

# RCMW-FSP

January 2018

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## Subscribe to RCMW

RCMW is the only model airplane magazine that provides all plans as full size PDF files in every issue. All pages of the monthly online magazine can be printed out, including the full size PDF files, using your own computer printer.

If you like to build models you will appreciate the ability to see again antiques, old classics, reproductions of kits, as well as new designs made for the reliable, lightweight Micro RC equipment currently available.

If you are one of the "Buy-&Fly" fraternity and would like to learn how to build and repair models, RCMW is also the magazine to read.

Each issue is full of useful information rather than just a seemingly unending series of advertising for expensive models and equipment.

Subscriptions are \$24 for a full year of 12 issues and you can also download the previous 11 issues on a rotating basis if you wish.

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1640 N Kellogg Street  
Galesburg, IL 61401  
USA

# For the Model Bulder and Flyer - January 2018 Issue



Full  
Size  
Plans



Everyone needs a chuckle these days, particularly when the news on the “Boob Tube” and in what is left of the newspapers doesn’t exactly lift you spirits. We have a couple of answers to that in this issue. You will notice that on the home page of our website we have moved the cartoon that appeared below the moving slides to above the slides. We are planning to have a new cartoon every day so check back often. We will also include news about models and model building also. Should be better than reading the daily paper.

Related to that, in this issue we include all the remaining download links for both the Smilin’ Jack movie and the Hop Harrigan radio program. You can listen to the radio while cutting, sanding and doping and watch the movie while waiting for glue to dry. Have fun!!

The PEACEMAKER by George Aldrich is our UC Stunt job for this issue and in his article George says it’s the best design he has ever done.

Our download for this issue is the February 1951 issue of Model Airplane News. Just look at those great prices - Sure would be nice to have a time machine like H.G. Wells !!

And now for something completely different. How about this little indoor/outdoor ornithopter, LI’L IGGLE by Larry Conover. Sounds like a lot of fun.

John Jennings, one of our subscribers sent in some notes and photos on how he builds his own modeling clamps. Another use for popsicle sticks and rubber bands.

The CHICKEN HAWK RC Biplane by Ted Strader is a really nice looking model and it looks like it would be an easy build as well. There was a kit available back in the 60’s but they are probably hard to find these days. Maybe one of the laser cutter guys are making it. Let us know and we’ll publish a source.

Here’s the Goldberg JUNIOR FALSON. I would hazard a guess that there were as many or more of these sold as any other model, except perhaps for the RINGMASTER. There are kits around for this one too.

Earl Stahl designed a lot of small rubber powered scale free flight models, one of which is included in this issue. It’s the HOWARD GH-1. That’s its military (Navy) designation but it is better known as MISTER MULLIGAN in it’s civilian dress. Makes up into a very pretty model.

With the loss of so many hobby shops it isn’t all that easy to buy the bits and pieces needed for scratch building. Here’s an article showing how you can make your own fuel tanks. I used to use old tin cans back in the 1950’s but now they use some sort of coating and they aren’t as easy to solder.

Has the “Boss” made disparaging comments about the piles of “Smelly old model airplane magazines” ?? Drop a hint about the digital collections featured on the last three pages of the magazine, especially if she says that she doesn’t know what to get you for your birthday.

Keep ‘em Flying - Roland Friestad, Editor

# Plans, Magazines, Books, Radio Programs & Movies for Downloading by Editor

For quite some time now we have uploaded back issues of model magazines to a file transfer service so that subscribers could download them and save them for reading during the long winter nights, or any other time that the urge to daydream or learn about models became impossible to ignore. We have had some good positive comments about the downloads.

We also tried to put some of the adventures of Phineas Pinkham, Bill Barnes, and a couple of others in the pages of RCMW. We got good comments about those too but also found that they took up too much space in each issue and didn't leave enough room for plans, construction and How-To-Do-It articles.

The Smilin' Jack movie and Hop Harrigan radio programs were also enjoyed by quite a few of our subscribers, but the movie segments took a bit more time to download than everyone liked.

We will be arranging for more downloads in future issues including the magazine back issues we currently provide but, in addition, more classic model building books and adventure stories, rather than having them take up pages used for construction and plans.

There are literally thousands of publications about model building available and we have many hundreds (perhaps several thousands) of them in our archives.

They include not only model airplane items, but also books about full scale aviation (mostly lightplanes) and both hobby and professional machine shop topics.

In recent years, the ability to store large quantities of information on very small memory chips along with better high-speed scanning and digitizing equipment has made it possible to do things unheard of a relatively few years ago.

For instance, it is possible to carry well over a thousand back issues of model magazines like Air Trails, American Modeler, Flying Models, and Model Airplane News on a single credit card sized Flash Drive.

Not only that, just recently it has become practical to put 20 or more full length movies on similar cards that can be played on your desktop, laptop or tablet omputer.

So, no more scratched DVD's that won't play because they have been not taken care of as they should. I used to go to our local library and check out a DVD if it was something of interest

but 4 out of 5 of them would only play partially and then would lock up.

The files we will be providing will not have those problems and included will be free software to play the files, the same as was done with the Smilin' Jack movie and Hop Harrigan radio files.

While we are talking about the movie and radio program, I would like to hear from readers who have watched or listened to the programs, particularly if they have had any problems.

We would like to know of any problems so that they can be fixed before we set up more books, movies and radio programs for subscribers to download. So send us your comments.

On the next pages are the download links for the complete Smilin' Jack movie and all chapters of the Hop Harrigan radio program.

Let us know if you want more of this !! We have lots of it in the archives.

Send me an e-mail

Roland Friestad  
cardinal.eng@grics.net

# Saturday Serials

Nostalgic Movies

&

Radio Programs

We recommend the VLC media player to play both the movies and the radio programs. It is completely free software, although they would appreciate a donation but that is your choice.

The Windows version of VLC can be downloaded using the following link ---

[CLICK HERE TO DOWNLOAD](#)

The MAC version of VLC can be downloaded using the following link ---

[CLICK HERE TO DOWNLOAD](#)

Run the software to install it and it is handy to create a shortcut on your desktop if it isn't created automatically during installati

After downloading the movie or radio program chapters from the other links on this page, you can just drag either on to the VLC shortcut that looks like an orange and white traffic cone and the chapter will play automatically.

Play can be stopped and started using the icon on the left of the bottom of the screen. Volume is changed by sliding the wedge shaped triangle on the bottom right of the screen.

Now don't get so deep into nostalgia that you forget to build model airplanes !!



Smilin' Jack was a popular comic strip for many years and always had a lot of aircraft information. The author was an enthusiastic private pilot and promoted flying events and expositions in his daily and Sunday cartoon strips that were carried in many newspapers across the USA and in other countries.

As far as we know there was only one Smilin' Jack movie ever made but if we find another one we'll try to get it for you. You can download Chapter 1 using the followins link --

[CLICK TO DOWNLOAD CHAPTER 1](#)

This is a large file and should download in 15 to 20 minutes, less if you have fast internet.



Hop Harrigan was a daily radio show for several years with several hundred episodes. A complete story took about three or four weeks and had 15 to 20 daily episodes of about 20 minutes each. You could get a lot of model building done while listening to the adventures of Hop and his sidekick and friends.

Here's the first installment one Hop Harrigan story, "The Mystery of the Vanishing Men" Just click on the link below to get it ---

[CLICK TO DOWNLOAD CHAPTER 1](#)

This audio file should download in three or four minutes.

**Go to the next page for download links to more chapters of the movie and radio program**

# Saturday Serials

Nostalgic Movies

&

Radio Programs

Page 2

I've decided to change the way we will provide these movies and radio programs to our subscribers. Instead of one chapter each Saturday, we will have several chapters available in each issue of RCMW. This will be easier by making each RCMW issue stand by itself and not have additional separate files and pages.

Movie chapters take 10 to 20 minutes to download and the radio chapters only take a minute or two. This depends on your internet connection speed, of course.

First the Smilin' Jack Movie - The first chapter was in the November Issue of RCMW and because of our original intent of another issue on each Saturday to replicate that trip to the movies when many of us were kids, we intended to make another chapter available each Saturday.

Well fond memories are OK but this has proven to be a bit unworkable for several reasons. So we will be offering several chapters in each issue of RCMW to simplify things.

Please send me an email message with your comments and suggestions. My email address is --  
[cardinal.eng@grics.net](mailto:cardinal.eng@grics.net)

# SMILIN' JACK

Chapters 1 through 5

Here are the download links for chapters 1 through 5 of the Smilin' Jack "Cliff Hanger" movie that originally appeared as the Saturday morning serial at the local movie theatres. There are 13 chapters in the entire movie. Watch for the rest in the next issue of RCMW

Here are the download links for Chapters 1 through 5 of the SMILIN' JACK movie

Download link for Chapter 1

[CLICK HERE](#)

Download link for Chapter 2

[CLICK HERE](#)

Download link for Chapter 3

[CLICK HERE](#)

Download link for Chapter 4

[CLICK HERE](#)

Download link for Chapter 5

[CLICK HERE](#)

# HOP HARRIGAN

Mystery

of the Vanishing Men

Radio Program

Chapters 1 through 6

And here are the download links for chapters 1 through 6 of the HOP HARRIGAN radio program

Download link for Chapter 1

[CLICK HERE](#)

Download link for Chapter 2

[CLICK HERE](#)

Download link for Chapter 3

[CLICK HERE](#)

Download link for Chapter 4

[CLICK HERE](#)

Download link for Chapter 5

[CLICK HERE](#)

Download link for Chapter 6

[CLICK HERE](#)

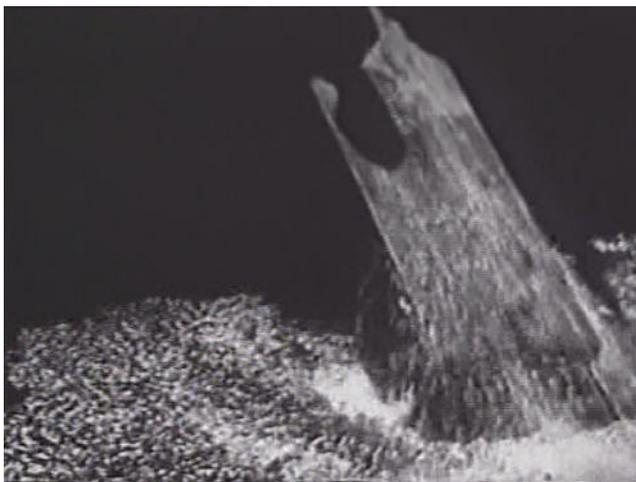
Go to the next page for download links to more chapters of the movie and radio program



## SMILIN' JACK

Chapters 6 through 10

Here are the download links for chapters 6 through 10 of the Smilin' Jack "Cliff Hanger" movie that originally appeared as the Saturday morning serial at the local movie theatres. There are 13 chapters in the entire movie. Watch for the rest in the next issue of RCMW



## HOP HARRIGAN

Mystery  
of the Vanishing Men  
Radio Program  
Chapters 7 through 12

And here are the download links for chapters 7 through 12 of the HOP HARRIGAN radio program

Download link for Chapter 7

[CLICK HERE](#)

Download link for Chapter 8

[CLICK HERE](#)

Download link for Chapter 9

[CLICK HERE](#)

Download link for Chapter 10

[CLICK HERE](#)

Download link for Chapter 11

[CLICK HERE](#)

Download link for Chapter 12

[CLICK HERE](#)

Here are the download links for Chapters 6 through 10 of the SMILIN' JACK movie

Download link for Chapter 6

[CLICK HERE](#)

Download link for Chapter 7

[CLICK HERE](#)

Download link for Chapter 8

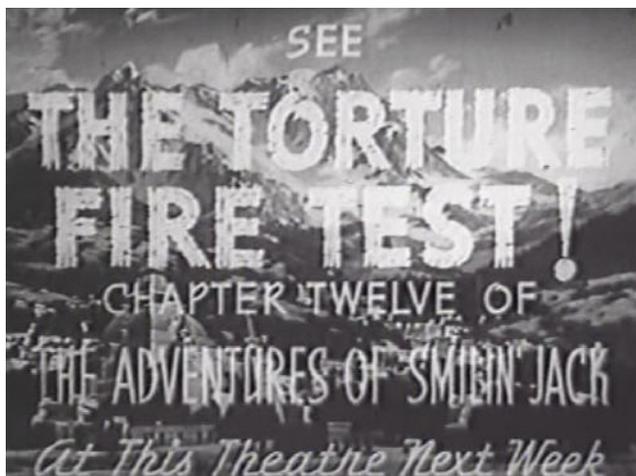
[CLICK HERE](#)

Download link for Chapter 9

[CLICK HERE](#)

Download link for Chapter 10

[CLICK HERE](#)



## SMILIN' JACK

Chapters 11 through 13  
End of Movie



## HOP HARRIGAN

Mystery  
of the Vanishing Men  
Radio Program  
Chapters 13 through 18  
End of Program

And here are the download links for chapters 7 through 12 of the HOP HARRIGAN radio program

Download link for Chapter 13

[CLICK HERE](#)

Download link for Chapter 14

[CLICK HERE](#)

Download link for Chapter 15

[CLICK HERE](#)

Download link for Chapter 16

[CLICK HERE](#)

Download link for Chapter 17

[CLICK HERE](#)

Download link for Chapter 18

[CLICK HERE](#)

Here are the download links for Chapters 6 through 10 of the SMILIN' JACK movie

Download link for Chapter 11

[CLICK HERE](#)

Download link for Chapter 12

[CLICK HERE](#)

Download link for Chapter 13

[CLICK HERE](#)

# The Peacemaker

**George Aldrich, several times winner of the Nats, Plymouth Internats, and other major meets considers this sleek ship to be one of his best designs. For the Oliver .15 Diesel - The construction article and plans are from the April 1960 issue of Model Airplane News.**

by **GEORGE ALDRICH**

My first acquaintance with diesel engines came a little over ten years ago. Our modeling group, which was pretty much by itself in the Lower Rio Grande Valley of Texas, was then flying such models as the Super Zilch (by the late Jim Saftig) powered with big Anderson Spitfires, Orwicks, etc.



Much to our dismay, one Sunday a member of our club appeared with a big Zilch and, you guessed it, there was a diesel up front. Some may remember the old Drone diesel, designed by Leon Shulman. The Drone, when perking along on its 50% ether, 50% castor oil, fuel, and swinging an 11x10 prop, not only got the Zilch off the ground but could pull it through any maneuver the 60's could!

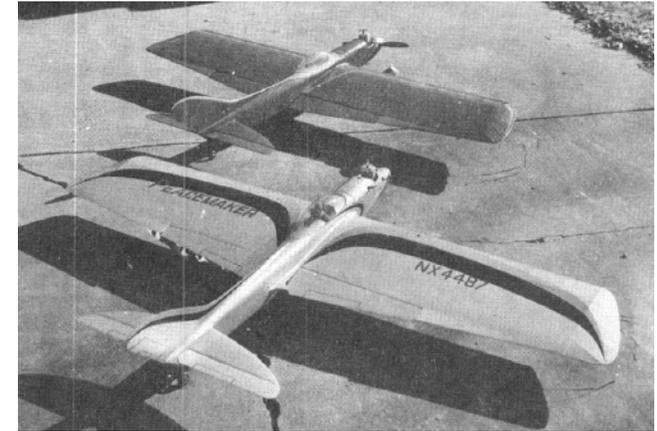
The Drone was only about a 29 and it was pulling a 60-sized model with the coil and batteries still in it. Pretty revolutionary for those days.

About two years ago, the author obtained an Oliver Tiger .15 diesel from England with the thought of trying it for an International stunt design. To appraise its potential it was installed in an old battle scarred Flite Streak.

Sure enough, on 60-foot lines the little .15 pulled that oil-soaked wreck around like a .29. The remarkable thing was that the lines stayed tight over the top of the circle.

So far we have heard only that a diesel has plenty of power to pull around an abundance of weight. Before we go any further, let's discuss what this means on the end of the lines.

We have all heard a model powered with a glow engine leaned out on the ground and as soon as the model was launched it began to "come in" (gain rpm). The reason for this was that glow engines do not develop their full power while being "held down"



The big difference with a diesel is that it develops almost all of its capable horsepower while still on the ground. It will pick up some when released, but not as much as the glow engine does.

In the same vein, if we have two engines, one glow, one diesel, both of the same displacement, the diesel would haul a heavier load than the glow engine because it developed more power or torque at lower rpm's. It is something like a car pulling more in low gear than it can in high gear.

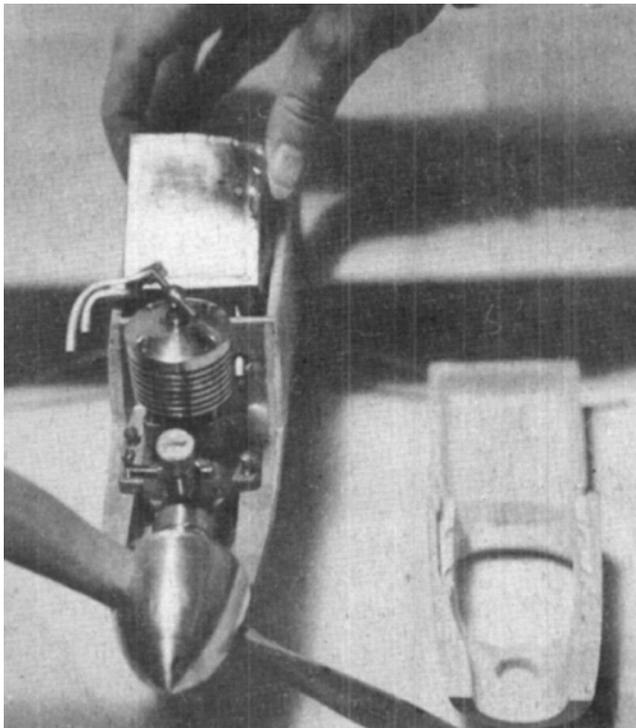
Out on the end of the lines, this means that you experience very little, if any, of the slowing down in maneuvers that you are accustomed to with glow engines.

Thus, from the time your model is launched until the engine quits you have constant engine pull, even when the engine burps or changes from "four-cycle" to "two-cycle". Last, but by no means least, the model flies at almost the same speed whether it is climbing or diving.

So a design was arrived at that would handle this power yet not be outsized - enter the Peacemaker. While, the model is basic, it presents the best general arrangement while still being unique in appearance.

Full-span flaps are not necessary as the sharper tapered trailing edge gives ample area. This also put the movable area in close to the root where it is more efficient; and cuts down on tip wobble.

While the Peacemaker is basically a diesel design, engines in the .19 to .29 cu. in. range will do nicely.



For glow engines and powerplants under 6 oz., it is suggested that the nose be lengthened 1 inch, moving the engine and firewall F-1 forward the same amount, so as to have room for the larger tank capacity that glow engines require.

A .15 diesel will run about 15 or 20 minutes on three to 3-1/2 ounces of fuel. A diesel requires much less than a glow engine. Also, for those who want a less sensitive model, the additional inch to the nose will make the Peacemaker react smoother.

There are only two critical points to watch in the building procedure. The wing must be warp free and the center of gravity should not vary more than 1/4" either fore or aft from the given position. The drawings and photos are self explanatory, except for the wing which utilizes a new construction devised to be warp free and extremely rigid even before covering.



**Paul Gittel, member of SAM (Society of Antique Modelers) sent this photo of an Aldrich PEACEMAKER that he is currently building - Looks like a laser cut kit.**

A good way to speed up construction on your Peacemaker is to get together a group of local modelers and share in work. Each gets a set of full-size plans and takes a portion of the model to cut out the parts for. By blocking up the ribs, fuselage sides, formers, etc., and cutting all together as a unit you obtain parts that are identical to each other.

### **Wing**

Begin by taking the ribs and sliding them into the notches in the 1/8" sheet spar, omitting the two tip ribs. Next, slice the four trailing edge pieces from straight grained 3/32" sheet. Be sure that these trailing edge pieces are exactly 1-1/2" wide with both edges parallel and not bowed from end to end. If these pieces are accurate, keeping your wing warp free will be a much easier job.

Lay the trailing edge pieces down on the plans in their proper positions and mark each rib position. Now cement the ribs and quickly pin to the two long sections of the trailing edge. The top section will start at the left tip and end exactly in the center of the fourth rib from the right tip. The bottom section will begin at the right tip and end exactly on the center of the third rib from the left tip.

While the cement is still wet, push all the ribs down on the spar and get the trailing edge as straight as possible. You do not cement the ribs to the spar until the wing is completed.

Now cement and pin the two remaining short sections of trailing edge in their respective places, making sure the splice is neat.

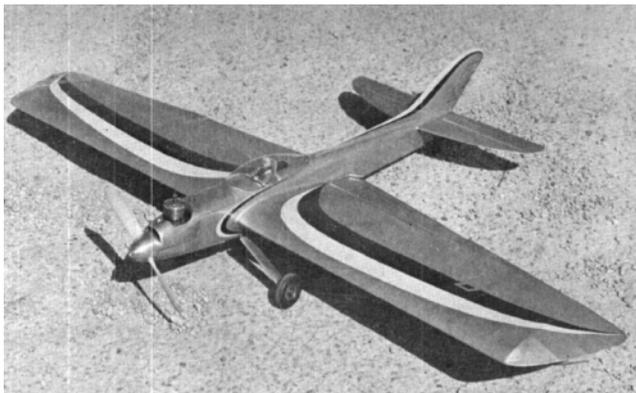
Pin and weight the trailing edge to a good flat surface until dry. Now, with the same care given to the trailing edge, slice the leading edge pieces from 3/16" medium sheet.

Again mark off the rib positions, but this time cement only the bottom pieces of the leading edge and pin in place.

After they are dry enough to carve, shave off the leading edge until it is beveled at the same angle as the ribs, and the top leading edge will fit into position without having gaps along the bevel. Make a good joint!

Now, sight down all edges, pushing and pulling until both leading and trailing edge are straight. Watch out for a twist. It can be deceiving. The leading and trailing edges both can be straight but you'll still have a warped wing if it is twisted.

Quickly add the tip ribs and 1/8x1/4" spar cap strips and again pin the trailing edge to a good straight surface. Block up and/or weight down the wing at any position where a warp starts in.



Allow to dry and then install the bellcrank mount, bellcrank and leadouts. Cement the bellcrank nut to the bellcrank mount securely so that the bellcrank may be loosened later when installing the pushrod.

The 1/16" center section planking, 1/8x1/4" trailing edge cap, wing tips, and tip weight are now added.

When dry, give the entire wing a good sanding with a fairly coarse grade of sandpaper and then with a very fine grade, such as #400 wet or dry.

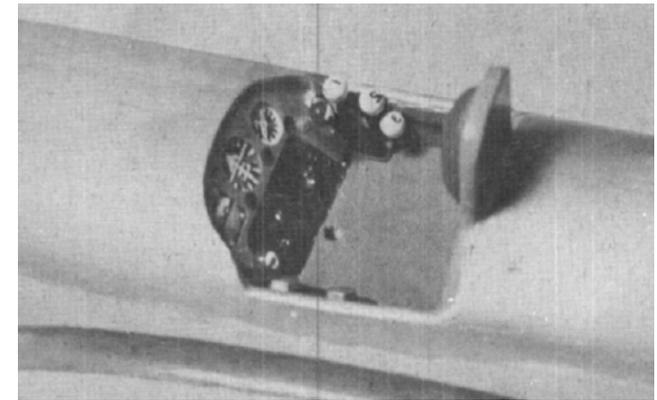
Give the wing one coat of uncut clear dope and sand again with the fine paper. Now, and only now, cement the ribs to the spar, making another check for warps.

Cover the wing with a good grade of medium Silkspar (with the paper wet). When the wing has set for three or four hours, give it one good coat of clear dope.

### Fuselage

After assembling the basic fuselage structure, that is, the sides, doublers, F -1 and F -2, and joining the sides at the rear, the wing and flap horns are slipped into place.

Now drill the 3/32" diameter holes in the flaps and cement them onto the horn using a piece of aircraft pinked tape for reinforcement. Cut and cement the hinges in place as indicated.



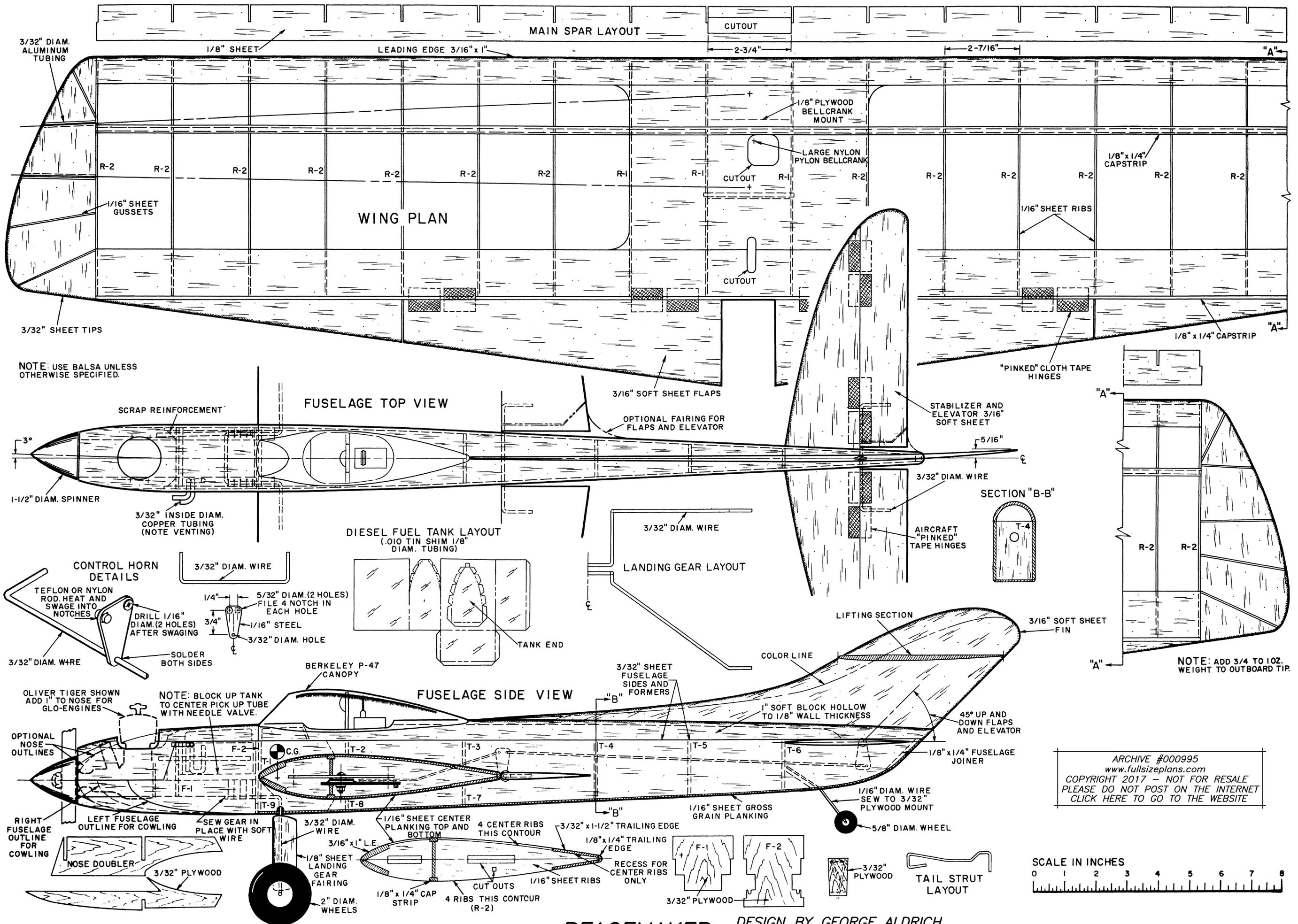
Next, using a triangle, align the wing in the fuselage and cement securely.

When the cement is completely dry in the fuselage, cut the holes for the pushrods in the 1/16" center-section planking as shown on the plans, and install the push rods.

The remaining construction (including the tail) is conventional, not unlike many other stunt models. While a complete cowling is not a necessity this writer strongly recommends that you spend the little additional time required to carve and install some kind of cowling. A cowling adds both to the performance and appearance of the model.

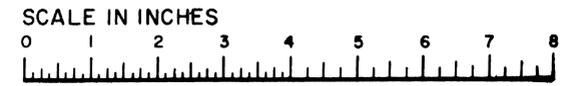






PEACEMAKER DESIGN BY GEORGE ALDRICH MODEL AIRPLANE NEWS, APRIL 1960

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 CLICK HERE TO GO TO THE WEBSITE



**Back Issue**  
**MAGAZINE ARCHIVES**  
from the Digitek Books Collection

Here's the next in our series of monthly back issues of model airplane magazines available for download to subscribers.

This month's choice is the February 1962 issue of MODEL AIRPLANE NEWS. It has four construction articles and several three views along with all the pages containing ads with prices we all wish were still the same as back then.

This issue has been processed using OCR (Optical Character Resolution) and is searchable.

To download the February 1962 issue of MODEL AIRPLANE NEWS click on the link below ---

**[-- CLICK ON THIS LINK PLEASE --](#)**

This download link will expire on March 1, 2018, so if you'd like this issue for your own collection, better do it now. As a note of interest, these issues are stored in the "cloud" that you see mentioned as one of the latest of the buzzwords used by the computer folks. We use a service called Mediafire which can easily handle very large files that would otherwise cause problems with downloading. There are more digital magazine collections and books available on our other website. Click on the link below to visit.

**[www.digitekbooks.com](http://www.digitekbooks.com)**



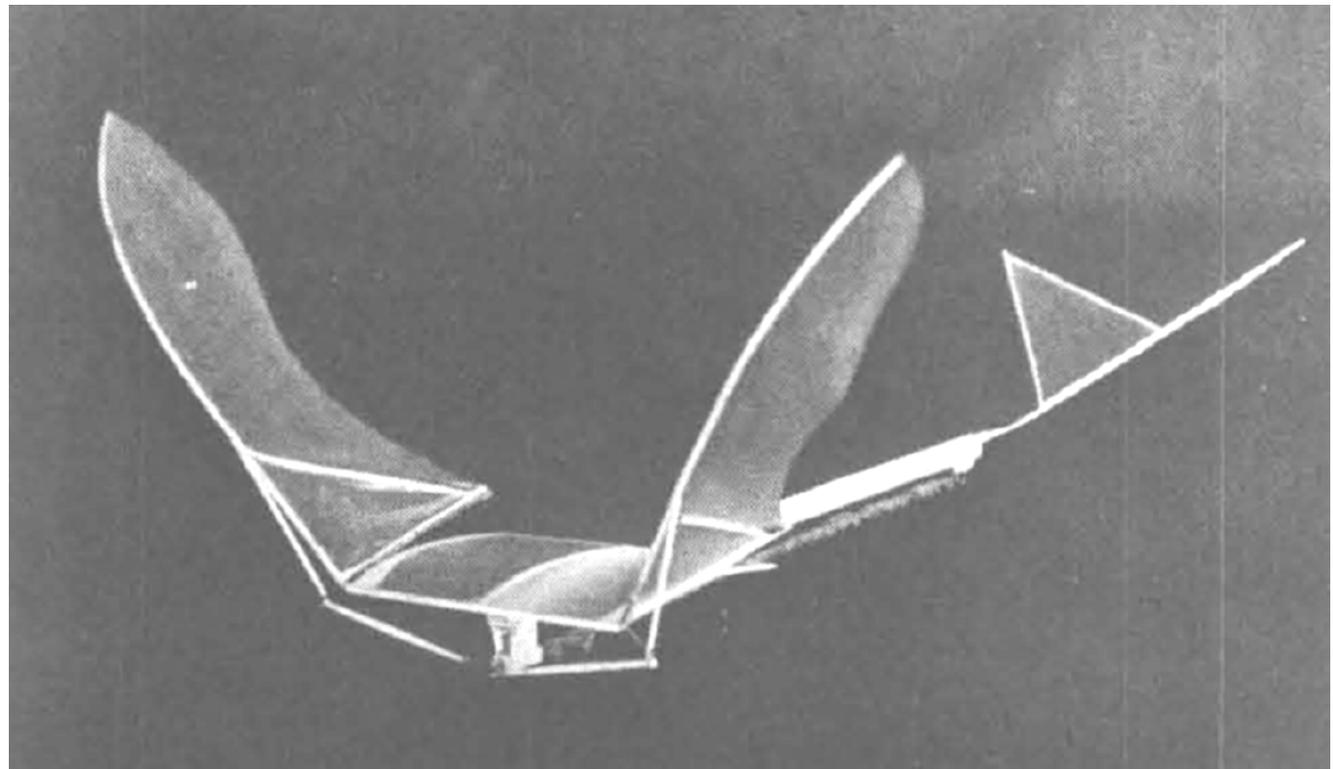
# LI'L IGGLE

## ORNITHOPTER

by Lawrence Conover

Ornithopters have always been fascinating and this easy to build performer should help to fulfill the urge to build and fly your own. Send us photos of your own project and we'll publish them in a future issue.

This design by Larry Conover appeared in the May 1957 issue of *Model Airplane News*.



How-to-do-it comes to birdwatching. First, you make this thing, wind it up, then .... Kidding aside, it is astounding in flight.

This is a "breadboard" ornithopter. A basic design that is easy to work with. Quick to fly. It has a climb like a Zipper when fully wound, yet can be easily flown in your own living room.

Follow general indoor building methods but be sure to use stronger wood in areas of stress. Especially follow the words of indoor and ornithopter expert Carl Goldberg. "Take care. That is the secret."

The first new thing to learn about is the Indian Seed Bead. These little jewels cost only fifteen cents per thousand (Editor - Probably abit more these days) at the hobby shop or dime store. Make wonderful bearings.

The plans tell most of the story so I will just light on points of interest. Bend wire fittings directly from three views of the structure. Choose beads with holes just large enough to slip around the corners after the piece is bent to shape.

It may be hard to believe but you can cement a bead to the end of a connecting rod, and make it stay. The trick is to run a band of cement around the bead after it has been cemented on. No thread binding was used on any part. In this size model cement is strong enough.

Note that, looking from the top, wire lever A extends forward, and B backward, to line up with the throws on the crankshaft.

The length of the connecting rods is critical. (As are all dimensions of the power group.) This length determines the mean position of flapper travel. This places their dihedral. If you got more travel below the main wing than above, the model might roll over in flight. Even big eagles don't usually do that.

The more total flapper movement you can get per revolution the more efficient will be your balsa bird. It costs extra energy every time the flapper stops and changes direction.

Some live birds, when working hard, actually flap 180 degrees with wing tips touching both top and bottom. We would like to do this, but even if it could be done mechanically it is doubtful if stability could be maintained.

I have used as high as 105 degrees travel on some machines. On LIL IGGLE I found it better to flap only 80 degrees. More would require heavier structure, larger wire sizes, and some bird tricks we must discover yet on anything over 120 degrees of travel.

The wing of any flying creature is a most extraordinary wonder of engineering art. Ours is not. So the best we can do is make it work. To do this both sides must have the same stiffness, strength and flexibility.

Cut both from the same area of a medium hard balsa sheet. Sand to the size shown on plans. Bend carefully with heat. Do not singe wood!

Note the angle of downthrust built into the flapper root fitting. This enables the model to climb nearly straight up with no danger of power stalling.

The flapper is hinged on the front only. This provides very good-power adjustments. You just change the angle of one or both flappers by bending C fitting. More negative angle on one causes that side to lower. More negative on both gives downthrust effect.

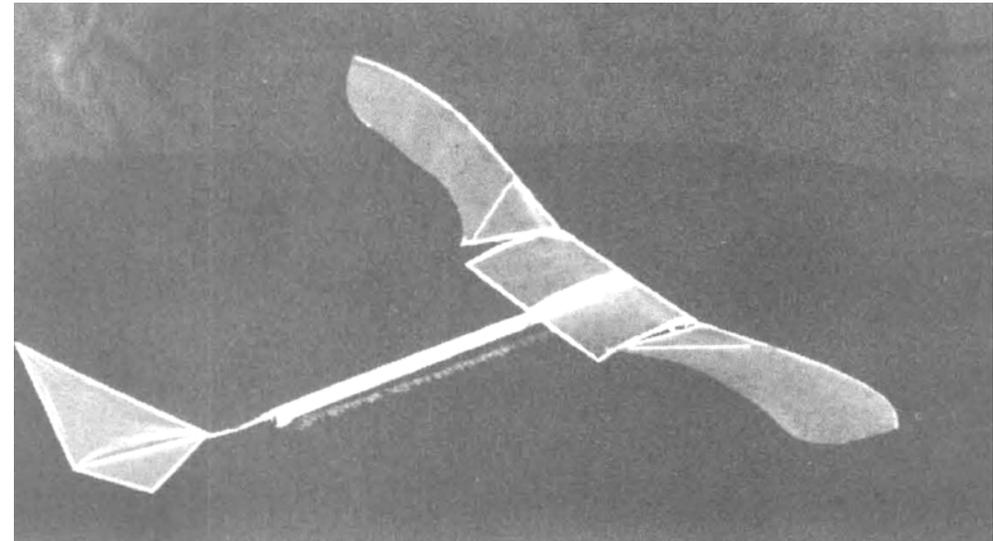
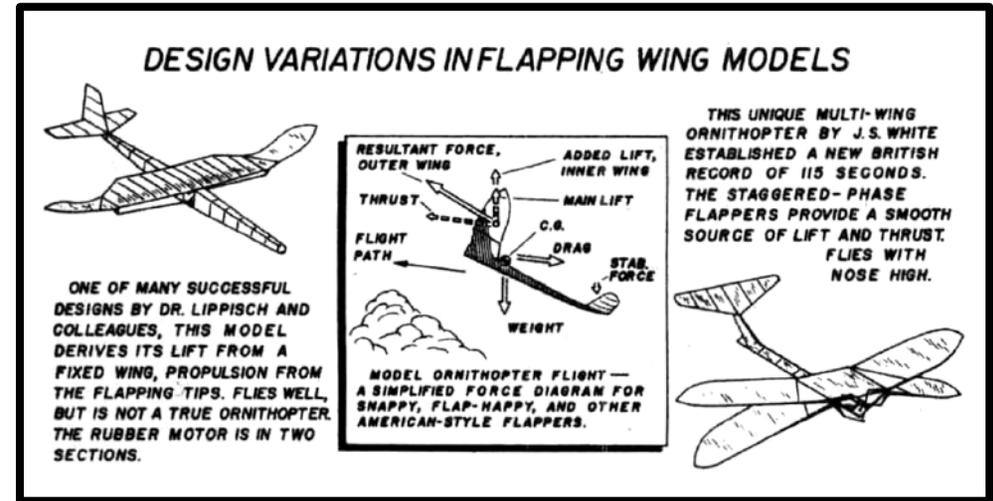
Flight adjustments: Bend the tail boom five degrees left, and five up. Torque is still there. I found that for a left circle I had to turn the winder backward (CCW) when winding from the rear. With the CG far back it tries to stall in straight flight when the power burst leaves, so trim for a tight climbing circle.

Just for fun, when you're out showing it off, announce a controlled bird flight. Wind clockwise from rear to about 70% turns. (Top turns so far are 450)

L'L IGGLE will spiral up to the right, straighten out, hover, change to left circle and continue climbing. Spectacular!

Building an ornithopter can be a real education, both in structures and aerodynamics. (Check the old master, Par Schoenky, in July 55 M.A.N.)

When you see how marginal our model birds fly you may wish to learn more about nature's fliers. How do they do it with such ease, such skill? Then you will end up like us. Fellow FBW's. Flying Bird Watchers.

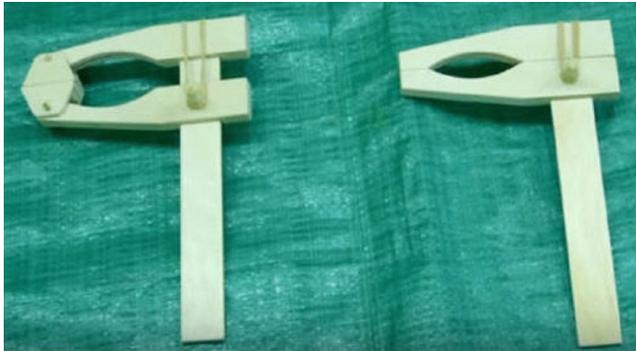




# DIY Model Clamps by John Jennings

One of our RCMW subscribers, John Jennings sent in these photos and a link to a youtube video showing how to make these nifty little modeling clamps that make use of the ever-present rubber bands to apply pressure and act as a "third hand" or even a fourth or more.

The first photo is a screen shot from the youtube video by Ronald Walters. H sort of copid and improved upon commercial clamps that he purchased many years ago.



Take a look at this youtube presentation which runs about 13 minutes to see just how he does it.

[CLICK HERE TO SEE THE VIDEO](#)

It's pretty obvious that Ronald Walters has a very comple set of tools and power equipment after viewing his Youtube presentation, but Jennings went a bit further and simplified the making of the clamps by using the basic ideas and substituting popsicle sticks instead of couutting the parts out of 1/8 inch plywood.

Actually, for smaller models the popsicle sticks should work even better.

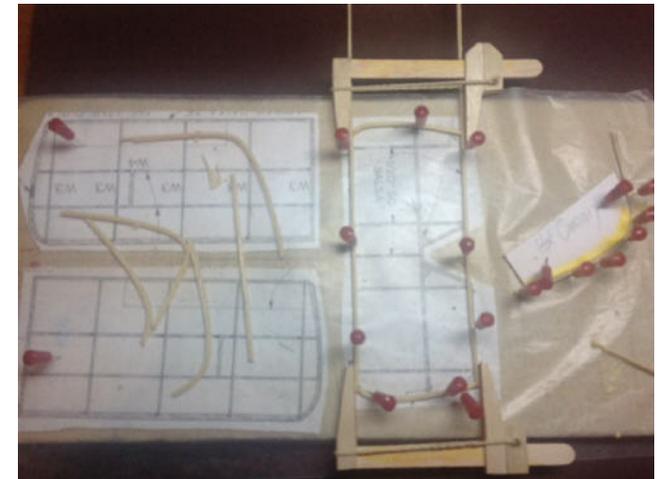
The first picture is of three of John's mimiature clamps shown in comparison to a Zona saw and an Exacto knife to give a better idea of their size.



The next photo is another of three typical clamps showing the way the rubber bands apply the pressure. Various amount and strength of rubber bands can produce a wide variation in pressures as required.



And this last photo shows two of John's clamps in action. Looks like the answer to the not enough hands problem.



If any of you readers have ideas for gadgets, methods or improvements in "How To Do It" just send them in. If we use it in RCMW we'll give a year's subscrpition to our magazine. Contact the editor (that's me) at --

[cardinal.eng@grics.net](mailto:cardinal.eng@grics.net)

Roland Friestad

No, it's not a "Fowl Flyer" . . .

## THE "CHICKEN HAWK"

Ted Strader's 1/2A R/C actioneered biplane

This attractive Strader design comes from the August/September issue of Flying Models

If there's one thing we've learned about true biplane fans through the years it's that they have long memories! Hazy, but long! This fact stood out like the proverbial sore digit when we unveiled the hero of this construction epic at a local club meeting.

Several of the fellows were giving it the usual and required 3W Tests (Wrinkle, Weight & Warp Tests) when it happened. I could see him elbowing through the crowd.

He had that odd split-vision stare peculiar to all biplane fans that allows them to see two wings on anything. He also seemed to have a chip on his shoulder (it was a balsa chip ... and that's the worst kind).

Why the chip was there became almost immediately evident. (We forgot to mention that biplane fans are also loyal ... with long but hazy memories)

"That design looks familiar!" ... No hello, how are ya? ... just "That design looks familiar!" This hearty greeting was quickly followed by "I saw a biplane in a magazine a while back that looks like that one. "Is that where you got the idea?"

Now you'll have to admit, this is a shaky way to win friends and influence club members!

This story has an equally shaky ending. Friend biplane-critic summoned a cohort to ask him what the name of that biplane was in "the magazine".

The cohort thought for a moment and replied it was called a "Duet". I tried to explain that I had also designed the "Duet" and hadn't seen any great similarity between the two. My disgruntled audience merely shrugged and ended our meeting with "Sure!"

As it turned out this modeler has a large crush on the "Duet" and felt that even if I did design it, any attempt to use any part of it in another biplane made me guilty of plagiarism. Woe is me!

Actually I haven't looked at the plans or even pictures of the "Duet" for almost two years. But I'll have to admit that, in the final analysis, there is a resemblance. So, sue me.

This word play did take place ... give or take a little. But that's not the important point in our construction story. The important feature from a modeling standpoint is performance and we're sure you'll find the "Chicken Hawk" worth the little extra effort needed to bring it into being.

Balancing is easy with the equipment outlined and arranged according to plan. Additional gear, such as extra batteries can be arranged between formers No. 2 and No.3 without disturbing the balance. But we're getting ahead of our story ... we're flying high with a ship that hasn't been built yet!

That can be corrected with the proper amount of 1/16" sheet, a dab of glue, some pins and a little patience. Shall we?

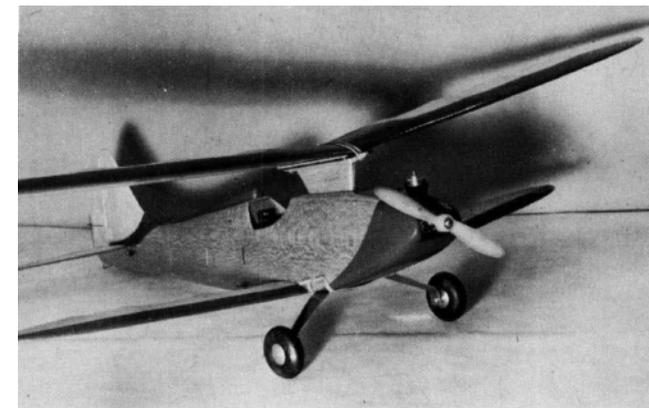
### FUSELAGE

1/16" medium weight balsa was used throughout on the original. With the proper amount of juggling you can get both fuselage sides out of one 4" sheet. We used 3" stock and spliced just above the bottom wing along the line shown on the plans.

Use a little care to be sure both side pieces match . . . including the slots which align the bulkheads. If 3" stock has been used for the sides, cement the splice pieces in place before marking the side outlines.

This will help assure the accuracy of the lower wing position which is a critical point . . . or could be if the angle of attack should differ too much from the plans. Next cut out the 1/16" sheet doublers and cement in place.

Layout the bulkheads and cut to outline. Applying a little cement skin to both sides of each bulkhead will help when you come to cutting out the areas through which the control rods pass.



An easy way to lay the groundwork for correct alignment is to cement former 5 in place and pin the fuselage sides together at the rear. A rubber band will draw the side in to the outline of No. 5. Next cement the 1/2" sheet balsa piece which makes up the forward fuselage bottom from the leading edge of the bottom wing to the nose.

With the sides pinned securely to this piece, install the 3/32" ply firewall and the 1/16" ply formers 2, 3 and 4. Here again rubber bands will help draw the fuselage sides in to conform to the former's outlines.

Don't hesitate to apply hot water directly onto the wood at these bend areas. Use a tissue or paper towel to apply the hot water at the spots that need it.

Now the remaining formers 6, 7 & 8 can be cemented into place. Rubber bands will come in handy here, too, plus a little more hot water. To get the area over former 8 to sweep up into a gentle flow toward the fin, we used hot water as a start and applied some snap type clothes pins to force the wood to shape.

Needless to say, the fin and stabilizer should be cemented in place prior to this bit of business.

The fuselage top from the cockpit to fin can be cemented in place now. This leaves only the forward top and rear bottom pieces to be installed.



We advise cementing the top wing mount platform onto the pylon strut prior to setting it into its location between formers 2 and 4. This way it can be accurately checked to be certain the platform is perfectly perpendicular to the pylon before it becomes a permanent part of the fuselage.

When dry, and before the 1/8" outer pylon sandwich sheets are added, cement the basic pylon assembly in place. Cut and install the 3/32" sheet fuselage top piece between formers 2 and 4. Then, before the cement is dry on both the pylon and top piece, fit the 1/8" pylon sandwich pieces into place to check for accuracy of pylon attitude. These 1/8" sheet pieces do not have to be cemented in place at this time, but they do serve as good alignment guides.

The 1/2" sheet nose pieces can be cut, fitted and cemented into place. The radio hatch cover can be cut and hinged in place also. The fuselage rear bottom 1/16" sheet can be positioned after control rods have been installed.

Finish-sanding can be done once everything, except the headrest, has been cemented in place. The headrest should be finish-sanded before cementing it in its proper place.

To get the outline of the nose section, refer to the forward former outlines. Installing the lower wing dowels and the plywood landing gear backstop will just about complete the fuselage, except for paint.

## WINGS

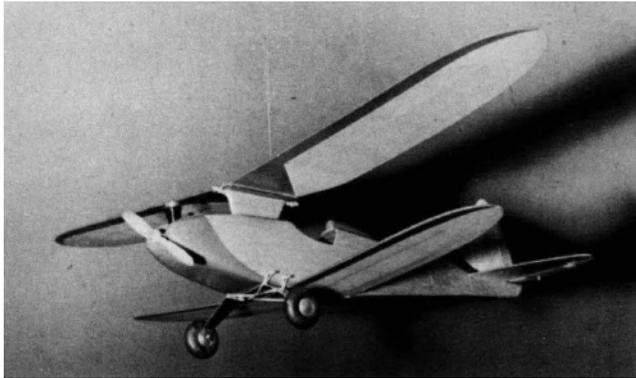
To aid construction, mark rib locations faintly on both wing's bottom leading and trailing sheets. Pin down bottom wing sheets of one wing panel at a time and cement the 1/8" sheet spar in place. Next cement ribs and plywood dihedral brace in place.

Sand the outer edge of the bottom assembly slightly to make a better joint with the top sheeting. Cement top sheeting in place.

When dry, pin the first panel of each of the top and bottom wings in position against the bottom sheets of the opposite panel. Prop each finished panel up to effect dihedral, then complete these panels in the same manner.

## FINISH

After a thorough job of fine sanding, your "Chicken Hawk" is ready for its finish of Jap tissue and dope. The wings get the tissue and the rest gets dope. We topped it off with four coats of clear on both the wings and fuselage. Two coats of red trim finished the job.



## EQUIPMENT

Power is supplied by a Cox .049 Baby Bee. For radio equipment we are using an Ecktronics "Courier" receiver and a Babcock escapement for up-down-left & right. Two pencells supply the juice.

The plans will explain our method for spring loading the control surfaces. This is about the simplest solution to a somewhat knotty problem we've been able to come up with.

## FLYING

First, let's test glide our Hawk. We've all heard of the models which "flew right off the board". This is usually a somewhat exaggerated world we'd all like to live in where models are concerned. We've come close to this ... closest, perhaps, with the "Nomad".

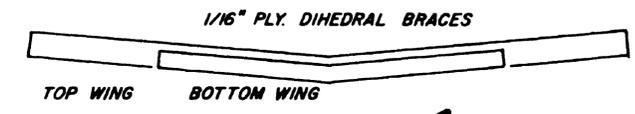
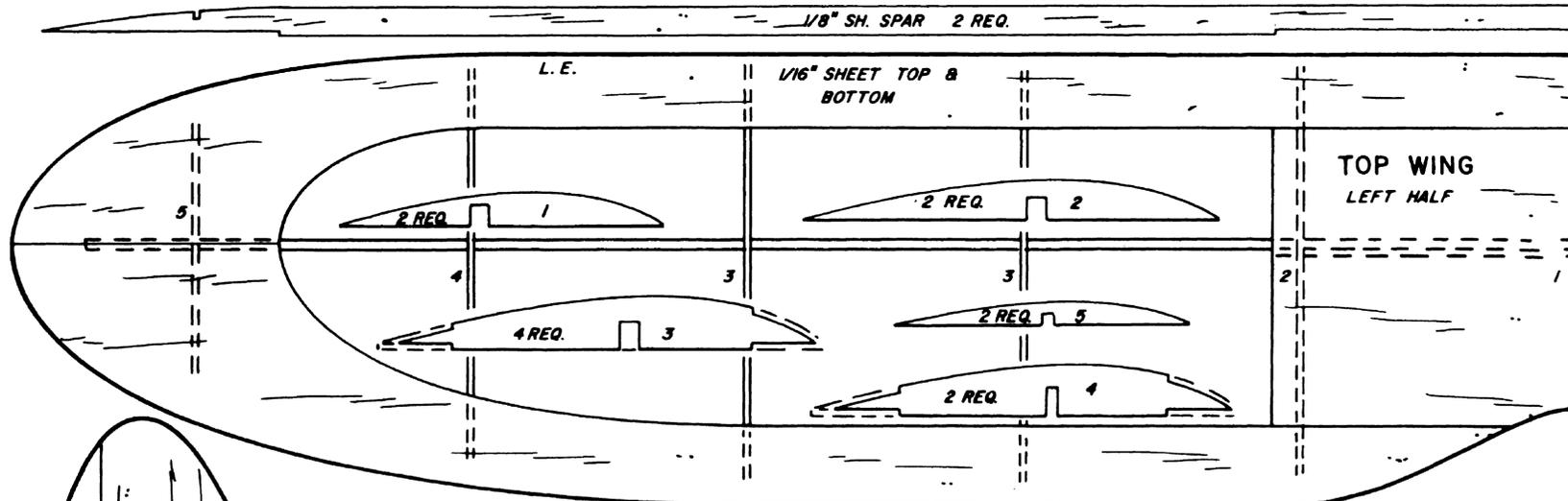
Within about three test glides it was gliding like we figured it should. The first two weren't bad, but still either a bit nose or tail heavy.

For some sheer stroke of luck ... and I wish I could explain scientifically why, the "Chicken Hawk" hit its stride on the first toss. No changes, no adjustments ... and I'm sure it'll never happen again. Certainly never with that most difficult of all birds to trim, a biplane.

So we feel that you'll probably have less trouble and more success with your "Chicken Hawk" than normally encountered.

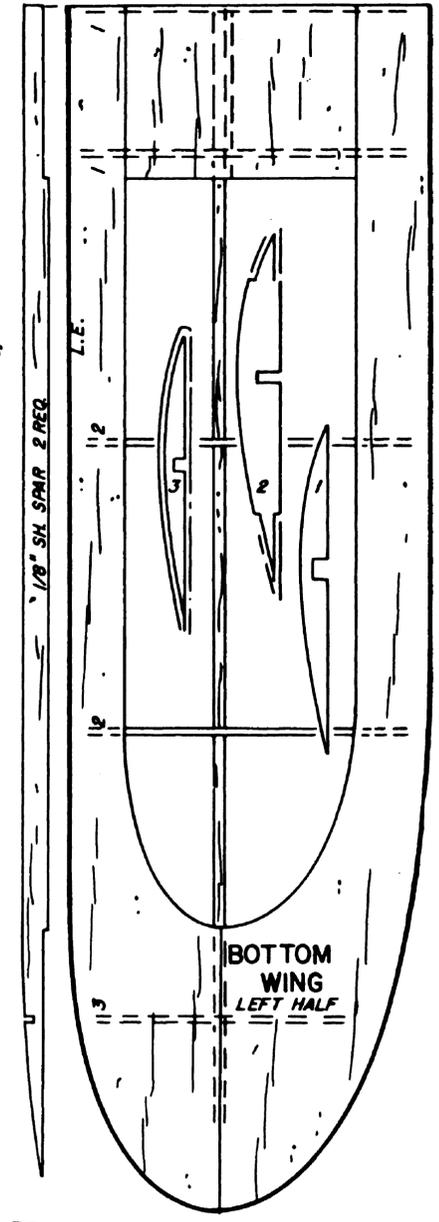
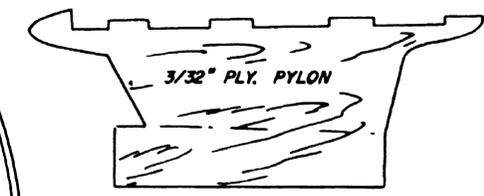
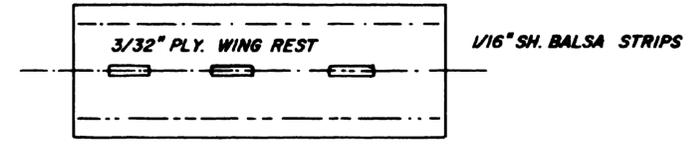
Balance your model as shown and go for the long flat glide. Then, go for the clouds. Good Luck and Good Flying. Keep in touch.



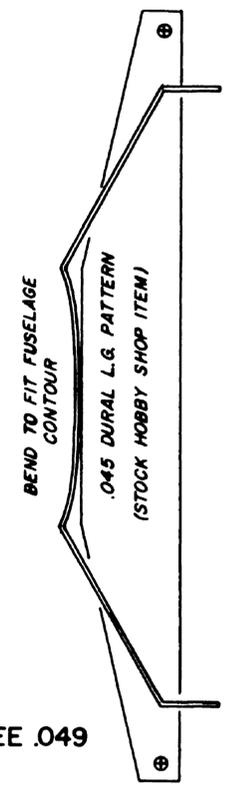
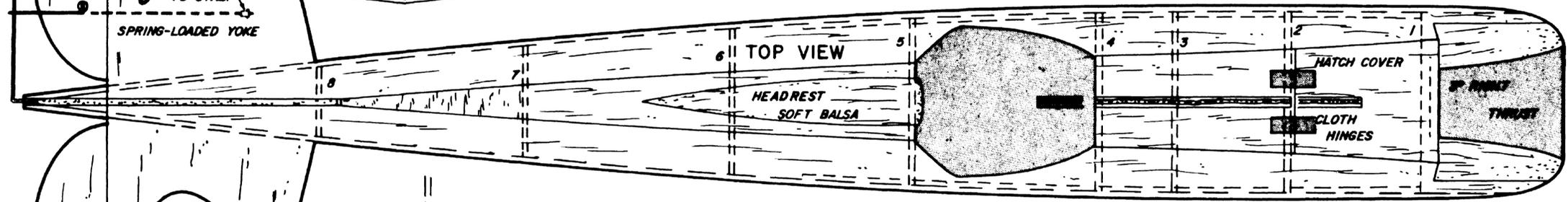
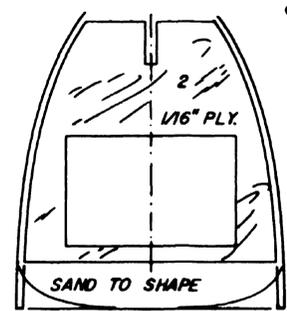
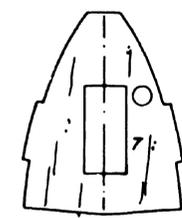
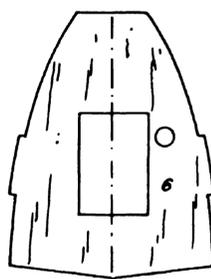
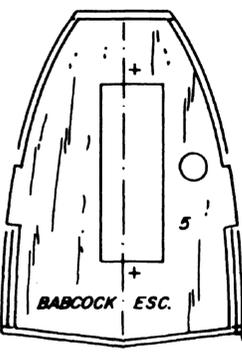
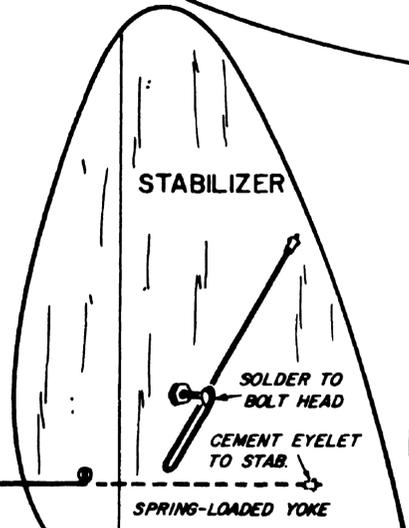


# Chicken Hawk

34/25" 1/2A BIPLANE FOR SINGLE CHANNEL R/C



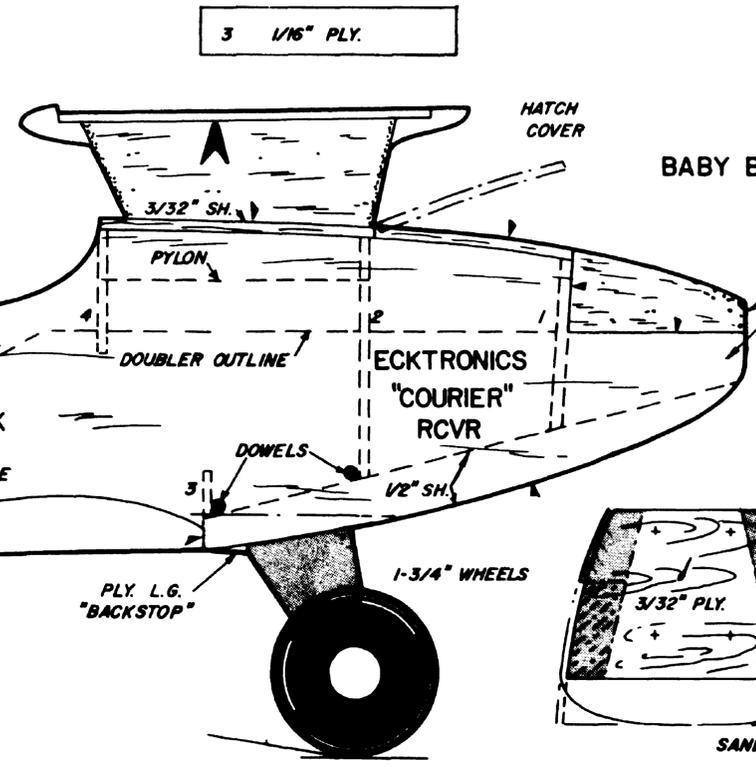
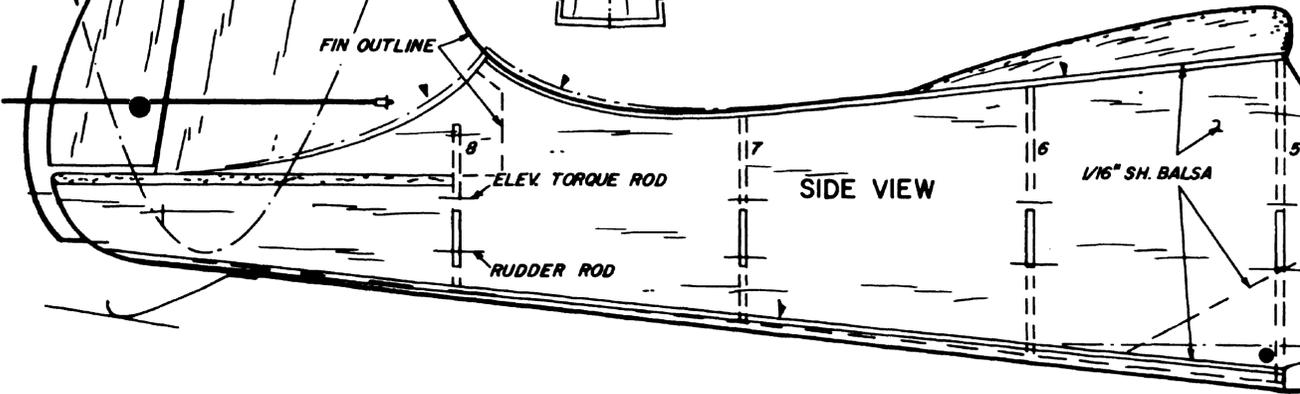
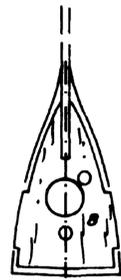
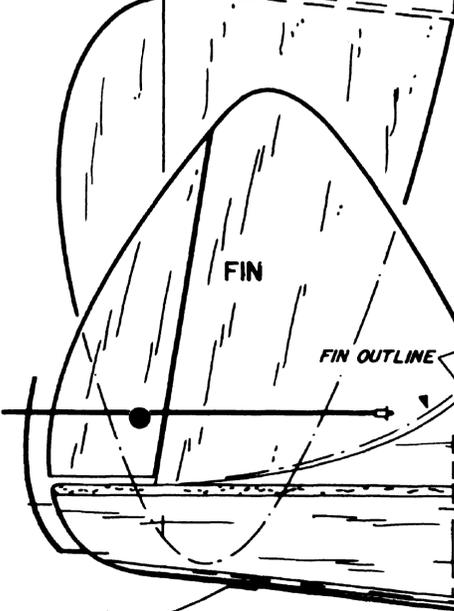
1/16" SHEET Balsa USED THROUGHOUT UNLESS NOTED



▼ DENOTES FUSELAGE SIDE OUTLINE PATTERN

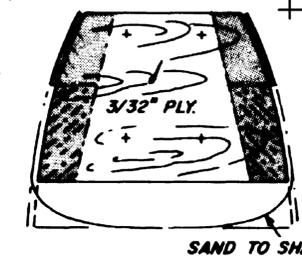
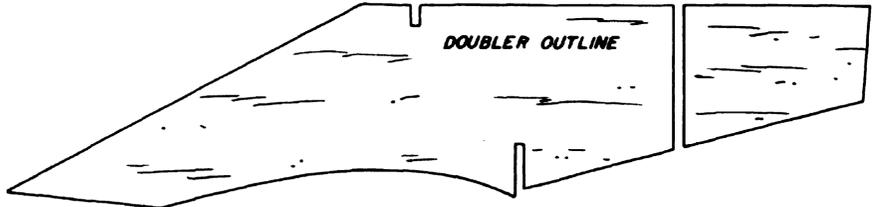
TOP WING DIHEDRAL 1-1/2° EACH TIP

BOTTOM WING DIHEDRAL 1-1/8° EACH TIP



BABY BEE .049

FILL IN WITH 1/2" SH.



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DESIGNED BY TED STRADER  
 FROM FLYING MODELS  
 AUG/SEP 1963



# MISTER MULLIGAN JOINS THE NAVY

A realistic high performance scale model of the new Navy  
Howard personnel transport plane

by **EARL STAHL**

Another of the many designs by Earl Stahl

This from the August 1942 issue of Model Airplane News

## BACKGROUND

WHILE the transport planes do not have the spectacular appeal of fighters, scouts and dive-bombers, they are a most necessary part of naval aviation. Essentially these "work horses of the flying fleet" are adaptations of commercial ships, their mission being to provide aerial services of all kinds.

One of the latest type planes to be acquired by the U.S. Navy for light transport duty is the Howard GH-1. Ideally suited to this task, it has a convertible cabin for passengers, cargo, a stretcher for patients, space for mail or express, or for use in aerial photography,

Howard airplanes were developed from Ben Howard's famous racer "Mister Mulligan", winner of both the Thompson and Bendix Trophy races in 1935.

Remarkably similar to the race plane prototype, Howard military and commercial transports are noted for their outstanding performance, ruggedness and the ease with which they can be flown.

Few details have been released on the navy GH-1; however specifications of the commercial,

five passenger Howard DGA-15P should prove fairly accurate.

This 450 hp. Wasp Jr. equipped monoplane can cruise at 201 mph for 980 miles on 115 gallons of fuel. Initial rate of climb is nearly 2,000 ft. per min. and the service ceiling is 22,500 feet. Useful load is 1,700; gross weight 4,350 pounds.

The model plans have been carefully prepared so they will serve either as the basis for a flying or scale model. Proportions of the real plane make possible an attractive model with exceptional flying characteristics. You are sure to be fully satisfied with the stable, swift flights of this little ship if you build it according to these instructions.

## CONSTRUCTION

A simple rectangular frame is the backbone of the fuselage structure; it is shown lightly shaded on the plans. Work directly over the plans, or better still, tracings, and build two side frames, one atop the other to be certain they are identical.

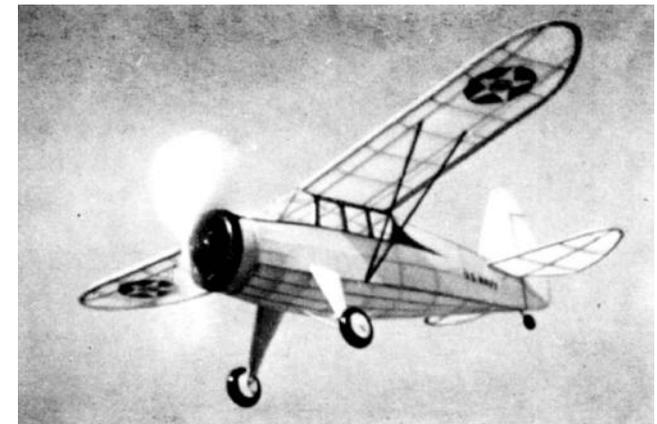
While it is not absolutely necessary, it is best to steam or soak the longerons in hot water so they will dry to a natural curve and thus help in keeping the structure from springing out of shape.

Hard grade wood is used and longerons and uprights are 3/32" sq. stock. Invert the completed sides over the top view and cement 3/32" sq. pieces to place at the center of the body: when dry, draw the backs together and place the remaining cross pieces. It will be necessary to crack the longerons in the front so they can be pulled into the positions shown on the plan.

Cut the various formers from 1/16" sheet and now if the basic structure is dry, it should be removed from the work board and formers attached to their correct positions. Center section is assembled and cemented to the fuselage frame: do this accurately as the wing's correct placement is determined by its position.

Since stringers are merely fairing strips they should be medium soft balsa. Stringers are cemented directly to the underframe except where there are formers, of course, and where there are no notches in the formers; they are cemented right to the sides,

The engine cowling is made next. A frame consisting of two circular 1/16" sheet bulkheads and four 1/16" sq. spacers is assembled



as indicated by broken lines: this structure is covered with 1/32" sheet. The rounded nose section is made from laminations of 1/8" sheet; the centers of these discs being removed to the extent shown.

Details of the nose plug are indicated. The removable section should be made to fit accurately to the crankcase which is cemented within the cowl front. Finish the nose and cowl by sanding to finished shape but do not cement the cowl to the nose until later.

The landing gear unit can be made at this time; it is bent from .040 music wire and formed to shape and size shown. Using thread bind the wire unit to the fuselage underframe. Add the triangular 1/16" sheet gussets shown and then apply several coats of cement.

Although the 1/8" sheet balsa struts are not added to the landing gear at this stage of construction, they can be cut out. These struts are streamlined in crosssection and have a groove in the back to conceal the wire.

Pieces of hard 1/16" sheet cemented between the rear fuselage members provide anchorage for the bamboo pin that holds the rubber motor in the rear.

Only the right wing plan is shown so it will be best to prepare a full scale drawing of the left panel in order that construction can be done directly atop it.

Using patterns given, cut the regular and tip ribs from 1/32" or 1/20" sheet. Pin all like ribs together and sand them uniformly, then very accurately cut the notches.

Pieces for the tips are cut from 1/8" thick sheet and assembled over the plan. Taper the 1/8" x 3/8" trailing edges before pinning in place over the drawings. Ribs are kept in proper alignment by pins.

Spars are hard balsa strips, all of them being 1/16" sq.; leading edge is 1/8" x 1/4". Slant the inner ribs a bit so the dihedral angle will be correct. Cement all joints firmly, then when dry, remove from the plans and finish the edges and tips by trimming with a razor and sandpapering.

Making the tail surfaces is easy and both the rudder and stabilizer are constructed in a similar manner. In the interest of greatest strength the stabilizer is built in one piece so a complete plan must be drawn.

Outlines of the surfaces are cut from hard 1/16" sheet stock and spars are 1/16" x 1/8" strips.

Ribs are lengths of 1/16" sq. When dry, frames are removed from the plans and soft pieces of 1/16" sq. are cemented to each side of the ribs; these are cut streamline once the cement has hardened. Trim and sand the surfaces to their final shape.

Shown in perspective is the propeller blank. Select a hard block of the proper size and then shape the blank as indicated. Drill the tiny hole for the prop shaft before starting to carve a right hand propeller.

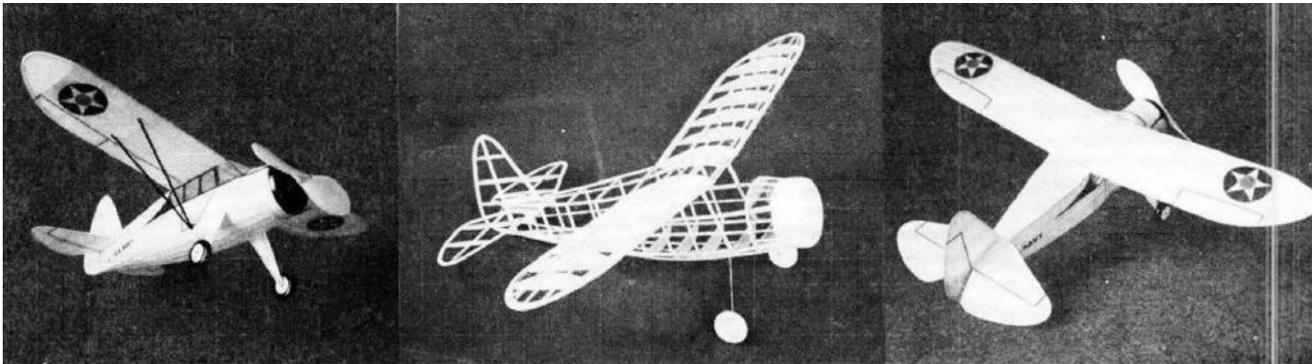
Hard ness of the block will determine the blade's thickness, the shape of which can be seen in the photos. Thoroughly sand the propeller to balance and smooth the blades, then apply several coats of light dope with light sanding between each to produce a nice finish.

Equip the air screw with a free-wheel device of some sort to help improve the glide. A washer is cemented to the back, too.

For the propeller shaft use .040 music wire. Fix the thrust line through the nose plug by cementing washers to both sides then slip the nose plug, several washers, and propeller on the shaft in the order given. A loop is bent in the end of the shaft into which a winder can be hooked.

Covering and assembly: Probably the most important item for a fine appearing model is a neat covering job. Before starting to cover your Howard, the entire frame should be lightly but thoroughly sanded to remove all roughness.

The flat side windows are covered with thin cellophane at this time: the front windshield is celluloid and is not added 'til later. Either colored tissue or light grade Silkspan may be used.



The color of the real plane is silver but other colors to suit the builder may be employed. Cover the fuselage first using light dope or banana oil for adhesive. On curved parts numerous small pieces of covering will be required to prevent unsightly wrinkles. Use an individual piece to cover each side of each wing and tail section.

The balsa cowling and similar parts are tissue covered too. Once covered, all parts are lightly sprayed with water to tighten the covering: to keep the wings and tail surfaces from warping they should be pinned to a flat surface until dry. Clear dope is not applied until later.

Next the various parts are assembled. A half windshield pattern is given. It is best to make a complete paper pattern to check for exact fit before cutting one from celluloid. Avoid cement smears when attaching the windshield.

Completion of the landing gear unit is easy. Flow cement into the groove of the previously made fairing struts and fit them over the wires - do not, however, attach the tops of the struts to the fuselage structure. A strip of silk cloth over the strut and wire will keep it from coming loose. Colored tissue should be doped to the struts so they will match the fuselage.

Wheels are made from laminated sheet balsa or they may be purchased. Wheel pants improve the appearance but since they are optional equipment on these planes, we eliminated them in the interest of lighter weight and better flights. Color the wheels and then attach them to the axles by soldering a small washer to the ends. The thin center struts are rounded pieces of bamboo.

Care must be exercised when assembling the surfaces to the fuselage. It will be necessary to

temporarily cut the rear of the fuselage to get the stabilizer in place; it is parallel to the work bench. A tissue fillet is fitted between stabilizer and body before the rudder is set in position.

Off- set the rudder a bit for right circle in the glide. Tips of the wings are raised 1-1/8" for proper flight stability; be sure they are cemented securely. Wing struts 1/16" deep are shown and they should be assembled and painted before being attached. The entire model is given one or two coats of clear dope.

Add the various more minor details to "dress-up" your HOWARD and the construction is finished. Naval insignia, cabin trim, cowling decorations, etc. are all made from colored tissue of a contrasting shade. Control surfaces, a door and the like are effectively represented by thin strips of black tissue.

If the builder wishes, engine details can be placed within the cowling. The tail wheel and similar items are made from scraps of balsa. Naturally the propeller and similarly exposed wood parts should be colored to match the model's color scheme.

## FLYING

About six strands (three loops) of 1/8" flat brown rubber will be required to power the little ship.

Measure the strands to the right length and then attach them to the loop on the prop shaft. Drop the other ends through the nose and slip the rounded bamboo pin through the fuselage to attach them. It may be necessary to remove a small section of covering to do this. Your HOWARD naval transport is now ready for its first flights.



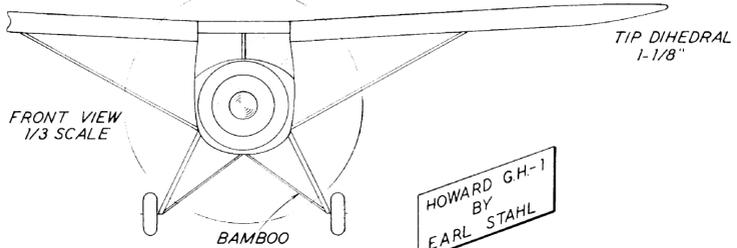
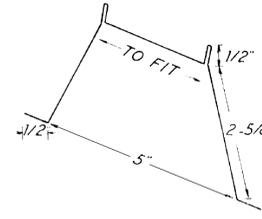
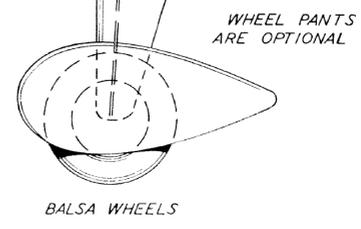
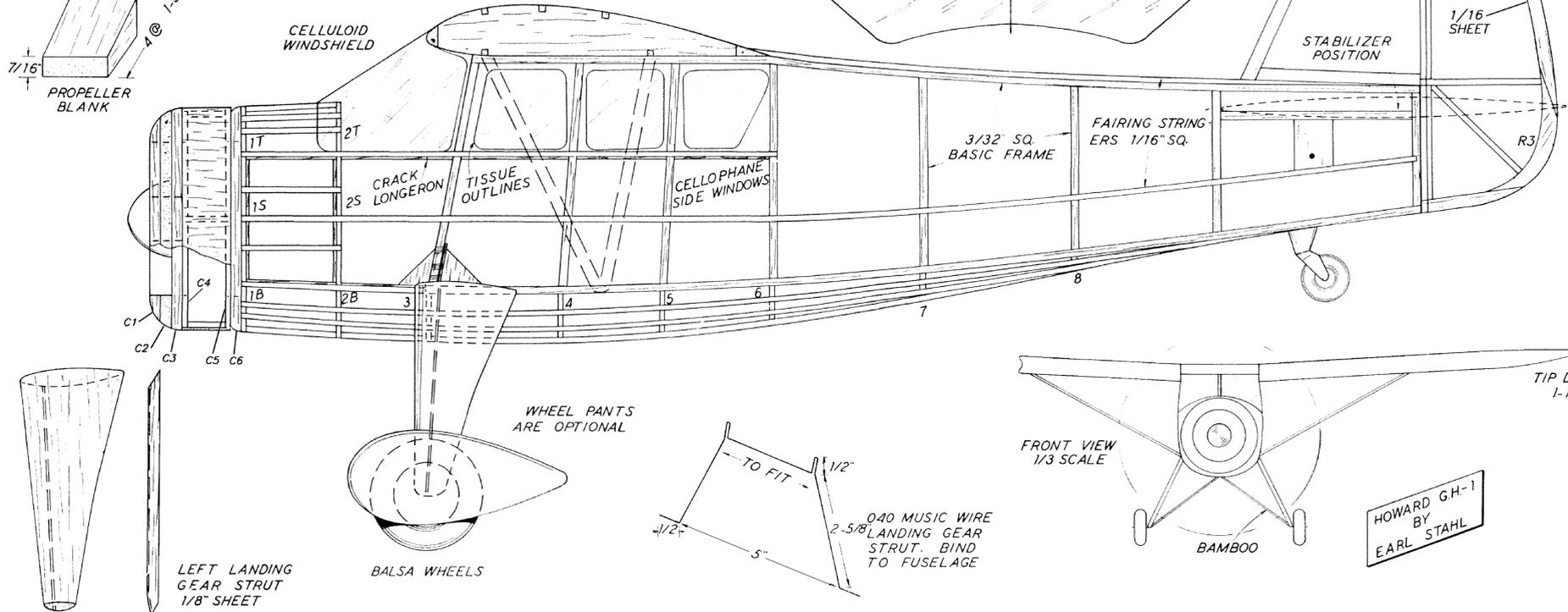
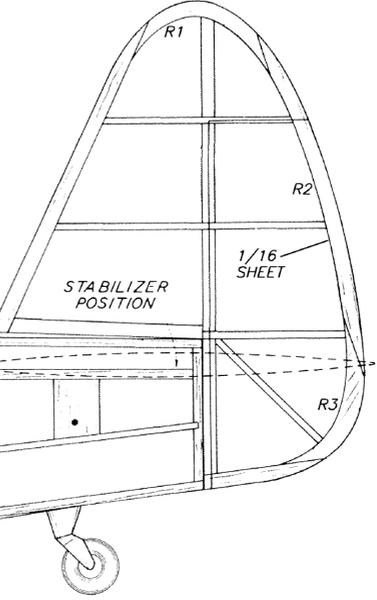
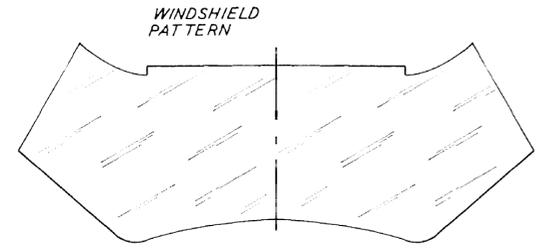
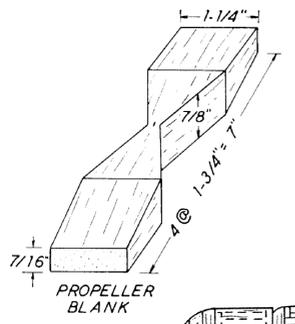
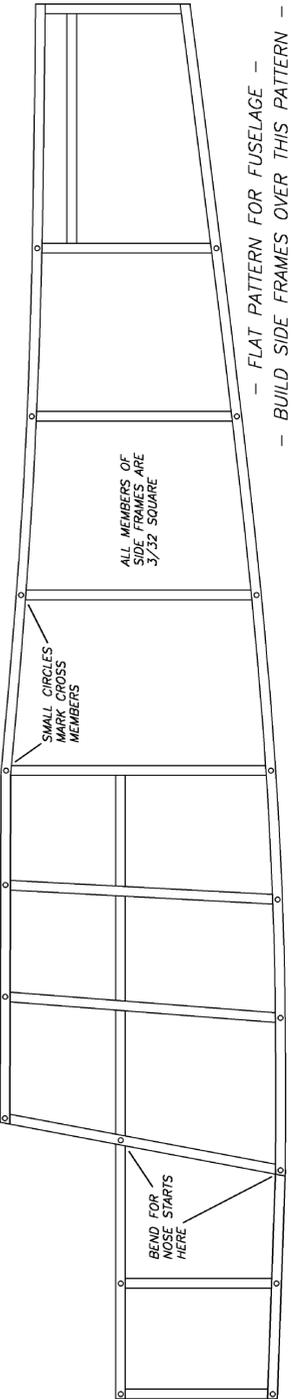
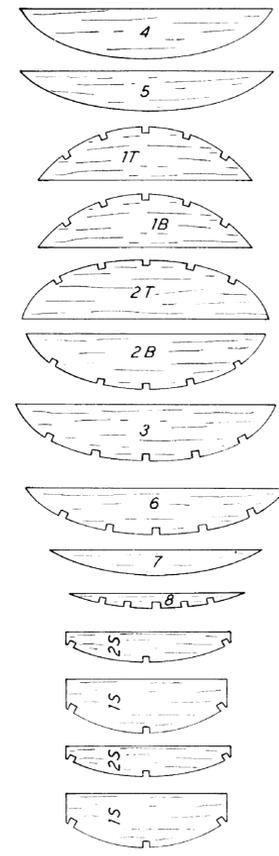
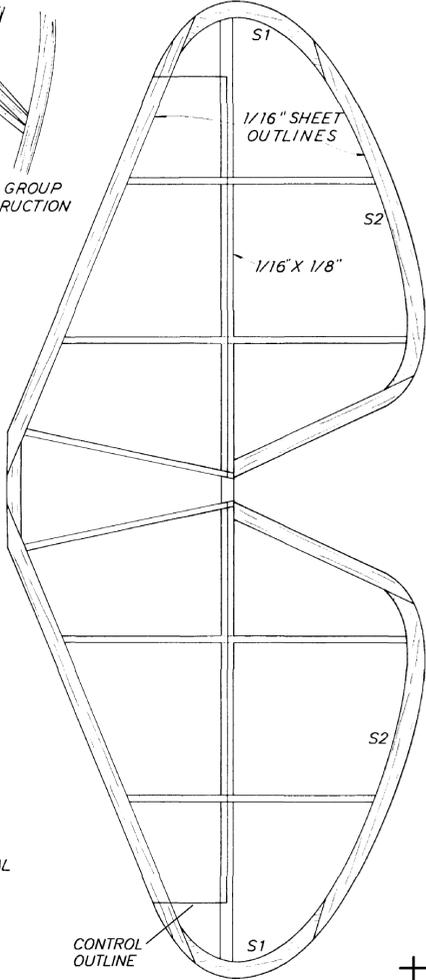
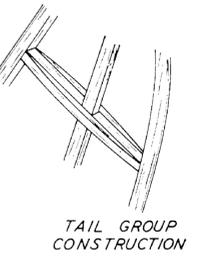
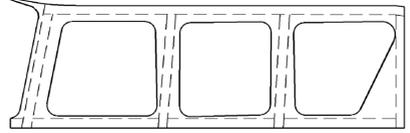
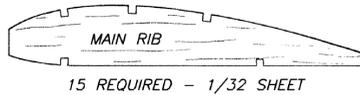
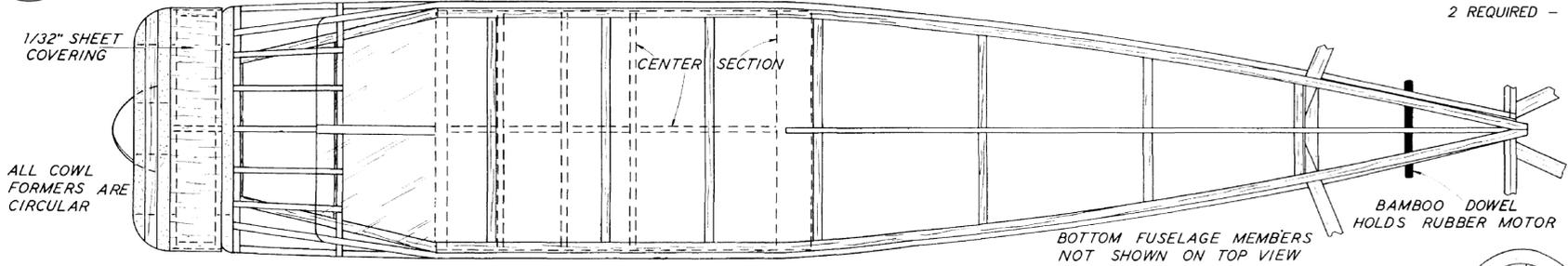
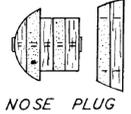
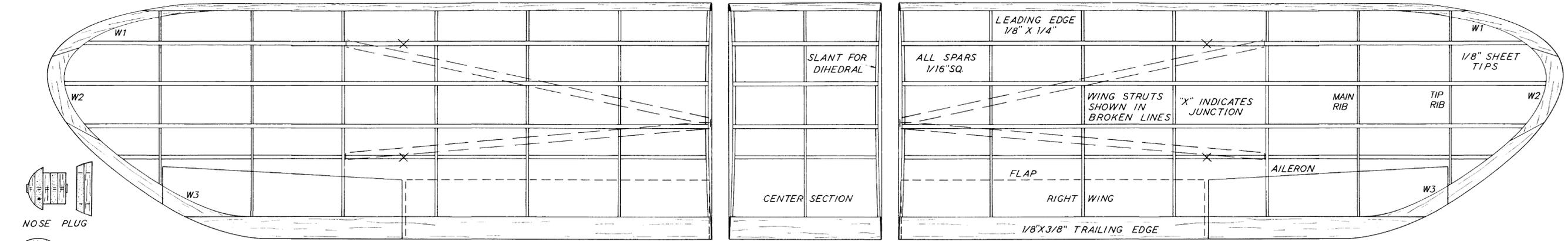
To get maximum flight performance from any model, it must be properly adjusted. Even the most carefully built planes usually require some minor corrections so go about this with caution.

Before going to the flying field, the ship should be made to balance on an even keel when held at the wing tips: this is done by adding weight to the nose or tail. A grassy field free from obstructions is best for flying this or any other model.

Test glide and make any weight readjustments necessary to get a nice smooth descent. Once the glide is satisfactory, try short power flights and if any corrections are needed, make them at the nose plug by offsetting the thrust line.

A sliver of wood between the top of the nose plug and crankcase, tilting the thrust line down, will probably "iron out" a stall while right or left thrust will make it circle as desired while under power. Under power circles should be large and to the left; in the glide it should turn to the right.

The original model is pleasing to the eye from the standpoint of appearance and it is an



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PLAN REDRAWN BY ROLAND FRIESTAD

# DIY Fuel Tanks

by Alan Hieger

&

Terry Thorkildsen

Alan Hieger publishes a weekly newsletter for the VCB (Valley Circle Burners), a U-Control club in California. Alan calls it the "VCB Weekly Nag" This article was extracted from a recent issue. Photos and much of the text by Thorkildsen. If you are interested in getting on Alan's list you can contact him at [dognosticator@yahoo.com](mailto:dognosticator@yahoo.com)

To begin with, building a tank is certainly not for everyone since it is quite time consuming. But you can make the exact size and type you want to fit in that ARF, Nobler, or make one big enough for a Ringmaster or something else that doesn't have much room.

To build a tank takes about 4 to 5 hours, depending on how complex it is. A plain rectangular one is the easiest to make, but one like that in the attached photos which has a bevel on the outside holds fuel at the pickup better, and on a profile particularly, works better.

You can buy the material to make one at your hobby shop if one is available. Or you can go the mail-order route. It is tin coated sheet steel .008 x 4 in x 10 inches which cost \$1.59 per sheet when I got it in December at my local hobby shop. I always use 1/8 inch copper tubing, since it doesn't fatigue crack like brass tubing eventually will and it's easy to bend.

Incidentally, to anneal brass tubing, stick it in the open flame from your gas burner stove. When it turns cherry red, pull it out and let it air dry, and it will be annealed so you can bend it without cracking. With the copper tubing you don't have to do any of that, since it bends easily just as it is. K & S supplies 1/8 inch copper tubing, Part #8120.

To make a tank you must first make a form of hard balsa or other wood to bend it around, as the pictures show. This way you can get a consistent size of exactly what you want and the tank will look more professional when you are finished.

The tank I made was 4.5 oz for an LA .46 and is basically the same as what I made for the Cardinal previously. The tank measures 1.15 in thick by 4.0 inches long by 2.15 width to the outside of the bevel.

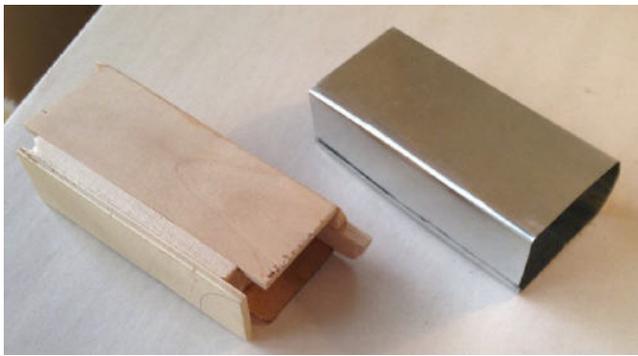
Most tanks are 1 inch thick, since most needle valve locations are 1/2 inch above the beam mounts, and you want the center of the needle valve to line up with the fuel line tube.

To figure out how big the tank should be, take a known tank (say, 4 oz.) and calculate the volume (length x width x height). You can then determine the volume you need for the capacity you want.

*Note from Alan Hieger: A gallon is equivalent to 231 cubic inches, and contains 128 fluid ounces. By extension, a fluid ounce =  $231/128=1.805$  cubic inches (approximately). Therefore, for instance, a four ounce tank would require an enclosure of 7.22 cubic inches--make that at least 7.25 cubic inches, to allow for the space occupied by the internal plumbing.*

The first two photos show the forming block with the main structure of the tank wrapped around it, and then the main body of the tank as it appears when it is removed from the form.





To solder the tank I use 60/40 (tin to lead ratio--ed.) solder, sometimes referred to as Sn 60. The stuff I use has a rosin core for flux in the center but I also brush on a little bit of flux around each joint using a Q-Tip before heating it.

The soldering iron I use is a 40 watt pencil type made by Weller. I would not suggest using a soldering gun since it would be too hard to control. A good solder joint will be shiny when cooled. It is easier to do using flux, but you must clean off the flux when you are done.

To clean off the flux when done I use butyrate thinner, and I imagine nitrate thinner or acetone would also work. Alcohol doesn't work that great, though. Using a small wire brush makes the job go faster and I always make sure it as clean as possible before soldering on the last end cover.

The job of removing the flux can also be made easier by using a Monokote or other heat gun to thin the flux."

The next two photos shown the main body of the tank with its seam soldered closed at the overlap, followed by a second view of this component along with its end caps, which have had their respective overlaps bent into rough position.



I put the main feed line roughly 1/16 or 3/32 from the back corner and cut a bevel in it to avoid having solder on the back plate interfere with the tube, and to make sure it will pick up the fuel. The uniflow tube is soldered to the main pickup about 5/8 to 7/8 in front of the pickup. I would not suggest you put it real close to the pickup, like 1/4 inch, since the bubbles will disturb the fuel draw if it is too close. "You don't need to guess how I learned that."

*Notes from Alan Hieger:*

*1) Attempting to bend copper tubing using pliers will generally put a crimp in the tube. Perhaps the best way to avoid this is to use a commercially produced tube bending tool, such as one made by Du-Bro. These are available at moderate cost. Be sure to get the appropriate model designed for the size tubing (in this case 1/8 inch) you are using. Some people have had success by inserting a flexible cable or section of solder into the tubing prior to bending it, and then pulling it through after the job is completed.*

*2) Terry is, of course, describing the uniflow plumbing system preferred by many stunt flyers. To instead make a "standard" vented tank, replace the uniflow tube with a pair of short vertical vent tubes at the front of the tank which extend to within about 1/8 inch of the opposing tank wall. Also note that most uniflow tanks include one such vent, which is used as a fueling overflow, in addition to the uniflow tube. This vent tube is plugged for flight in the uniflow system.*

The next two photos show the main tank structure with the fuel feed line and uniflow tubing assembly soldered into position. The second photo includes the end caps. The front end cap has been pre-drilled to allow for the passage of the fuel and uniflow tube



The final photo shows the completed Pathfinder fuel tank.

You should make your opening in the nose of the aircraft about 1/8 inch wider than your tank thickness if you know typically what the offset should be for the tank from the motor center-line based on the motor you are using."

To check for leaks, I plug up all the outlets and use a bulb to apply pressure. It will show bubbles where the leaks are with the tank under



# Back Issues of Model Airplane Magazines

If you're like me, you enjoy paging through model airplane magazines and plans, sometimes to find a project to build, to research a particular aircraft, or to just spend some pleasant time away from the daily grind.

If you like to build models, the magazines of today don't offer much since they are primarily expensive catalogs of ready-to-fly models. There's nothing wrong with RTF or ARF models but they don't offer much to interest model BUILDERS.

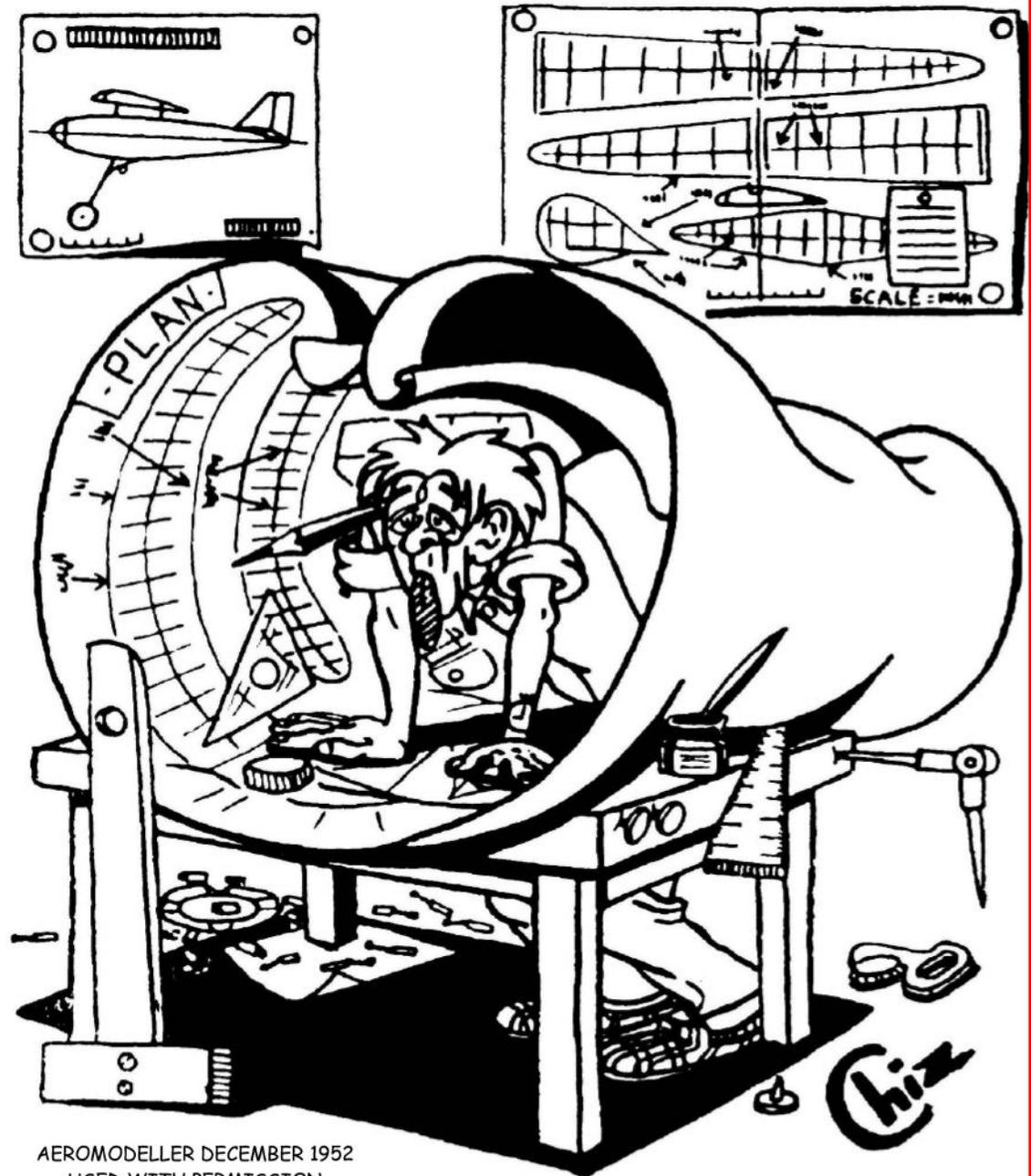
That's NOT the way it was in the past, when you had to build a model before you could fly it. If you're an old-timer, as I am, you have fond memories of Air Trails, Flying Models, Model Airplane News, Aeromodeller and many of the several other magazines available "way back when".

If you're a relative newcomer to modeling and want to learn how to build them, those old magazines can provide a wealth of useful information, plans and how-to-do-it articles.

There are several problems with those old magazines. They are sometimes hard to find, often in bad condition, and in many cases they are so fragile that they can fall apart just by turning the pages. This is because they were often printed on pulp paper, also known as newsprint. Newsprint is inexpensive, but has residual chemicals that cause it to deteriorate when exposed to the air and particularly to sunlight. Your wife or "significant other" might also ask "When are you going to get rid of all those smelly old magazines?"

I admit to being a bit of a "nut case" but have been collecting these magazine for over 50 years and now I am trying to digitize them to preserve them for other modelers. They are now available as digital PDF files. See the details on the next page.

Keep 'em Flying - Roland Friestad



AEROMODELLER DECEMBER 1952  
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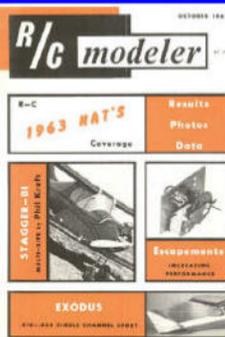
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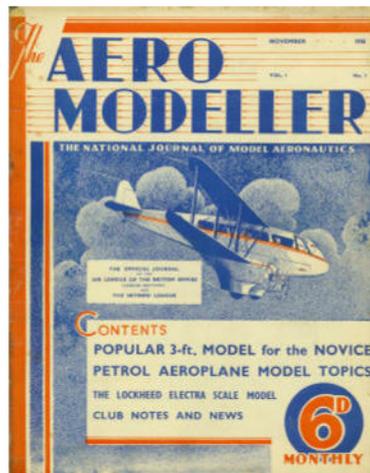
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