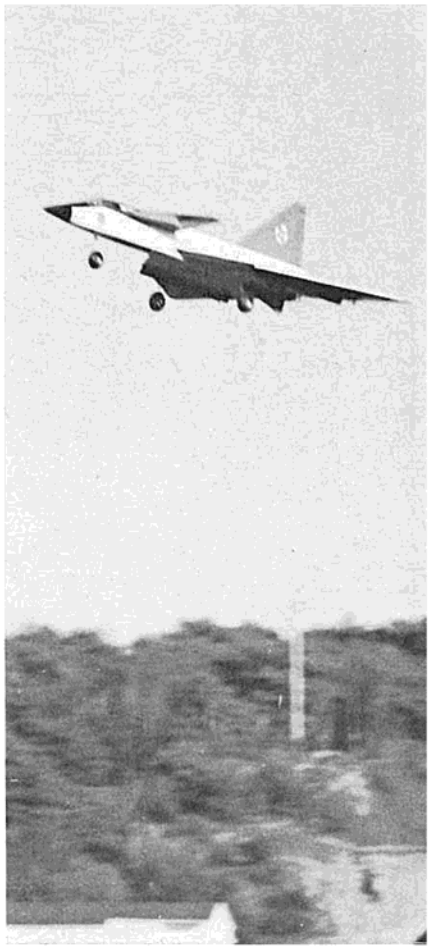
The flying tests with the smaller models have clearly shown that it would be a great advantage if you could retract the gears. I am going to try this on my next model, but I haven't found a good solution yet. I think that in the USA you have better possibilities for solving this problem. But be careful that the flying weight doesn't exceed 7 lbs.!

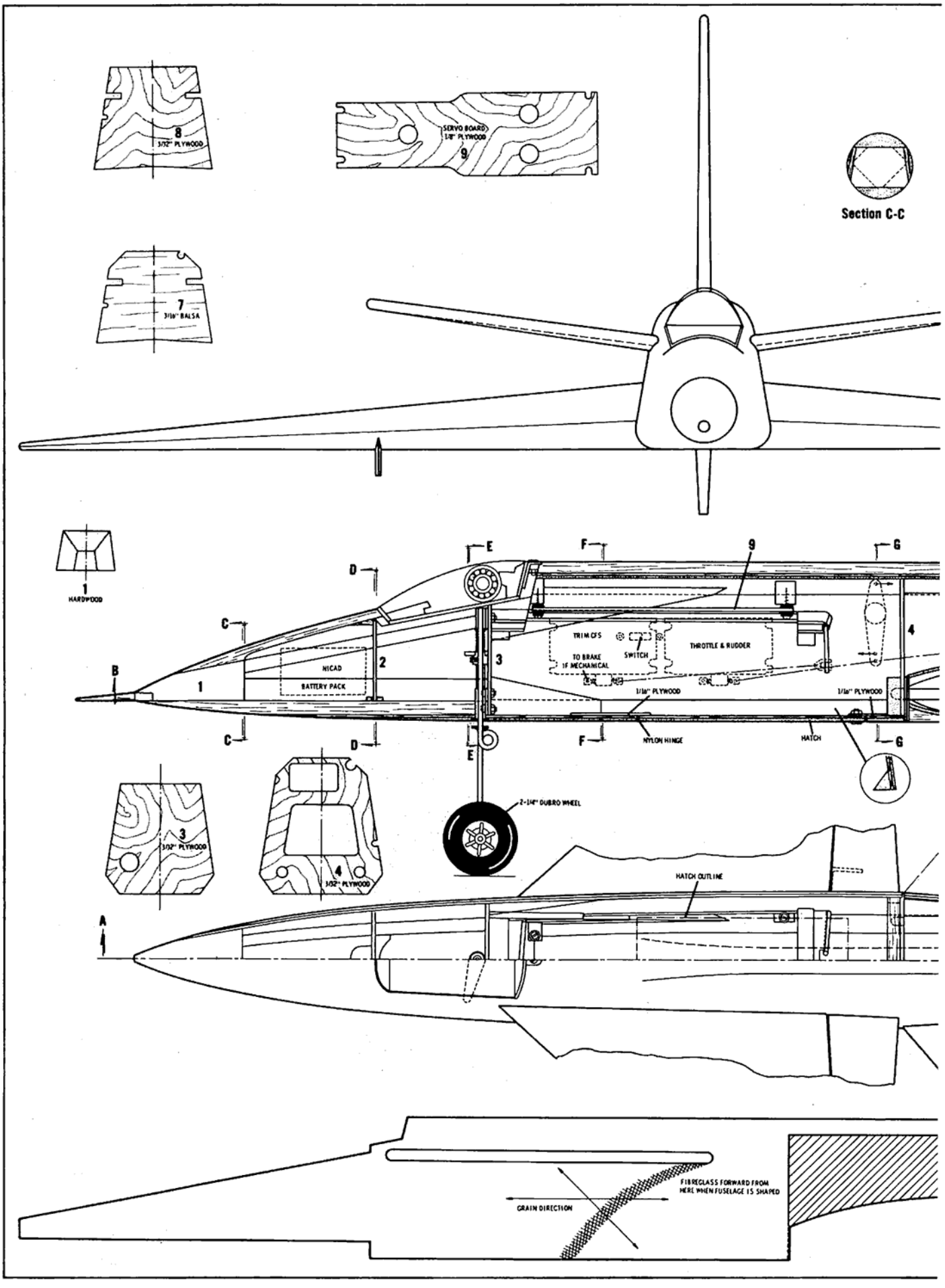
I am not going to render a detailed construction description. As far as I know there are not many who build in the same way, and I have a feeling that you in the USA have directed the development and led the race from the start. (But we have not reached the goal yet.) With experience from the prototype I can, perhaps, help to make the construction easier by telling something about the assembly sequence. Begin with the forward wing and the fin. They are much more tedious to do later when you really need them. Note the grain direction of the planking. In the meantime, cut out the ribs for the wing and the formers and glue on the doublers.

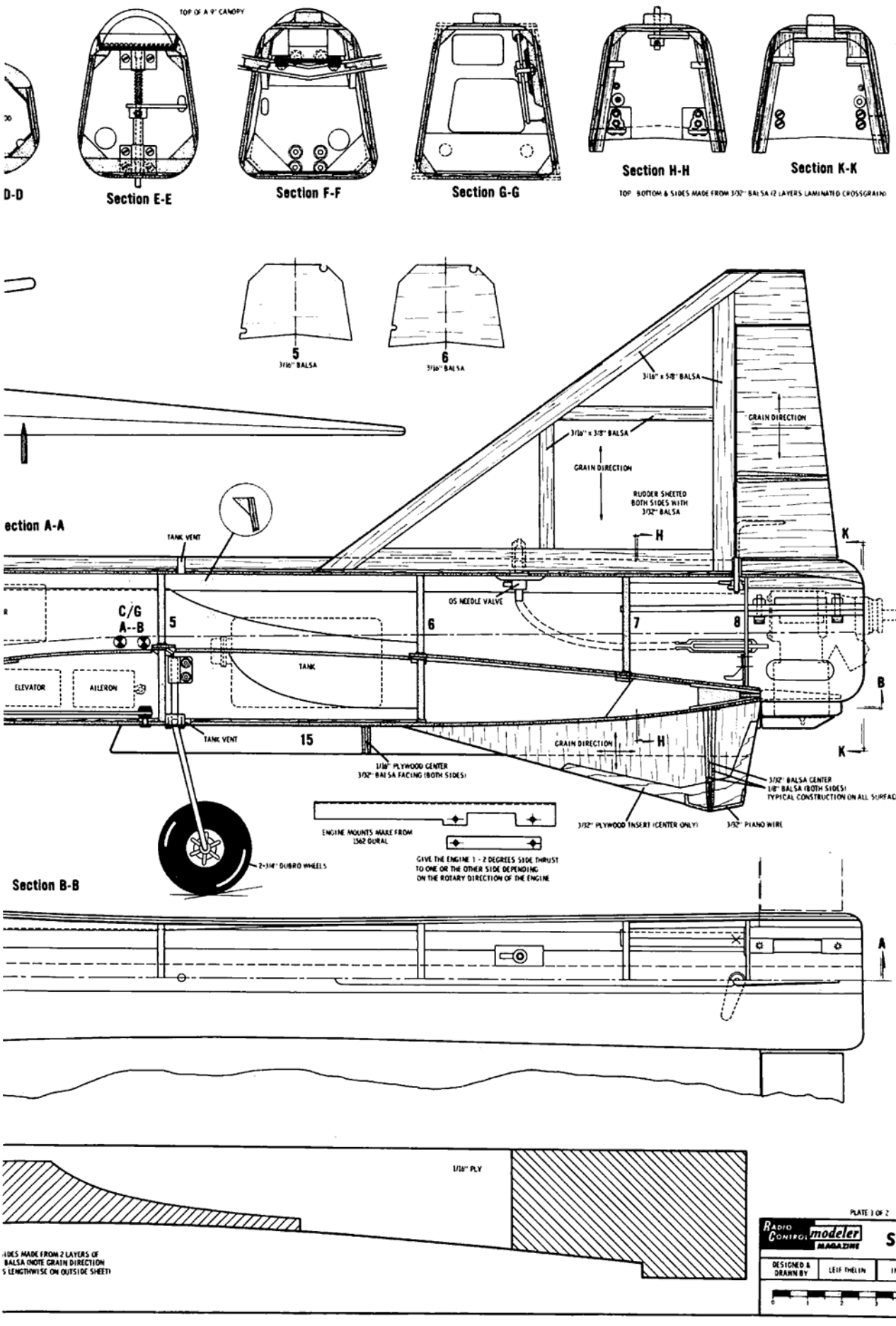
Everyone has their own principles for gluing, but I glue all doublers and the cross joinings with Hobbypoxy Formula II after the mixing has been thinned out with 20% thinner. I don't know what the Pettit people say about that but it gives good results and the glue is in this way easy to spread with an ordinary brush. Apply pressure with a plank and some weights, and you will have a joint which never warps. The hardening time is also much shorter than the time of drying for ordinary balsa glue. Therefore, I generally use balsa glue only when joining smaller surfaces which are always double glued. Ribs, formers and all gluing edge-to-edge is made with "white" glue, except in the engine room and in the tank location. Epoxy glue has shown to be most resistant there. And thinned, I brush it on all over in these rooms. Even all glassing is made with Hobbypoxy. Join the lists for the leading edges to their correct form. Lay out the bottom flakes between the stretch dotted lines with the attachment for the landing gear and the bottom spar in the right place. Put the ribs on, and glue the reinforcements in the servo and the tankrooms, as well as the plywood sheets under and behind the aileron bellcranks. The plywood sheets are divided in two pieces in order to protect the aileron bellcranks if the wheels, for some reason or other, should come up through the bottom. Then, you only have to insert the spars in the leading and trailing edges and over the ribs and start to apply the planking. But, don't forget, before that, the reinforcements for the fastener have to be put in place. First, on the rear sheet on the bottom side, parted in two, and after that, forwards on the upper side. Use #16 jig in the plan. Its object is to give you an exactly straight trailing edge. Put in the front bottom sheets quite early, so you can get all the bellcranks in place, complete with pushrods. Don't have the rods sticking outside the wing, as it will make the sanding and covering difficult. Solder threaded couplings and guide them in short tubes. Mark the location with a knife, and cut deep enough so it will not be removed during sanding. The antenna is installed inside the leading edge of one side of the wing and a ground wire inside along the other. This results in a cleaner model and additional field strength of the receiver. Don't forget to put in the connectors for the rockets if you desire. Furthermore, it will be an advantage if you lay in a strip of fiberglass inside, to protect the wing. Later on you will grab right there, when you lift her. You don't need to remove the wing before the entire upper surface is covered. When the underside is planked, just sand the front edge straight and glue the leading edge. I always add a thin spar of fir to protect the leading edge from marks. The front plate with the locating dowels, is better left until later on, when the whole fuselage is ready. At that time glue it in with the wing in place, and you will thus have a better alignment.

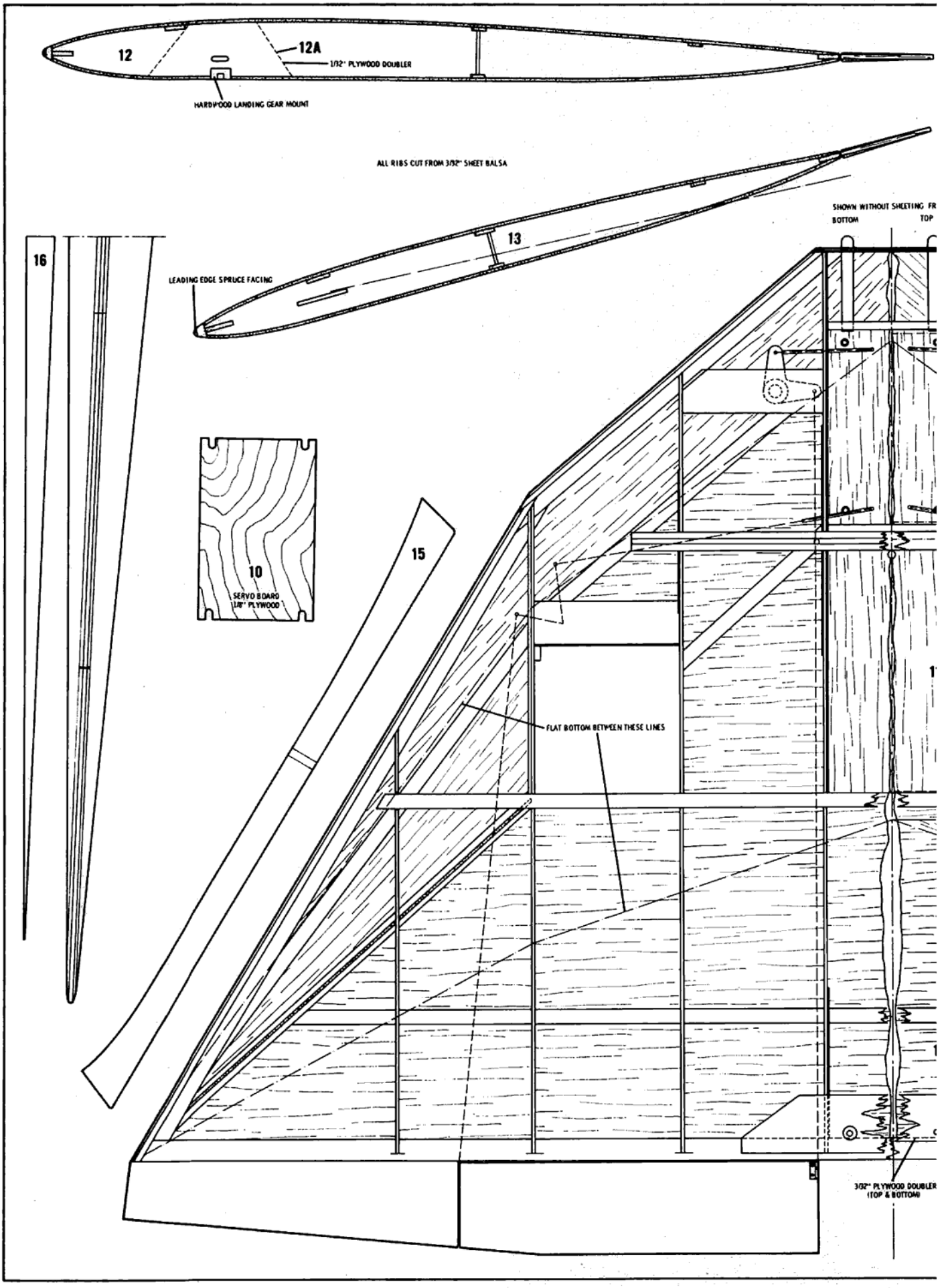
In the meantime, when working with the wing, crossjoint not only the fuselage sides and the top sheet, but all rudders, etc., then cut them out. Draw a centerline along the top sheet and if also the bulkheads and formers have a center line drawn, it will make the whole assembly match easier. No, maybe it doesn't but it is easier for you to control the warping in the fuselage. When the triangular longerons are in place at the fuselage sides, trim them at the top to proper angle to fit, and then glue the sides in place together with formers 4-7. Have bulkhead 3 ready with the nose wheel brackets in place. Now bend the sides together and glue in the bulkhead. Here it is to

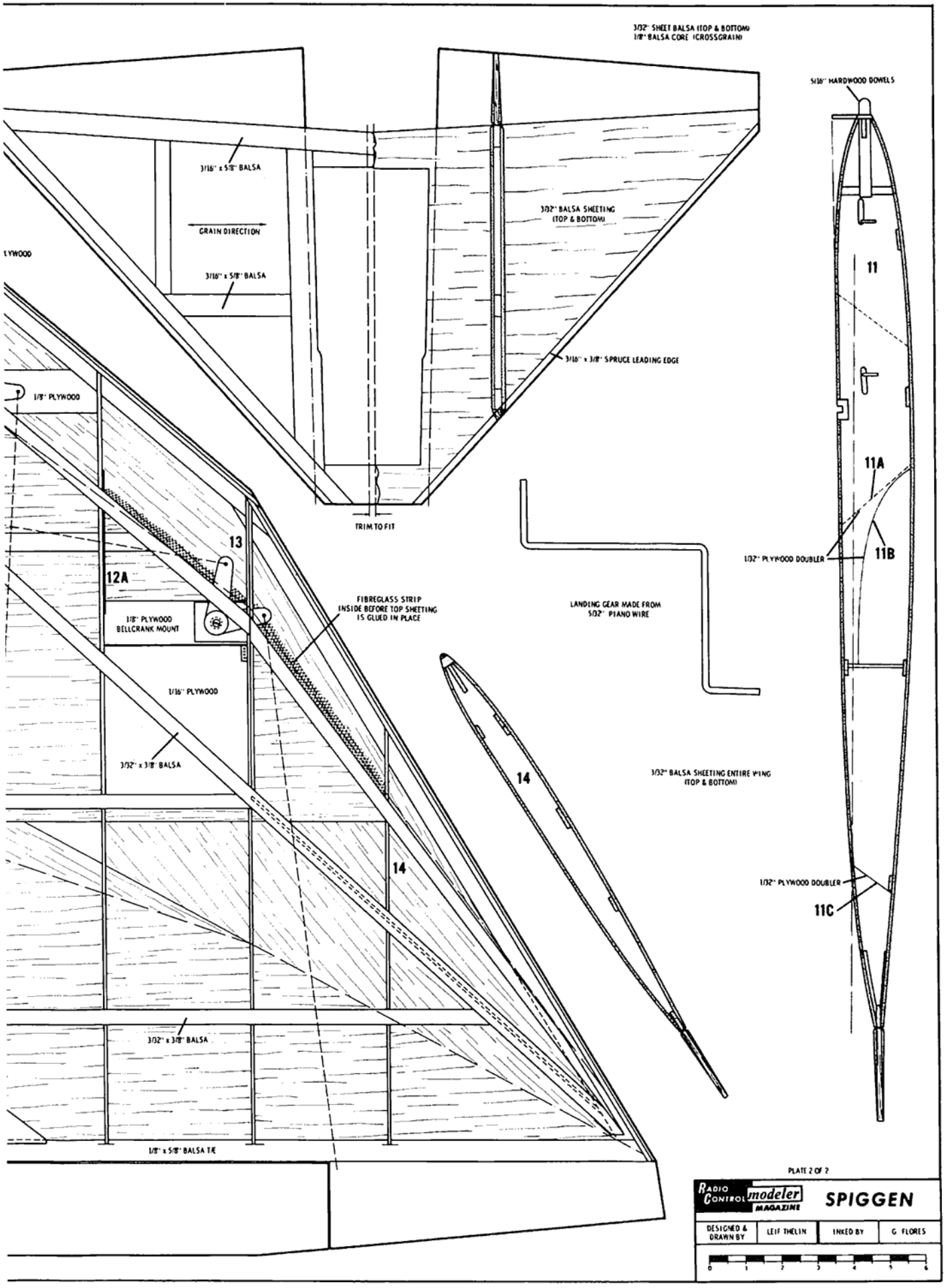
(Continued on Page 21)

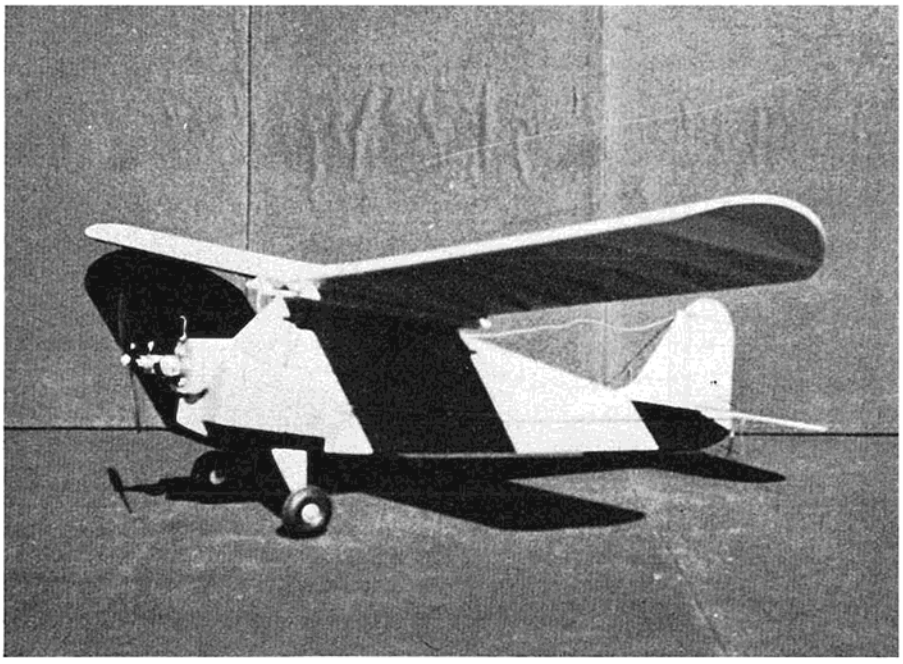



8
3/32" PLYWOOD
SERVO BOARD
1/8" PLYWOOD
9
Section C-C
7
3/16" BALSA
1
HARDWOOD
NICAD
BATTERY PACK
TRIM CD'S
TO BRAKE
IF MECHANICAL
SWITCH
THROTTLE & RUDDER
1/16" PLYWOOD
1/16" PLYWOOD
NYLON HINGE
HATCH
2-1/4" DUBRO WHEEL
3
3/32" PLYWOOD
4
3/32" PLYWOOD
HATCH OUTLINE
GRAIN DIRECTION
FIBREGLASS FORWARD FROM
HERE WHEN FUSELAGE IS SHAPED


TOP OF A 9" CANOPY
D-D
Section E-E
Section F-F
Section G-G
Section H-H
Section K-K
TOP, BOTTOM & SIDES MADE FROM 3/32" BALSA (2 LAYERS LAMINATED CROSSGRAIN)
5
3/16" BALSA
6
3/16" BALSA
ection A-A
TANK VENT
C/G
A--B
5
6
7
8
OS NEEDLE VALVE
TANK
ELEVATOR
AILERON
TANK VENT
15
3/16" x 5/8" BALSA
GRAIN DIRECTION
3/16" x 3/8" BALSA
GRAIN DIRECTION
RUDDER SHEETED
BOTH SIDES WITH
3/32" BALSA
H
K
B
K
GRAIN DIRECTION
H
1/16" PLYWOOD CENTER
3/32" BALSA FACING (BOTH SIDES)
3/32" BALSA CENTER
1/8" BALSA (BOTH SIDES)
TYPICAL CONSTRUCTION ON ALL SURFACES
3/32" PLYWOOD INSERT (CENTER ONLY)
3/32" PIANO WIRE
ENGINE MOUNTS MAKE FROM
1562 DURAL
GIVE THE ENGINE 1 - 2 DEGREES SIDE THRUST
TO ONE OR THE OTHER SIDE DEPENDING
ON THE ROTARY DIRECTION OF THE ENGINE
2-3/4" DUBRO WHEELS
Section B-B
A
1/16" PLY
IDES MADE FROM 2 LAYERS OF
BALSA (NOTE GRAIN DIRECTION
S LENGTHWISE ON OUTSIDE SHEET)
PLATE 1 OF 2
RADIO CONTROL modeler MAGAZINE
SPIGGEN
DESIGNED & DRAWN BY
LEIF THELIN
INKED BY
G. FLORES


12
12A
1/32" PLYWOOD DOUBLER
HARDWOOD LANDING GEAR MOUNT
ALL RIBS CUT FROM 3/32" SHEET BALSA
SHOWN WITHOUT SHEETING FR
BOTTOM
TOP
13
LEADING EDGE SPRUCE FACING
16
10
SERVO BOARD
1/8" PLYWOOD
15
FLAT BOTTOM BETWEEN THESE LINES
3/32" PLYWOOD DOUBLER
(TOP & BOTTOM)

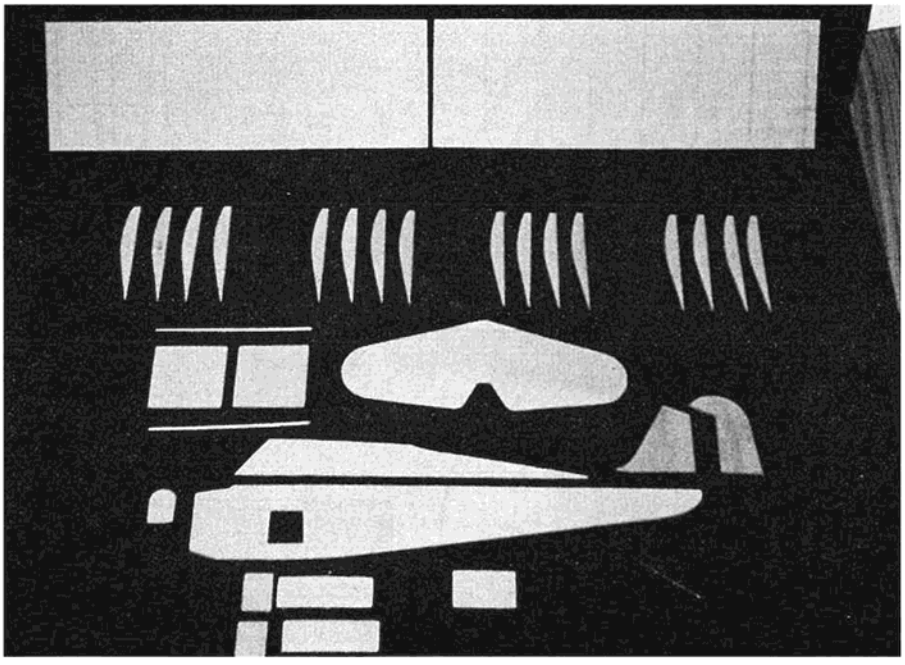

3/32" SHEET BALSA (TOP & BOTTOM)
1/8" BALSA CORE (CROSSGRAIN)
5/16" HARDWOOD DOWELS
3/16" x 5/8" BALSA
GRAIN DIRECTION
3/16" x 5/8" BALSA
3/32" BALSA SHEETING (TOP & BOTTOM)
3/16" x 3/8" SPRUCE LEADING EDGE
1/8" PLYWOOD
TRIM TO FIT
11
11A
11B
1/32" PLYWOOD DOUBLER
13
12A
1/8" PLYWOOD BELLCRANK MOUNT
FIBREGLASS STRIP INSIDE BEFORE TOP SHEETING IS GLUED IN PLACE
LANDING GEAR MADE FROM 5/32" PIANO WIRE
1/16" PLYWOOD
3/32" x 3/8" BALSA
14
3/32" BALSA SHEETING ENTIRE WING (TOP & BOTTOM)
1/32" PLYWOOD DOUBLER
11C
3/32" x 3/8" BALSA
1/8" x 5/8" BALSA T/E
PLATE 2 OF 2
RADIO CONTROL modeler MAGAZINE
SPIGGEN
DESIGNED & DRAWN BY
LEIF THELIN
INKED BY
G. FLORES
0 1 2 3 4 5 6



CHAMPION EVERY SUNDAY

A quickly built profile Aeronca Champion, ala control line style, for the R/C beginner, sport flier, or just for a change of pace.

BY HERMAN GELLER



THE past few years have seen some significant steps forward in the development of new construction methods and materials in order to eliminate much of the work in an R/C model. Unfortunately, almost all of this effort has gone into the larger multi ships. As the building time was reduced, the cost increased. The average Sunday flier has been left high and dry in the new era. Except for champions of the cause such as Ken Willard and Ted Strader and a few others, the emphasis has been on the larger, more expensive, aircraft.

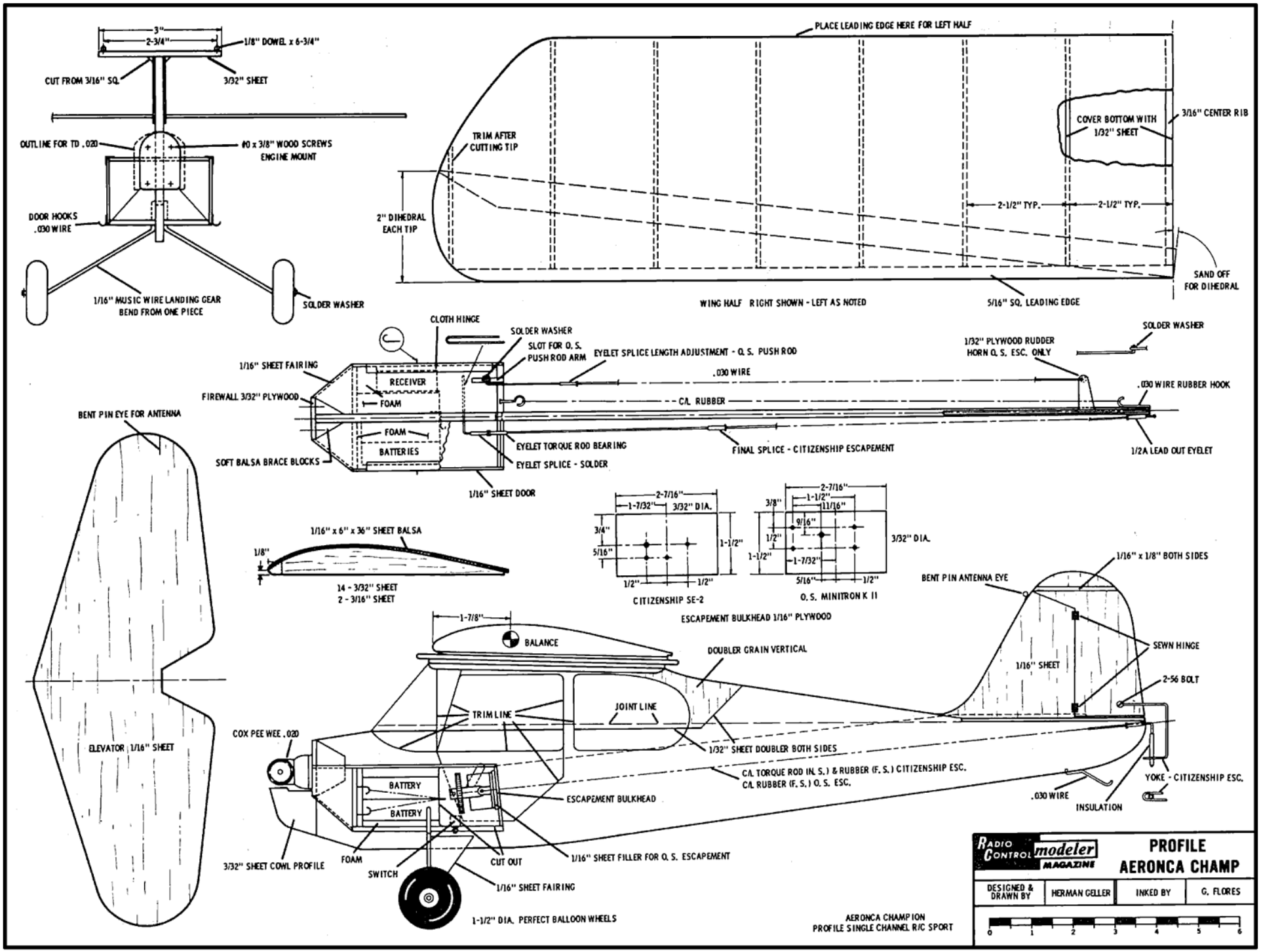
It seemed only logical that an Aeronca Champion be chosen to further the cause. Ken Willard has pioneered simplified small R/C model construction. This one carries on by eliminating the built up fuselage insofar as possible. A person who has never built a flying model airplane before should be able to build this one in a short time with no trouble. For the old-timer it is a model that will go together very fast for small field flying or to get your kids started with this obsession. Further, I think it is a good place to start the wife if you have already gotten her to the point where she is convinced that "if you can't beat 'em, join 'em."

FUSELAGE

Since the installation of the R/C gear in the fuselage is the most time consuming part of the job this seems like the logical place to start. Fuselage is cut from two pieces of 3/16" or 5/32" thick medium hard balsa. A 3" wide x 36" long sheet is more than enough for the fuselage profile with plenty left over for the center ribs in the wing. If your local hobby shop has the 5/32" material, it will be helpful to reduce the finished weight. If you want to take the time and make the mess, you can sand down the completed fuselage profile to 5/32" thick. The joint line shown on the plan is coincident with the bottom of the stabilizer. Pick out a sheet that is flat and straight and has clean cut square edges. Trace the plan using carbon paper to make a template for the bottom half and the top half of the profile. Include the escapement cut out and the landing gear hole in the bottom half template. I find the cardboard from a manila file folder is ideal for template making. It is thin enough that you can cut sharp radii with a scissors and not deform the edge. It is heavy enough that you can trace around it a number of times without wearing it out.

Align the bottom half of the profile so that the joint line coincides with the edge of the sheet and the front end coincides with the end of the sheet. Trace the profile onto the wood using a ball point pen with very light pressure. The top half of the profile is made in the same manner with its joint line coin-

(Continued on Page 18)


3"
2-3/4"
1/8" DOWEL x 6-3/4"
CUT FROM 3/16" SQ.
3/32" SHEET
OUTLINE FOR TD .020
#0 x 3/8" WOOD SCREWS ENGINE MOUNT
DOOR HOOKS .030 WIRE
1/16" MUSIC WIRE LANDING GEAR BEND FROM ONE PIECE
SOLDER WASHER
PLACE LEADING EDGE HERE FOR LEFT HALF
TRIM AFTER CUTTING TIP
2" DIHEDRAL EACH TIP
COVER BOTTOM WITH 1/32" SHEET
3/16" CENTER RIB
2-1/2" TYP.
2-1/2" TYP.
SAND OFF FOR DIHEDRAL
WING HALF RIGHT SHOWN - LEFT AS NOTED
5/16" SQ. LEADING EDGE
CLOTH HINGE
SOLDER WASHER
SLOT FOR O. S. PUSH ROD ARM
EYELET SPLICE LENGTH ADJUSTMENT - O. S. PUSH ROD
1/16" SHEET FAIRING
RECEIVER
FOAM
FIREWALL 3/32" PLYWOOD
FOAM
BATTERIES
SOFT BALSA BRACE BLOCKS
.030 WIRE
C/L RUBBER
EYELET TORQUE ROD BEARING
EYELET SPLICE - SOLDER
FINAL SPLICE - CITIZENSHIP ESCAPEMENT
1/16" SHEET DOOR
1/32" PLYWOOD RUDDER HORN O. S. ESC. ONLY
SOLDER WASHER
.030 WIRE RUBBER HOOK
1/2A LEAD OUT EYELET
BENT PIN EYE FOR ANTENNA
1/16" x 6" x 36" SHEET BALSA
1/8"
14 - 3/32" SHEET
2 - 3/16" SHEET
2-7/16"
1-7/32"
3/32" DIA.
3/4"
5/16"
1-1/2"
1/2"
1/2"
CITIZENSHIP SE-2
2-7/16"
1-1/2"
11/16"
3/8"
9/16"
1/2"
1-1/2"
1-7/32"
3/32" DIA.
5/16"
1/2"
O. S. MINITRON K II
ESCAPEMENT BULKHEAD 1/16" PLYWOOD
1/16" x 1/8" BOTH SIDES
BENT PIN ANTENNA EYE
SEWN HINGE
1/16" SHEET
2-56 BOLT
ELEVATOR 1/16" SHEET
1-7/8"
BALANCE
DOUBLER GRAIN VERTICAL
TRIM LINE
JOINT LINE
1/32" SHEET DOUBLER BOTH SIDES
COX PEE WEE .020
C/L TORQUE ROD (F. S.) & RUBBER (F. S.) CITIZENSHIP ESC.
C/L RUBBER (F. S.) O. S. ESC.
YOKE - CITIZENSHIP ESC.
BATTERY
BATTERY
ESCAPEMENT BULKHEAD
.030 WIRE
INSULATION
3/32" SHEET COWL PROFILE
FOAM
SWITCH
CUT OUT
1/16" SHEET FILLER FOR O. S. ESCAPEMENT
1/16" SHEET FAIRING
1-1/2" DIA. PERFECT BALLOON WHEELS
AERONCA CHAMPION
PROFILE SINGLE CHANNEL R/C SPORT
RADIO CONTROL modeler MAGAZINE
PROFILE
AERONCA CHAMP
DESIGNED & DRAWN BY
HERMAN GELLER
INKED BY
G. FLORES
0 1 2 3 4 5 6

(*Continued from Page* **16**)

ciding with the opposite edge of the sheet. If your sheet has good edges you now have a factory made square joint that should fit very tightly. I like Ken Willard's method of butting two sheets together. That is, you carefully put the two sheets together on your bench top and apply a piece of masking tape the length of the joint to hold the pieces tight. Now turn it over and "open the hinge." Apply a bead of glue in the opening. Close the joint and wipe off the excess glue. Lay it flat on the table and apply another strip of masking tape to this side to hold the pieces tightly together. If you desire, you can pin them to the bench. When this is dry remove the tape from both sides and you have a construction that is stronger than the wood. Add the 1/32" sheet doublers to each side. Use of epoxy will provide additional strength but cement is adequate. Sand the edges of the profile to shape. Do no sanding on the front end where the firewall mounts or at the tail on the surface where the stabilizer mounts. We want to keep these surfaces square, which is what they should have been when you bought them. Be careful when sanding the area for the wing mount so that it remains square with the fuselage. Use a sanding block for this and check your work with a square.

If you have to do a little extra sanding so that the wing support area is lower than shown on the plan, it will not matter providing you maintain the same angle between the wing mount and the joint line. This can be checked by measuring from the joint line to the leading and trailing ends of the wing mount. Cut out the escapement opening and sand it so that the back edge has the slope shown and is at right angles to the sheet. This will give you the proper mount for the 1/16" plywood escapement bulkhead. The slope avoids binding of the torque rod and rubber shaft. Drill a 1/16" diameter hole as marked from your template for the wire landing gear. You will have to elongate this hole by additional drilling and cutting in a rearward direction about 3/16" in order to install the gear which will be done at a later time.

Make a template and cut out the firewall from 3/32" plywood, mark the center lines on it in both directions and lay out the engine mounting holes. Drill these approximately 1/32" diameter through the plywood. Rough shape some soft balsa block or build up one from laminations of scrap left from the fuselage sheet. Rough shape these blocks per the plan leaving them slightly over size to finish after gluing. Glue the firewall and support blocks in place using white glue or hobby-poxy. You can block the fuselage in a standing position on your bench and block the firewall in place while it dries. Make sure that it is square with the fuselage. When the firewall and support blocks are dry you can bring them to final shape with sandpaper.

Bend the landing gear from 1/16" music wire. The front view of the plan shows the gear in its actual size. I find it easier to start with the "U" bend that goes through the fuselage and work from the center towards both axles. If you have a pair of pliers with narrow jaws or some other piece of steel or wood 3/16" thick, it will help in making this bend. Check the "U" bend on the finished gear to make sure that it grips the sides of the 3/16" sheet snugly before inserting it. Insert the gear into the hole and enlarge the hole if necessary working in a rearward direction with the gear pointing either forward or aft during insertion. Once the gear is inserted bring it to the vertical position as shown on the plan and using a sharp pencil, scribe a light line on both sides of the wire on one side of the fuselage. Rotate the gear out of the way and drill a series of holes along each line at about 1/16" to 1/8" centers. These holes should be about .020" in diameter or the closest thing you have to it. The gear is sewn in place using heavy thread. I like to use dacron control line which is sold at most hobby shops. It is a little tough to push a needle through 3/16" balsa; hence, the drilling. When the landing gear is sewn securely in position thoroughly coat both sides of the gear and fill the elongated hole with hobby-poxy. Apply enough at the gear so as to provide a coating over the wire in addition to a fillet on each side of the wire. This gear has withstood numerous hard landings with no damage and I believe the success is due to a tight sewing job and the hobby-poxy glue. A good model cement may be used if you coat it two or three times allowing each coat to dry thoroughly. The landing gear fairings are installed at a later time if you want to use them.

The wing mount is made from 3/32" medium hard sheet balsa. Cut two pieces 3" long from a 3" wide sheet and cement them together edge to edge to give you a 6" long platform with the grain running the short way. Sand or cut a piece of hard 3/16" square to a triangular cross section and cement it in place as a brace on each side of the fuselage. Have this ready when you initially glue the platform so that you can put them in place while the glue bead from the platform is still wet. When this is dry apply glue to the fuselage and block it in place vertically with the wing platform on the bench top. Check this with your square to make sure it is correct. Check again with the square and if all is okay, allow to dry. Cut two pieces of 1/8" dowel x 6¾" long, round off the ends. Glue these in place on the wing mount platform as shown. Make sure they are reasonably parallel to each other and to the fuselage or they will interfere with your wing alignment.

R/C GEAR

Trace and cut the escapement mounting bulkhead from 1/16" plywood. The plan gives the layout for both the Citizenship SE II and the O. S. Minitron K II. Any other escapement will do. If your escapement is larger than these, you will have to enlarge the R/C box accordingly. Make sure that you do it equally on both sides of the fuselage so that the drag will remain symmetrical. Lay out and drill all mounting holes. It will be necessary to remove the rubber hook shaft from the escapement in order to install it. The two escapements have threaded shafts for easy removal. Remove the shafts, being careful to note the direction in which the parts re-assemble and making sure that any washers in the mechanism go back to their proper places. Mount the escapement to the bulkhead with the screws provided or with 2-56 machine screws and nuts. Reinstall the rubber shaft. Fit the bulkhead into the opening and fuselage and line it up so that its center is where it should be. Make sure that your escapement clears all around, if not enlarge the opening. With the Citizenship escapement you will need to notch the back of the opening in the fuselage to clear the head of one mounting screw. It will be more convenient if you solder the receiver leads to it before putting the assembly into the fuselage cut out. When all is ready glue the bulkhead with the escapement installed into the fuselage with white glue or hobby-poxy and let it dry.

The installation of the torque rod bearing comes next if you are using a Citizenship escapement. Bend a loop in the end of a piece of .045 music wire as shown on the plans to fit over the pin on the escapement. For best performance this pin should be insulated by sliding a piece of plastic tubing or wire insulation over the pin. Make the loop large enough to go over this insulation and run free but without too much play. Slip a Perfect ½ A lead out eyelet (copper colored) onto the wire with the flange end facing the loop. Insert the wire through the torque rod hole in the bulkhead and engage the loop on the escapement pin. Push the eyelet into the bulkhead hole about half way as shown on the plan. Slip another eyelet onto the wire and clamp or pin it to the tail of the fuselage as shown on the plan. Rotate the torque rod to make sure everything is free, then thoroughly cement both sides of the bulkhead eyelet and the one at the tail. Give these two coats of cement. When they are dry remove the torque rod. The push rod

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for the O. S. escapement is not installed until the fuselage and tail assembly are complete.

Cut out the 3/32" thick balsa bottoms and front ends of the R/C box. Also cut the 1/16" sheet tops for the R/C box. Check these parts for fit, sanding if necessary to bring them to final shape. Glue them in place. The receiver can be installed next. Cut a piece of 1/2" foam rubber to fit the receiver compartment. You may cement this with contact cement directly to the bottom of the receiver leaving approximately 1/2" sticking out at the front end. If you would rather not do this, tie the foam rubber to the receiver with string or thread at two places by threading it through the leads on the receiver components so that when it is pulled up tight the thread will be against the printed circuit board and not on top of the receiver components. Coat the area on the side of the fuselage just forward of the escapement opening for a width of 3/4" with contact cement. Coat a similar area on the foam rubber with contact cement. When this is dry to the touch, carefully locate the receiver in the compartment and bring the two cemented surfaces into contact. Cut another piece of 1/2" foam to fill up the space between the front end of your receiver and the front bulkhead of the R/C box. I have found this gives a good mounting. By omitting the cement at the front end of the foam you can readily take it out of the compartment when you want to. You would be surprised at how tough it is to get a receiver out of a tight compartment without damage if it is cemented to the foam rubber and the foam is completely cemented to the fuselage. Mount the switch in the bottom of the R/C box on the left hand side as shown. This is the least crowded area. The small, single pole single throw, switches which are available in the hobby shops can probably also be mounted on the right if you prefer that side. Make sure that the wires will not interfere with the escapement operation. I tie the loose wires together with thread and glue them to the bottom of the box with contact cement so that they cannot move around and get into the works. The batteries are installed in the same manner as the receiver. Since I follow the practice of recharging dry cells, I use a two prong plug and receptacle cut from the six prong variety that is available at the hobby shop. I solder the female end to the batteries to avoid accidental shorts, and the male end to the receiver and switch leads. The wiring is done in accordance with the receiver and escapement instructions. Make sure you have good solder connections. I used a Controlaire 5 receiver and two alkaline pen cells. I taped the pen cells together with a double wrap of plastic electrical tape. Make sure that they are turned end for end so that by soldering the lead across one end you will end up with a positive and negative on the other end and have two cells in series to give you the three volts required by most receivers. The alkaline batteries are well worth the additional cost and you can get a full day's flying out of them. If you do not recharge your batteries, bend three small "J" shaped hooks from .030 music wire. Cement two to the forward bulkhead and the other to the fuselage at the forward edge of the escapement opening. Leave this one sticking out just past the foam. Tie the batteries in securely with a husky rubber band between these hooks. The batteries have a great tendency to go flying forward when the model comes to an abrupt stop, so if you do not glue them in securely, make sure you strap them in securely.

Make the doors for each side of the box from 1/16" sheet. Bend a small "J" shape hook from a pin or music wire and cement it to the bottom edge of the door about 1/4" forward from the landing gear. These hooks are used to keep the door shut. A small rubber band stretched from the hook on one side under the fuselage in front of the landing gear to the hook on the other side keeps both doors closed. The objective, of course, is to keep dirt out of the escapement.

The fuselage assembly is now ready for doping.

TAIL ASSEMBLY

The elevator, fin and rudder are cut from medium hard 1/16" sheet balsa. The elevator is 12" tip to tip and about 4 3/8" wide at the center. If you have a 4" wide sheet, measure off about 12 1/2" and locate the center. Glue an additional strip of 1/16" about 3/8" wide or larger and 2" long to the edge of the sheet symmetrical about the center line. When this is dry you can trace out the complete elevator and cut it in one piece.

The fin and rudder should be cut with the grain running vertical. Cement the 1/16" x 1/8" braces to each side of the rudder as shown on the plan. Locate and drill the hole for the 2-56 bolt if you are using an escapement yoke. If you are using the O. S. escapement, cut the rudder horn from 1/32" plywood and white glue it in place. The tail pieces are now ready for doping.

WING CONSTRUCTION

The wing construction is quite simple and goes together very rapidly. If you cannot buy a 6" x 36" sheet of 1/16" medium balsa, buy two 3" wide sheets and make sure that the edges are straight and will match together. Glue them up using the same technique described for the fuselage. Fourteen ribs are traced and drawn on medium soft 3/32" thick sheet stock. The two center ribs are cut from the leftover fuselage material. They are all the same shape. Stack the ribs together in two groups for easy handling. The idea is to line them up at the leading edge and the bottom and hold them together in a group for sanding. This will make them all the same size and shape. Obtain a straight hard piece of 5/16" square for the leading edge and mark a line with a ball point pen 1/8" from one corner for the full length of the 36" strip. Cut the leading edge into two equal lengths. Using a razor plane or sanding block, taper the entire strip to give the cross section shown in the plan. Try to stay away from the inside edge so that it will remain the full 5/16" deep and will match the height of the ribs. Find the center of your 6" wide 1/16" sheet and draw the center line with a square. Cut it into two equal pieces. Pin the leading edge for one-half of the wing onto the plan. Cement the leading end of each rib to the leading edge and pin them to the plan and allow to dry. The rib should be flush with the top of the leading edge. If you have some variation here when the assembly is dry, you can take out the bump with a sanding block. Coat the bevelled surface of the leading edge and the top curved surface of each rib with contact cement. Using a square, mark a light line on what will be the underside of the 1/16" sheet at 2 1/2" centers. Apply a coat of contact cement about 3/16" wide along each line and along the leading edge about 5/16" wide and allow to dry. Lay the leading edge and rib assembly, bottom down, flat on the bench, using a strip of wood or other flat object to butt the leading edge against. This will serve as a guide for placing the 1/16" covering. Keep in mind that once the two surfaces covered with contact cement come into contact they have made a permanent joint, so it is necessary to have everything lined up before letting them touch. Hold your prepared sheet, contact cement down, with the leading edge against the alignment block and about 1/4" above the wing framework. Make sure the end of the sheet is lined up with the face of the 3/16" rib and is in line with the front of the leading edge. Lower the sheet in place at an angle so that the leading edge makes contact first. Run your finger along the leading edge of the sheet, pressing it down firmly against the leading edge of the framework. Run your hand across the sheet from front to rear, pressing it down against the top of each rib. The wing panel assembly is now ready for trim. Turn it over and check to make sure that all the ribs are in contact. Make a template of the wing tip, lay it on top of the wing so that it is tangent to the tip of the sheet and mark the outline with a ball point pen. Trim to the

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line and finish with sandpaper. Taper the leading edge and the bottom of the tip rib to blend in. You are now ready to sand the dihedral angle into the thick rib. The best way to do this is to block up the wing so that the tip has the proper height and thick rib is at the edge of your building board or work bench. Using a sanding block with medium or coarse sandpaper and holding it vertical, sand the thick rib. This will produce the proper angle. Be careful that you sand it at right angles to the leading edge so that you don't end up with a swept wing or a reversed swept wing. Make the other panel in the same manner but opposite hand. One wing tip template does for both. Block up the two halves on your bench and check the fit of the center joint. Make any corrections necessary with the sanding block. Get as much area in contact as possible between the two halves as this will determine the strength of the joint. Place a piece of wax paper on your bench, coat the ribs with cement, bring the two halves together and block them in place for a tight fitting joint and the proper dihedral. When this is dry cover the bottom of the wing from the center to the first rib out with hard 1/32" sheet, the grain running parallel to the span. Complete the shaping of the leading edge top and bottom to the finished contour shown. You can do this by eye or make a template and check it along its length. The wing is now ready for finishing.

FINISHING

Weight is the main consideration with regard to the finish. I have found that at least three coats of dope thinned 50% are necessary over a contact cement joint to protect it from the fuel. If you want to leave it natural, three coats clear thinned about 50% and sanded lightly after the second coat should be enough. I wanted a little color on mine so I used two coats of thinned clear and one coat of colored thinned about 50%. If you brush this on evenly it will not cover the grain but will give the model an attractive coloring. I used the standard Aeronca colors, that is, an orange fuselage, rudder and fin with a yellow wing and elevator.

I use a particular technique for doping thin balsa parts to avoid warpage. The idea is to apply the dope to both sides simultaneously so that the shrinkage is equalized. I start at one end of the part for the length of about 2" then turn it over and dope the opposite surface for a length of about 4", then back to the first side and repeat. By alternate doping one side and then the other, warpage is avoided. I use pins for legs on thin parts so they can be stood up for drying. Another scheme is to insert a pin into the edge of the piece and suspend it using a spring type clothespin tied to whatever is available.

Examine the engine mount carefully prior to doping and fill or close any openings with cement so that the fuel and exhaust oil cannot find its way into glued joints. I use an extra coat or two of clear dope on the firewall and bracing area for improved protection against fuel. Additional trim may be added to improve the appearance. You can use the trim tapes that are available or do the following: make templates of the window and door outlines, locate them on the finished doped fuselage and go around them with a black ink ball point pen. You will find that this will leave a nice heavy line without much pressure. Now very carefully give this area a coat of clear dope. The dope will run the ink so it must be put on without much brushing. It is much safer to use a spray can.

FINAL ASSEMBLY

Using a needle and thread sew the rudder to the stabilizer with a figure eight stitch. I pick out a thread that closely matches the color and apply cement only to the ends of the hinge so that the thread will not unravel. Don't get any cement near the hinge joint or it will stiffen. Mount your rudder yoke if you are using one and then glue the fin and rudder to the elevator, blocking it up to maintain it at right angles. When this is dry, cement the entire tail assembly onto the fuselage making sure that the elevator is perpendicular to it. You may want to add a triangular brace between the rudder and the elevator. I haven't found this to be necessary yet.

If you are using the O. S. escapement, fit the push rod between the escapement arm and the rudder as closely as you can. Cut it in two at a convenient place and snip off about 1/8". Slip a Perfect 1/2 A eyelet about halfway onto one piece and crimp it on with a pair of pliers. Connect the two ends of the push rod to the escapement and the rudder horn. Using a piece of scrap balsa, clamp the rudder to the fin to maintain it in neutral position. I find it best to install the rubber on the escapement and put in a few turns to hold it in its normal neutral position before making the final linkage hook up. Now slip the other half of the rod into the eyelet and making sure that your escapement is in the neutral position, solder this connection. This allows you to make the final neutral setting without having to bend the push rod ends with a high degree of accuracy.

If you are using the Citizenship escapement, you may have noticed that the torque arm and yoke are opposite to the usual installation. If you mount the escapement as shown, it will be upside down, hence the reversed linkage. This keeps the signaling standard i.e. key and hold for right, short and hold for left. Cut off the loop which you bent earlier that fits over the escapement pin. You just can't get the loop with a long piece of wire attached back into the box once all the gear is installed. Cut this to give a 3/8" long shaft. Bend the end of the remainder of the wire to make the arm that engages the rudder yoke. Fit this wire in from the tail and mark it about 1/4" beyond where it comes out of the bearing eyelet in the bulkhead. Remove the wire and cut it off. Cut it again about halfway from the end to the bend. Reinstall it. Slip a Perfect 1/2 A lead out eyelet over the short shaft on your loop. Crimp it in place. Install the loop in the box so that it is engaged on the escapement pin and push the straight torque rod piece into the eyelet. Move the whole assembly forward as far as you can so that you can solder both pieces of wire to the eyelet without soldering it to the bearing. This eyelet not only makes a splice but makes the thrust bearing in a rearward direction. Now join the two halves of the torque rod together with another eyelet about halfway between the bulkhead and tail bearing. I wrapped a double thickness of aluminum foil around the fuselage to protect it during this soldering operation. This connection allows you to make the final adjustment in the length of the torque rod so that you will have about 1/16" end play. Use the same technique as described for the O. S. equipment to hold this in a neutral position when making this last solder connection. If you end up a little bit off, you can make adjustments by bending the rudder yoke.

I used the Cox Pee Wee .020 engine which is very inexpensive and adequate for the job. You can mount it with the cylinder upright if you prefer, but it breaks up the profile. The Cox TD-.020 will give you improved performance at additional expense. Mount either engine using No. 0 x 3/8" wood screws which are available from Perfect. The Cox three blade prop made for these engines gives the best performance but does not have the scale appearance of the two blade prop. You take your choice!

FLYING INSTRUCTIONS

Before flying, balance the model. It should balance slightly nose heavy at the point indicated on the plan. Since the radio gear is mounted off center, it is advisable to screw a small eye at the center of the wing at the point shown on the plans and suspend the entire model so that the balance can be checked both longitudinally and around the thrust line. If your model does not balance with the fuselage vertical, add the proper weight to a wing tip until it does. I cut a piece of solder which I lay on top of the wing, trimming it until it is the proper weight. Then I flattened it out

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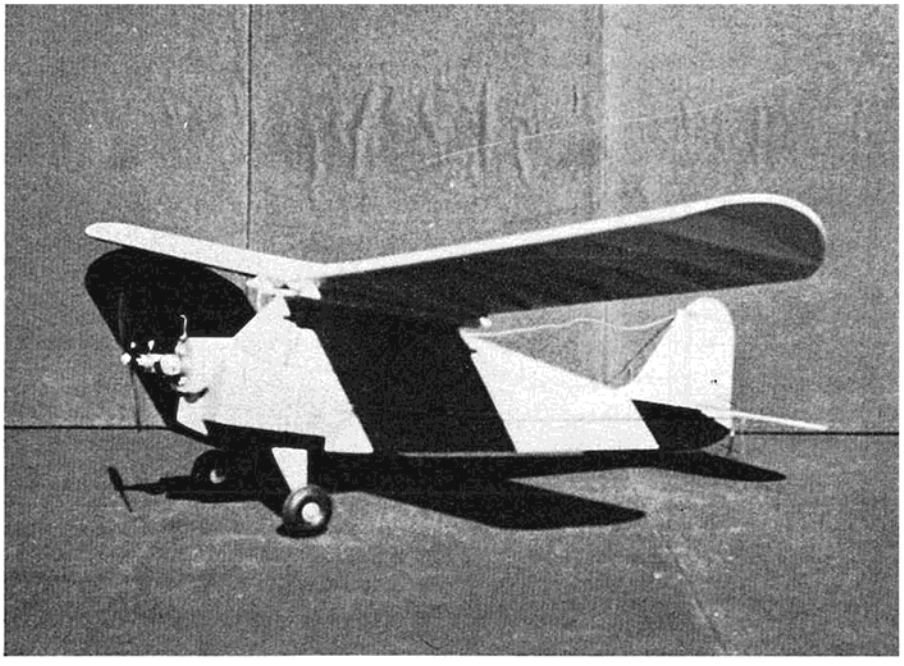
with a hammer to about 1/32" thick, formed it to the curvature and thoroughly cemented it to the underside of the wing tip. You should be able to achieve longitudinal balance by shifting the wing on the mount until the thrust line is horizontal or slightly downward. If you need to add weight you can add it under the R/C box forward or under the elevator where it will not be visible.

Test glide the model. It should have a fairly long flat glide that should be straight. If it dives, move the wing forward. If you have the wing as far forward as it will go, then add a 1/16" shim under the leading edge to increase the angle of incidence. If it has a tendency to swoop in the glide, move the wing backward. When you have achieved the proper glide you are ready to fly.

One of the old pros in this business, Bill Winter, made a statement in one of his articles; "No one can tell you how to fly, but there are some things that you can try to avoid." He went on to list a number of items which I feel are very excellent although I haven't always been able to follow his instructions. I think it is most important that you keep from making any maneuvers or giving any signals when close to the ground unless you are an expert. My failure to do this has caused more crack ups than any other single thing. A poorly trimmed model will do itself much less damage if left alone than if given the wrong signal at the wrong time. On my prototyype I had no choice. My escapement was so badly worn that I could not key it fast enough to obtain a left turn. The left turn is the downfall of all beginners. Therefore, I trimmed the rudder about 1/16" to the left when measured at the trailing edge. Trim it neutral for the TD-.020. In other words, I started out with a built in slight left turn so that the corrective signal would be right. This only requires pushing the button and holding it. Right rudder throw should be about 3/16". My model flew almost straight with this trim and I planned my flight to consist entirely of right hand turns. Try to launch it in the level position. Run with it if you want, but it is so small that it is not difficult to throw it with a pretty good toss. Just make sure you don't throw it with the nose up or down. Let it get about 75 to 100 feet of altitude before the first command. When signaling hold the button for a short period of time, just long enough that you can see the effect. Then release it. The model will tend to come out of the turn and you can bump it again. "Bumping" it around the turns is the best way to feel it out and although it isn't smooth, it keeps you out of that deadly spiral until you get a little more experience. When you have it trimmed out and have flown it a couple of times, let it climb to a good altitude and then try your keying skill for a left turn. If your model is well lined up, it will probably be more susceptive to a left turn due to engine torque, so don't hold the signal very long but practice the bumping to the left at a safe altitude.

Good luck and have a ball. I did.



SPIGGEN

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be noted that the cut-out in all formers depend on which side of the engine the throttle arm is located. Fasten the blind nuts on the engine mounts and glue them in together with firewall 8, keeping the support blocks and gluing it all in at one time. The next day, remove the fuselage from the construction board and have a go at getting the right curve on the nose. If you succeed, join the hardwood noseblock, and glue on the bottom balsa block. Former 2 is moveable and is held in place with the canopy only. Fit in the triangular filling-out spars in the nose room and glue them in place. Join the hollowed block at the top. Don't look at the fuselage now. It's ugly. Shape and sand the top **right now.** It would be almost hopeless to make the top beautifully curved with the forward wing and the fin in place. When the top has been shaped, fit the wing and turn the fuselage upside down.

Slide in the wing halves from each side with the wire hinges in place. The wing tips shall now reach the board. Complete everything else inside the fuselage before you lay on the bottom sheet. I waited to cut out the hatch until the fuselage was glassed and doped. The cockpit is made of just the top part of a 9" deBolt canopy which is forced on a plywood frame. I hope you will find a ready-made landing gear which will suit. I have used a Bonner Digimite 8 which has given me 1½ years of trouble-free, intensive service. That has also been the touch which made this project look more realistic. It gave me further freedom to put in brakes, rockets and later retractable gears, and thus have use for all the controls on the transmitter.

I'm absolutely not the right guy to explain how to get a nice finish, and there is too much written already. I finish in a new way every time, anyway. But whatever method you prefer, this I know: Give her, in every case, a protective cover of cloth or tissue. Don't experiment on a new good-looking ship!

When the bird is ready for flying, please take a picture of her (before takeoff), together with something characteristic of your part of the world and please send a single copy to me, Leif Thelin, Nordmannagatan 8 G, Kungalv, Sweden.

Don't you worry — she will take off all by herself!

SLOPE SOARING

BY REX TAYLOR

PHOTOS BY WHITEY PRITCHARD

EVERY model magazine we pick up is devoting more and more space to this slope soaring thing. We read glowing descriptions of touch and go landings on the hilltops, altitude and duration records being shattered, and pretty soon we find ourselves looking at the glider kit ads. We start putting together some ingenious plan by which we can justify spending that dough the good wife was saving for a new bedroom suite on a slope soarer.

The next thing we know, we're right down there at the ole hobby shop trading the king-size for that beautiful glider kit. Why that particular kit? You like the lines, or maybe it comes in a prettier box, or maybe that's the one that the mag says Sam Sorethumbs got four hours' duration out of and did 27 turns in a spin.

In powered models we have always played follow the leader. When Dunham won the nats with a Smog Hog, we all built Smog Hogs; and so on through the Astros, Orions, Beachcombers, Candys, ad infinitum.

This practice is basically a good one in powered models where we are working with a built-in lift generator in the form of an engine. (Some uncouth persons have even been known to profane the beauty of a glider with power assist pods. They are to be pitied, for they do not earn their place soaring in the heavens by sweating out each pass across the hill.)

Just picking out a glider because you like it, or because it performs well in Southern California or Australia, perhaps, is no guarantee it will perform well for you on your soaring site.

The question now becomes simply this, "How does a beginner pick a glider, select a hillsite and, perhaps even more important, get into the lift zone and stay there?"

Well, let's analyze this thing and see if we can learn by human means what the buzzard was born with.

There are four basic requirements in slope soaring, which I shall attempt to cover in easy (I hope) stages. First, of course, you gotta' have a slope soaring type airyplane; otherwise the other three stages will be very difficult. But, and this is important, if you don't have the right glider for your particular conditions, slope soaring may be a big disappointment. All too many would-be glider pilots either build or design a glider which, while it may be beautiful and well constructed, is almost totally unsuited to the prevailing local conditions, and therefore either doesn't last long or is hung up to grace the ceiling of the work shop.

In choosing a glider one has an almost unlimited choice, but the choice must be governed by these factors:

A. Lift conditions in your area
B. Type of radio gear to be installed
C. Anticipated duration of flight
D. Landing area.

When considering wind conditions a check with your local weather bureau will give you the figures on average wind velocity and directions at any given period of the year. Once you are armed with these facts you can start looking for a suitable hill, if you happen to be pioneering the glider thing in your area.

We have found here that a hill should be at 90° to the wind direction if possible. This gives maximum lift per wind velocity, although the wind can angle into the hill as much as 45° and still produce an adequate amount of lift. As a general rule, though, the more angle into the hill the less lift to be generated. Now the next point is the slope of the hill itself. Just how steep does the hill have to be? It would appear that 45° or more slope is required to produce a decent amount of lift. A hill should be relatively clear of trees, large boulders or other protuberances which would disturb a smooth air flow over the slope. The longer the hill or ridge, the better, as it tends to deflect the air upwards and over the hill rather than around the ends, and as a result produces a much longer lift area. Ideally, the modeler would be able to find more than one hill so as to always have a hill which is facing the wind, but this won't be possible in many localities, so it makes it doubly important to select and build the right glider for the conditions that prevail in your area. Another important factor after you have a hill spotted is the average wind velocity. The reason I keep referring to average is simply this: if the glider is tailored to the average conditions in your area the net result equals much more usable flying time which is what we're after.

Let's assume you have checked out the wind and hill now, and you have determined that you can usually expect a 5 to 15 knot wind from the northwest and have selected a hill which is at 90° to the prevailing breeze. Okay, so far, this set of conditions dictates a glider of light wing loading, as lift will be light in this kind of air. Should the average be 15 to 40 knots, then you would be wise to forget the lightly loaded ships and concentrate on designs with high wing loadings and forward CG locations as penetration is the prime factor in staying airborne in this kind of weather. Locally, we have flown in 50 knot winds by, believe it or not, filling all empty space in the nose with rocks, decreasing wing incidence and applying down trim! In this kind of wind even the birds are walking.

The size of your glider will be largely determined by your lift conditions versus the type of radio gear you intend to install. If your gear is heavy and your lift is light build a big glider so as to keep the loading light. This is where

The author slope soaring at Sunset Beach State Park, near Watsonville, Calif.

The end of a day of soaring. Whether thermal or slope, you may find that gliders are just for you!

factor "C," or duration of flight, can make a big difference. It is well to plan ahead and make allowances for an extra large power supply as flights of two or more hours are not at all uncommon, and duration many times will be limited only by the battery life in your control system! It is pretty heartbreaking to have to come down because of weak batteries when you know you could get a real long flight. Plan on the most flight time from the start and make sure your glider can carry the extra weight of an adequate power supply to give extended control life.

Almost any type of radio gear can be used successfully in gliders, from a simple escapement to the most advanced proportional rigs. Incidentally, this is an ideal way to get many more hours of enjoyment out of that old 10-channel reed rig you parked on the shelf when you got your new propo.

We have a good representation of all types of gear here in the R. C. Bees Club (Santa Cruz, Calif.), from bang-bang to propo. Galloping Ghost is a natural for the single channel man, can even get trim from that unused throttle on Rand or Ghost actuators.

Another thing we have found is that gliders require very large control surfaces when compared to powered planes. The size of the surface seems to be in relation to the speed of the aircraft. For example, a slow, lightly loaded glider will require much more control surface and surface deflection to produce the same trim as a heavily loaded, high-air-speed ship with small surfaces. The apparent reason is that the air is flowing so slow over the surfaces on light gliders that it takes more surface to do the same job.

One club member has built a beautiful 12-foot span extremely high aspect ratio glider of original design with small control surface area. Unfortunately it is very reluctant to turn; in fact, probably will not be used as a slope machine at all for this reason. Maybe it will find a place in thermals as it is a shame to see so much work not turn out right.

The slope soaring glider must be able to turn tight with a minimum loss of altitude. One of the best I have seen turns almost flat with very little bank. Sometimes the altitude lost in a poor turn can cost you the flight, as once you drop out the bottom of the lift area, there is virtually no possibility of getting up into the lift again.

Construction methods vary greatly, particularly since the advent of foam, and really are not of great importance so long as your glider ends up **strong**, and I can't emphasize the "strong" too much. They may be beautiful and graceful in the air but they have to take a beating sometimes, so use your best building methods. The wind that is so nice while you are flying can destroy a weak glider almost instantly if you should be blown down and have your ship rolled like a tumbleweed.

Consider the areas where you will be landing and treat the nose and fuselage bottom to a liberal application of fiberglass if it is to be subjected to gravel, etc. Stringers and silk are all right for grass but damage easily and can cut your flying short.

So now we finally arrive at the point where we have the glider built. We have the hill (or hills, if you are so fortunate as to have more than one) and all that has to happen now is for the wind to blow at the average speed and from the direction it always blows at this time of year, and you can show ol' Mr. Buzzard a few pointers on soaring flight.

Relax now, for as some wise old sage once said, "The hardest thing about slope soaring is waiting for the wind to blow." It never seems to blow when you have a new glider ready, or if it does, it either blows too hard for light ships or not hard enough for the penetrators. If you are foolish enough to attempt to fly your glider in unsuitable weather you may offend the Toy Airplane God and he will surely smite your toy and reduce it to rubble.

However there is a logical solution to enable your glider to fly in a broad range of wind conditions; namely, build two wings. My glider uses a 104 span, 800 sq. in., undercambered section wing to soar on light winds and a 72 in. span, 540 sq. in., semi-symmetrical section wing when it is really blowing. This seems to me to be a whole lot easier than trying to maintain two separate ships and also needs no extra radio gear.

Some of our club have learned to always have the glider's power packs at full charge and one guy even keeps his glider in his car almost all the time so the soaring group is in instant readiness to fly if the wind starts to blow from the right direction. Then when all is in order and ready for the wind, you fly your old oily multi or whatever you have until the wind does blow. In this manner we seldom miss a day's flying because of weather unless it rains, and our local glider ace has even been known to fly in the liquid lift. Why not? The wind was blowing and dope is waterproof.

Now here we are at the flying site and you are ready to make that first flight. The only question is where is the lift located relative to the hill? Again we are forced to generalize, there being no hard, fast rules in slope soaring.

Usually, however, the best lift is about even with the top of the hill. The lift area will be from the top third of the hill to a height above the hill determined by the height and slope of the hill and the wind velocity. The stronger the wind the higher the lift area.

(Continued on Page 26)

GOODYEAR RACING

How to organize and conduct an N.M.P.R.A. Goodyear contest

PART I

Scale Pylon Judging Guide

A MAXIMUM of 20 points can be given to a Goodyear pylon racer model. The awarding of these points can be easy to do. Please remember that the purpose of the event is to race model aircraft against each other. It is not a scale contest.

The models to be judged at a given contest should be judged against each other. The best and the poorest model should be selected and assigned maximum and minimum values. The remainder of the models will be assigned points accordingly between these two aircraft. The time to judge each model should take 3 to 5 minutes each, maximum. To receive full points the model does not have to be exact scale or have a perfect finish, but the model should be well above average.

It should be noted that a given aircraft may have different points assigned to it as it is entered in different competitions. We are after a relative judging so that we can have one aircraft better than another. This will then in turn provide us with a handicap for a staggered racing start.

A definite attempt towards realism must have been made before the model is acceptable. Judges shall disqualify any entry that doesn't look like a particular Goodyear racer but still meets minimum dimensions. It is up to the judges to keep this event free from unrealistic models built only for speed. Contestants should bear this in mind if they plan to build to minimum standards for they may end up with an entry that will not be acceptable at all contests.

To judge for scale points the judges will stand approximately five feet from the model. He should not be concerned with the scale dimensions or scale construction. An example of this would be a stabilizer that is enlarged and built out of solid balsa while the real one was smaller and fabric covered. The only thing the judge should be concerned with is if it looks similar to the real one from five feet away.

This is only one example to show the judges what to consider for points, but the judges should try and judge the entire model at once for it is possible to have a model with many outlines correct and not even resemble its full size counterpart, if a few distinguishing features are not done correctly.

Fidelity to scale, workmanship, and finish are the factors to consider when judging. All three items are to be grounded together to arrive at the total handicap system. The judges should realize that it would be impossible to have a step by step set of rules to judge by. This judging guide was written to give the judges a better concept of this event and should never be interpreted as an exact standard of judging.

HANDICAP SYSTEM

I believe the handicap system is self-explanatory but I will go over its use in practice. Say a plane receives appearance points of 10 — this is subtracted from 20 (which is maximum) — giving him a handicap of 10 seconds. When the contestants come to the starting line the lowest handicap is on the left and will be first off. The rest line up on his right in handicap order. When all engines are started or at the end of two minutes, whichever is sooner, the flagman will point the flag at each contestant and timer. As soon as he has the OK from all concerned, he will raise the green flag. At this point the timer's watch will be started. The flag will be dropped for each contestant as the handicap is reached on the flagman's stopwatch. When two contestants have the same handicap, a coin will be flipped to see which will take an extra second delay. An insurance lap should be taken by the contestants in case he might have cut a pylon on the last lap. When the flagman has confirmed the completion of the race by all participants, he will give the word to land aircraft which will be done without delay.

SCORING: The handicap being taken care of at the start of the race means whoever crosses the finish line first is the winner. When running three plane heats in the finals, the winner always gets three points — regardless of how many finish. Second place gets two and third gets one. A plane that does not finish gets no points. Normally at the end of four rounds you will have a winner. If not there are three ways of coming up with winners. One, if time allows use your check off list and patch together another round. Two, if ties are on different frequencies, fly them against each other. Last, use qualification speeds, the fastest is the winner.

QUALIFICATION HEAT

The qualification heats serve several purposes. They give the contestants a chance to familiarize themselves with the operation. It should be impressed on the contestants that in the event of a point tie at the end of the meet between contestants on the same frequency, the one who turned the fastest time in the qualifications wins! Flying two contestants at a time during qualifications seems to work out the best. Each contestant is allowed to go to the starting line three times to post a qualifying speed. If he posts a qualifying speed on the first round, he may, at his own discretion, drop out of round two and three or he can fly and try to improve his time. When a contestant is called to the line he must fly or pass the round. The event

(Continued on Page 26)

N.M.P.R.A.

(*Continued from Page* **25**)

director may waive this rule under extenuating circumstances but it should be followed wherever possible.

Speed is the thing that you are interested in at this point — not placing 1st or 2nd — so it doesn't make any difference at this point if the same people are in the air at the same time in consecutive rounds.

Scheduling the races is the most difficult part of running a fair race. Great care must be taken at this time to avoid having a contestant fly against one man more often than the rest of the contestants! There is no easy way to schedule races but there are a few hints that will help. Use colored pencils to match frequencies when writing contestant's name. Make a list under each contestant's name of the names of those he can fly against and then mark them off as races are scheduled. When a heat is scheduled it is the contestant's responsibility to be ready. The races will start on schedule and any contestant who is unable to make the starting line will get zero for the round.

It is unlikely that you will be able to run a completely balanced meet because of the frequency problem but with proper care you will find the fastest and most competent flyer getting first place.

You will need the following officials:

Event Director — His duties are to make sure all other officials are on hand. He will normally be responsible for having the correct contestant at the starting line. In general — he will have to do anything he can't get someone else to do.

Recorder — Duties involve scheduling the races and recording the results.

Flagman — Starts the race, warns the flyers of pylon infractions during the race, drops the white with one lap to go, and ends the race with the checker. **He will only accept reports of cut pylons from the lap counter assigned to the contestant.**

Lap Counters — Keep track of the laps. During qualification heats they also time the contestant they are responsible for. During the race they must watch the pylon judges for cut pylon signals and relay this information to the flagman. They must also inform the flagman when the contestant they are keeping track of **starts** his 8th lap.

Pylon Judges — No. 1 pylon has the same number of judges as there are planes in the heats. Pylons No. 2 and 3 have one judge each. The judges at No. 1 pylon will space themselves out to the right of the pylon and each will be responsible for the plane in the same relative position on the starting line: i.e., plane on right — judge on right, plane on left — judge on left. The judges will hold their flags up as the planes approach the pylon and drop them as the plane comes abreast — 90° to the course and even with the pylon. Care must be taken not to drop the flag early or late so as to avoid unfair advantage or handicap the contestant. The signal for a cut pylon is waving the flag in a circular motion over the head. Judges at pylons No. 2 and 3 will signal all cuts on their respective pylons. If more than one plane is passing the pylon at the same time, he should call out which one cut. If a suitable intercom system is available, the flags for cut pylons can be eliminated and the plane's color and basic number can be called in the starting line for relay to the flagman. (To be continued.)

SLOPE SOARING

(*Continued from Page* **24**)

The glider should be hand launched from a point below the crest of the hill, straight out from the hill, down elevator usually being required at first to keep it penetrating into the wind until it gets out away from the hill and into the best lift. Anytime the glider gets back too close to the crest, apply enough down to make it penetrate into the wind. The glider is always going down and will climb with a nose down attitude, so don't get eager and pull the nose too high in an attempt to gain altitude. It doesn't work!

The whole secret of slope soaring is simply this: the rate of sink on the glider must be less than the rate of rise or climb as you may call it, of the lift area so that even though the nose is down the aircraft is going up. Most all gliders seem to have two distinct flight speeds and it is well to remember them and use them accordingly. At slower flight speeds you get maximum duration, but if you must get from point A to point B a higher airspeed will get maximum distance with minimum loss of altitude. This is very useful sometimes if you fly out of the lift area and have to get back or land. Just remember to put the nose down to stretch the glide.

Always make your turns away from the hill and be especially careful of elevator here as a little too much can cost you all the altitude you gained on the pass across the lift area. A proper turn will gain altitude for you.

It would be almost impossible to foresee all the variables which may modify some of these things I have mentioned. I have not said anything about thermal soaring because we don't have good thermal conditions here. Consequently, I have no experience in that area.

What I have outlined is based on the experiences of our local group and we had to learn everything the hard way.

Successful slope soaring is no accident. It is the result of careful planning, including the right aircraft, the right slope for the wind conditions, proper piloting techniques which can only be learned by soaring every time you get the opportunity, and radio gear that will perform faultlessly for the duration of your flight, whatever that may be.

Soaring has been called "motorless" flight but it seems that planning can go a long way toward replacing a smelly, oily engine as a source of power.

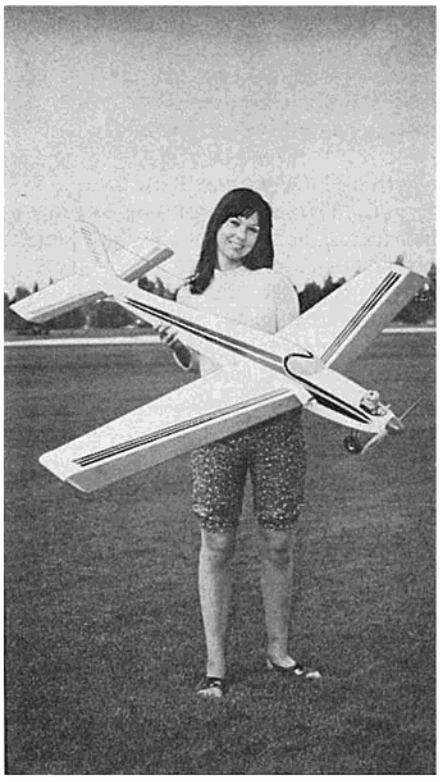
Learning to watch the local weather report daily in your newspaper is your best tipoff that gliding type winds are coming. Usually storm fronts moving in bring winds with them.

Another thing that is very important but very often overlooked in our haste to go flying is adequate clothing, a thermos of hot coffee, gloves, sunglasses, folding stools, and all the other paraphernalia relating to the creature comfort of the pilot. An otherwise perfect soaring day can become an ordeal if one is not dressed comfortably and warm. Recently our local ace, Paul Forette, was flying an attempt on the club glider record and his biggest problem was lack of a relief tube setup!

In summary, analyze your local soaring conditions, then choose a design that can make those conditions work for you rather than against you, be always ready to fly when conditions are right, and be comfortable enough to last as long as the wind does.

I'll meet ya at the hill.

(Ed's note: After that remark about powered gliders, Rex, you won't meet me at my hill!)



This series of articles on R/C aircraft design and associated aerodynamics is co-authored by Ben Herman, Professor of Atmospheric Physics and Jack Capehart, Professor of Psychology at the University of Arizona. Acting on a consulting advisory basis is Professor Parks, Dept. of Aeronautical Engineering, Capt. Henry Wright, U.S.A.F., and the Tucson R/C Club.

A study in Class III Aerodynamics by

BEN HERMAN
JACK CAPEHART

part 1

PRECISION PATTERN AIRCRAFT DESIGN

INTRODUCTION

AERODYNAMICS is such a complicated subject that it would require the use of high speed computers to even approach any degree of thoroughness. Economic considerations, unfortunately, preclude pursuing the subject in this manner, and therefore, we modelers are generally forced to use the cut-and-try method along with as much common sense as we can muster. It is also helpful to have a basic knowledge of elementary aerodynamic physics. The authors do not claim to be experts, "unless you ask us." However, this article does represent the culmination of several years of discussion (disagreements) and arguments (usually more profane than profound) between the authors. In fact, we have almost come to feel that if we can agree on something it must be absolute truth (until we ask a third opinion). We hope to outline in this article the results of this frequently frustrating period to the extent that our discussions apply to multi-aircraft design. Undoubtedly, many will disagree with what we have to say. This is only to be expected and we confidently expect and welcome fruitful controversy. In fact, if controversy can be established, we feel that an important step may be taken towards leading the way out of the current wasteland (toad farm) of multi-pattern design.

In support of the last statement it must be conceded that the Kwik-Fli II is the top Contest Pattern airplane of the day. That is based on its record, everyone must conclude that it is the "top-toad." Frankly, it is the feeling of the authors that this design represents a fine tribute to Phil Kraft's flying ability while pointing out what is perhaps a slight weakness in his abilities as an **aircraft** designer. In Phil's defense, however, it must be recalled that the design has also won in hands other than his. Don't despair, Phil, we never tell R/C manufacturers how to make equipment (unless it stops working). We selected the Kwik-Fli II for a number of reasons. First, it is the top airplane of the day; and secondly, it has some interesting defects which we hoped to correct by the application of certain aerodynamic principles. We built three Kwik-Flis in order to conduct an experiment, so we know enough about its characteristics to kid it a little. But, back to our story.

A survey of the AMA and FAI patterns and associated judges guides reveals the necessity of a formidable array of flight characteristics for any airplane to possess. We suspect that even the Russian Yak 18-PM would have its problems. Not only do present designs fail to meet these specifications, but it is probable that no design could fulfill all of the requirements of these two patterns. It is, however, also probable that our current designs are not the ultimate. They **can** be improved, at least to some degree, by both experimentation and sound common sense. First, it is evident that any design must represent a number of compromises. For example, we require an engine to give us thrust, but at the same time we are forced to accept the undesirable torque reaction which goes along with the operation of the reciprocating engine. Other compromises such as right engine thrust which may cause other adverse effects are made in an attempt to counteract torque. After attempting to put various multi-designs through the pattern, it suddenly occurred to us that the greatest compromise of all was that of the pilot skill and practice required to make up for the inbred defects of these designs. In other words, we couldn't hack it so we blame the airplanes! We've built most of the "famous" designs, begged flights on those we haven't built, and have observed (enviously) most of the experts. From this experience we feel justified in maintaining that these designs require too much of the pilot. With apologies to Bill Northrop, we believe that the term "TOAD" did not just happen, but rather, it fulfills a definite need. (Sorry about that, Bill.) That is, while many of our planes are adequate Sunday fliers, they become somewhat "warty" when the demands of pattern flight are made. One might say that the purpose of this article is to apply some wart remover to present multi-design. Before we get down to cases, let's have a look at some aerodynamic basics. What we will have to say in the next section will no doubt be "old stuff" to most of you humans out there and maybe even to Doug Spreng (whatever his species). However, we have noticed that R/C attracts a large number of newcomers who have not had the long background of experience that some of you old-timers have had. This brief review is mainly for their benefit.

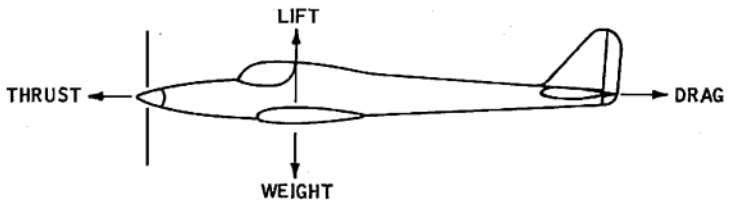
Some Fundamental Aerodynamics

Sir Isaac Newton once said many years ago, "A body at rest will remain at

rest and a body in **uniform** motion will maintain that motion unless acted upon by an unbalanced force." Translated, this means that the application of a force will result in an acceleration (non-uniform motion). Mathematically, we say,

$$F = M \times A \qquad (1)$$

where F is the force, M is the mass of the body which the force acts upon, and A is the resulting acceleration in the same direction as the force. We need the concept of force because an airplane in flight always has certain forces acting upon it. Now let's take the simplest case, a plane flying straight and level at uniform speed, and see what forces are acting. The diagram below shows the various forces.



FORCE DIAGRAM OF AIRPLANE IN STRAIGHT & LEVEL FLIGHT

FIG. 1

In the diagram, we see that there are two horizontal forces, thrust and drag. Thrust acts in the direction of motion and drag operates in the opposite direction. Since we have assumed the plane to be in uniform motion there is no acceleration, the unbalanced horizontal forces are zero (that is, there ain't any of them). In other words, the forward force is exactly the same and opposite to the rearward force. If we increased thrust, we would increase speed but also increase drag so that the airplane would "stabilize" at some greater speed. Looking now at the vertical forces, by our assumption of uniform **horizontal** motion, there can be no unbalanced vertically acting forces, or by equation (1) there would be a vertical acceleration. In simple words, lift is equal and opposite to weight. So in straight and level flight, thrust is equal to drag and lift is equal to weight. Unfortunately, things aren't always this simple. Forces very often act so as to produce what is called a **torque.** In fact, most of the forces we will discuss do act to produce torques. This is fairly simple, but, before we get to torques have a break, drink a martini, or a six-pack, or both, and then we will look at some more (ugh!) equations.

The basic relationship that we are interested in is the following:

$$F \times d = MI \times AA \qquad (2)$$

Here F again is the force, d is a particular distance which we will explain shortly, MI is a quantity called the **moment of inertia,** and AA is the angular acceleration. We will not go into the intricacies of the moment of inertia here as it is quite complicated and not essential for the discussion to follow. All we need say is that, for the same geometrical shapes, the greater the weight, the greater the moment of inertia. The angular acceleration expresses the rate of increase (or decrease) of rotation in a given time period. Consider an airplane performing two perfectly axial rolls. If the first roll is completed in two seconds and the second roll is completed in one second, the rotation rate increased with time and the airplane has undergone angular acceleration.

Let's look at the distance, d. This distance must be measured in a very special manner.

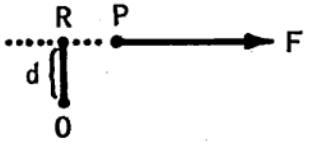


FIG. 2

Consider a force F acting on a body at point P in the above diagram in the direction indicated by the arrow. We wish to get the resulting angular acceleration of the body about point O. Let us extend the force along its direction of action as shown by the dotted line. If we draw a perpendicular line, OR, to this extension from point O, this is the distance d that goes in formula 2 above. If the extension of the force F was to pass through O, then the distance d would be zero. From Eq. 2, we see that if d is zero, the quantity MI × AA must also be zero. Since MI, the moment of inertia for any real body is never zero, the angular acceleration, AA, must be zero. Hence in this latter case, the force would produce no rotation. Another name for d is the moment arm of the force.

Finally since physicists are inherently very lazy people, they don't like to write F × d if they can help it. So, they invented a new name for the quantity F × d. They call it a torque, denoted by the symbol T. Torque serves two purposes. First, it allows lazy physicists to write one letter, T, instead of two letters F × d. Secondly it serves to confuse uninitiated humans. At any rate we can re-write equation (2) as

$$T = MI \times AA \qquad (3)$$

where we have written T for the quantity F × d. The important thing to remember for all of the above is that torques produce rotations.

Let's get more concrete and look at an illustrative example. Suppose we have a board with a rope connected at the center on each side, as in this diagram:

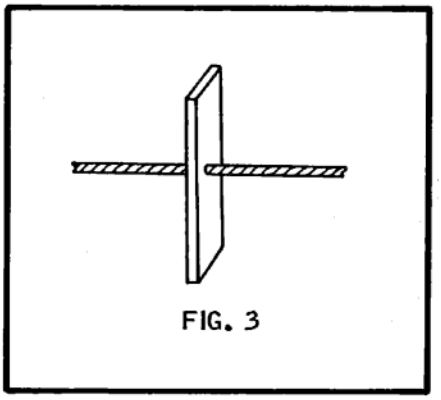


FIG. 3

If a person were to grab each end and pull equally, nothing at all would happen. The board would remain in place because we have equal and opposite forces. Thus, the net force is zero, (i.e., no unbalanced forces) and therefore, by equation (1), there will be no acceleration; the board remains at rest. This situation is analogous to the thrust and drag forces in straight and level flight.

Further, since both forces go through the center of mass of the board, the distance d is zero and we have no torque, hence no rotation. Let's suppose we make one force stronger than another (e.g., speed up the engine), we would then get an acceleration but still no torque. Don't worry about engine torque. Here, we are talking about torque in general.

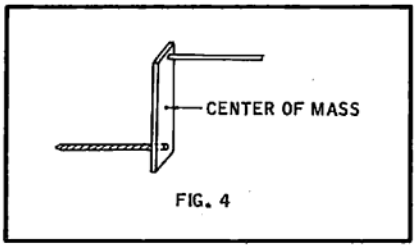


FIG. 4

Now let's take another case. We tie the ropes on the opposite ends of the board as in the above figure. If we pull the ropes equally and in opposite directions, the result is not the same as in the first case. Even though the **forces** are equal and opposite, the board rotates about its center of gravity. What has happened is that we have produced unbalanced **torques** which produce the rotation. This situation is similar to the rotation of the aircraft produced by

aileron deflection. Let's take a close look at the difference between the two situations. The only difference is in the point of application of the forces. In the second case there is a distance perpendicular to the direction of both forces from the end of the board to the center of the board. The applied force times this perpendicular distance gives the torque about the center of the board. In this case, both torques give the same direction of rotation.

As a further example, consider the following two cases:

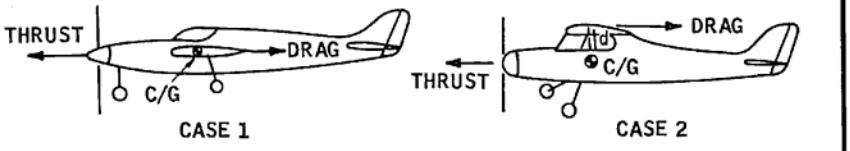


FIG. 5

In the first case we have the drag force operating right on the center of gravity. Here the drag produces no torque, therefore, no rotation. In the second case, however, the drag force is operating a certain distance above the center of gravity. This perpendicular distance from the application of the drag force to the c.g. would be the distance d in our formula (2). We see that the drag produces a torque given by

Torque = Drag Force × Distance from C.G.

This state of affairs is typical of a high wing and produces a torque which tends to put the airplane in a climb. The **compromise** is that of raising the thrust line in order to develop a thrust torque which will balance the drag torque, or else, as is more commonly done on high wing aircraft, use down thrust in the engine. If you've stayed with us so far, the rest will be more practical. Relax, have another beer cause we are (finally) going to talk airplanes.

As practically everyone knows, there are three axes of rotation about the center of gravity of an airplane. They are Pitch, Roll, and Yaw. We'll look at them in order. When you pull back on the stick you give "up elevator." This introduces a change in the airfoil of the stabilizer-elevator surface such that it now has negative lift. The tail of the airplane rotates downward about the C.G., causing the wing to have a positive angle of attack and this, combined with the now positive thrust of the engine pulls the airplane into a climb. In view of what we have learned, let's analyze this a little closer. (Fig. 6)

In the above figure we have indicated the negative lift on the elevator by a force F, pointing downwards. We also have indicated the moment of this force about the C.G. by d. In this case the moment arm is simply the well-known tail moment arm that is so widely spoken of, but so rarely understood. We see that we have a torque now, given by

$$T = F \times d$$

and by Eq. 2 we must have an angular acceleration, which we can derive from:

$$T = MI \times AA$$

The rate at which the airplane rotates its nose upward about the C.G. is, of course, the angular acceleration AA. We may solve the above expression for AA, giving

$$AA = \frac{T}{MI} \qquad (3)$$

When the R/C pilot talks about elevator response, he is talking about the angular acceleration, AA, in the above expression. We have lots of response when AA is large, and little response when it is small. Eq. (3) tells us that we may make AA large by making T large, or MI small. Since T is given by F × d, we may increase it by simply increasing d, the tail moment arm. But wait a minute. What about that mysterious quantity MI, the moment of inertia? Without going into a lot of mathematics, we will simply state that MI increases roughly as d^2. Therefore when we increase the torque by increasing the tail moment, we increase the moment of inertia even more, resulting in a net decrease in AA. It is for this reason that long tail arms are less responsive and generally smoother in pitch control. The other, obvious way, to increase the response is by increasing F by virtue of more elevator deflection, or larger movable surfaces. We all know this anyway.

Let's take a quick look at ailerons now. Suppose we give the plane a little right aileron. The surface deflections now are such that the left wing has positive lift, while the right wing has negative lift. This case is completely analogous to the case (2) of the rope and board examples given earlier, except that the board, a wing in this case, is in the horizontal plane.

In the above figure F_L and F_R are the forces on the left and right wings, respectively, with moment arms d_L and d_R. We thus have torques $F_L \times d + F_R \times d_R$ acting to roll the plane. If these are the only torques acting, and there are no unbalanced forces, the result will be beautiful, purely axial rolls. As we shall later see, this is aerodynamically impossible as many of you may have already concluded "experimentally." The roll rate, as we see it, is again the result of torques. The greater the aileron deflection, the greater the force on each wing, and everything else remaining the same, the greater the resulting roll rate. However, deflecting ailerons increase drag and since thrust is constant, the airplane **must** slow down during rolls. When the airplane slows down, the roll torque is smaller, by virtue of the decreasing values of F_L and F_R as speed decreases. If we increase the length of the wing, we move the effective location of F_L and F_R farther from the C.G., thus increasing the moment arms d_L and d_R. As before, we also increase the moment of inertia of each wing. However, in this case, the increase of MI will be much less than in the case of the pitch moment discussed earlier and the result will normally be an increase in the roll rate. I say normally because there is the problem of the increased damping force on the larger wing which causes an opposite torque tending to slow the plane down. This will be discussed in more detail later.

Finally we have the yaw axis which is controlled by rudder. This case is completely analogous to the elevator case discussed earlier except that the angular acceleration is about the yaw axis instead of the pitch axis. Everything which has been stated with respect to elevator control applies here also. Again, more will be said about yaw later.

The next problem is that of Stability in the various axes of Rotation. That is, pitch, roll and yaw stability.

(To Be Continued)

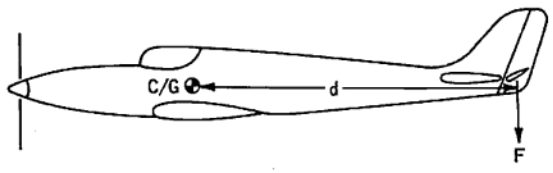


FIG. 6

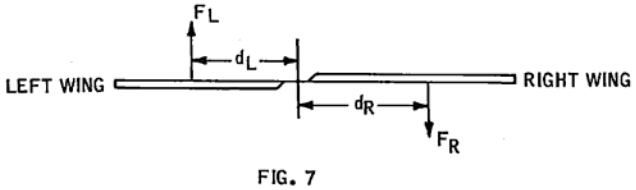
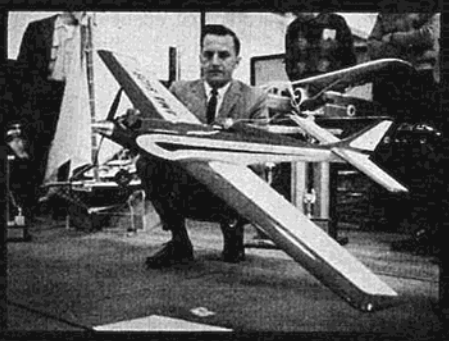
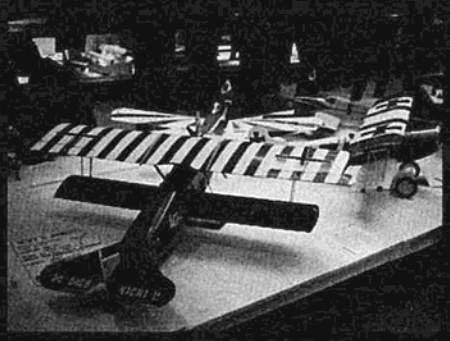


FIG. 7

Very neat Gee Bee.



Dow Ballreich — RCM trophy.



Shades of the Red Baron!

13th ANNUAL MID-WINTER RADIO CONTROL CONFERENCE AND EXPOSITION

"Weak Signals" R/C Club of Toledo sponsored trade show sets all-time attendance record of 10,000 spectators

Bob Dye and R/C duck!

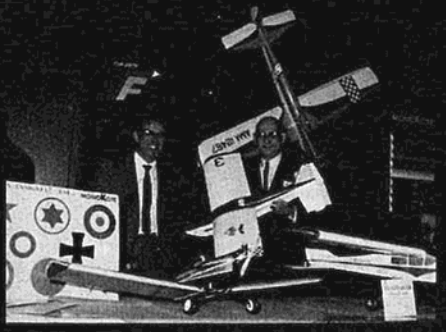
Airtrol's R/C dirigible.

Myers Models.

Pete Van Dore-Veda.

Ace R/C display.

MRC-Enya exhibit.



Sid Axelcote & Top Dawg.

EK Products propo booth.

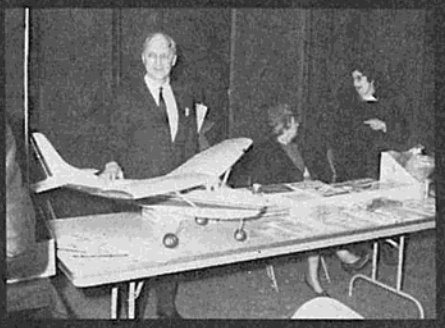
Sam Peterson at Min-X.

Dee Bee Stinger.

Popular Rand exhibit.

Wing's retractable gear.

More-craft wing rack.



Goldberg and big Skylane.

Simul tone proportional.

Micro-Avionics . . . feed through antenna?

Royal Products display.

"Gee, Bill, I don't know!"

V K Model's new Navajo.

Mr. Easy-Does-It.

F & M Electronics exhibit.

Where's Big Frank?

Testor's wing flexibility.

Finishing Touch Decals.

Don Foster of Dee Bee.

Stanton & Kreiser — New entry.

A-Justo-Jig Wing Jig.

Warner's impressive foam wings.

R/C Development Co.

Westee Hobby Imports.

Gil Rose, Aristo Craft.

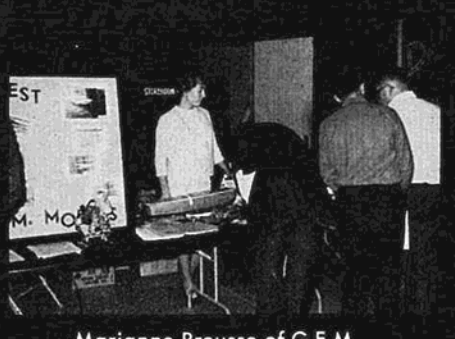
Du-Bro Products.

Hartman Fiberglass wares.

Darin Bros. accessories.

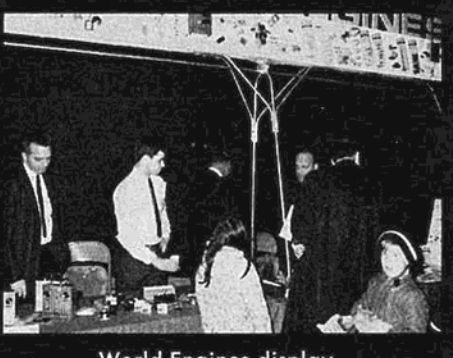
Octura's boating line.

Gene Drake and Bill Hall.

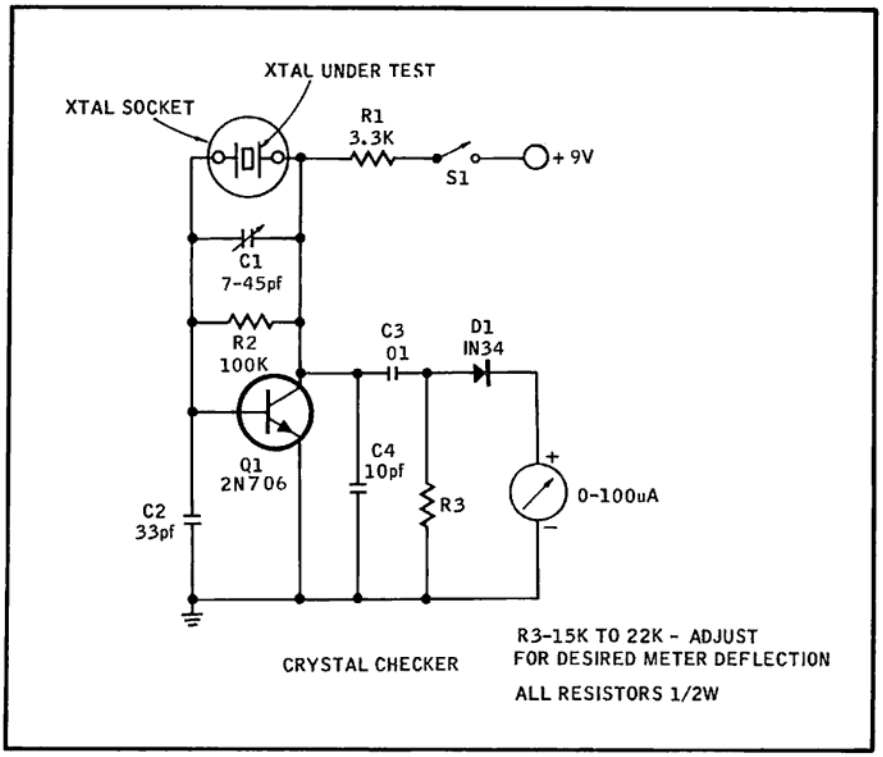


Marianne Preusse of G.E.M.

Ed Alexander & Bill Welker.



World Engines display.



Build an R/C CRYSTAL CHECKER

By Richard A. Frost

THIS is a simple circuit to check both Rx. and Tx. crystals as used in model control devices. Actually the operating range of the unit will extend from 20 MHz to 80 MHz. This includes the three ranges now used for model purposes 26.995-27.225 MHz 50-54 MHz (6 meters — ham band) and the new 72-76 MHz band. Cost is around $10.00.

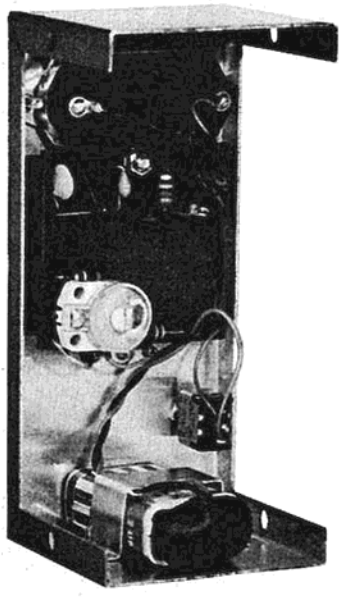
Circuit Description:

The checker consists basically of two sections — an oscillator and diode detector.

Q1 is a 2N706 or 2N3646 silicon device and forms an oscillator with regenerative feedback between collector and base. C1 peaks the oscillator, R2 forms the bias for Q1, and C2/C4 give proper phase shift to sustain oscillation. R1 is the collector load. R3 is the oscillator load and determines meter deflection. D1 is the diode detector for M1.

Construction of Unit:

The printed circuit is simple and may be done in two ways, photographically, or the brute force method of cutting and peeling the copper from a 1/16" epoxy glass or phenolic laminated board. The box is a Bud CU2104A (2¼" x 2¼" x 5"). Make cutout for meter, switch, and crystal holder. (Note: a transistor socket may be used for testing small Rx crystals. This can be wired across the larger crystal socket.) Mount meter, switch,



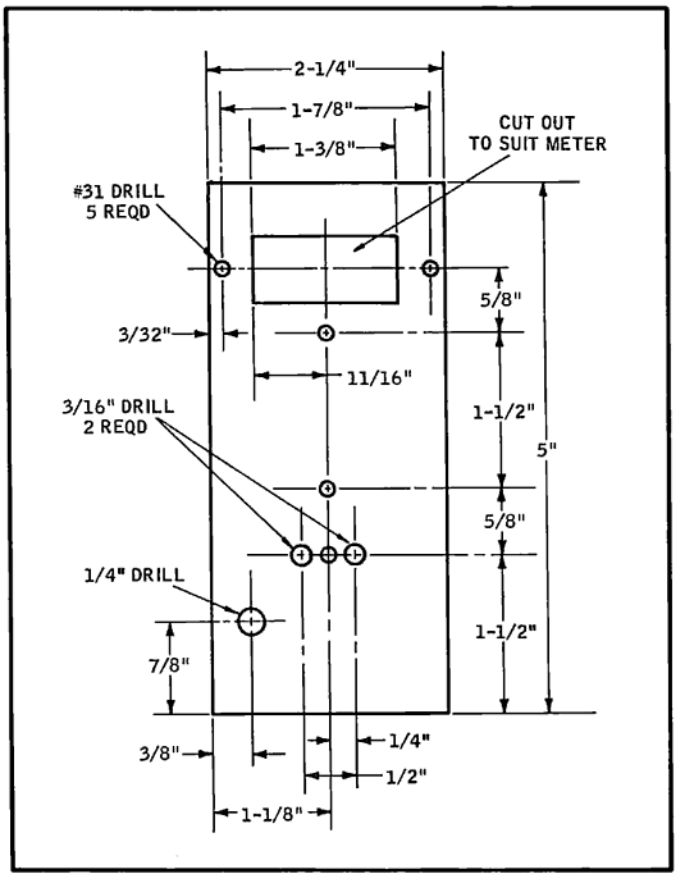
PARTS LIST

Ref. No.	Description	Source	Stock No.
R1	3.3K ¼w — ½w	W.E.	....
R2	100K ¼w — ½w	W.E.	....
R3	15k — 27k ¼w — ½w	W.E.	....
C1	7-45 pf trimmer	Lafayette	33C2511(822-BN)
C2	33 pf	W.E. or Lafayette	Lafayette #32C0943C
C3	.01 mfd disc	" "	" #32C0943C
C4	10 pf	" "	" #32C0943C
D1	1N34A Germanium Diode	W.E.	1N34A
Q1	2N706	W.E. or Lafayette	2N706
S1	SPST Toggle Switch	Lafayette	Lafayette #99C6162
M1	0-100 ua meter	"	" #99C5034
	Crystal Socket — TX Type	Lafayette	Lafayette #40C3712
	Crystal Socket — RX Type	"	" #40C3715
	Mini Box 2¼" x 2¼" x 5"	"	" #12C8371
	.062 Epoxy Glass PC Board 2" x 2"	W.E.	....
	Battery Connector (9V Snap on)	Lafayette	Lafayette #34C1003
	9V Transistor Radio Battery 2U6,U30,2N6		
	Two 4-40 x ¾" Bolts, Nuts, Washers		
	Two .156 x ½" brass tubing spacers		

Reference: Lafayette Radio Electronics, 111 Jericho Turnpike, Syosset, Long Island, New York 11791.

R/C MODELER

TECHNICAL FEATURE



and crystal holder. Mount all components on the PC board as shown on overlay. D1 is mounted with the bar end down. D1 may be easily mounted by using stiff wire from its terminals to its respective mounting holes in the PC board.

Mount PC board to the case using 5/32" x ½" brass spacers and ¾" 4-40 bolts (2 required).

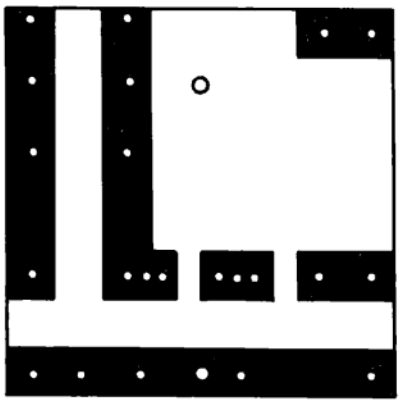
Wire up meter, a switch, and power leads. Keep leads to crystal socket and meter as short as possible. A small hold down bracket for the 9V battery may be used to secure it to the case.

Operation:

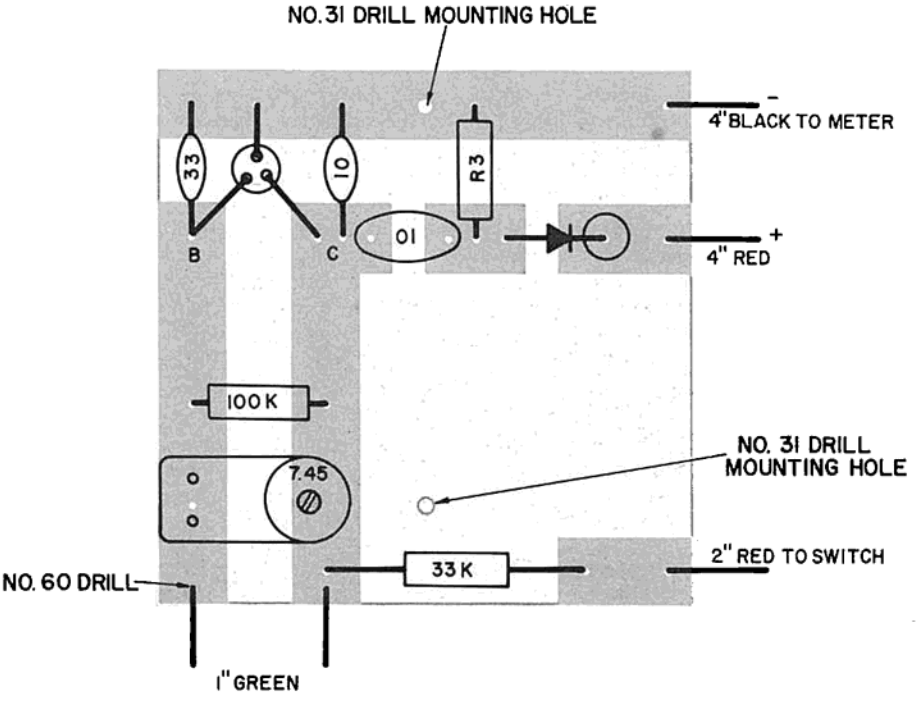
After double checking unit for possible errors, plug in crystal and apply power. Meter should read. If not, recheck wiring. Adjust C1 for maximum meter reading, R3 may be adjusted for desired meter deflection (e.g., ¾ scale).

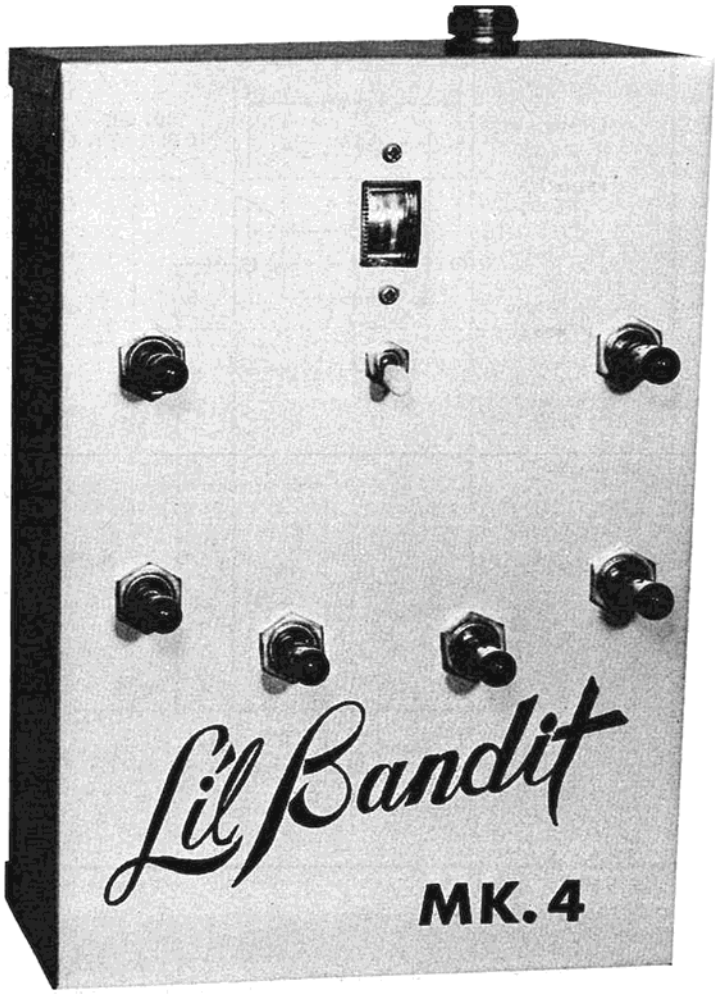
The crystal checker proves to be a valuable instrument for any home or scratch builders work bench.

Technical Editor's Notes: Most 72-76 Mc. fundamental crystals are of the fifth overtone in this circuit. However, the basic function of the crystal checker would still be served — that of detecting a defective crystal. Although a capacitor is not shown across the meter it is general practice to use a .01 in this type circuit for RF filtering.



Build this simple crystal checker, designed to check R/C receiver and transmitter crystals on the 27 MHz, 50-54 MHz, and the new 72-76 MHz bands. Full size P.C. board shown. Parts price is $10.





Li'l Bandit

By W. F. Hebestreit

Part 1

Don't throw away those old reed servos! Here's an excellent 12 channel transmitter that will make a good backup for your propo rig.

THE MK 4 TRANSMITTER

THIS is not exactly a "do-it-yourself" article for the beginner, nor is it the ultimate in reeds. However, it is complete enough for the technician who wants a custom transmitter, as well as providing a good starting point for those who want to carry the development further or convert their present rig.

I make no claims for fantastic power output, but radiation efficiency is more important than the amount of power in the final, and this one seems to have output to spare. Twice, during the second day of flight testing the MK 4, other transmitters on the same frequency were turned on while my plane was in the air. (My fault — the brown flag had faded and looked like a red one!) On both occasions, simul control became spotty but single was still solid. In the meantime, the proportional fellows were wondering why they were jammed in failsafe! (EDITOR'S NOTE: This is a good point in favor of reeds. Although reed systems are not completely immune to digital interference a reed bank acts as a filter, rejecting digital pulses.)

The MK 4 prototype (MK 1) was started in November, 1964, and the final MK 4 circuit board etched in September, 1965. Actually the MK 3 was supposed to be the final version but a sudden crash, while flying in the desert, led to further development work. Some quick experiments, conducted in the kitchen oven, uncovered a case of thermal run-a-way in the modulator. This has been corrected in the MK 4.

Experimenters Take Note: All the flight tests were made in the winter and spring near the ocean where the air temperature never rose above 75 degrees, but it took a desert contest, 140 miles from home, to uncover the basic weakness in the MK 1.

Since production assembly was not a design criteria, I decided to simplify the circuit board layout by wiring the switches with hook-up wire. Actually, I have a penchant for wire bundles and string ties because it looks more impressive to bystanders than a flat board full of fine copper lines! I was also trying to squeeze the whole mess into a 3" x 5½" x 8" box because my nine-year-old son had trouble holding the larger transmitters (although he soloed with my nine pound home brew tube-nicad-converter type, which is referred to as "The Thing" around the club flying field).

My second design criteria was transmitter balance (physical, not electrical). Human Engineering is the current popular term. While watching my son's early attempts at multi, I noticed that he spent most of his time trying to find a comfortable position for the transmitter or looking for the switches instead of watching the airplane. I felt that with proper balance, one would forget that he was holding the transmitter and could concentrate on flying, so, a lot of time was spent shifting transformers and switches around before the component layout was finalized. The MK 4 layout is based on a dry battery and center-loaded antenna. With this arrangement, balance is so close to optimum that a switch to seven nicad pencells for power made a noticeable change! It only moved the C.G. ⅜ths of an inch upward, but it just didn't feel right until I added some ballast. I don't want to make a fetish out of this balance thing, but it is kind of like "rudder only"—until you've tried it, don't knock it!

My "goodie box" turned up most of the parts except the switches and toroids, so my third design criteria was to leave room on the board for substitution of parts. The prototype used some "economy" capacitors in the tone circuits but the drift with temperature was unacceptable. Consequently, the final version uses Mallory and Arco-dipped mylars only. I have listed part numbers and at least one source for most of the components. None of the parts are critical,

but if you substitute transformers be prepared to "diddle" with the wave-shaping values in the modulator. If you are still interested, read on and find out what else this design has to offer.

ASSEMBLY INSTRUCTIONS MK 4 TRANSMITTER

Description

The MK 4 is a twelve-channel transistorized transmitter featuring collector modulation by a temperature stabilized and frequency compensated push/pull modulator. This provides a minimum of 100% upward sinewave modulation with virtually no harmonic distortion. It also allows exceptional simultaneous operation.

In other respects the circuit design is conventional, using proven techniques and is actually based on a blend of early Kraft and Controlaire designs involving tapped toroid tone generators. When properly adjusted and used with a matching receiver, it is even possible to attain good simultaneous operation of adjacent reeds (Deans and Medco are the only ones experimented with). By matching receiver, I mean one that has the first audio amplifier bias tailored for true Class A operation with AVC active. This point may be somewhat academic since we do not normally use adjacent reeds but for six channels it is nice to have simul throttle and rudder available for ground handling.

The transmitter may be built with either a center loaded or a base loaded antenna. The center loaded version has excellent stability and freedom from RF harmonics plus higher radiation efficiency. Either a nine volt dry battery or nicads may be used.

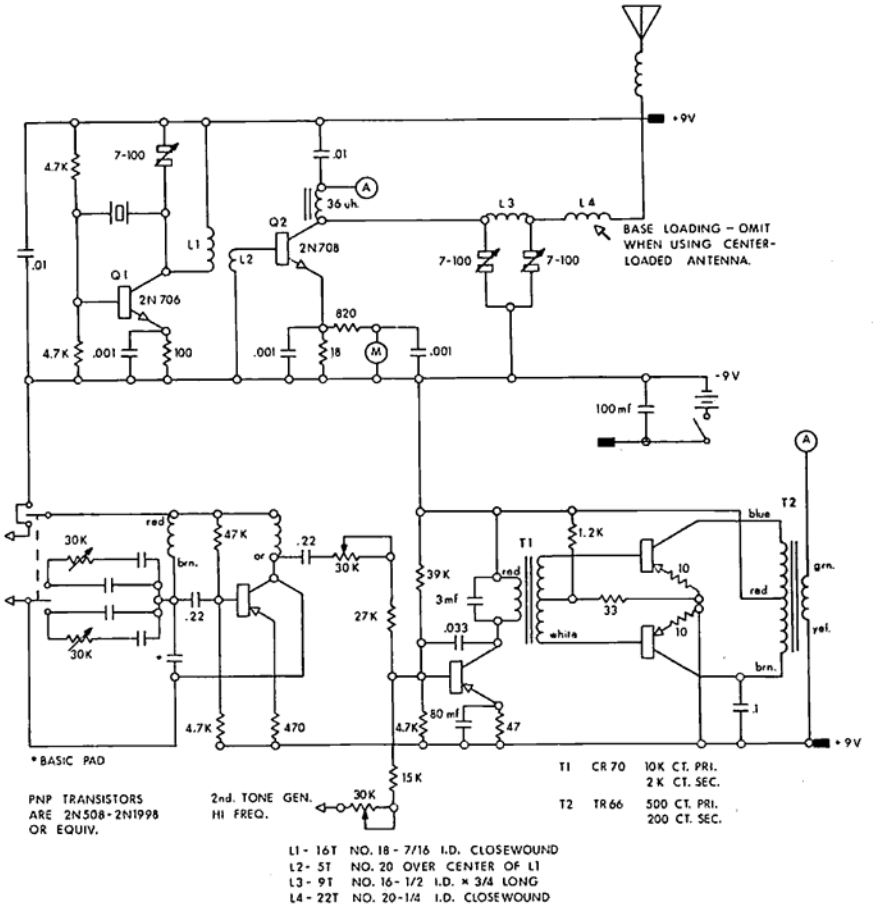
Frequency compensation is automatic and provides a relatively constant modulation level for all single tones. As designed there is some cut-off distortion on simultaneous keying, but there is no noticeable effect on performance even at extreme range with the antenna collapsed. The slight distortion may be eliminated, if desired, by replacing the 3 MFD capacitor shunting the driver transformer primary with two separate capacitors. Connect a 2 MFD capacitor between the center tap (red lead if using toroid from Ace or W.E. — white if using Allen) of the low frequency toroid and the collector of the driver transistor. Connect a 1 MFD capacitor between the high frequency toroid center tap and the driver. There are several isolated copper segments in the area of the dual 30K pots that may be used to add extra components.

The antenna bracket shown in figure 1 has both mechanical and electrical significance. You will note that the RF feedpoint is 2⅝ inches from the end of the antenna rather than at the base as is normal practice for quarter-wave vertical antennas (even though this is considered base fed with respect to the transmitter case). In addition, we control the distance between the tank coil and the antenna as well as the direction in which the coil is wound. In effect we establish a fixed amount of inductive and capacitive coupling between the tank and the antenna, in addition to the direct coupling at the feed point. The net result of all this is cancellation of higher harmonics and mechanical stabilization of the antenna which takes the bending load off the top of the case. This additional out-of-phase coupling has no effect at the fundamental frequency because the antenna impedance is relatively low when matched to the design frequency.

An antenna design engineer (when pressed to clarify some design formulae) once told me that antenna design is about 5% science and 95% black magic which is the approximate ratio of design time to laboratory testing (cut and try).

To Be Continued

Author at right. Bror Faber, left, fellow Bird club member. Two transmitters shown have logged over 700 flights without a failure.



JERRY KLEINBURG

Judges at work! Memphis scene has John McWhorter, Herm Stroop, Harold Fanning and Dan Gunn doling points at the Tennessee contest. (McClure pic.)

FAI . . . FAI . . .

TO the Tucson R/C Club — and to Ken McDaniel for his Snoopy rendition — as well as to all other organizations and individuals who have so far responded to our request for support of Class I & II FAI demonstrations, we give genuine thanks. Ever since the March 1967 RMC reached readers each day brings a fresh batch of letters reflecting enthusiasm for the idea and promising support to make it all happen. It would be nice to print all of the letters since many contain sensible and constructive comment on the value and benefit of R/C activity.

It's felt the immediate, significant response on such a broad scale is a reflection of many valid purposes these writers and others want served by this project as well as representing grass roots feelings in the matter. It's evident to many that the long range future of R/C depends upon awareness of the many sides there are in the hobby/sport, and that recognition and operating scope is needed by each to retain it as an important link essential to the whole! The FAI demonstrations suggested here are only one area deserving enthusiasm. Others such as scale, GG, Goodyear, and gliding also search for expression on the national and international scale and will ultimately attract support. It's hoped this project will aid and encourage such future enterprises. . . .

In the meantime, each reader is asked to become a part of this one — more pledges are needed and any amount will help. So far, it's estimated we're half way to the goal of $2000 — so clip the coupon (or just drop a card and keep Mr. Dewey's masterpiece intact) and send it on right away. Pledges are all that are needed at this time.

YES, I agree on FAI action in **1967!** Put me down for a $_____ pledge to sponsor Class I & II demonstrations in Corsica.

Name _____ Address _____

AMA No. _____ Other affiliation _____

SEND TO: Jerry Kleinburg, 2512 W. Craig Pl., San Antonio, Tex.

THE NATIONAL SCENE

While editorial and FAI chores have taken our time of late, an imposing stack of mail and pictures has risen on other activities. So we'll leap into those . . .

● Winter generally sees an upswing in newsletters which are a lot bigger volunteer institution than most realize. We have a healthy respect for the editors of these some times imposing and sometimes humble publications which give voice and substance to much of the passing scene. Without their on-the-spot recordings much R/C history and human touch would be lost as a zephyr in a hurricane. To give recognition to those whose offerings we read regularly, and to give an indirect pat on the back to all others, TOP OUT tips its pen to the glue pot-ink pot set and their papyrus creations:

Art Cummings, BLOW, Antelope Valley Tailwinds, Inc.

Jerry Heller, FEEDBACK, Houston R/C Club.

Lin Haslam, DOPE BUCKET, Utah State Aeromodelers.

Bill Hollenbach, CONDENSOR, Alamo R/C Society.

Ben Herman & Ken McDaniel, NOISE, Tulsa R/C Club.

Jim Sunday, MODULATOR, Pioneer R/C Club, Inc.

Dr. Nino Campana, The GLITCH, SoMoRacc — Saulte Ste. Marie, Ont.

Ron Alexander, SPARKS, SHARKS — Shreveport, La.

Al Signorino, CARRIER WAVE, MacDonnel MAC — St. Louis, Mo.

Bill Antoine, PRINTED CIRCUIT, N. Jersey R/C Club.

C. W. Reed, CONTACTS, Kansas City R/C Assn.

Bob Follette, SQUAWK SHEET, Oily Birds — Port Arthur, Tex.

Will Kehr, GLUE DOBBERS, Tulsa Glue Dobbers.

Jan Sakert, HAWAII, Hawaii R/C Club.

Alex Kabbaz, SMOKE SIGNALS, Meroke R/C Club, Inc., N. Y.

Marv Lindsey, The FLYAWAY, CC-RCC — New Orleans, La.

Ted Blase, The FLYER, N. Ohio Aeromodelers Assn.

Clark Beasancon, PROP BUSTERS, Prop Busters R/C Club — S. Dak.

Jerry Smith, TRI-VALLEY, Tri-Valley R/C Club — Indiana.

Betty Stream, EYE VIEWS, B.I.R.D. Club — Long Beach, Calif.

Brad Shepard, G.C.RC A., Gulf Coast R/C Assn. — Victoria, Tex.

● Remember "Buzz" Sawyer who authored the emergency chute article a while back in RCM who pshawed the idea of mid-air mishaps? Yep, he had one. Tangled with Don Chaffee's Cherokee down Tucson way and scratched one each Kwik-Fli. It all happened too low for the chute to open — it fouled anyway — so back to the drawing board! One interesting sidelight: an AMA insurance claim was filed to cover Don's loss. . . .

● Bill Womack — Tulsa Glue Dobbers — reports local RC'ers just about depleted stocks of 1/32" balsa in his area in response to a challenge from the FF

St. Louis McDonnel Club 9th Annual Meet contestants voice approval of the late season contest. OK, who's the dissident of the right? (MRCC photo)

(Continued on Page 38)

CD Ed Henry & Bill Butters, scale judge, look over Bill Weaver's well known PT-19. McDonnel Club contest featured outstanding entries. (MMAC photo)

TOP OUT

(*Continued from Page* **37**)

section of the Glue Dobbers to an indoor hand-launched glider contest. With winter conditions, it may well constitute a big percentage of their flying. Oh, those sore arms! When's the rematch?

● Just received news of the TORKS contest plans which feature a four-day extravaganza for the R/C world that'll cover all known phases of R/C plus a few to be invented especially for the occasion. May 27 through 30 is the time — the TORKS own field in Oklahoma City, the place. Four CD's — McGee, Brownlee, Woods, Welborne — will serve up Pattern and fun events for all classes **including** single channel. Extra effort is being given the single channel and GG events to encourage these flyers to come out and enjoy themselves by meeting and exchanging information and ideas on the latest equipment, planes, and techniques. Since this brand of flying is developing its own language and reference terms it'll be an excellent chance to get together and fly with a large number of RC'ers who are beginning to experience this exciting variety of remote control modeling. It'll also help in formulating opinion and details for a set of AMA rules to cover competition for the S/C buffs. Another event for the new simple equipment planes will be the RCM-Midwest pylon race which is gaining in popularity. And this is only a sampling of the action planned by the Oklahoma City club that has gained a solid reputation for having memorable contests. Curt Brownlee tells us in addition to the S/C events and regular Pattern competition for all classes, regular pylon and Goodyear will also be offered. But this isn't all because in addition to their famous "Speed and Seed" wingding, Curt says a couple jobs called the Washington National Airport as invented by Maynard Hill and a thing called the "Diaper Derby" promises to make the upcoming contest fun for all and one not to miss. More details soon; just remember May 27, 28, 29, and 30 for the TORKS! Or better yet, drop Randy McGee, their prez., a card for full particulars — his address: 2401 Huntleigh Ct., Oklahoma City. Phone 405-751-3701.

● And speaking of 4 day meets, the Mexican RC Nationals are again set for Mexico City for 23 thru 26 March this year. The flying site at "Pistas Paraiso" will be also available for practice on the 22nd which is a good idea since the 7200 foot altitude has a decided effect upon engines and planes. Nothing drastic that a little familiarization won't cure, but it is different — algo differente, as they say. On people, too. . . . The door to the hacienda is wide open we're told for U. S. fliers to experience a south-of-the-border shindig. Drop "Paco" Gallegos at Modelandia, Niza 81, Mexico 6 D.F. a line for details. . . .

● And speaking of contests, here's one to put on your agenda, especially mid-east coast flyers: The Dixie Flyers of Aiken, S. C. have a fly-in set for 4 June. W. W. Trotti is looking for a fine turnout which will also be used to tap the thinking and desires of RCers from South Carolina regarding an RC league similar to the fine one in North Carolina. "WW" may be reached at 1015 C Ave. in West Columbia, S. C. for more details. . . .

● You've heard of Zip codes, now here's the Zip Pattern of Curt Brownlee who invented it to put fun and excitement into pattern competition while at the same time promoting safety, more flights, and keeping models close to the pilot during his performance. It features mandatory wind direction for each of the 10 point maneuvers and gives 5 extra points for each full minute saved by the pilot under the 10 minute limit. Any 3 consecutive zero's by any single judge also causes flight termination under Curt's system! Here are the maneuvers and direction of execution:

Proto Takeoff	Upwind
Touch & Go	Upwind
Wingover	Upwind
Tail Slide	Downwind
3 Inside Loops	Upwind
Immelman Turn	Upwind
3 Outside Loops	Downwind
Cuban Eight	Upwind
3 Rolls	Upwind
Rolling Eight	Upwind
4-Point Roll	Downwind
3 Turn Spin	Upwind
Vertical Eight	Downwind
Proto Landing	Upwind

There's more detail but this is enough to show the interesting aspects of RC Zip. It will encourage shorter flights but leave the pilot to face the problem of sacrificing points in hurrying maneuvers trying for the saved time bonus. Specifying maneuver execution direction incorporates the "deBolt" concept of a 'total flight' presentation. Maneuver selection of Zip happily considers all current classes of planes also. Give it a try next time you're out and see how it feels. Be sure to keep time on each flight to test the 'bonus' feature. . . .

(*Continued on Page* **39**)

● And while on the contest kick, here are details of a couple that were staged late last season by two enterprising clubs. The first account deals with the 9th Annual McDonnel RC Meet held in St. Louis. It was their largest with 56 contestants — 17 from Chicago alone — coming from 6 states. The winners list shows high calibre performance was the pace setter with results being nip and tuck in some events. Here's how they fared:

C1 III Expert: Jim Grier, Bryan Lakin, Jim Fielding.
C1 III Novice: Bill Reed, Bill Bitters, Jack Mathias.
C1 II Expert: Chas. Reed, Len McCoy, Bud Atkinson.
C1 I Expert: Dallas Armstrong.
C1 I Novice: Will Carper, Bob Schissler, Butch Signorino.
Open Pylon: Jim Grier, Hal Parenti, Bryan Lakin.
Scale: Claude McCullough, Bud Atkinson, Bill Weaver.
RC Dogfight!: Jim Goad, Jim Grier, Don Dickerson.

That last event is another McDonnel Club innovation joining their initiation in the past of Novice Pattern and Open Pylon. Ed Henry, the CD for the meet, assures this last creation — done with 30' crepe streamers — is a real crowd pleaser but takes real discipline on the part of pilots to avoid flying over the spectator area. After nine years, the McDonnel Club's Annual has become an established St. Louis institution receiving good radio, TV, and newspaper coverage. Al Signorino's souvenir booklet distributed at the contest was sure to also aid in maintaining spectator interest as well as assuring the 10th Annual will be looked for with interest and anticipation.

Following on the heels of the St. Louis show was the meet in Memphis where 18 flyers battled for silver mounted on blue marble trophies offered by the Memphis RC Club. K. K. McClure was CD at the affair that saw Jackie Gardner pace Carl Von Seutter and Rev. Lynton Younger in Class I, while John McLellen headed up Class II and John McWhorter and Dave Keeling. Class III Expert — in a hot battle — fell to the new District V RC CB member, Don Coleman, followed by genial Jim Edwards and young Bob Wood. All flew Citrons and used Kraft propo, incidentally. Novice in Class III was also offered at the Tenn. affair with Bill Welker — the Citizenship man — topping the event over Marion Loughridge and John Dougherty. . . .

TOP OUT

(*Continued from Page* **38**)

The contest, although low in attendance, was enjoyed by everyone and the Memphis club is looking forward to their 1967 contest to be set for the 3 day Labor Day weekend.

● On the building front we hear of Alex Kabbaz — who knows what he's up against — putting genuine effort and about nine yards of balsa into an RC B-36! Powered by 6 Supre Tigre 19's, it'll carry a Bonner 8 propo. We would like to hear more about the project which is probably a counterbalance to Alex's interest in S/C planes.

● Bob Follette's idea — buy your wife a subscription to your club's newsletter. With all the time spent in the shop, at the field, and at contests, it may be a way for her to occasionally hear

Claude McCullough and AMA VP Bill Weaver give Claude's Mauler a check at the 9th Annual RC Meet. Claude, and the Mauler beat Bud Atkinson's entry by a bomb drop to take 1st place. (MMAC photo)

about you! Recall, Bob's editor of the "Oily Birds" newsletter, so we know he's stretching a point — I think. . . .

● Mentioned awhile back about the H/L glider contest in Tulsa for RCers to fill a winter's drag. Other winter 'fills' find radio gear in cars, even cigar boxes fitted with wheels! The Shreveport SHARKS use cars of various sources while the Oily Birds in Port Arthur put propo rigs in the cigar boxes for bad weather indoor sport. We hear they replaced Classes I, II, & III with panatella, perfecto, and blunts!

● At the other end of Texas (900 miles), in a recent visit to El Paso we had an opportunity to visit with Ben Franklyn in his interesting hobby shop. The local RC club is growing with Bob Jarrel as president, Bob Brown and "Lucky" Gibson as its more active members. Their Fly-In in January was the first RC event we've heard of for 1967.

● Like to congratulate Ron Clem. He was voted Outstanding Member of the Year by the N. Virginia RC Club. . . . Their new runway will see lotsa use in 1967.

● While recognizing outstanding effort, we cannot close without mention of

Charlie Reed, Class II, and son Bill, Class III Novice — each placed at 9th annual St. Louis RC contest. (MMAC photo)

an honor given Maynard Hill in receiving FAI's Paul Tissandier Diploma, one of the highest awards given individuals by the international aviation agency. The award was the first bestowed on an American since 1961 and came in recognition of Maynard's record setting achievements since 1963. He now joins notables Jocqueline Cochran, Roscoe Turner, Frank Zaic, Al Lewis and Walt Good in receiving this distinctive honor.

● — And in closing, one short one: **1st RCer** — "You're not gonna let your wife fly your plane, are ya?" **2nd RCer** — You kiddin'? Why, she's so uncoordinated she can't even walk and chew gum at the same time!

RCM ELECTRONICS

By Ed Thompson

RCM Technical Editor

WELCOME from California. The home of topless shoeshine girls and late movies starring Ronald Reagan. The first state requiring an anti-smog device on new cars. **RESULT:** Cleaner air for the public and emphysema for the autos.

I occasionally receive letters asking for information on equipment that is no longer manufactured. I'd like to pass on a couple in the hope that one of the readers can help the writers:

Dear Sir:

I have a "Courier" single channel relayless receiver made by Ecktronics, 2109 S. Wright Street, Santa Ana, California.

I sent the receiver to them for repairs and it was returned by the post office marked, "addressee moved — no forwarding address."

So, do you have any idea where they are now located? Or — the name of an outfit which could do repairs? Any help you can give would be much appreciated.

Yours truly,
John Austin
196-05 Hillside Ave.
Jamaica, N. Y. 11423

Gentlemen:

I was recently gifted with a Klinetronics jet fire 10 channel receiver and transmitter. I received also 5 Bonner transmite neutralizing servos.

Klinetronics is out of business, of course, and I know of no facility that is able to afford me sufficient technical knowledge to wire this system for a rudder and motor J-3 Sterling kit. The problem that I have of course is to wire the system to a sufficiently light set of batteries to include in the J-3 as opposed to the very heavy nicad that came with the set.

I am really a neophyte, so I will appreciate whatever help you can give me.

Yours truly,
William G. Carter
267 Stanmore Road
Rogers Forge
Baltimore, Maryland

Citizen-Ship Radio Corporation is now delivering their 5-channel digital

(*Continued on Page* **40**)

RCM ELECTRONICS

(*Continued from Page* 39)

equipment on 72 M.C. In addition to the 5-channel system they now have a 3-channel and a single-channel digital system. The single channel is priced to meet competition at less than $100.00 (nicads extra) and should send some of the other manufacturers to the drawing board. I have enclosed pictures of all three of their digital systems.

I have received many entries for the "deadbeat" and "name the column" contest but I am writing this shortly before the entry deadline so will announce the winners next month.

I received an interesting letter from Mr. Chung Wing Bor of Hong Kong, asking for information on a motor synchronizing circuit for twin engine models. He sent along an article from "Radio Control Models and Electronics" magazine in England. The article was from the October 1961 issue and was written by Mr. Gerd Hoyer. The synchronizer used magnetic pickup via a small piece of steel in the thrust washer of each motor and inductive pickups made from small transformer laminations wound with wire. The pickups supplied pulses to a flip flop which in turn drove a servo amplifier. As long as the thrust washers were turning at the same speed the servo motor received equal pulses and effectively remained stationary. The speed of one of the engines was controlled by the servo motor and the other was set at the desired speed. If the slaved engine changed speed in either direction the servo motor would counteract the change by running in a direction to bring the slave engine back to the speed of the master engine. The master engine could be controlled by R/C and the slaved motor would follow its speed through the circuitry.

The circuitry was ingenius in design but Mr. Chung Wing Bor couldn't get it to work. I found the idea very interesting and would like to hear from anyone who has worked on this circuit or any similar method of synchronizing two or more engines so I could pass the information on. I would also like to know if there is enough interest in such a device to warrant the time and labor to design one using feedback servos.

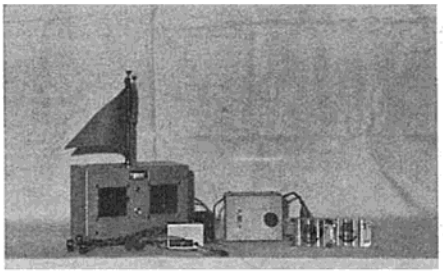
Here are some items and comments that may be of interest to you Digitrio builders. Bud Lanham of Bedford, Mass., is planning to build a 6-channel version and doesn't want to wait for the upcoming articles. He sent in drawings of his proposed P.C. layouts and wanted me to look them over and give him an opinion. His request is typical of several others that I have received. To start with, it's very hard for me to look at any P.C. board drawing and give an accurate answer on whether it will work or not. The same is true of schematic diagrams sent in from time to time. I usually give such items a general "eyeball" and assume that if the person sending them in was capable of drawing them he has a better than even chance of it working unless I see an obvious error. So, if you send in something of this nature you will have to be very specific if you want a specific answer. Even at that don't expect "magic" answers. I'll do my best but would rather not give this type of advice because of the possibility of errors on my part. In Bud's case he recounted his experiences with building the Digitrio and impressed me with a better than average knowledge of the circuitry so I have no doubt he will be successful. Others would like to know if it is possible to cut the transmitter board in half, or make a new one of a specific shape or size to allow installation of a stick assembly, or other mechanical considerations they can't accomplish with the P.C. board in its original form. I would in general advise against this, based on the fact that they were unsure enough to ask me. Printed circuit layout is an integral part of any design which uses radio frequency voltage. The considerations and technique of component placement and land arrangement come from experience and knowledge gained only by practical application. It is further complicated by the size limitation and general component "cramming" inherent in radio control equipment. It's a talented and "lucky" man that consistently produces perfect P.C. boards for R.F. circuits the first time around — I haven't found the "key" yet myself. The best I can offer to any of you who want to make P.C. board changes is to try it and see, but keep Murphy's law in mind: "If there is any possibility of something going wrong it probably will." This applies to all areas of radio control modeling.

I received a letter about the -4 decoder not operating two servos from one channel properly. The channel following the one with two servos connected would not operate. This was not a consideration in the -4 decoder design so I was not surprised. I tried it on my system and found that two channels would operate satisfactorily loaded with two servos. I wouldn't recommend this type of operation unless you use the last channel for two servos and check it out first before you depend on it. Usually not more than one channel is needed for parallel operation so this should not be a drawback.

I received word that a Digitrio is currently flying at the Guantanamo Bay Naval Station. It has several flights over the fence with no bullet holes and some admiration from the other side!

Remember: Days are shorter for those who live in a valley.

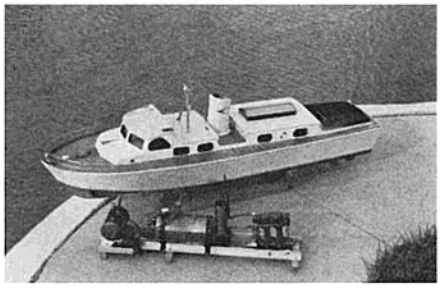
Digitrio-4 by Bill Davidson of Montebello, Calif.; has been a hobbyist for 35 yrs. Top: Shows servo checker along with Digitrio Bill built. Bottom: Bill's work shop.

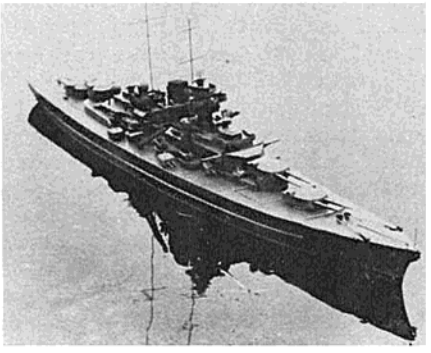


Alan Boyer's magnificent scratch-built 48" version of the Wilmington, Delaware tug "Long Beach." Citizen-Ship 10, twin Pittman 12V motors.

POWER & SAIL

The beautiful **steam powered** Aerokits 46" Air-Sea-Rescue tender is by Ed Cuminskey of Plum Grove, Illinois. Ed built the Stuart Double 10 steam engine from Octura Castings. You gas or steam engine nuts — send for Octura's engine kit catalog. They've got everything! Little two cycle glo plug jobs up to a 4 cyl., 4 cycle overhead cam that's a dead ringer for an "Offy." And — coming up soon in RCM . . . one of the finest do-it-yourself series of articles on a steam plant designed exclusively for R/C! Watch for it!!



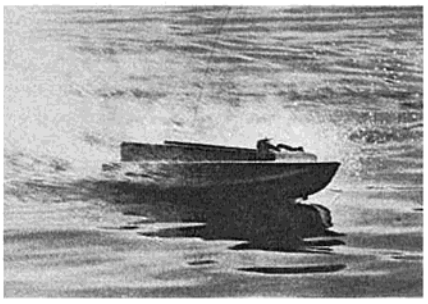


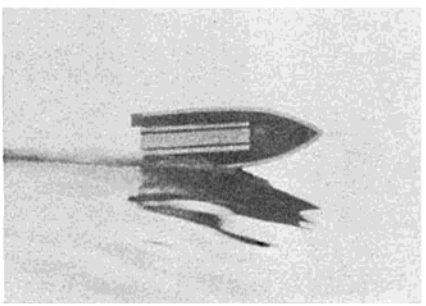
Henry Hill of Armdale, Nova Scotia, bringing in his scale German battleship "Bismark." Built to a 1/16" equals 1' from German plans. Part of the model is from a kit, i.e., guns, float equipped reconnaissance plane and superstructure. The hull was carved out of white pine; single channel radio; power by two Japanese electric motors, one per shaft; weighs 25 lbs.; and sails at realistic scale speed. Note: The Bismark closing in for the kill! Can you see the float plane? Red Baron, you in there?

Still another scale job by Mr. Hill. Sterling Models kit of the U.S.S. Missouri, 55" long, six channel radio.

●

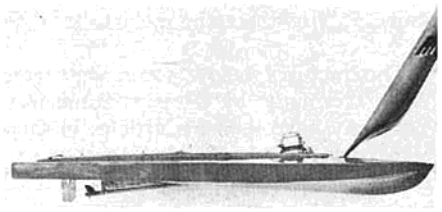
The pictures below were sent from West Germany by Holger Schweizer. You may have seen his articles in German and English (Model Boat) magazines. He's very interested in our racing hydros but reports, "We have no fast racing course in Europe or Germany on which we could drive with three-point hydros. We must drive with small and easily steerable boats. Our most widely used boats with Rossi 60 is the English design Pirana with **28-inch** length!"



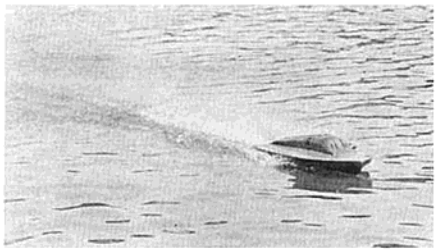


The European record holder by K. Matschulat. Rossi .60 Pirana flipping on the straightaway at 45 m.p.h.!

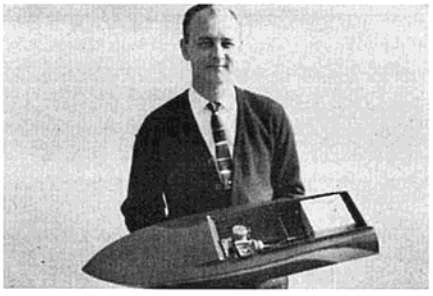
Here's a Rossi powered Phantom by Schweizer. Note far forward engine placement — but it does give a shallow prop shaft angle. Bottom at stern must be completely flat or even an inverted V.



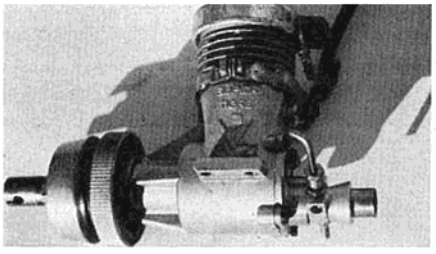
Same hull "at 40 mph." I'm trying to get plans and/or more details on these hulls.



Jack Krohn of the Modeleers Club with his latest Ski boat. S.T. 29 Rear Rotor engine, C&S proportional radio. New ideas "in the bottom" according to Jack — it sure handles well in rough or smooth water. Good possibility Jack will publish plans and construction article in RCM.

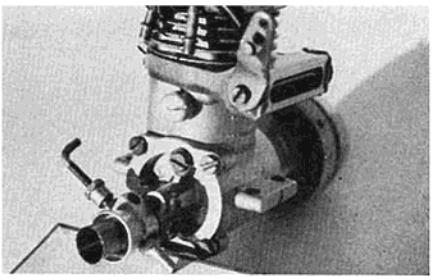


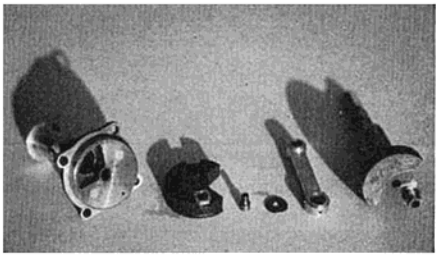
Here's a SuperTigre 29 Rear Rotor set up for boats with Octura flywheel and universal and Kool Klamp and S.T. R/C "clamp on" type exhaust baffle for throttle.



To make it suck fuel without having to use pressure I insert a length of ⅜" O.D. brass tubing into the stock venturi tube — goes clear through. Drill a new hole through the center of the tube for the stock needle valve body.

While I'm on the subject of SuperTigres — note the small rivet heads on the flat surface of the 29's back plate casting. They're holding on a ground steel face cap (on the inside) so the rotor rotates against steel instead of aluminum. Other goodies—crank pins drilled and tapped for a small pin which holds a steel washer — keeps rod from working off the end of the crank and rubbing against the rotor. The threaded pin (approx. 5/32" diameter) fits into a squared block of aluminum which in turn fits into a slot in the back rotor. All these add up to more speed through less friction but more important less "bottom end" and rotor valve problems on rear rotor Tigres. This new back plate will fit the 35 and 40 too.





Latest S.T. improvements, L to R: Steel cap over rear case; slotted rotor with aluminum block; threaded rotor drive pin; steel washer keeps rod from moving back against rotor; new crank showing tapped hole and pie-cut type balancing.

●

It's Official! The International Regatta will be held in San Francisco on August 12 and 13. The 1/16 mile timing will be held on Lake Merced with the ¼ mile at Spreckles Lake in Golden Gate Park. Lakes are only a few miles apart and by using both for the time trials there should be more time. On Sunday afternoon there will be multiple boat racing at Spreckles. Thanks to the San Francisco Model Yacht Club, and especially Frank Snowden, for working with "The City" officials and I.M.P.B.A. I'm sure the Roostertail will have all the details next month. See you in August at the Internats.

●

Hot Hydro or The Sidewinder Story.

I've received so many letters inquiring about the World's Record Holder that I'm taking the easy way out and answering the questions here. First — there ain't no plans available! This hull was scaled **up** from a smaller hydro by Del Park. The little boat was obtained by Steve Stevens in one of his many trades. Del wanted something to build, so Steve said "why not scale up that little Sidewinder for a 60?" It **was** named Sidewinder! Del changed the sponsons and made other changes in the process of "scaling up." By the way — Del thinks the small hydro is an actual true scale of a real full size Unlimited Class Hydro, the Miss DeSoto. When Del finished the original hull in January 1965, it was unnamed, unpainted and powered by a well worked over McCoy 60. Piloted by proxy Tom Nicklin at the San Diego Record Trials in February 1965, it wiped out Frenchy La Jeuneusse's record and set a new all time speed of 35.21 MPH for Del. Quite frankly this hull was one of those "naturals." On its **very first** run it performed like no other model hydro ever had before. No foolin' around, just up on the step, then the roostertail, and flat and true. Well — shortly after the San Diego record run and right after Del painted it, the rudder servo locked into a right turn just as it was passing a dock. Pow! Right into a piling. The nose was pushed back a foot! Del re-built it and re-painted it but we all could tell he was losing interest; actually his doctor had told him to give up hot boats for awhile. Del's other more sedentary hobby is collecting old model engines. Steve Stevens had a jewel of a Morton M-5 (five cylinder radial four cycle) so they traded and Stevens got the Sidewinder. He made a new, deeper rudder, changed the prop shaft strut and prop placement. He also built a coupled exhaust baffle — low speed needle valve method of idling a Rossi without affecting its top speed and power. But probably the most important thing he did was hand make his own prop. The 1966 (February) San Diego Record Trials saw a 49 MPH Sidewinder! The rest is history.

Del has actually built (or at least "framed up") several other of these same hulls.

No. 1 — The Sidewinder

No. 2 — Joe Barazoto's McCoy 60 twin powered F Class record holder.

No. 3 — The one I have — only run a few times, cracked up at Delano. Being re-built with a hopped up SuperTigre 71.

No. 4 and No. 5 — Both unfinished. One being set up by Stevens with a homemade in-line twin 60 with built in overdrive gear box.

No. 6 — The Cobra, Del's latest and best (I think). Has a "worked over" Rossi with a special high compression head and a Stevens exhaust baffle set up. Aluminum clad engine compartment, horizontal lifting plane on tail fin, enclosed driver bubble, Del's "breakaway rudder" (it pivots back and up if it hits something so the transom doesn't get torn out). The paint job is Poly-Aqua

(Continued on Page 43)

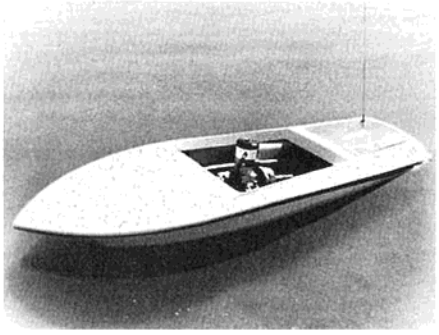
(*Continued from Page* **42**)

Epoxy with hand pin striping and wording. The cobra painted on the deck is so real looking it scares kids way!

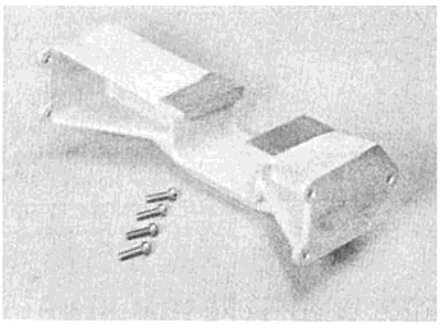
So that's the Sidewinder Story. I'm reasonably sure that Del Park and Steve Stevens are going to draw up the plans — actually right now there's only a bunch of lines and rib patterns — and publish them with a really complete step by step construction article.

I'll keep trying.

With the sudden upsurge in popularity of power boating, many new products are making their appearance on the market. One of these is the Stinger, a new fibreglass ski boat from Stinger Manufacturing Company, 537 E. Mission Lane, Phoenix, Arizona. This is a completely assembled boat with hardwood beams and motor mount holds drilled for your choice of engines. The R/C compartment is completely waterproof and features aluminum stringers molded in for cover bolts. The Stinger comes in four molded metal flake or solid deck colors. Engine size can range from .29 to .61. Length is 33" with a 13¼" beam. Price is $49.95.

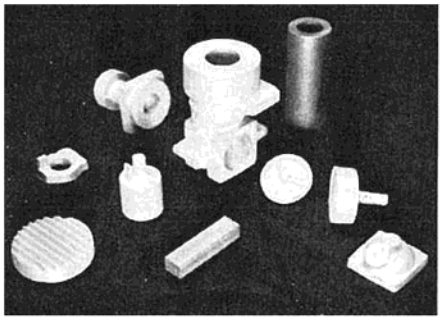


Octura Models, P. O. Box 536, Park Ridge, Illinois, has a new motor mount for the Rossi 60, Gannet 15, and Octura #1230, available in their Type 90 mount. Made from sturdy, rigid cast aluminum, the mount is machined to fit between engine bearers 7⅛" apart. The pads for mounting to engine are also machined but undrilled. Four 8-32 machine screws are provided for fastening an engine to the mount. In addition to providing a strong, trouble-free mount for your engine, the unit also acts as a heat sink to help dissipate crankcase heat. Price of the Octura 90 motor mount is $6.75 plus 5% packing and postage.

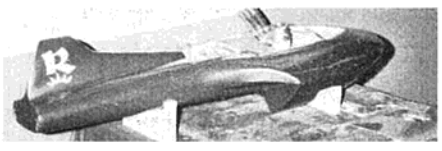


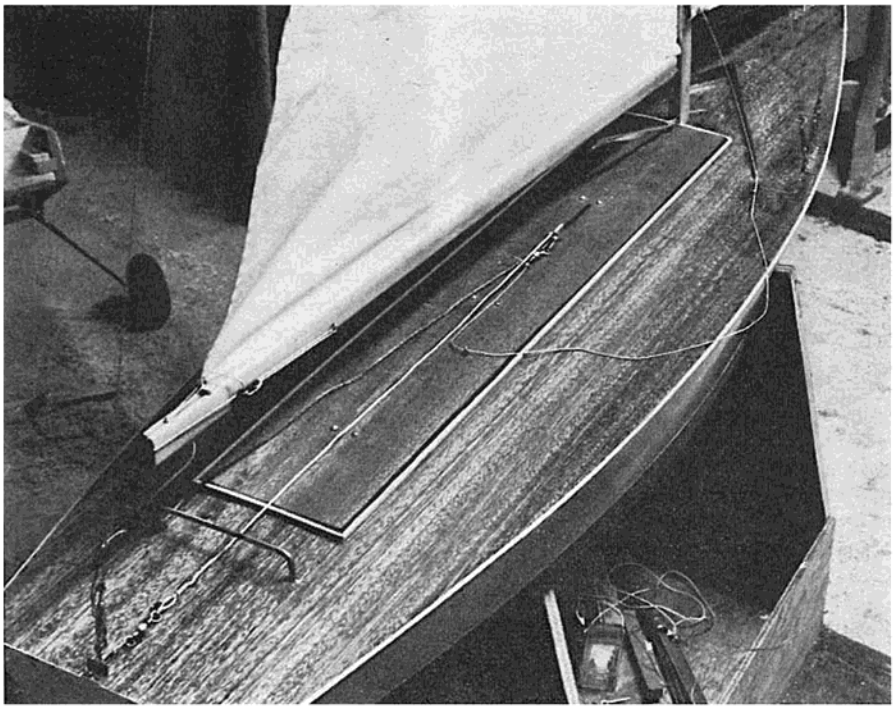
R/C boaters having a desire to build a racing engine for Class F model power boats should consider the Octura #1230 engine casting kit. The original engine, designed, built, and raced by Charles Watkins of Chicago, Illinois held the B class record (up to 30 cc displacement) for tether boats for 8 years. This record of 81.81 mph was set with the engine using spark ignition, alcohol and castor oil, and no nitro. Its displacement of 30 cc is top limit for Class F R/C model boat use. Bore 1.4", stroke 1.187.

The Octura 1230 kit consists of two sheets of full size blue line prints and the following cast aluminum parts — crankcase, front bearing, piston, cylinder head, rotary valve, carburetor support housing, timer housing and rotary valve support. A cast iron sleeve is supplied for the cylinder liner. A stick of Dural is furnished for the connecting rod and a finished piston ring is also included. Castings can be machined on a 9" lathe and a drill press. Makes an ideal home workshop project. Engines can be built to run on either spark or glow ignition, air or water cooled. Casting kit as described is priced at $35. Order direct from Octura Models, 8148 N. Milwaukee Avenue, Niles, Illinois 60648.



American RussKit Company, 5514 Satsuma, North Hollywood, California, well-known for their activities in the slot car field, has entered the R/C boat industry with a line of 27" and 36" boats. Included is a hydro, a ski boat, and a swamp buggy, each available in the 27" or 36" configuration. First seen by RCM at the Chicago HIAA Trade Show, the RussKit boats feature a foam filled vacuum formed basic hull with ⅛" plywood decking. Price of all boats will be $29.95 for the 27" sizes, and $39.95 for the larger 36" versions. Further information on the line can be obtained from RussKit by writing them at the above address.





Three-quarter rear view of Dumas One-design after modification. The mahogany deck is highly polished and the spruce sheer rail is left natural color. Photo shows rigging of sheets as modified. Outhaul (on boom) is author's own innovation. When boats are in the water, the edges of the sheeting plate are sealed with plastic (electrical) tape. Small amounts of water still find the inside of the hull through the slot for the follower. Ring on traveler is a glow plug gasket.

MODIFYING THE DUMAS STAR ONE-DESIGN

By Frank D. Kelley

JUST for a change in pace in R/C from the big fast multi birds, I thought I'd try a little sailing. I had had two small sailboats that my dad had built when I was a youngster — a two-footer, and a faster racing type four-footer with a gaff rig. These were a "set 'em and let 'em go" type of boat, with rubber band tiller holders, both of which would go like crazy, or so it seemed at the time. The little one would do about two and one-half or three, and the larger one, 4 miles per hour. The four-footer would sail in any direction, when properly set. but the smaller one would only tack and reach, but not sail before the wind. I've often wondered what happened to those boats in the last twenty years.

I found a three-foot sailboat that would not break me up in business in which I could install my Micro and still make it easily removable so that it could be reinstalled in my Mighty Mambo or Cherokee. These were the prime considerations for any boat that I would buy. This was the "America Cup Class" by Aurora ($14.95). It has a styrofoam hull and metal spars.

This first attempt at R/C sailing was a resounding failure, and I was tempted to give it up as a total loss. The boat was slow; so slow in fact, that it would not even carry itself through luff. While the boat was abeam the wind, a gust tipped it over far enough to ship water. Radio equipment and water don't mix, and I was soon out of business!

The next day, I lightened the keel, and by that time the radio was back in operation so I tried it again. This time the gear was wrapped in plastic, but my fun was still short lived. Water seeped in despite my efforts and shorted out the rudder servo. It locked in full left rudder, and I waded out to get it, again.

I talked to Doc. Del. Johnson, telling him about it. He thought it sounded like a slow lazy way to have fun. Before I got to his house to give him back the Mambo he had loaned me to train for Class III multi, he had read all the articles in the series on the S.B. one-design (July, Aug., and Sept. RCM). He had worked himself up a good strong enthusiasm about it. We looked at the pics, and decided that the S.B. was not the boat for us. It would not fit in the back of our station wagons without disassembly, and did not look "scale."

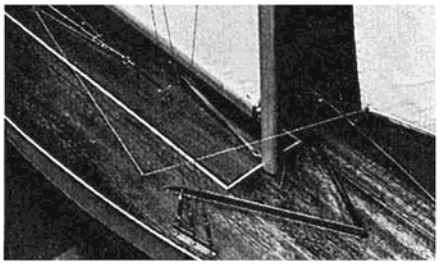
The Aurora boat, we decided, just wasn't designed for R/C. Pouring over the ads in the magazines, we settled on the Dumas Star one design 45". Less boat than the S.B., but less money, too. If I didn't think it had enough beam, we could change it slightly. We could completely seal the hull (or so we thought), to keep the radio gear dry. Doc would use his Orbit 3+1. By following the plans and directions, two Dumas boats were ready for the water about a month later.

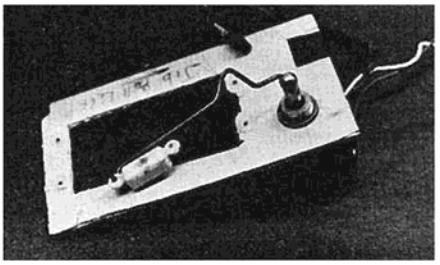
We had no way of sheeting the sails, for the sheeting kit ($25.00) had not arrived from Dumas at that time. We just tied the sails off, out a little bit from "close-hauled" and I dropped mine in the water. Doc was just a little bit leery, thinking that he might not get it back. He watched out of the corner of his eye as I turned it around, and he was convinced. After a day of sailing, I told Doc that if I lost my boat at that point, I had had my money's worth. He didn't quite agree with me, but he was more than happy with the fruits of our labors in building them.

When the sheeting kit did arrive from Dumas, we checked it out. It consisted of two threaded rods which are turned by electric motors to drive the two followers, which, in turn, project through the deck. The sheets (lines to the sails) are fastened to these followers. The followers had a total travel of about 13", from "jam" at one end, to "jam" at the other. The main sheet follower would make the length of the rod in about 10 seconds. It was driven by a Pittman "Boatmaster" geared down 4 to 1.

The jib sheet follower was another matter, however. It had a Wilson 1490K1 for a motor, again geared down 4 to 1. Using 4.8 volts, (4 nicads) it took 23 seconds for the follower to travel the length of the 13" rod. (Handy for coffee breaks but not much good for racing.) The idea was, since the corner of the jib (which has no boom on the bottom of it) extends back past the mast, to pull the jib in tight when the follower was all the way to the stern of the boat say, on the starboard side. As the follower moved forward, the jib sheet would loosen on the starboard side and tighten on the port side. When the follower was all the way forward, the jib would be close-hauled on the port side. Twenty-three seconds to change tack, and have the jib again effective!

I thought this was somewhat ridiculous. Doc, no sailor, wasn't so sure. We decided we'd try it anyway. As we played with our new toys, we discovered





Right: Single pole, double throw, center off, switch, for pulling in, or letting out main and jib sheets. Square hole in servo mounting board receives Micro servos. Plug-in goes to sheeting motor, is a fourth of a Bonner 8 pin connector, easily reversible, should polarity be wrong. Other wires plug into battery pack. Switch worked better than other one for mainsail, so was retained. Other installation was merely cut off. Switch was taken apart, some of the length of springs removed (to lighten the effort needed to move it) and restretched for proper pressure on contacts. The length of this piece of plywood fits between the frames on the Star, and rests high in the hull, thereby keeping switch, servo, and wiring above any water that might get into hull through slot in deck cover for follower.

Left: Deck of Dumas Star One-design, showing method of sheeting jib and mainsail on the same servo. Note that jib sheet is not fastened to the jib at the tack. Vang is rubber band from base of mast to a point 5" out on main boom. Note that Star boats do not carry a boom.

that the followers would jam at either end, so hard, in fact, that the motors could not restart when the polarity was changed. A system had to be devised to cure this. A set of Micro switches could be used, and seemed to be the only answer. Doc. claimed that they could not be wired so that the limit switches could be installed properly. I thought for a little while, and said that they could. He gave me an argument, so I told him. "I'll bet you a hamburger and a coke that I can draw you a wiring diagram that'll work."

"You're on," he said.

I went back into the house with him and drew it out for him. I put the limit switches in place and crossed the wires after they went through them, from the double pole, double throw, center off switch. Soon we were headed for the local hamburger joint, with him doing the buying! (I don't show the wiring diagram here because there is a much simpler way of doing the same job.)

Our first attempt at sailing with this set-up was a resounding bust. The followers kept jamming at the end of their travel, and we had to keep bringing the boats to shore to free them. It seemed that the limit switches were a must. We disconnected everything and continued sailing the rest of the day.

The next day, Doc. called me, and said, "We don't need limit switches. There's a real simple way of doing it. We'll do it mechanically, instead of electrically." I wanted to know how. "Real simple. He told me. "All we have to do is grind off the threads at the ends, and put a sponge rubber block on the frame to bounce the follower back into 'em when the motor is reversed." By the end of the week, both of the boats were repaired this way, and we went sailing.

It still took 25 seconds to change tack, and the jib sheet was continually fouling in the threaded rod under the deck. This necessitated bringing the boat to shore, to unfoul the sheets. It had been more fun to sail them without being able to move the sails in and out. We disconnected the sheeting servo for the jib, and tied the jib sheet off solid. There was just enough slack in it, so that the jib would start to flutter in luff just before the main. By letting the jib flop freely from side to side as we changed tack, but still being able to control the main-sheet, we were back in business. Things worked well again, and the jib was working, pulling the boat along, the instant the wind filled it.

To eliminate the dead weight, the motor, threaded rod, and follower were removed, along with the extra servo (radio) and switching mechanism. A new piece of Mahogany was cut from a door jamb to 3/32" thick. This was used to replace the decking over the sheeting kit, this time with only one slot in it for the main sheet follower. This slot was centered in the boat, by moving the sheeting kit over to that point.

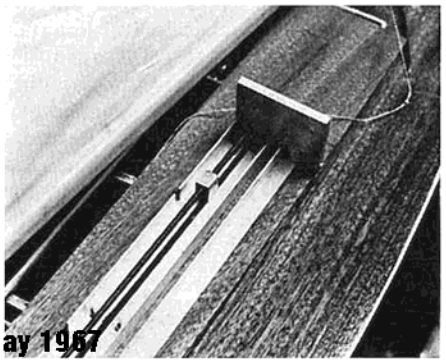
Re-reading the article on the S.B.'s we each decided to install a vang. This merely consisted of two screw eyes, with a wing rubber between them. The screw-eye on the mast was placed as low on the mast as I could get it and still step the mast. The one on the boom was placed 5" from the mast. This would hold the boom down while running (before the wind) and not bother anything when the boom was close-hauled. I can't say whether it did any good in the speed department, because both boats had them installed at the same time. Neither of us would release it to see, because the competition was keen. One thing that did make a difference, however, was the ability to change the length of the sheet on the jib. I fastened the jib-sheet on the follower as shown in the photos, and Doc. did not. He merely tied it off solid and let it flop. Mine still flops, the same as his, but when I lengthen the main sheet, I also lengthen the jib-sheet. On a run before the wind, I've got it all over him. I go by him like he backing up! On the beat to windward, I've got real problems keeping up with him. I've got to read the wind better than he does, or save a luff in order to keep up. If the races are short enough, and he's on the ball, I'm dead!

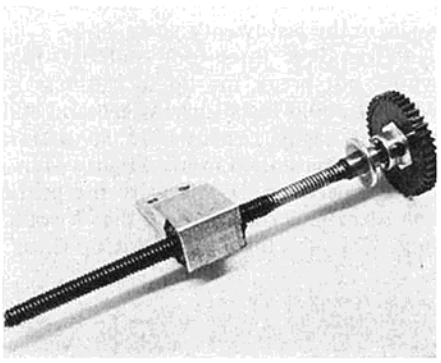
To get a good looking keel on the Dumas Star one-design is not the simplest job in the world. Dr. Johnson and I looked at the plastic forms that came in the kit, and shook our heads. The instructions call for filling them with 9 lbs. of shot and bolting them onto the keel. I wanted a slimmer profile if I could get it, and this made sense to Doc.

We picked up some plaster of paris at the hobby shop, and we proceeded to make some molds in which we could cast our lead. The first attempt failed, to some extent, when we cast the outside of the lead mold. This made the casting too short to fit on the existing keel, although the both sides weighed exactly 9 lbs. As I recall, however, the results were more sleek than the ones we finally wound up with. The method we did use was more work but made the keel and

Left: View of underside of Dumas sheeting kit. Notice that half of sheeting kit has been removed. Sheeting kit has been moved over to put Main Sheet follower in the center of the boat. Photo shows method of construction.

Right: Follower on threaded rod, with Cox 40T gear. Note threads removed from each end of brass rod. Follower sticks up through slot in deck to attach sheets. (This one was the jib sheeting follower, which was removed after being unsuccessful. See text for details.)





lead integral.

We made two frames from ¾" boards about 2" deep and more than large enough to hold the plastic molds that came in the kit. Placing the frames and molds, over waxed paper, we poured a soupy mess of plaster of paris over the mold, and waited for it to harden. In an attempt to get rid of the moisture in the plaster, we placed the molds in the oven for about an hour. (It didn't work, we still got bubbles.)

Using an X-acto knife, we cut holes (sprue holes, only there was never enough metal to make a sprue) in the reverse side of the mold. The mold was then placed over a piece of asbestos sheet. The lead was melted in a heavy duty cast iron fry pan, over a gasoline camp stove, 4½ lbs. at a time. It was then poured through the hole in the back of the mold, with a flat piece of asbestos under it to keep from burning the joint. The first casting worked fine, but warped the asbestos, so that the next casting leaked under the edges of the mold. It had to be re-melted.

We changed to a piece of ½" plywood in place of the asbestos and everything worked fine. The resulting casting was a slab-sided affair that didn't look or fit very good. In all, we cast six times to get the four sides needed for our two boats.

Next came the problem of getting them onto the metal keel in the proper place. We discovered that we should have used at least five lbs. of lead on each side, so that we had some surplus material to file off. We tried tilting the molds in an attempt to increase the weight at the bottom and making the top of the weight smaller, but finally kept the molds flat for our final castings. When the insides of the castings were smooth enough to suit us, we tried placing them on the keel. They didn't fit; they were warped just enough to look bad!

I drilled a couple of holes in the keel where there would be enough lead to cover the bolts. Using these holes as a guide, we placed the newly formed lead under the keel in the proper place, and started drilling. Lead is the toughest material I can think of to drill, particularly with a power drill, and sure enough, I broke a drill on the first hole. From then on I was more careful! I had to stop at each ⅛" or so to clean the galled lead from the bit, before I could continue drilling.

With the two holes in each casting, and everything lining up, I changed bits, and counter-bored from the outside of the lead. This would allow the bolts to be covered by the lead. We used the bolts supplied by Dumas, and countersunk both the bolts and nuts. The resultant keel was a real mess! There were gaps all around the "flush" fit between the lead and the galvanized metal from the boat. We cut off the bolts as deep as we could, so that we could cover them, and we were ready to shape the lead.

We knew that we wanted exactly nine pounds of lead on the bottom, so before we started, we weighed the boats. We found that our boats each weighed within an ounce of the other at 7 lbs. 1 and 2 ounces respectively, without the lead. We would make them weight 16 lbs. exactly. Using more lead, solder, flux, and a welding torch, we filled in the bolt holes, and the casting irregularities. We found that the torch with a #2 tip was too hot and with the #0 tip wasn't hot enough. Doc didn't have a #1 so we did the best we could with what he had. A propane torch would have worked equally well, and perhaps better.

As I said, we added more lead, and soldered the edges of the castings to the keel, puddling it into the holes and irregularities in the casting. We used wood rasps, files, sandpaper, and a sanding disc to get it smooth, filling the holes and sanding them down. I had a gunsmith barrel, inletting rasp I used to smooth up the fillet at the top of the lead where it joined the keel.

The "C" clamps that we used to build the hull worked well to hold the keel down to the table while we worked on it. (We used a picnic table, outside on a windy Sunday afternoon. Would you believe that the picnic table was the only place we could find that wasn't piled high with modeling junk, er — materials?)

When we started bolting the lead on, I figured that I could use a hammer to beat the lead in place and get a good fit at the keel. This didn't work either, but the lead did get a little closer, at least close enough so that we could bridge it and fill the gaps with solder and surplus lead, making a monolithic keel and weight.

We have not yet raced any of the other designs, (or even seen one, for that matter) but we are looking forward to the time when we can. In the meantime, if there are any sailboat nuts within 500 miles of Spokane, Washington, who want to race the Dumas boats, a card or letter inviting us to race will receive a prompt answer. The address is Frank D. Kelley, W. 2524 Francis, Spokane, Washington 99208.

The Roostertail

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

FLASH! The big boating event of the year, "The International Model Power Boat Association Regatta" is sanctioned for August 12 and 13 in San Francisco. The San Francisco Model Yacht Club will be host. What an ideal location! Now you and your family can take that trip to one of the world's most beautiful cities and run in the Internat's at the same time. Start arranging your vacation so that you can attend this outstanding event. With the increase in model boat popularity, and the rapid advance in design this should be the largest and best regatta ever. In subsequent Roostertail columns major space will be allocated to details regarding the I.M.P.B.A. Regatta.

It is necessary to print three corrections to the I.M.P.B.A. Record Listing, R/C Modeler Roostertail, February 1967. These records were set during the 1966 season, and for some reason unknown to the Roostertail Editor, were not included in the original listing. Please correct your listing with the following data:

Class C-2, ¼ mile oval, time 0:38.6, Lee Pender, set 7/17/66.

Class E-3, Ski, ¼ mile oval, time 0:42.87, Gary Preusse, set 5/14/66.

Class F-3, Ski, ¼ mile oval, time 0:46.5, Gary Preusse, set 7/17/66.

Attention I.M.P.B.A. Clubs. This column was originated to aid in the interchange of ideas within the I.M.P.B.A. framework. The strength and smooth running of the I.M.P.B.A. is dependent on the individuals and clubs contributing their knowledge and data to us. There are two major objectives that we should work toward: the growth and prosperity of present clubs, and the formation of additional clubs. There are many major cities in the United States and in the world that have excellent facilities for model boating but have no organized groups to use them. In most of these terested in model boats but find it difficult to get the city or park directors to approve running just for an individual. In addition, the major source of enjoyment in this hobby is to compare your boats to others. We urge individuals to correspond with the active clubs and to make every effort to start their own. In future Roostertail columns we will spend some time on suggested means to establish and run a model boat club. It is possible that some of the active clubs might want to foster a new one in their geographic area. As a start, the St. Louis Model Power Boat Assn. would be interested in helping individuals in Kansas City, Tulsa, Memphis, Nashville, Louisville, and other cities nearby get a start toward a club. In case you are interested write Cy Crites, 785 Babler Drive, Florissant, Missouri 63031.

According to I.M.P.B.A. Headquarters, we have not heard from a lot of clubs regarding regatta sanctions. Don't let another day go by before making out your sanction request.

The Roostertail has not had much mail lately regarding your club's activities. Why don't you let us know what you are doing, where you are running, and other items of interest?

The following should be added to the Regatta and Time Trial Calendar:

Blue Dolphins—Time Trials—April 29 and 30; Lake Woollomes, Delano, California.

DeVry Dolphins Invitational Regattas, June 10 and 11 and Sept. 16 and 17; Wheeling, Illinois. Time Trials (start at 2:00 p.m.) May 27, June 24, July 29, Aug. 26, Sept. 30.

Marquette R/C Boat Club of Chicago Invitational Regatta; Sept. 2 and 3, Marquette Park, Chicago Club Regattas; June 4 and 16.

Minute Breakers Multi Boat Races, July 23 and August 27; Lombard, Illinois.

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