R/C MODELER

THE LEADING MAGAZINE FOR RADIO CONTROL • JANUARY 1968 • 60¢

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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EDITOR'S MEMO

IT'S nice to know that someone's in your corner.

Particularly at a time when many are busily planning a wake for our forthcoming "suicide."

I refer, of course, to the editorial in the November issue stating RCM's policy concerning product reports and evaluations. Since that time we have been receiving letters and telegrams of support and encouragement from all over the United States, as well as the many foreign countries in which RCM is circulated. What is even more important is that a vast majority of this correspondence is from modelers who have never before written to a model magazine for any reason, but who took the time to write and let us know that this unprecedented stand was important to their participation in this hobby and sport of radio control. Other letters were from entire clubs with both large and small rosters, offering the combined support of their membership. Still others were from advertisers who agreed with this new approach—large, well established firms who said the industry has long needed this type of service from the model press, as well as new, and smaller companies, who called to reaffirm the fact that they needed an honest report on their products in order that they might be able to upgrade them and correct any possible deficiencies or oversights.

There is, of course, always the other side of the coin.

As an example, one manufacturer reminded us of the fact that we could not survive without income from the sale of advertising space, and suggested that we "carefully consider the economic facts of life before you condemn any product." This same letter stated that "most manufacturers are constantly working to improve their products and you could easily kill an item at the very time it is being made worthy of your reader's dollar."

Let's take a closer look at both of those statements.

The first statement concerning the "economic facts of life" could either be well meaning advice, or it could be a form of pressure. I prefer to believe it is the former, which I can understand, but cannot accept. This "economic life" has, all too often, taken the form of "you do a good story on our product or on our plant and we'll give you an advertising contract." Or, "your competitor gave us a free page of advertising for a testimonial letter we wrote about how much business an ad in his magazine pulled for us. How about it?"

Yeah. How about it? Such a 'testimonial' isn't worth much more than the paper it's written upon, and a magazine would have to be pretty desperate for advertising in order to print it.

If we accepted these "economic facts of life," just how much faith would you have in this publication? If I walked out on a flying field to see an RC'er hold up a copy of RCM and say, "don't believe anything you read in this rag," that "economic life" wouldn't be worth the powder to blow it to hell.

The second statement — " . . . you could easily kill an item at the very time it is being made worthy of your reader's dollar." Unless I misread it, it implies that this "item" has been on the market for an unspecified length of time, and it is just now being "made worthy" of its price tag. In which case, what in the name of Sam Hill was it doing on the market before it **was** "worthy?" It's not the consumers place to do a manufacturer's research and development for him. Certainly, it is to be expected that a manufacturer will continually strive to improve his products, but it should at least meet certain standards of performance before being made available to the consumer.

And that "standard of performance" is where the difficult part comes in. By what "standards" do we intend to evaluate these products? As one modeler wrote — "who pinned a tin badge labeled "God" on you?

The responsibility for presenting facts and editorial opinion based on an accumulation of facts, is not an arbitrary thing — **it is the moral responsibility and obligation of any publication to its readers who, by their enfranchisement of trust in that publication, place themselves in a position to be influenced by it.**

The staff of this publication does not pretend to be anything more than it actually is — a group of radio control enthusiasts and participants who gather and disseminate information through one composite medium to a much larger and vaster audience. To the best of all of our abilities, we will present our findings as RC'ers, to RC'ers, with as little bias and prejudice as is humanly possible.

Remember that word "human" — it's the key to the whole thing.

●

If you have been building models for any length of time, you're probably aware of the rising costs of our basic raw material — balsa wood. During the past year, price increases on balsa have risen to unprecedented high, with what appears to be certain inequities in the price structure. As an example, a sheet of 1/16" x 3" x 36" sheet of wood is currently priced at 30c while a sheet of 1/16" x 6" x 36" retails for 95c. This month, we attempted to find out why.

To begin with, our balsa wood is grown and milled in Ecuador. Two importers, Balco and International, bring the wood into this country. It is then purchased from them, and distributed to our industry by three major U. S. balsa plants — Midwest, Pactra, and Sig. Thus, the distribution chain for balsa is as follows: (1) Ecuadorian mill (2) importer (3) U. S. balsa plant (4) wholesale distributor (5) hobby dealer.

(Continued on Page 7)

From its original native source, our 30c sheet of 1/16" x 3" x 36" balsa has gone through five major steps before we purchase it in the local hobby shop.

Going back a few years, we discovered that this same sheet of wood was priced at 10c. **But,** at that same time, a laborer working with the material was paid a minimum wage of 45c per hour. Today, the same job classification pays $1.40 per hour with a new U. S. minimum hourly wage of $1.60 going into effect on February 1, 1968. Thus, the sheet of 3" wide stock went up 300% in retail price over the years — barely keeping pace with the rising labor costs! Last year, just prior to the price jumps on balsa, the Ecuadorian natives, working in the mills with the raw balsa material, formed their labor unions, and were no longer content to work for a dollar or two per day, but demanded and received what they consider to be a living wage. Certainly, no one would want to deny them this right. But, added together, the distribution costs for Modwest, Pactra and Sig have more than doubled in the past three years due to these labor increases both at home and abroad. And that cost must be reflected in their wholesale price, and eventually reflected in the retail price charged by the local hobby dealer.

But, what about the vast difference in the retail price between that 3" wide sheet of 1/16" balsa at 30c and the 6" wide sheet of the same stock at 95c? Let's take a look at an average carload of balsa arriving at one of the U. S. balsa mills.

A carload of balsa consists of approximately 35,000 feet of material. Since a balsa tree is rather small in diameter, 90% of the total carload of wood will be suitable only for 3" wide stock, while 9% will make into 4" wide material, and **less than 1% is classified as 'premium' and suitable for the wider 6" wood!** This one percent then has to be accumulated, graded, and proceed — steps that are not necessary with the 3" wide sheets. During this process, the amount of rejects are extremely high, and far less than that one percent will ever reach your local hobby shop.

And there are the reasons behind the seemingly high costs of balsa, and of balsa kits. No conspiracy to escalate prices — just a simple economic fact of rising labor costs — a fact evidenced in the price of every consumer product we purchase, whether for the necessities of living, or in our hobby.

●

Ever since RCM presented the Amp Gate Charger by L. J. Weirshauser, we have been deluged with inquiries from readers who have been unable to obtain the all-important amp gate diodes. The author finally obtained an agreement from Mallory Semiconductor Company to set up a mail order source for this item. If you have been unable to obtain these amp gate diodes, you can now purchase them from Teco Distributor Company, P.O. Box 284, DuQuoin, Illinois 62832, according to a letter from K. J. Thornton, General Sales Manager for Mallory.

●

KEN WILLARD

WERE you confused by my explanation of the interaction of rudder and dihedral when flying inverted, which I described in the November issue? Well, take heart, so was I! It seems that our printers have an aversion to printing words upside down, so let me try to straighten things out.

The diagram which appears on page 74 should have come immediately after the expression "Like so:" which appears at the bottom of page 72. Next, the printing at the top of the diagram (when it is right side up) was supposed to be printed upside down, so that you would read it that way when you turned the page upside down, and it would then describe the effect of rudder when the airplane was upside down. You try it that way, and then I think you'll have a better understanding. Then all I've got to do is to try and interest our pixy printers in R/C.

Next I had better explain how come the airplane designed by a committee didn't show up like I said. Seems that what happened was this — the plans were sent to the draftsman, who observes "I'll do them, but do you plan to have that many construction articles in one issue?" Guess who called me and suggested we postpone for one issue. That's right!

However, I can tell you a little bit about design philosophy — mine, that is — which your letters indicate would be of interest to you.

First, one of the most frequently asked questions is "Why do you always put the horizontal tail surfaces on the bottom of the fuselage?"

The answer is "I don't — always. But I do, in most cases where the design is for a high wing or shoulder wing monoplane, because locating the stab below the wing keeps it out of the wing wake for one thing; keeps it in the effective downwash for more variations in the angle of attack for another; and the combination seems to result in a design that can be flown successfully even though the center of gravity may vary considerably for each modeler's version. In other words, the design feature results in an airplane that will fly even though it's really out of balance — and when you are publishing designs, or putting them into kits, you have to take into account that there will be many inexperienced modelers trying to build and fly the airplane, and this tends to put the odds in their favor."

A side benefit is that it makes the construction and alignment easier, but this is strictly secondary.

The high stab, or T-tail arrangement, does the same thing — up to a point, but this complicates the structure and the linkages to the elevator as well. Also, with a T-tail, if it isn't quite high enough, then when the model assumes a flight condition near the stall, the stab can enter the wing wake and cause all sorts of erratic actions.

Another interesting effect — and I'm not sure why it happens. Take a model with the stab on the bottom of the fuselage, adjust it so it flies straight, then put the stab on the top of the fuselage, and you'll find that you have to increase the right thrust, otherwise it'll turn left under power. The amount of change varies with each model, of course, and is affected by the position of the center of the fin area with reference to the thrust line, but apparently the vortex flow of the slipstream of the prop hits the fin differently if the stab is up higher.

Anyway, to sum it all up, it has been my experience, ever since watching Lou Andrews' original Trixter Beam fly, that for all around sport models, a low stab works out best. So that's why I use it.

Another design feature that I've used since coming over to R/C flying from free flight in the flying boat type of model. Contrary to all full scale flying boat designs, I've put the step slightly ahead of the center of gravity — and the reason goes back to free flight.

(Continued on Page 7)

On takeoff from the water, where control is available, the pilot of full size seaplanes first pours the coal on gradually while holding back pressure on the elevator to keep the nose of the plane from ploughing. Then, as the nose comes up, the back pressure is reduced until the plane is riding level on the step, and the pilot holds the plane there until flying speed is reached, then gently applies slight up elevator and lifts the plane from the water.

Obviously, free flight model flying boats can't make these adjustments, and you can't apply power gradually. You have a choice; get everything all set, engine peaked, and give the model a slight shove as you release it so that it doesn't plough into the water, nose down and dunk — or the alternative is to figure some sort of a compromise. I took the latter course, and experimented with the step position. I designed a little job which had the step right underneath the leading edge of the wing, but which I could modify by adding balsa blocks to move the step back by stages. Also, the step could be removed entirely, so the bottom would be a simple planing surface, like a water ski.

With the leading edge and the step in vertical line, the model took off, but needed full power. With the step under the CG, or behind it, the model would plough along and never get up on the step for a takeoff, but if I gave it a shove to get it over the ploughing stage and up on the step, it took off rapidly, and it could be made to take off that way even though the engine wasn't fully peaked out. But who wants to shove a model every time it takes off? So, the compromise that seemed to work out best was to have the step just far enough ahead of the CG so the model would plough along slightly nose high and come up on the step unassisted, then ride on the step in the slightly nose high attitude until liftoff. I'm no hydrodynamicist, and don't know why it works — but it does. And I've carried the idea over into R/C. Perhaps now, with the advent of full proportional control, it might be interesting to take a Shearwater, for instance, put a Bonner RS in it, with an .09 for power, and make some tests with the step position by adding a section to bring it under the CG. Maybe one of these days I'll do just that, but if any of you get interested and try it out for yourself, let me know the results.

Speaking of seaplanes and flying off the water, I just received a letter from Ernest DeBardeleben, of Orlando, Florida, who writes:

Dear Ken:

About two years ago I wrote you a letter and told you I was just starting in R/C and was interested in flying off the water. I thought I would write and bring you up to date and ask a few questions.

I wrote to all the hobby shops and I ended up with all the seaplane kits that have ever been put on the market. I have a "Sea-Cat," "Custom Privateer" and the "Super Privateer 15." Before I got the "Super Privateer" finished I got tired of working on it and put floats on a single channel "Falcon Jr." I left the .049 engine

Ken's "Classmate" — parked at the local airport it looks like a classic homebuilt. Watch for it!

SUNDAY FLIER

(Continued from Page 6)

in it and flew it for about five flights. The plane would not get off even with a hand launch unless a good breeze was blowing. I then got the idea to run across the roof of my boathouse and launch it from that height. That way it would pick up speed before it hit the water and would continue to fly. All the neighbors came out to watch me fly — I thought. But no, they were out there to see me run off the edge of that boathouse. Anyhow, I learned a little bit that way and then someone came along and wanted to buy my single channel stuff for what I paid for it. You can believe I let him have it real quick. I then built a "Falcon 56" — it flew well but just would not take off the water due to weight. I was using a .35 for power in it. I learned a little bit more about flying from that.

I then got a Bonner Digimite 4 and put it in a "Cherokee" and using a Veco 61 for power we were able to get it to take off. We had to use the big GeeBee floats and it performed well even with those floats hanging down. I have had some bad crashes in the water and never hurt the plane at all. The water is a lot softer than the land believe me. . . ."

Ernest goes on with a couple of questions which I answered directly, but I thought you'd get a kick out of his description of some of his experiences, especially the boathouse bit. Wish I had a picture of it

* *

Galloping ghost in its modern version seems to be catching on internationally Here's a letter I received from Barry Bowerman, Earlwood, N.S.W., Australia

Dear Ken:

I have been reading your articles on Sunday flying for quite some time now a this aspect of modelling interests me very much. Although occasionally I indulge in competition flying in control line scale and R/C scale. However, R/C flying has been single channel only until recently when started to get interested in galloping ghost

I was very pleased when I read your article on Pulse Proportional (April '67) as a this time I had a Min-X system on order for 3 months and almost had no finger nails left to chew as there were no modellers here who had ever seen this system as it is now.

My reason for writing to you is to see if it is possible to get a set of plans to build Bob Schneider's 50" high-performance design as it really looks clean and capable. I have only had, to date, some 2 dozen flights with the system installed in a modified "Rudder Bird" and I think it is a little frightening but this can be tolerated. I don't think it will be long before there are a number of sets around as everyone is impressed.

The boys in the club look forward to R.C.M. each month so they can keep up with the trends as we do not have a magazine in Australia now. There are about 60 members in the Macquarie Club and we fly every Sunday in a cow paddock at Minto about 30 miles S/W of Sydney. It is not a bad field but boy! Are we envious of the fields you fellows fly from. When we read about what the armed services do to help your Nationals, we froth at the spinner!!

If the aforementioned plan is available could you let me know the cost.

Kind regards,
Barry Bowerman

Note what Barry says — "R/C flying has been single channel only until recently when I started to get interested in galloping ghost."

To me there is a certain significance to his statement. He, along with many of you, do not think of galloping ghost as "single channel" and yet it really is. However, the control which is provided is proportional, and we're used to thinking of single channel in the sense of escapements or servos which give full throw to the surfaces when actuated. The significance is that when galloping ghost is working properly, it just doesn't seem right to call it single channel proportional!

We'll talk some more about galloping ghost next month. Meantime, I'd like to repeat something that I mentioned a year or so ago, for the benefit of some of the new readers. To save time, both for you and for the overworked staff at RCM's offices, if you want to tell me about your experiences, or ask questions, or just shoot the bull, write me direct, at the following address:

Ken Willard
665 Riviera Drive
Los Altos, Calif. 94022

Send along a stamped, self-addressed envelope if you want a reply direct. I'll publish those of general-interest to the Sunday Flier clan.

And here's a teaser for spring 1968 — your new Classmate.

EDITOR'S MEMO

(Continued from Page 5)

The time of the year for RC trade shows and conferences is almost upon us. For those of you who have never attended one of these events, we urge you to plan to attend one or more this Winter. Here is where you will see the latest in equipment, with many manufacturers unveiling new RC gear for the first time; new kits and RC accessories displays of some of the most beautiful radio models you will ever see — all combined to provide you with a show you won't want to miss.

The first of these is the Model Airplane Trade Show, scheduled for January 6-7 at the Orange County Fairgrounds, Fair Drive, Costa Mesa, Calif. In addition to the displays by manufacturers, flying demonstrations "around the clock" will again be featured, and as an added attraction, the public will be invited to try their hand at R/C flying. By popular demand, there will also be a symposium of speakers on a variety of RC subject. For further information, write Tony R. Birt, Show Director, Model Airplane Trade Show, P.O. Box 127, Midway City, California.

The 1968 edition of the Buffalo Bisons R/C Conference will start January 19th at 6:00 P.M. and continue through noon January 21st, holding forth at the Airways Hotel, located at the entrance to Buffalo Airport. Manufacturers will again exhibit their new wares and a forum of experts will field the questions from the floor. Direct all inquiries to H. C. Keller, 39 Lorfield Drive, Snyder, New York 14226.

The Third Annual Northwest R/C Conference is slated for February 3-4 at the Tyee Motel in Olympia, Washington, and will include manufacturer displays, continous showing of "edited" home R/C movies, music and dancing, swimming, aircraft displays and awards, and a featured guest speaker. For further information, contact Tyee Motor Inn, 500 Tyee Drive, Olympia, Washington 98501.

The well-known Toledo Conference, sponsored by the Weak Signals R/C Club of Toledo, Ohio, will be held this year on February 24th & 25th at Lucas County Recreation Center, Maumee, Ohio. Modelers are invited to see the latest in radio control equipment, planes, boats and cars. This conference feautres talks by R/C personalities, a trading post (bring your surplus R/C gear, models and accessories to sell or trade) and competition for trophies and prizes so bring your latest design. For further information write The Weak Signals RC Club, P.O. Box 5772 Wernert Sta., Toledo, Ohio 43613.

Orbit West Export Distributors has announced the appointment of Al Strickland as their first General Manager. This new firm will be exporting, for overseas delivery, all major R/C lines including Orbit, Bonner, E.K., Micro-Avionics, PCS, Deans, and Kraft. In addition to R/C systems, Orbit West will handle export of all major R/C accessory lines in world wide distribution including the countries of South and Central America, Mexico, Australia, New Zealand, Europe, England and Japan.

According to Orbit Electronics, Strickland, early in 1966, organized Orbit East, the only factory authorized sales and service center for Orbit gear. Strickland, three times AMA Vice President of District 5, is exceedingly active in R/C contests, and holds original AMA number 369.

Heads Up.

Len Glasser (left) looks over damage to his once beautiful Great Lakes Trainer #13. Photo by Chuck Borel.

"Dear Sir: Where's my Rig? I sent it in for repair . . . ."

By Joe Martin

I SUPPOSE I could start this article by telling R/C flyers to read the manufacturer's instructions, do a better job of installing equipment, don't fly it when it's working a little bit "funny" and keep your hooks out of it; but I won't. It sure might save a lot of expense and work for both modelers and manufacturers though! Instead, I'm going to try to state the manufacturer's position on repair and service work as well as give you some insight into their problems along with a few hints to keep your repair bill down and the quality up. I've talked to several of the major manufacturers of R/C equipment, and their problems all seemed the same.

Let's begin by taking a look at the average manufacturer that you're doing business with, so that you can better understand why it's becoming increasingly difficult to continue the personalized service you have become accustomed to in the past. He employs about 30 to 50 people; has 5,000 to 10,000 square feet of plant space; has more orders than he can fill in the spring and more units than he can sell in the winter. The point which I'm trying to make is that we are not dealing with garage-type operations any more, as we did in the early days of R/C and there is much more to this repair business than meets the eye.

Virtually every piece of equipment sold will, sooner or later, have to be serviced; so let's try to follow an average repair through the average shop. Boxes arrive at the shipping department shipped in about every possible way imaginable from all over the world and packed in as many different ways. Some are packed so that they could survive an atomic attack while others couldn't be distinguished from the trash! The first order of business is to try to unpack this mess and make order out of chaos. The shipping clerk has the task of unpacking it, trying to find the return address (usually illegible), and making a list of what was received.

Next, the system goes to a lower priced technician where servo mechanics are repaired, batteries and broken components are replaced as necessary, wired harnesses checked, and the system generally fixed up and passed on to the senior tech.

It is now the job of the senior technician to get this rig working as well as new. The task doesn't look quite so hopeless now, for most of this crash damage (if any) has been repaired before reaching him. His first order of business is to read the accompanying letter that the shipping clerk almost threw away because it was all tangled with the packing material.

Dear Sir:

Hope you fix up my rig — need it for a contest this weekend. Don't know what's wrong with it but noticed glitches of down elevator before I took off. Please return A.S.A.P.

Thanks,
Smiling Jack

About this time our senior tech sits back and asks why he took off at all if it wasn't working properly? He begins to wonder if he can find what was originally wrong with it now that it has been smashed in. Checking the transmitter out, he finds that the engine control pit is worn out and sends the entire rig to the assembly shop to be replaced. His time is to valuable to do work that can be done by semi-skilled help.

In the assembly shop a new pot is installed and then returned to the senior tech. He has it working now and is just about ready to give it the final check when the battery goes dead. Smiling Jack ran the batteries down trying to get it to work before shipping it to the manufacturer and didn't charge the batteries before shipping it. Now it has to be set aside for a day to be charged. Finally, it's all working and returned to the shipping department where an invoice is completed. The unit is repacked and sent C.O.D. back to you.

Now might be a good time to mention why all repair work is sent C.O.D. One reason is that charges would double the paper work. Another is the obvious one — some people just won't pay any other way! One manufacturer tried billing after shipping serviced units, but soon had so much money owed to him that he had to give it up. He's still out about $6,000!

As you can see, quite a few people are usually involved in every repair job, and a good part of the work is in the shipping and accounting department. It costs the average manufacturer an average of $10 just to have a technician look at a unit and ship it back (not including postage). Technicians that are capable of fixing these units must be paid wages comparable with space industries in order to keep them, and their shop time costs the manufacturer at least $10 per hour including overhead, etc.

Another point to be made is that there **isn't a manufacturer in the industry making any money on repairs.** They are **all** losing money on them. Several told me that they would be ashamed to charge what it really costs to fix them. None of them have ever planned to make a profit on service work but they are beginning to worry about losses! Each year service work is increased proportionately to the number of sets the manufacturer builds, yet sales may only increase by 10 or 15 percent. This means that the profits don't increase enough to cover losses in the service department. One manufacturer stated that higher repair bills by all manufacturers will be unavoidable in another year unless they can lower their operating costs in the service departments.

To carry this point a little farther, let's assume that a manufacturer has 5,000 units in the field. Figuring approximately 240 working days per year, if each set is only returned for service once a year, this amounts to over 20 repairs a day. A good senior technician can complete, on the average, 6 to 7 repairs per day. This means that it would take approximately 3 senior technicians plus a staff of less experienced personnel just to take care of repair work.

(Continued on Page **14***)*

CESSNA SKYHAWK

Semi-Scale sport design for single channel or full-house proportional

By R. Jess Krieser

THE Cessna Skyhawk featured here began its life over five years ago, in the form of a ½-A semi-scale single channel Skylane that I designed and built as a single channel sport-trainer, to help me break into R/C, after hanging up my free-flight ships. After experimenting with a few small R/C designs then in vogue, without really being satisfied with them, I decided to design my own.

I wanted an easy-to-build ship, stable and tame in flight — one that would be "goof-forgiving," so that if you made errors, you could rely on the inherent stability of the ship to get things back under control without making a jigsaw puzzle of the ship. It turned out to be mostly sheet balsa construction, with a flat-bottom wing featuring built-in washout at the tips, to safeguard against tip stalling in turns near the ground.

I believe I was successful, as every time I let Carl Goldberg fly the ship, I almost had to beg him to give the transmitter back to me. He liked it so much that it became the forerunner of his highly successful Skylane kit. Carl took the basic design, began making a few changes here and there to give it more fidelity to scale, opened up the cabin to provide real windows, instead of the ones I painted on, and before we knew it the changes began to grow and grow, until it evolved into his present Skylane.

When I decided to go multi, my ½-A Skylane became the basis for my Sky Squire design, which started life with a flat bottom wing. Next I tried a semi-symmetrical section, then added ailerons, and

it became the present design featured in the Midwest kit. I think that this was successful too, as every time I go over to the Midwest plant, Big Frank Garcher is out of Sky Squire kits!

About the time the Sky Squire was in its second season of existence, my son wanted to build a small multi — his first radio control project. He didn't want anything quite as big as the Sky Squire, so I decided to blow up the ½-A Skylane, put a semi-symmetrical wing on it, and stick 6-channel reeds in it, with a Max .15 for power. This flew just like the ½-A ship, but was a little faster. I took one of these to Kansas City a few years ago, while visiting the Lake Jacomo flying site of the KCRC Club. It was quite well received, and put in some fine flying — especially when Bud Atkinson was on the transmitter! He did things with that ship that I didn't know it would do.

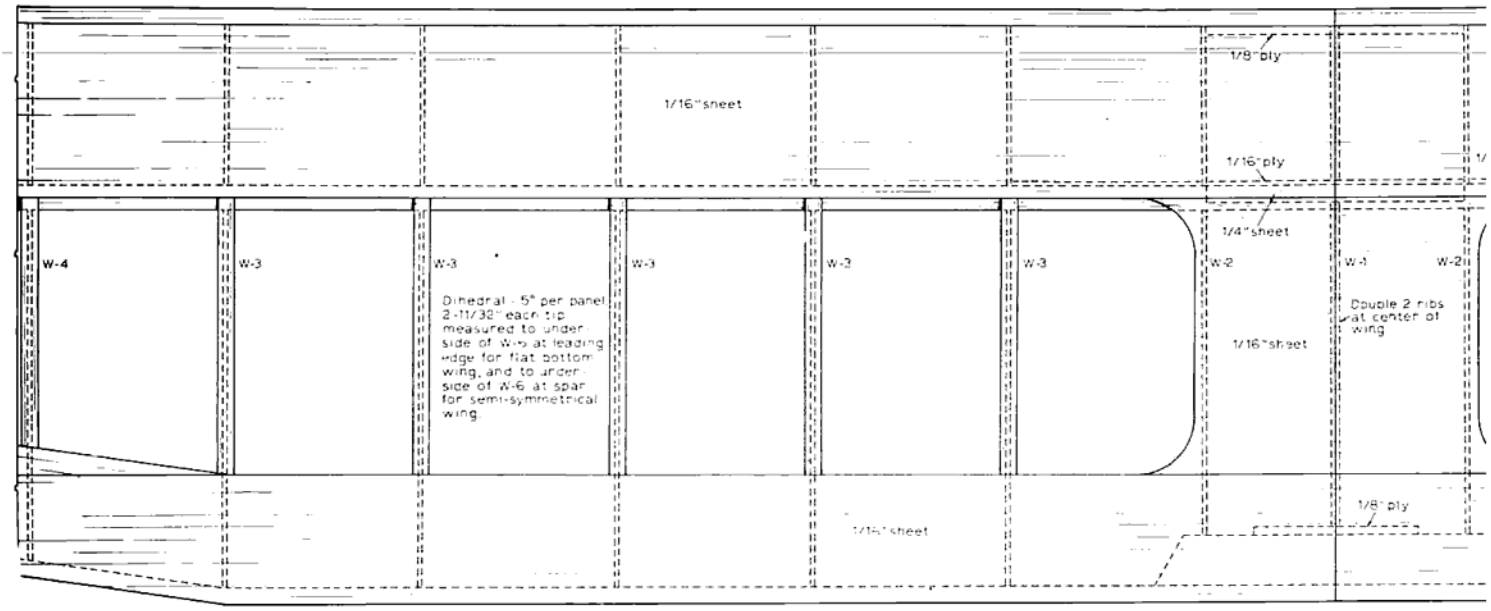
Not long after, Cessna Aircraft broke with their introductory ad on the 1966 Cessna Skyhawk, in full color, in the aviation magazines. Here, flying out of the page at me was a beautiful all-white ship, trimmed in two-tone blue. I don't know if it was the inherent good looks of the Skyhawk, or its striking paint job that attracted me most, but I felt that I just had to build a model of it. After tinkering around with a few ideas, I trotted out the plans to the scaled up version of the ½-A Skylane and worked them over. I left all of the basic moments and aerodynamics of the design as they were, but altered the lines to make it look like the Skyhawk. The end result is what you see here. When I displayed this design at the Toledo R/C conference last year, it received an excellent reception, along with its companion ship, the Aero Commander 100. I think the paint job had a lot to do with this, as I had finished it to look exactly like the one I saw in the Cessna ad.

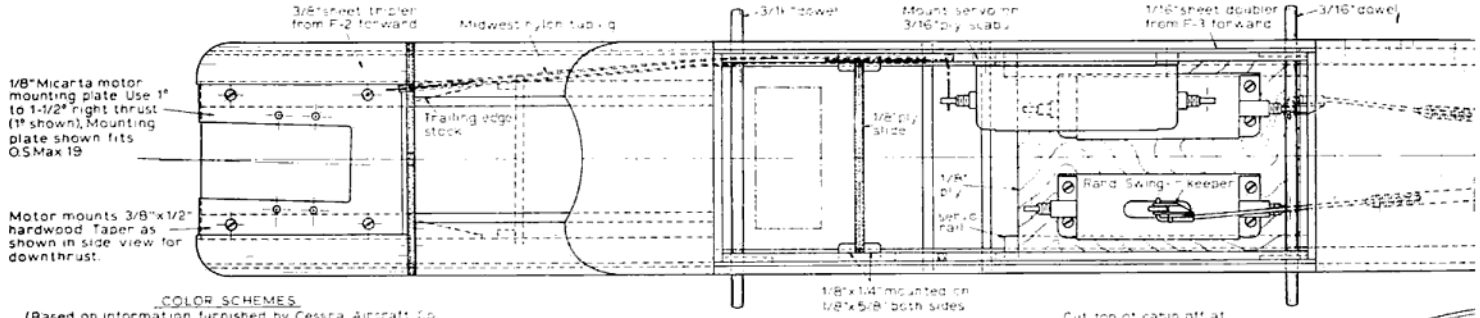
The ship is an excellent flyer, and has all of the stability and forgiving characteristics of both the ½-A original Skylane, and the Sky Squire, with the addition of being a top-rate stunter. The design was actually well flight tested before I had the original finished. I had been corresponding with Bill Anderson, of Hacienda Heights, California, and sent him plans for both the Skyhawk and the Aero Commander 100 as soon as they were off the drawing board. I received a number of detailed test reports in letters from him long before I got to Toledo with the prototypes! He flew both ships with an O.S. Max .30 for power, and 3 plus 1 propo gear for control.

The Skyhawk and Aero Commander 100 are identical designs, the only difference between them being that the lines of the Skyhawk were changed (once again) to make it look like the AC 100. To give you an idea of how both of these designs perform, let's let Bill Anderson tell you what his experience has been. Here are some quotes from one of his letters: "I flew the ship last week-end and it's just great. It flew right off the boards. It loops nice and easy, and rolls well too. Landings are real nice and easy, and almost automatic with very good rudder control at low speeds. One thing I'd like to recommend is with the larger engines a heavier main gear would be better. I'm using 5/32 wire instead of the ⅛ and find it much firmer." (I took his advice, and this is noted on the plans.) "Other than that, don't change a thing!" (I took this advice too.) And from a later letter: "This plane will do just about anything a full house multi will. It spins real easy and comes right out the moment you go to neutral. Touch and go's are almost automatic."

The ship is also very rugged, as Bill unexpectedly found out: "Since my last letter I have really put it (the Skyhawk) to the test. I've been having radio troubles, and the Skyhawk has really proved how much punishment it can take and still hold together. First off I taxied to the end of the runway and gave full power to take off, and all of a sudden — nothing! Wide open it crossed the field and into the flight line, clipping a wingtip of one plane, and then into a fence, hitting an I-beam post with the wing. Just a broken leading edge. Took my radio in and they repaired the receiver. Next week, on take-off, it fail-safed at about 20 feet off the ground, and then came back in about 5 feet off the ground, and I had a good flight. But then for the rest of the day I made about eight attempts and had eight fail-safes with full loss of control each time, and into the ground it went. Only damage was to the panel in back of the nose gear.

"Took my radio back and they replaced the parts that would cause that problem. Back to the field this time with a full fail-safe about a quarter-mile away, landing in



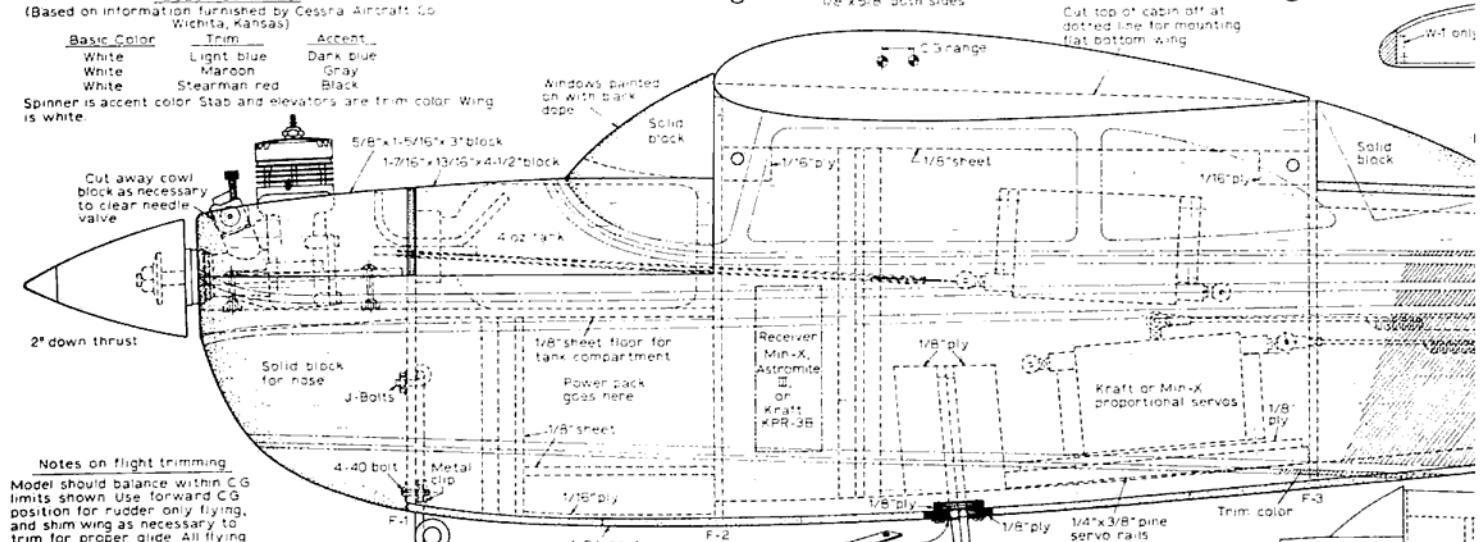


COLOR SCHEMES

(Based on information furnished by Cessna Aircraft Co Wichita, Kansas)

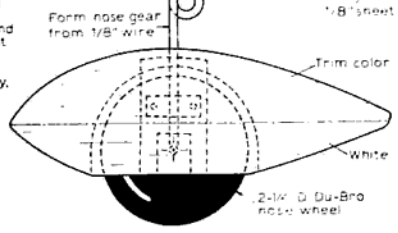
Basic Color	Trim	Accent
White	Light blue	Dark blue
White	Maroon	Gray
White	Stearman red	Black

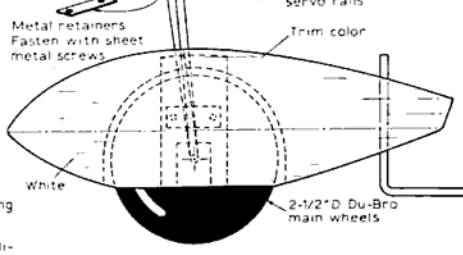
Spinner is accent color. Stab and elevators are trim color. Wing is white.

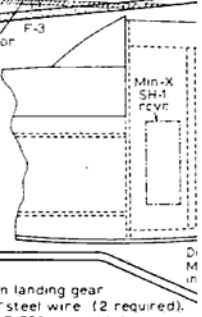


Notes on flight trimming

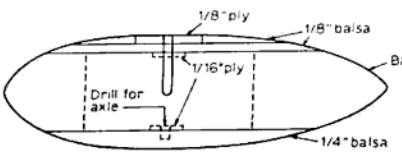
Model should balance within C.G. limits shown. Use forward C.G. position for rudder only flying, and shim wing as necessary to trim for proper glide. All flying surfaces should be true and free of warps before testing, and in proper alignment. When flight testing, adjust right thrust as necessary to obtain straight flight. If downthrust is necessary, add as needed. However, the wing is set at an angle of attack that should make downthrust unecessary.

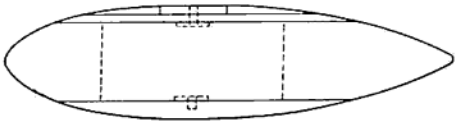


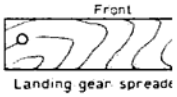




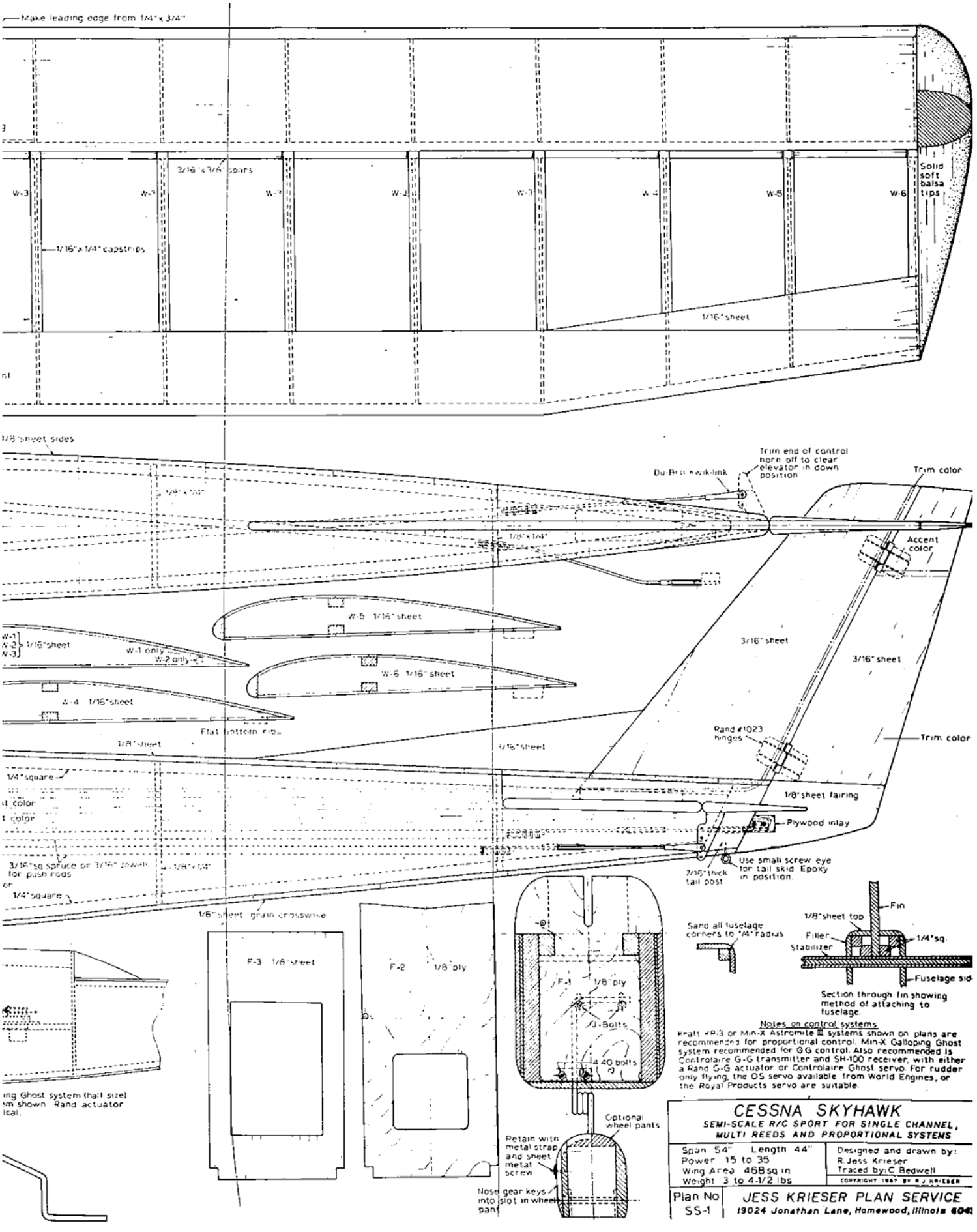
1/8" ply retaining guide for nose wheel pant







Landing gear spreade



ing Ghost system (half size)
m shown. Rand actuator
ical.

Notes on control systems

Kraft KP-3 or Min-X Astromite III systems shown on plans are recommended for proportional control. Min-X Galloping Ghost system recommended for G-G control. Also recommended is Controlaire G-G transmitter and SH-100 receiver, with either a Rand G-G actuator or Controlaire Ghost servo. For rudder only flying, the OS servo available from World Engines, or the Royal Products servo are suitable.

CESSNA SKYHAWK

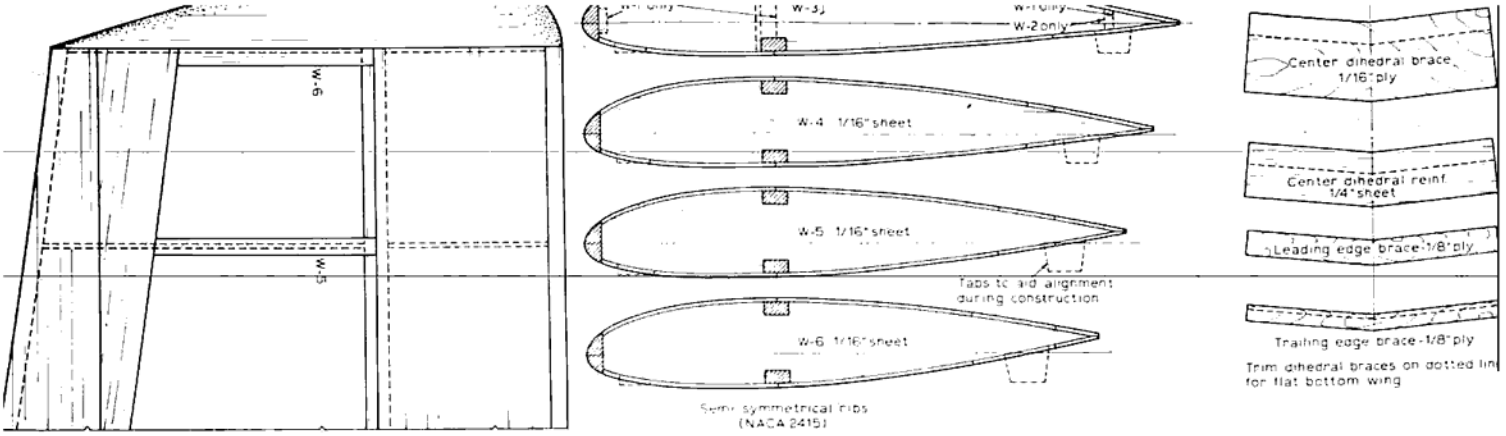
SEMI-SCALE R/C SPORT FOR SINGLE CHANNEL, MULTI REEDS AND PROPORTIONAL SYSTEMS

Span 54" Length 44"
Power 15 to 35
Wing Area 468 sq in
Weight 3 to 4-1/2 lbs

Designed and drawn by:
R. Jess Krieser
Traced by: C. Bedwell

Plan No SS-1

JESS KRIESER PLAN SERVICE
19024 Jonathan Lane, Homewood, Illinois 604



a soft (dry) river bed, with no damage. Back to the radio manufacturer (they know me by first name now). Then last Sunday I flew with no problems at all. The Skyhawk still looks as good as the first flight, and handles perfect. It does everything from power spins to 4-point rolls, and when I throttle back, it's as forgiving as a single channel ship."

I wish I could say that I was getting the same kind of flying enjoyment out of these two ships as Bill Anderson, but I can't. Herb Abrams, the Rand man, who designs some mighty fine single channel G-G and pulse proportional systems, is a top-notch salesman as well as a good engineer. He went to work on me, to sell me on the fact that since he was so busy designing and manufacturing R/C gear, he didn't get much time to build, and that those two ships could be put to excellent use if he had them, so what would I take for them? Well, being a persuasive salesman, he sold me, and now I have some fine reports on how the Skyhawk flies on his new Dual-Pak system. He hasn't flown the Aero Commander 100 yet, but it should fly just as well.

The Skyhawk, and its companion Aero Commander have been flown by a number of modelers, with everything from single channel, Galloping Ghost, multi reeds, to digital proportional systems, all with good results. I had three channels of a Kraft KP-4 in the Skyhawk, with a Min-X Astromite III in the Aero Commander. Because I had set up both of these ships for digital proportional flying, I used the larger elevators shown on the plans. This turned out to be the only criticism Herb Abrams had of the Skyhawk. The large elevators are really too much for Galloping Ghost or Dual Pak systems, as these actuators do not put out near as much "muscle" as a digital servo. Moving the hinge line back ¾-inch as shown on the plans, reduces the elevators nicely, and brings them down to the proper size for these systems. Other than the elevator size, Herb found the ship very enjoyable to fly with the Dual-Pak system, reporting that it was very acrobatic and responsive to the controls, yet an exceptionally smooth flying airplane. He's using an O.S. 30 for power, and says it can easily handle more with no problems. Although I haven't actually flown the Skyhawk with the Rand Dual-Pak system, it undoubtedly should be great for this ship, as I did fly a small edition of the Sky Squire that Herb has with a Dual-Pak in it, and I'm pleasantly surprised at how positive and smooth this system is. I really couldn't tell any difference from a digital system when in flight. This should be a hot single channel control system.

I'm satisfied enough with the performance of the Skyhawk, and its companion Aero Commander 100, that I'm now at work on a third ship in this series — a 54-inch span Aermacchi-Lockheed "Santa Maria." You've guessed it — I'm taking the Skyhawk set-up, and simply changing the lines to make it look like the Aermacchi. The wing will be identical to the Skyhawk. (With this line-changing act, I wonder how far I really can stretch this basic design?)

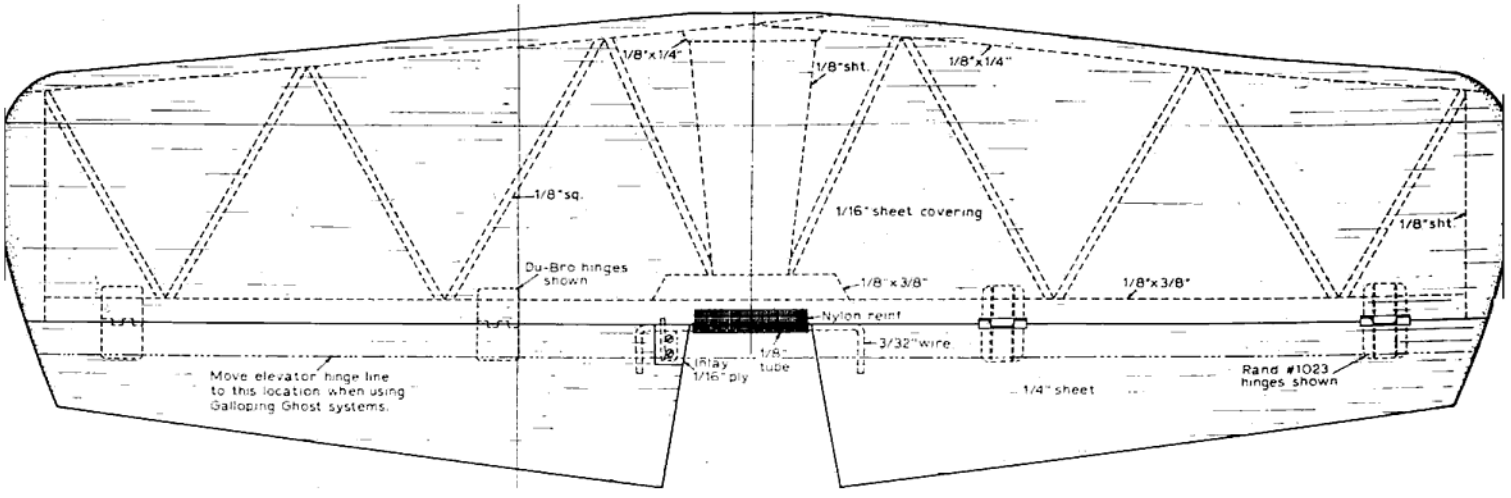
Since Don Dewey asked me to write a **short** article, I'll comply with his wishes by keeping the construction details to a minimum. Most scratch builders usually have some experience at building anyway, before tackling a project such as this, so providing full details to them is often like the proverbial "carrying coals to Newcastle." Anyway, I've tried to make the plans super-detailed, with all construction noted as clearly as possible.

The wing construction is quite simple. You can build it in one piece, or in two halves, joining them after completion and adding dihedral braces and gussets. Just make sure your center joints are well-glued, and strong. I prefer to build the wing in one piece. To do this, you can either construct a jig, or join two flat boards at the center, and prop up the tips to form the correct dihedral angle. The tabs on the ribs help keep things in proper alingment when building on flat boards. All sheeting and capstrips are glued in place on the top surface before removing it from the board or jig. The tabs get cut off the ribs after this stage is completed, and the bottom sheeting and capstrips are then installed. Tips are solid blocks of light balsa, carved to shape.

The tail assembly is simple, with the fin and rudder made from sheet balsa. The stab can be built up and sheeted with 1/16 balsa on both sides, as shown on the plans, or you can save a bit of time and make it from ¼" sheet. Whichever method you choose is immaterial; it's simply a matter of which you prefer to build.

The fuselage is made from 6-inch wide ⅛ sheet balsa. If you can't get 6-inch wide stock, you can join narrower sheets. The 1/16 sheet doublers are laminated to the sides with Hobbypoxy No. 2, as are the ⅜ sheet triplers. The plywood gussets to locate and retain the top shanks of the main landing gear struts are epoxied to the inside surfaces of the sides in their correct position before assembling the sides. The longerons and uprights are also added before assembly. I usually install the hardwood motor bearers, too, before assembling the sides. Join the two sides by gluing formers F-1, F-2, and F-3 in place, then add the plywood cross pieces for the landing gear on the bottom of the fuselage. Sheet the bottom of the cabin area at this

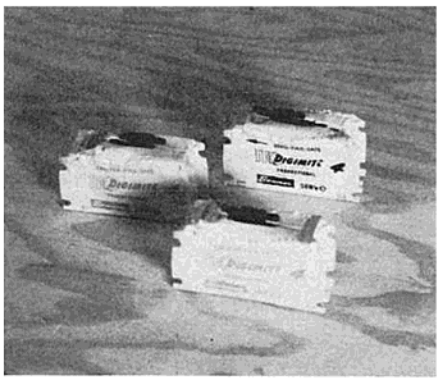
(Continued on Page **14***)*



"DEAR SIR: Where's My Rig?"

(Continued from Page 8)

To add to the confusion of the manufacturers, it seems that 60% of the repairs come from 10% of the customers. A very small percentage of this 10% have legiti-



mate complaints; for, like any other business, the radio control industry puts out an occasional "lemon." However, I've spent quite a few hours test flying "unflyable" radio control gear and haven't lost a plane yet; and one cannot help wondering who is at fault — the owner, or the equipment?

If you should happen to be in this unfortunate 10% group and cannot resist the temptation to write a letter to the manufacturer telling him what you really think of him, or perhaps any letter not pertaining directly to the repair, send it separately to the management and **not** to the repair department. I have been told of manufacturers being sent bills for crashed model aircraft, broken engines, etc. It should be stated here emphatically that a manufacturer only assumes normal liability as specified in the original warranty covering the equipment itself.

Just what can be done to help keep these service costs down? Just follow these few simple suggestions:

1. Clean all external surfaces of your equipment.

2. Do not send a receiver to the factory wrapped up in foam and tape. Untie all knots in receiver antenna. Do not send in servos mounted on trays, etc.

3. Charge the transmitter before mailing, making certain that it is "Off" and that it cannot be turned "On" during shipping.

4. Enclose a concise, accurate letter explaining the trouble you are experiencing with you requipment. If you attempted to repair or retune it yourself (which is not recommended) and were unsuccessful, please so indicate this in your letter. Please remember, too, that your letter will have to be read by several people.

5. If you do not need your unit returned for a couple of weeks, please indicate. This will allow the service department to expedite the ones that are needed for contests without unnecessarily holding up other less pressing orders. Almost everyone in this business is, or was, a modeler and understands your problem.

6. Always return receiver, transmitter, servos, and power packs as **all** are needed to give your system a complete check. Do not assume the obvious. For example, what may appear to be a faulty receiver may be a problem in the transmitter; or what appears to be a malfunction in the transmitter or receiver may actually only be a faulty servo.

7. Do not change any connectors. These will have to be changed back at the factory to fit the test equipment.

8. Save the original shipping container and packing material and try to return it to the factory packaged in the same manner you received it.

The radio control industry provides its customers with a highly sophisticated and complicated piece of gear. It is probably subject to more abuse from vibration, crash damage, etc., than any other electronics gear manufactured for any other purpose. Yet, customers expect indefinite life from this equipment; and, if a repair bill comes to say $50, the manufacturer is subject to all kinds of abuse from the customer. However, the same customer thinks nothing of paying $75 for a tune-up of his automobile or similar charges for repair of his colored television set. Customers must be made to realize that their radio control equipment takes considerably more skill to repair and service than does an automobile or television set.

The people of the radio control industry hope to improve service workmanship and costs in the future, but this may be impossible without the cooperation, patience and understanding of **you,** the customer.

CESSNA SKYHAWK

(Continued from Page 13)

time, as this helps keep the entire assembly in squared alignment when you pull the sides together and glue them at the rear.

After adding the cross pieces to the rear of the cabin, top and bottom, you can sheet the top and bottom all the way to the tail. Then you can reurn to the nose area, box off the fuel tank compartment, add the nose gear as shown, or your favorite steerable nose gear, and box off the battery compartment. Then sheet the bottom forward of the landing gear cross pieces, add the nose blocks, cowl blocks, windshield and turtleback blocks, and when dry, start carving and sanding to shape.

When the fuselage structure has been shaped and sanded, install the stab and fin, with the fairing pieces to close off the fuselage at the stabilizer joint. Carve and sand this to shape, and you're just about finished, ready for covering.

Before covering, make certain that the entire ship is shaped properly, and sanded very smooth. Coat the fuel tank and engine compartment area with fiberglass resin to provide fuel proofing, and then give the entire ship two coats of clear butyrate, sanding with very fine paper between coats. Cover the entire ship with silk.

There are many ways to finish a ship, and a number of articles have been written on this subject, so what you do from here on depends on what you have adopted as your favorite method of finishing. I'm a bit lazy on finishing, and don't believe in hand rubbing numerous coats as though I was out to win a finish trophy. I only want the ships to look good and be fuel proof. The finest finish job in the world can get washed out in seconds when you commit pilot error. Briefly, here's the method I use: after silking, apply three coats of thinned out clear dope, sanding lightly between coats with 400 wet or dry paper. Then apply three coats of thinned out clear dope with talcum powder added, and put the ship aside for at least three days to allow the butyrate to dry thoroughly. Then sand with 400 paper until smooth and slick. Top this with one more coat of thinned out clear, and sand very lightly when dry.

Now you're ready to apply color, spraying on two or three coats. When well dried, wet sand with 400 paper, then wash thoroughly to remove all sanding residue. Spray on several finish coats until you're satisfied with the color and depth of coverage. Mask off trim areas, and apply trim colors. When completed, top the entire ship with two coats of thinned out clear Aero Gloss. These final coats help add uniform lustre to the entire ship, and level off the edges of the trim where the tape was installed. The trick all of the way through this procedure is to get a good looking finish with as few coats of dope as possible. This method works well for me.

As for test flying, simply be sure the angles of attack for the wing and tail are as specified on the plans, and thrust line is as indicated. Make sure all is in proper alignment, with no warps. If anything is warped, remove the warps before flying. Be sure the C.G. is properly located. If you're an experienced flyer, you'll have no problems from this point on. If inexperienced, get an expert to do the test flying for you until it is properly trimmed out.

From here on, you're on your own, with nothing to do but have fun flying the ship. And I hope that if you build it, you'll get as much fun and enjoyment out of it as have the modelers who have built it to date during its development stages.

WALT AND WAGGER FLY THE

PETE 'N RAND PARASOL

Semi-Scale Pientenpol Air Camper for Galloping Ghost and .10 mills

By L. W. Dietrich

THE door on the little shack behind the garage flew open with a rush of enthusiasm and then slammed behind Walt's headlong rush. A pile of spare tubes, balsa, MonoKote, and ancient cobwebs teetered dangerously and then descended onto the sleeping Bassett below. A dusty cloud rose toward the ceiling just slightly in advance of the engulfed dog who followed, scrambling and snorting.

"Warf! Warf! Ow-o-o-oo!" yapped Wagger, shaking off the lumps. "Walt! What . . . o-o--!" Or at least that was how it sounded to Walt, who had often been accused of discussing model aircraft technology with a sleepy-eyed dog.

"Sorry there, old Gaines-Gobbler!" clucked Walt as he grabbed the dog and brushed him clumsily with the shards of an old Custom Cavalier wing. "I just wanted you to see something flying over before it gets away!"

"Naturally," groused Wagger. "Now if you'll get that splintered spar out of my ear and put me down, I'll set a few bones and stagger outside. Who knows? Maybe I'll be lucky and collapse on my back so I can at least get a dying look."

Walt sighted, cast his eyes upward for help which seldom came, and followed the grumbling Bassett through the door. Once outside he pointed toward a spot over the edge of town and was once again caught up with rapture.

"A Pietenpol!" he cried, his bulk almost

dancing with excitement.

"A Pietenpol! Just like the one I learned to fly back in Oregon in '34! Parasol wing homebuilt, with a thundering 40 horse scrap-iron Ford Model 'A' conversion. Ah, the wind in your face, the slap of fabric in the breeze . . ."

"Oh, for pity's sake," snorted Wagger. "Go back in the shack and sit down before you have pump stoppage. You know you'll get clobbered by your wife if you clutter up the garage with a rejuvenated relic of the air. "However," the dog opined as he turned to cast one more look at the circling red and yellow monoplane, "it does look like fun. That was real flying, wasn't it, Walt?"

The two strange companions settled themselves into the accustomed positions in the shack, with Walt on the battered stool and Wagger in his daytime bed of old deBolt Livewire scraps.

"Wiggler, there was nothing like it!" Walt enthused. "Peering out under that wing while the old 4-banger belched smoke and piston rings in your face and smelling a world made of hot water and oil; bouncing over the ruts on those big old donut tires; watching the ground fall away from an open cockpit; THAT, you old bone-biter, was living!"

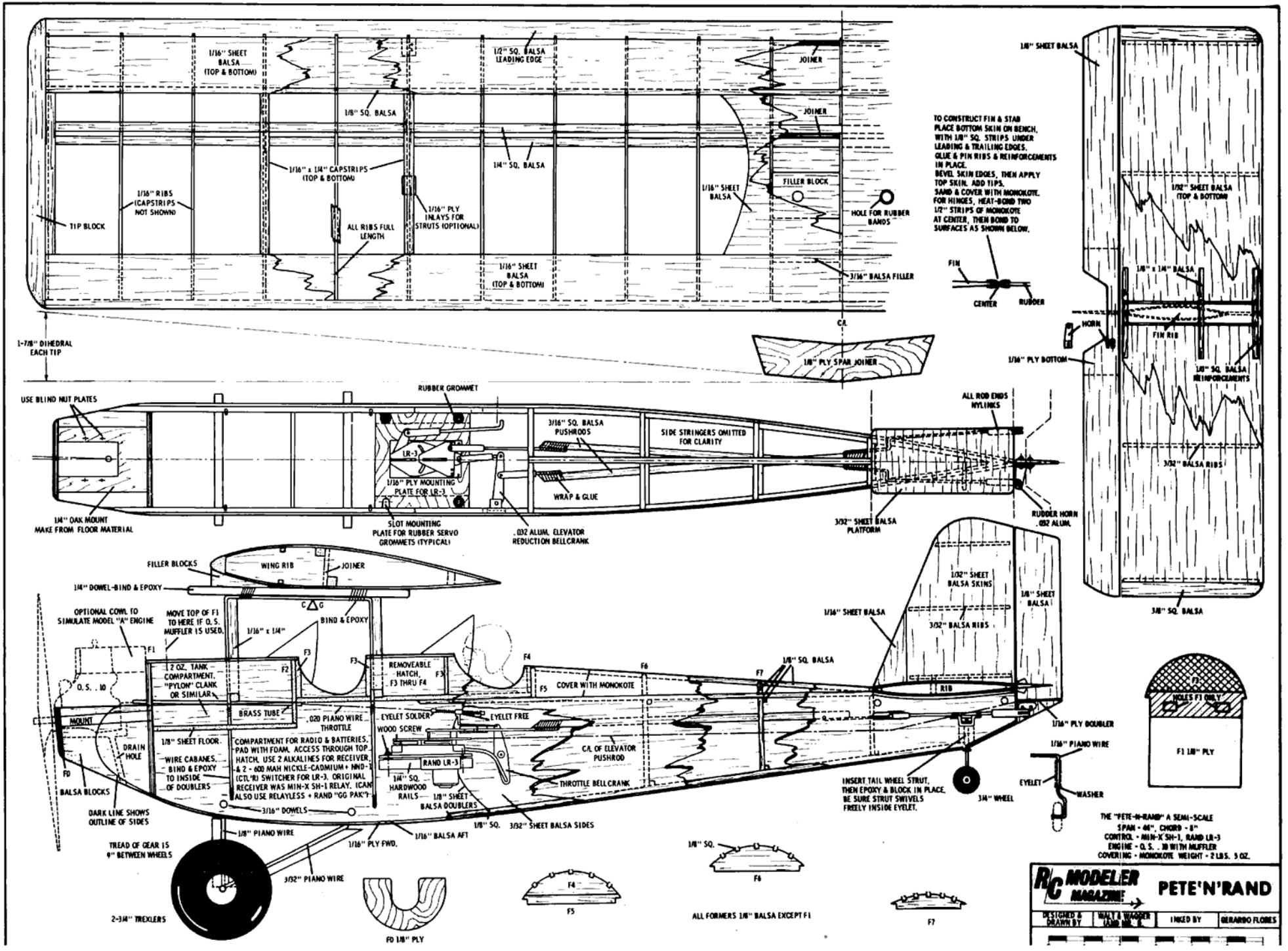
Walt's eyes glazed over as he relived the supreme moment while Wagger maintained a respectful silence and occasionally wrinkled his brow with an upward glance at his master. After a while, Walt mused;

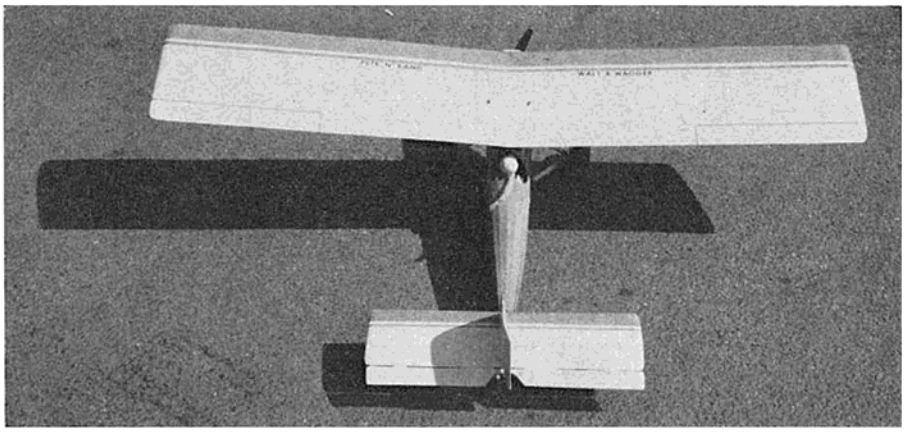
"Wagger . . . do you suppose . . . ?"

Wagger sent one more look in Walt's direction to confirm his suspicions and then sighed windily. Arising, he padded to the pile of magazines on a lower shelf and nosed the ragged copies for several seconds before selecting one. Carefully lifting his dewlaps he gently gripped the magazine in his teeth and extracted it, then deposited it on Walt's knee.

"Ergo, Eureka, and like that," Wagger said, plopping down again. "Semi-scale Pietenpol for 6 channel R/C by Jess Kreiser. Fill the bill?"

Walt hungrily scanned the pages of plan and story, then registered disappointment.


1/16" SHEET BALSA (TOP & BOTTOM)
1/2" SQ. BALSA LEADING EDGE
JOINER
JOINER
1/8" SQ. BALSA
1/16" x 1/4" CAPSTRIPS (TOP & BOTTOM)
1/4" SQ. BALSA
1/16" SHEET BALSA
FILLER BLOCK
1/16" RIBS (CAPSTRIPS NOT SHOWN)
TIP BLOCK
1/16" PLY INLAYS FOR STRUTS (OPTIONAL)
ALL RIBS FULL LENGTH
HOLE FOR RUBBER BANDS
1/16" SHEET BALSA (TOP & BOTTOM)
3/16" BALSA FILLER
C/L
1-7/8" DIHEDRAL EACH TIP
1/8" PLY SPAR JOINER
TO CONSTRUCT FIN & STAB
PLACE BOTTOM SKIN ON BENCH, WITH 1/8" SQ. STRIPS UNDER LEADING & TRAILING EDGES. GLUE & PIN RIBS & REINFORCEMENTS IN PLACE.
BEVEL SKIN EDGES, THEN APPLY TOP SKIN. ADD TIPS.
SAND & COVER WITH MONOKOTE.
FOR HINGES, HEAT-BOND TWO 1/2" STRIPS OF MONOKOTE AT CENTER, THEN BOND TO SURFACES AS SHOWN BELOW.
FIN
CENTER
RUBBER
1/8" SHEET BALSA
1/32" SHEET BALSA (TOP & BOTTOM)
1/8" x 1/4" BALSA
HORN
FIN RIB
1/16" PLY BOTTOM
1/8" SQ. BALSA REINFORCEMENTS
3/32" BALSA RIBS
3/8" SQ. BALSA
USE BLIND NUT PLATES
RUBBER GROMMET
3/16" SQ. BALSA PUSHRODS
SIDE STRINGERS OMITTED FOR CLARITY
ALL ROD ENDS NYLINKS
LR-3
1/16" PLY MOUNTING PLATE FOR LR-3
WRAP & GLUE
1/4" OAK MOUNT MAKE FROM FLOOR MATERIAL
SLOT MOUNTING PLATE FOR RUBBER SERVO GROMMETS (TYPICAL)
.032 ALUM. ELEVATOR REDUCTION BELLCRANK
3/32" SHEET BALSA PLATFORM
RUBBER HORN .032 ALUM.
FILLER BLOCKS
WING RIB
JOINER
1/4" DOWEL-BIND & EPOXY
C G
OPTIONAL COWL TO SIMULATE MODEL "A" ENGINE
MOVE TOP OF F1 TO HERE IF O.S. MUFFLER IS USED.
1/16" x 1/4"
BIND & EPOXY
1/32" SHEET BALSA SKINS
1/8" SHEET BALSA
1/16" SHEET BALSA
3/32" BALSA RIBS
F1
F2
F3
F4
F5
F6
F7
F0
2 OZ. TANK COMPARTMENT, "PYLON" CLANK OR SIMILAR
O.S. .10
REMOVEABLE HATCH, F3 THRU F4
COVER WITH MONOKOTE
1/8" SQ. BALSA
RIB
1/16" PLY DOUBLER
BRASS TUBE
.020 PIANO WIRE THROTTLE
EYELET SOLDER
EYELET FREE
WOOD SCREW
MOUNT
DRAIN HOLE
1/8" SHEET FLOOR
WIRE CABANES, BIND & EPOXY TO INSIDE OF DOUBLERS
COMPARTMENT FOR RADIO & BATTERIES. PAD WITH FOAM. ACCESS THROUGH TOP HATCH. USE 2 ALKALINES FOR RECEIVER, & 2 - 600 MAH NICKLE-CADMIUM + MND-1 (CTL'R) SWITCHER FOR LR-3. ORIGINAL RECEIVER WAS MIN-X SH-1 RELAY. ICAN ALSO USE RELAYLESS + RAND "GG PAK"!
RAND LR-3
1/4" SQ. HARDWOOD RAILS
1/8" SHEET BALSA DOUBLERS
C/L OF ELEVATOR PUSHROD
THROTTLE BELLCRANK
INSERT TAIL WHEEL STRUT, THEN EPOXY & BLOCK IN PLACE. BE SURE STRUT SWIVELS FREELY INSIDE EYELET.
3/4" WHEEL
1/16" PIANO WIRE
EYELET
WASHER
HOLES F1 ONLY
F1 1/8" PLY
BALSA BLOCKS
DARK LINE SHOWS OUTLINE OF SIDES
3/16" DOWELS
1/8" PIANO WIRE
1/16" PLY FWD.
1/16" BALSA AFT
1/8" SQ.
3/32" SHEET BALSA SIDES
TREAD OF GEAR IS 9" BETWEEN WHEELS
3/32" PIANO WIRE
2-3/4" TREXLERS
F0 1/8" PLY
1/8" SQ.
F6
F4
F5
ALL FORMERS 1/8" BALSA EXCEPT F1
F7
THE "PETE-N-RAND" A SEMI-SCALE
SPAN - 44", CHORD - 8"
CONTROL - MIN-X SH-1, RAND LR-3
ENGINE - O.S. .10 WITH MUFFLER
COVERING - MONOKOTE WEIGHT - 2 LBS. 5 OZ.
R/C MODELER MAGAZINE
PETE'N'RAND
DESIGNED & DRAWN BY
WALT & WARREN (AGE NO. 6)
INKED BY
GERARDO FLORES



The Pete 'N Rand . . . red and yellow MonoKote finish.

"That's sumpin', alright, for someone with a reed rig, a .35 a large field, and a big luggage compartment; however, we've found the **small** planes to be ideal for the way we live and fly here in town. Close, old Nibbler, but no cigar!" said Walt resignedly as he started to rise. Wagger, however, stopped him with one flat paw on the instep.

"Sometimes I wonder why I do this," the Bassett pondered. "I guess I just can't stand to see a 44-year-old man cry. Tell me the width of your Corvair trunk, young fellow."

Walt's eyes widened. "About 48", more or less."

Wagger rose and removed his boss from the stool by a deft application of a cold nose, then clambered up to face the drawing board.

"Hand me the ruler and T-square, Smilin' Jack," he commanded, "and we shall make short shrift of getting you a nice nostalgic Pietenpol for your baseball field. And fetch we a wedge of that Swiss cheese while I explain our approach," he added as he started to measure the plan.

* * *

One of the first problems (Wagger explained, as he rested an outsized paw on the drawing board) is that the wing causes most of the drag on any aircraft. Therefore, it should be directly behind the device causing the pull; that is, the engine. If, however it is located at some height above the engine there will be a considerable force tending to rotate the aircraft upward. Our Pietenpol has a parasol-mounted wing, and you can't get a wing any higher than that; therefore, I would expect our Pietenpol to be very mushy and "stally" in powered flight.

The second problem (Wagger went on) is the inherent characteristic of the Rand LR-3 actuator we are now using in our Min-X and Rand Galloping Ghost system of single-channel control. As you may recall from the Randwagon experiments, the LR-3 spends more time in the "up" position while changing engine speeds than we would like. This is evidenced as a "jump" and can put the aircraft into some dangerous flight attitudes when near the ground.

Thirdly, we have found that airfoils of the flat bottomed, high lift variety have too much lift and give a climbing tendency at higher air speeds. This lift is also hard to "turn off" with elevator action since a flat-bottom airfoil will develop lift even at negative angles of attack; this condition is not compatible with the limited elevator action obtainable with GG systems.

Other minor problems we should keep in mind while modifying the Pietenpol for "Galloping Ghost" flight are:

1. The size of the rudder and elevator is much too large for flapping. They should be reduced in both size and travel.
2. The availability of an engine throttle and tailwheel indicates we might be able to use ground steering just like the big boys if we can lick the tendency of the tail wheel to wiggle the aircraft from its pulsing action.
3. The big flat tail surfaces lend themselves to flat construction which unfortunately is prone to ground damage, warping, and stalling during flight. I would prefer to use symmetrical airfoils in them, but that calls for heavier structure which we can't tolerate because of the short nose. Therefore, we had better use the "Willard-Top Flight" type of hollow balsa construction of these surfaces.
4. The scale landing gear is very close to the center of gravity which spells nose-over trouble when flying from our grass field. We'll have to move it up, out, and forward as far as practicable.

Wagger settled himself at the drawing board and smoothed the vellum carefully. "Now, mighty chieftain, pay close attention while we draw up some quick plans for this highly modified Pietenpol which we will call the 'Pete'n'Rand' from now on to indicate it is only semi-scale. I'll pencil building notes by the parts as we solve problems to eliminate the usual long description of "cement tab A to slot B while holding with nose X" details." So saying, the frowning dog began to draw while giving this dissertation:

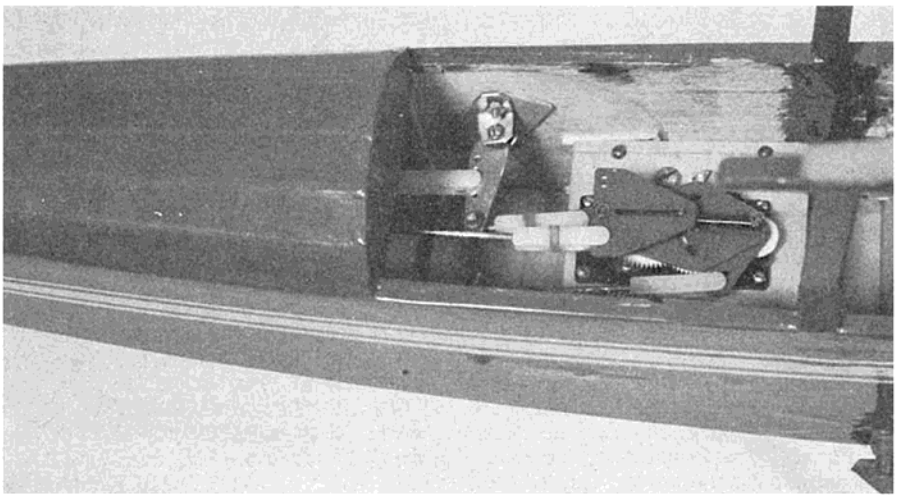
We'll start with conventional fuselage sides (shown between the heavy lines) to which we glue the front doublers and the rear structure of 1/8 square balsa. Notice that we have first bent the wing-mount wire cabanes to shape and fastened them to the inside of the doublers with lacing and epoxy before gluing the doublers to the sides. The two sides are then assembled with cross-bracing and bulkhead F1. The engine mount is sawed from a scrap piece of oak flooring material; notice it has two projecting ears which key it into F1. Appropriate balsa side and bottom blocks are now chosen for the nose; after everything is liberally coated with white glue, all blocks and engine mount are slid into place and checked for alignment before clamping firmly. When they are dry we contour the nose. Add the bottom sheeting consisting of both plywood and balsa. Set aside to dry.

We'll make a light but airfoiled stabilizer by using the hollow method. Place two 1/8" square strips over the plan where the leading and trailing edges would normally be. Place the skin over the top view, apply cement to the ribs and press them into place while pinning them to the workbench. Add the center structure, let dry, taper skin edges and then add the top skin. Remove from plans, add tip blocks and then sand structure. Build the vertical fin in the same fashion and then glue it accurately and securely to stabilizer.

Return to the fuselage. Add the stabilizer platform and dowels. Mount the tail surfaces with rubber bands. Fabricate the rudder and elevator mount the control horns and then use masking tape to fasten the control surfaces to the main tail temporarily. The Rand LR-3 actuator can now be installed; this will allow us to design and fit our bellcranks and push rods. Be sure to fit the mounting plate with rubber

(Continued on Page **18***)*

Rand G.G. Pak installation in Walt and Wagger's semi-scale Pietenpol.



PETE 'N RAND

(Continued from Page 17)

grommets to prevent fatigue of the actuator choke leads.

"You'll notice we've incorporated a combination reduction and 'lost motion' bellcrank into the elevator system to allow use of a large semi-scale elevator without excessive galloping or nose-jumping during throttle change. Refer to the Randwagon article for the background on the 'lost motion' concept if you've forgotten our experiences there," Wagger said. "By the way, our experience indicates that the use of Ny-links on both ends of the push rods will save the actuator in case of crashes," he added. "Since we've had no Ny-link failures in 50 hours of flight we'll continue to consider them cheap insurance."

Walt rose and stretched his dinner muscles and then started for the door of the shack.

"Thinking always makes me hungry, chow buddy!" he exclaimed over his shoulder. "Can I bring you back a cold ham sandwich?"

Wagger lifted his drooping jowls in a rare imitation of a friendly smile. The effect was suspended part way between a grin and a burp.

"Thanks, but I never eat scraps," the dog replied. "However, you may bring me a portion of my special Camembert cheese between two Lo-Cal Dog-Yummies. That will be quite sufficient." The dog suppressed a desire to add ". . . you should try it," as he viewed Walt's retreating figure which gave the effect of two boys fighting under a blanket.

Back at work, Wagger continued with the construction details. Next (he munched) we install the throttle bellcrank and push-wire. Notice we transmit the motion with a sliding eyelet between two springs. The eyelet, which is a free and sloppy fit on the pushwire, will not move the pushwire and throttle until the spring is compressed by definite motion of the throttle bellcrank. The springs also allow us to have "overtravel" of the bellcrank to assure that we hit the throttle stops firmly each time. If the throttle should "hunt" slightly with normal pulsing, we will unsolder one of the end eyelets and move the springs slightly farther apart to give the center eyelet more pulsing room. Notice also that the throttle push wire is run through a brass or plastic conduit to prevent binding in the fuel tank area. The end of the wire will pass through into the engine compartment where we will bend the end and pass it into the bottom hole on the O.S. Max .10 throttle arm. It will be secured with a soldered washer.

"Hold it, bone doggler!" Walt interrupted. "We have an O.S. .15 which should impart some real 'go' to this machine. Why settle for the .10?"

"Silence!" commanded Wagger, rapping Walt firmly on the kneecap with a quick thrash of the stub tail which had given him his name.

"We live at sea level and this is a sport model which is supposed to fly like a 1930 Pietenpol, not a Taurus! Now that you've antagonized me I'm going to go one step farther and move F-1 back to allow installation of an O.S. muffler. That will cramp the tank compartment a bit, but Pylon makes a 2 ounce short neck plastic tank that will fit. Then we can have realistic performance with a realistic engine sound. All the better for our baseball field sessions." So saying, Wagger made a quick notation above the tank compartment.

"Well," Walt sulked, "I still think we should make provision for installation of the .15."

"Actually we have," said Wagger apologetically as a sidelong glance with a bloodshot eye confirmed that he had pushed his master a little too far. "If the builder will simply drill both sets of mounting holes and mount the blind nuts before finishing the nose, the .15 will fit in almost the same space as the .10. At any rate, I suggest that the engine, fuel tank, and muffler be chosen first and then the front end modified to fit that combination. Keep the approximate location of the engine in the same place, however, or we'll have balance problems."

Seeing that the above comments had soothed Walt, Wagger continued. Pin the floor of the removeable hatch (he continued) to the fuselage, then add all formers and stringers as well as the hatch and tank cover sheeting. Remove the hatch and add two strips of 3/16" square balsa to its underside, positioned to fit snugly between the fuselage sides when the hatch is in place. Turn the ship on its back and bend the landing gear wires; start with the front wire. I suggest that you make a sketch on scrap paper first, making the center as wide as the fuselage and then bringing the legs down 1⅞" while spreading them to give 9" between the wheels. Bend the axle sections, then lash the wire strut to fuselage with rubber bands and bend a rear strut to fit. Complete by wrap-soldering the joints and attaching the 2¾" Trexler airwheels.

To turn our attention to the wings, you'll notice that we will try to solve the drag problem we mentioned by careful choice of airfoil to eliminate as much drag as possible. A semi-symmetrical section with very gradual leading-edge contour will sacrifice a little lift but should give us a reasonable speed range without excessive jumping and stalling. Also, we should be able to make the aircraft "mush" into a small field with up-elevator. We have that elevator control with the Rand so let's use it effectively to control the wing lift. As far as construction of the wing, it is rather conventional with the exception of the staggered spars and the single spar joiner. We use capstrips to give a broader area to which the MonoKote covering material can adhere. We will inset small plywood pads into the bottom of the wing for possible strut attachment, although they will be optional.

Lastly, we will fabricate a cowling to make the front end look like it really does have a big, flat Model A engine. If sufficient space for airflow is allowed, no cooling problems should exist.

Wagger sat back on his haunches and waved his big paws as he stretched, then clambered down and paced around the shack to loosen the cramped muscles.

"Any questions, O mighty builder, before you start?" he asked.

Walt nodded vigorously, in anticipation of beginning the construction of his dream ship. "How about that tail wheel, and who's going to give me a hand with the MonoKote?"

"As you can see from the sketches," Wagger answered, "the tail wheel is operated by a loop on the rudder pushrod. Although it is pulsing all the time, its 'straight up' design means that it will simply pivot rather than 'wag the tail' if you'll pardon the expression. Steering should be good on both grass and hardtop, however. As far as MonoKote is concerned, if you haven't learned how to use this stuff yet you should. If you're careful, you can cover the 'Pete 'n' Rand' with two sheets and get a flashy two-tone job at the same time. I'll come in and give you a hand with it when you're ready; it's awfully hard to describe how to use it but I can show you in a few minutes."

"Fair enough, Camembert cheesehound!" enthused Walt. "And now, to work!" So saying, he cleared the bench with one sweep of his arm and settled down to start cutting the doublers.

Wagger snorted, scrunched his eyes against the cloud of descending balsa dust, and beat a hasty retreat for the clear air outside the shack.

* * *

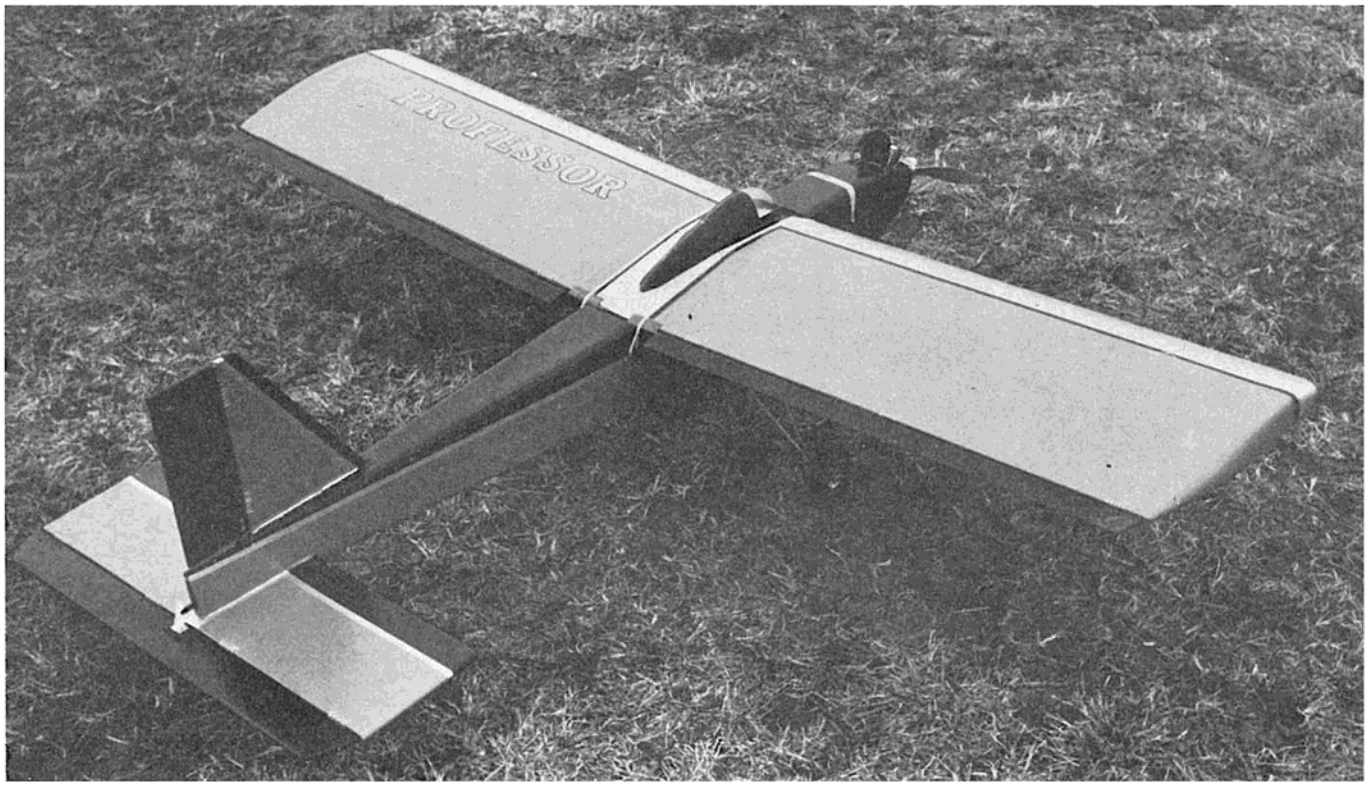
Several weekends later, the pair braked to a hasty stop at the baseball field and crawled out of the Corvair they used as the Airport Limousine. Walt, who was removing the glistening "Pete 'n' Rand" from the trunk where it had been placed fully assembled, called to Wagger.

"You coming, old buddy?"

"Be there in a moment," the dog grunted, working his collar loose from the horn ring. "Next time, **you** drive this thing. While you're waiting, check the adjustment of the rudder for neutral and the elevator for ¼" travel below neutral and ⅜" total travel above neutral. Then fire it up and check for proper operation of all controls including the engine. Be sure to hook up that vertical antenna, also; our combination of Min-X Pulsemite transmitter and SH-1 receiver is a real winner, but I prefer to have no 'glitches' in any flight attitude."

"Will do!" Walt called. It was testimony to his love for the aircraft that he did these things indeed, running a faultless pre-flight check. "Ready to go, Cheesehound!" he chortled, as the .10 purred away into its muffler. Wagger waddled over to the Pulsemite 800S transmitter and set the elevator trim to give about 5.4 pulses per second.

(Continued on Page 22)



THE PROFESSOR

Shop & Field presents part II of Chuck Cunningham's .45 - .60 Multi Trainer.

THE Professor has been designed to satisfy the need of the newcomer to R/C who wishes to start with a large engine and a large model aircraft. This ship will take engines in the .45 to .61 range, and has been flown with a Ueda .45, a Fox .59, an Enya .60 and a Webra .61. It is docile at almost any power range. It has been flown both on proportional and 10 channel reed gear and has much the same flying characteristics with either type control. It is not the greatest airplane in the world — it wasn't designed to be — nor is it the best possible pattern ship. It is a strong, smooth flying, rugged aircraft to get the beginner into the air and down again without making toothpicks out of wing spars. It will hold its own in a Sport Flying contest and will fly a pretty good pattern, and land either fast or slow. The wing is of a convenient span to fit into most automobile trunks and yet due to the low aspect ratio (the relation between the wing span and the wing chord is "aspect ratio") packs a lot of wing area into a small span.

Those of you who have been following RCM for several years will recognize the direct connection between the Instructor from the RCM Annual of 1966, the Lil Swinger from RCM, October '67, and the Professor. This has been intentional since each of these ships was designed to do the same thing, only do it with differing engine sizes and radio equipment. If you have built one of the earlier ships and liked it, then I know you will like the Professor. If this is to be your first entry into radio flying, then again I know that you will like the Professor. You needn't worry about skimping on the finish to save weight, although you are better off with a lighter aircraft. If you want to beef it up even more than the plans show, go ahead, the extra wood and glue won't hurt it. The idea is that this is one ship that you can build and not really worry about all of the time.

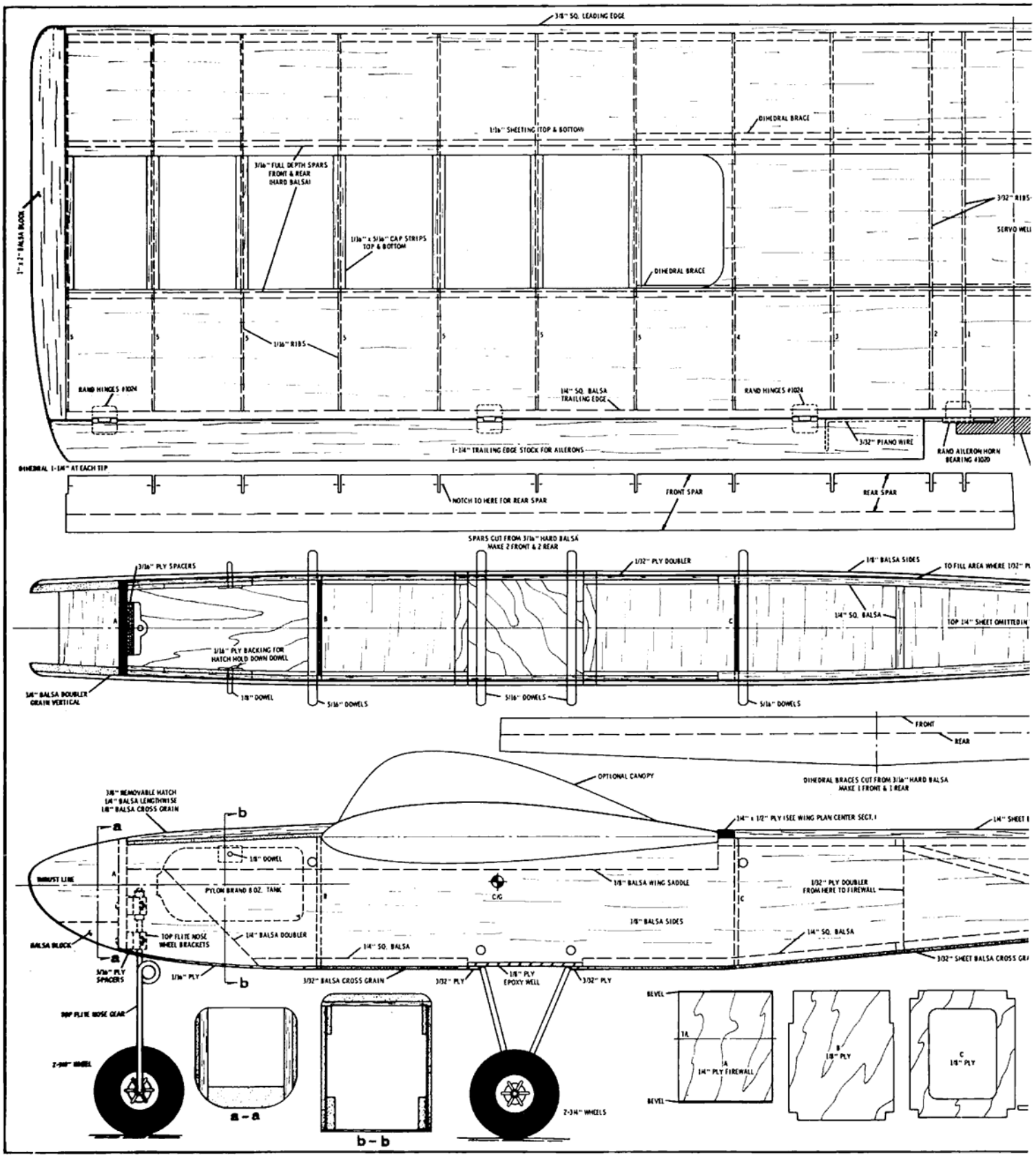
The original Professor has foam wings with balsa sheet covering. The plans show conventional balsa construction since this is the way that the majority of builders construct wings. Either method will be fine. I like to build foam wings since they are so much faster than built up ones, and if you cover with some of the new skin materials such as Marvelite, sheet plastic, or my favorite, cardboard, you can complete a wing in a remarkably short time.

Next month we will go into the problem of flying your first (or perhaps your third, fourth, or even fifth) R/C ship and will pay special attention to taking off, making simple turns, and landing. This month will give you time to get your Professor ready for the air.

Construction:

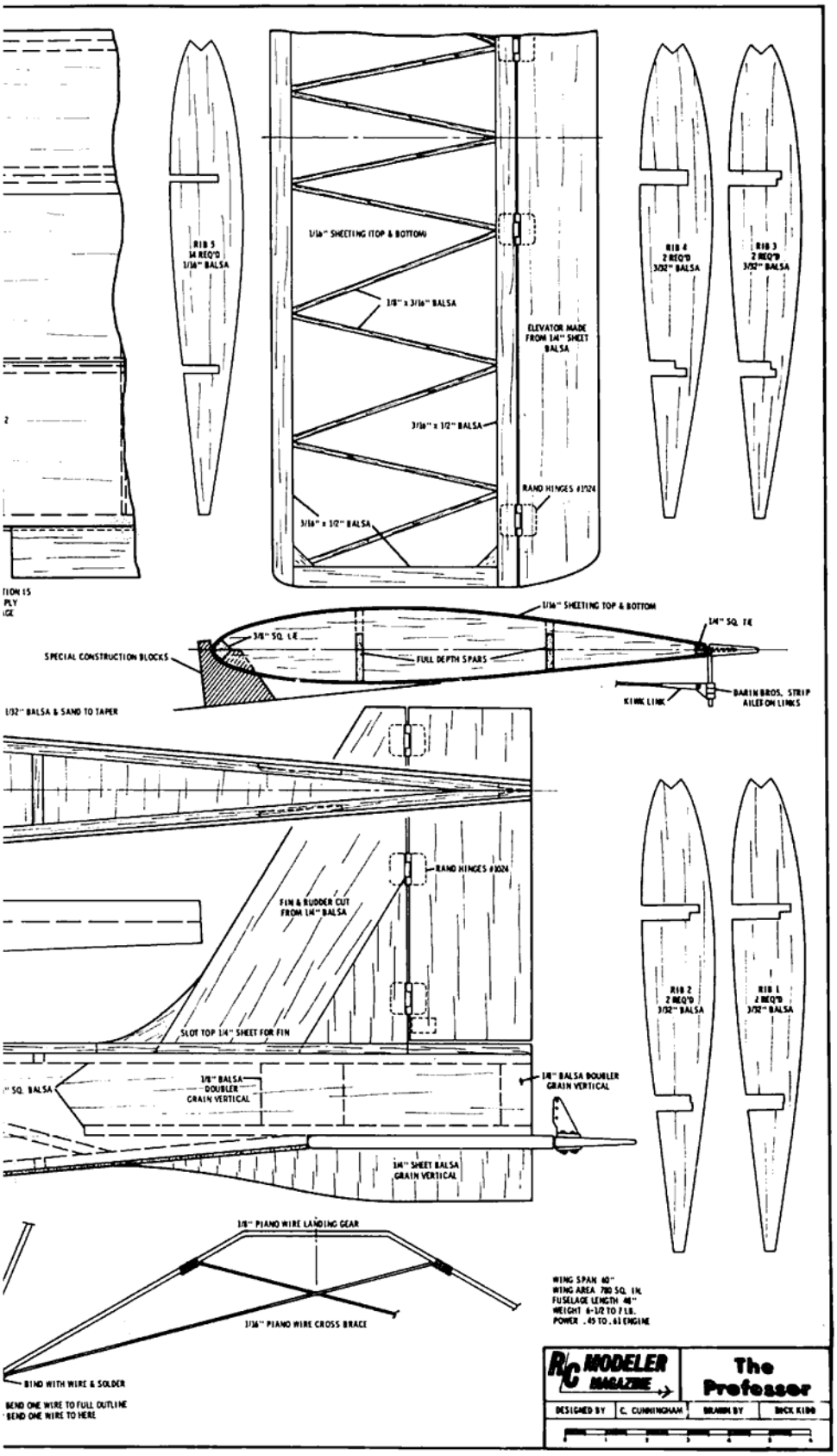
It seems most natural to start construction by building the wing. (If you want a foam wing, and do not cut your own, one of the commercial wing cutters will be happy to furnish you with this type wing.) Cut out all of the wing ribs from either 1/16" or 3/32" sheet balsa. I normally use the 1/16" since this is strong enough and yet much less expensive. Make a template from either cardboard or hard balsa from the master rib shown on the plan, trace around this template with a ball point pen on the sheet balsa, and then cut these ribs out with an X-Acto knife. After all of the ribs are cut out, stack them together, line them up carefully from leading edge to trailing edge, and pin all of the ribs into one neat bundle. Sand this bundle to exact rib outline with medium fine sandpaper. This will insure that all of the ribs are the same airfoil, and that your wing will not have high and low spots.

Next, pin the trailing edge lower sheeting in place over the plans and glue the 1/4" square trailing edge to this. Cut the spars from hard sheet balsa and notch this spar to accept the ribs. Slide the ribs into the slot in the spars, but do not glue them as yet. Lay a glue bead on the bottom of each rib as wide as the trailing edge sheet and up the back side of the rib, then pin the ribs and spars to the trailing edge sheeting. Pin the 3/8" leading edge in place and then block up this leading edge with the special blocks shown on the plans. Pin everything securely in place. The best glue to use in building the wing is a good grade white glue or Titebond glue. Take a small dime store paint brush, dip it into the glue and paint



the adhesive all over each joint between the ribs, the spars, and the leading edge. Don't slop it on, but make sure that you have a good glue joint at each intersection. If you have a large enough building board make both halves at the same time. If you cannot do this, allow the first half to dry at least twenty-four hours prior to removing it from the pinned position. Hurrying this portion of building may induce a warp.

Once you have all of the ribs and spars glued you can apply the top trailing edge sheeting, the top leading edge sheeting and the cap strips and then set the whole thing aside to dry. When unpinning a portion of the wing structure to add sheeting, just unpin that portion of the wing to be sheeted, then pin it back again after the sheet has been placed. Glue all of the sheeting in place with white glue. If you like, you can use contact cement for installing the sheeting. When one half is dry (24 hours) remove it from the building board and either build the other half, or prepare both halves for the dihedral brace. Do not glue on the bottom leading edge sheeting yet. Make the dihedral braces of hard straight grained balsa. Cut away the ribs where the braces go. Do not cut the brace. Put a liberal amount of white glue on the braces and



pin the two wing halves to the braces. Make sure that each half is lined up with the other, and be sure that one wing half does not slant up while the other slants down when viewed along the chord line. It is very important to maintain good alignment at this point since a mistake here will definitely show up when you are flying! When the glue has dried remove all of the pins and install the bottom leading edge sheeting and the wing tip blocks. Rough saw the tip block to shape prior to gluing them onto the wing.

Wrap a 6" wide piece of fiberglass tape or a piece of linen (a piece of material cut from an old bed sheet will do) around the center section and glue in place. If you are using fiberglass use fiberglass resin. Boat resin will be fine. You may buy both the resin and the tape from Montgomery Ward's or Sears at a very nominal price if it is not available at your local hobby shop. If you use a 6" wide band of linen be sure and dope the balsa wood at the center section at least three times before gluing the linen down with white glue. After this is dry, sand lightly and set aside for covering.

The fuselage is very easy to construct, and if you follow the directions closely you will have a very straight structure. Cut each side from good hard $\frac{3}{32}$" balsa and the doubler from $\frac{1}{32}$" plywood. Make sure that you have one right and one left side, and mark them as such so that when you are applying glue you will not get them mixed up. Use a good grade of contact adhesive and cement the doublers to the sides.

Next, take a straight edge and mark a long, straight line down the center of your building board. Make this line longer than the fuselage side. Cut out the fuselage formers A, B, and C, and mark the center line on both sides of each one. Lay out the location of each former at the correct place on the straight line by measuring from the plan, or you can build the fuselage on top of the plans. Pin each former in place on the plans, or on the straight line by putting the top of the former on the line. We are building this fuselage upside down. **Be sure that the firewall is offset to the LEFT when building upside down** (the reverse as shown on the plans) so that when the finished fuselage is rotated to the upright position the aircraft will have right thrust. Use Titebond glue on the sides of formers B and C only and pin the fuselage sides to this. Pin this very securely and add blocks of balsa wood to help hold this in place.

Now, glue in the tail block, made from a piece of trailing edge stock, and bring the rear of the fuselage sides together. Make sure that they join exactly on the line. If they do not, loosen and reglue. Hold them together with clothes pins. Use epoxy glue along the sides of former A (Sig Epoxy glue is the best that I have tried yet) and bring the nose of the ship in place at former A. Pin carefully and then add the extra braces and doublers around the firewall with epoxy glue. Check the sides with a drafting triangle to make sure that everything is straight. Check the alignment one more time. You should be able to look down at eyeball level from the firewall toward the tail and see that the center lines on each former line up with the long line down the middle and with the tail. If not, correct it before it dries. If you take care in this part of construction you will always have a good straight fuselage.

While the fuselage is drying in the inverted position you may go ahead and add all of the bottom sheeting and the plywood at the landing gear location and at the nose. It is a good idea to drill all of the holes in the firewall for the nose gear blocks and the radial mounts. You can use a normal radial mount back plate, or a Tatone mount for an engine support. I like the Tatone mount far better than any other form for installing a radial mounted engine since it eliminates a great amount of vibration.

When all of the fuselage structure is dry, remove it from the board and glue on the

(Continued on Page **22***)*

THE PROFESSOR

(Continued from Page 21)

top ¼" sheet rear cover and the front hatch. (Only tack glue on the hatch for sanding to shape.) Sand both of these to shape and then mark a center line along the top rear portion, and make a ¼" wide cutout to accept the vertical stabilizer.

The vertical stab is made from ¼" sheet balsa as is the rudder. The horizontal stab is built from 1/16" sheet and 3/16" x 3/32" ribs. The elevator is made from ¼" balsa. To build the stab, lay out the frame work on the plans, pin in place, and glue. Use contact cement to glue on the top sheeting, remove from the plans, and glue on the bottom sheeting with contact cement. Set these pieces aside for finishing.

Covering and finishing is something that has consumed at least a million words in the model press, and yet, no two builders ever do it quite alike. Since this is primarily to be an aircraft for the less than expert flier I suggest that you forego the super finish and stick with something simple. You may use either silk, silkspan, MonoKote or Shrink-Tite on the wings, or on the whole ship, for that matter. Whatever method you choose, be sure and seal the area around the nose as much as possible to keep the wood from becoming fuel soaked. If you decide to use silkspan for covering, double cover the wing. Finish doping all surfaces and check all surfaces for warps. Glue the vertical stab and the horizontal stab to the fuselage with epoxy glue. Remove the covering on the stabs where they are joined to the fuselage so that your glue bond is between wood to wood, not wood to a covered and doped surface. Check to see that the alignment of the stab to the fuselage is perfect and that neither is tilted in any way.

Install the radio gear as we indicated last month and make sure that the pushrods are not binding against the fuselage sides. Make sure that there are no metal to metal contacts. Even though many of today's proportional rigs are reasonably immune to noise it is much safer if you eliminate any potential trouble spots.

Build the main gear from music wire, or you can purchase a commercial main gear. If you have trouble in soldering this heavy wire with a soldering gun or iron, the job can be done with a gas kitchen stove (don't let your wife see you) or the gas lighter in the fireplace. Get the joint just hot enough to flow on the solder, but not too hot to make the wire brittle.

With the Professor completed be certain to check the balance point of the finished model (with the tank empty) with the C.G. shown on the plans. If in doubt, balance a little nose heavy rather than a little tail heavy. When flying, make sure that you have plenty of rubber bands to hold down the wing, at least eight large ones on each side. With a wing of this much area it is easy for the wing to lift if not held down tightly enough, and when it does you will have the wildest gyration that you have ever seen! This is common with a shoulder or high wing since the force of a pull out tends to pull the wing away from the body. The reverse is true of a low wing aircraft.

If you have taken care in your construction, and done a reasonably neat paint job, you will have an aircraft ready to fly that will treat you kindly. Next month we'll take up the question of flying and how to do it.

PETE 'N RAND

(Continued from Page 18)

"We'll use a rather high pulse rate to eliminate gallop with that big elevator," he explained. "If trim changes are needed to achieve cruising flight with that setting, we'll do it by adjusting the neutral position of the elevator with the Ny-link." So saying, he nosed the "Hi" throttle button, allowing the Rand to move the throttle to ¾ power for taxiing in the grass. By grasping the control stick firmly in his dewlaps, he steered the little red-and-yellow plane to a corner of the field. A quick nose movement on the "Lo" button gave a purring idle as Wagger and the new airplane both prepared themselves for the coming trial. Then, full throttle and the "Pete 'n' Rand" started down the field."

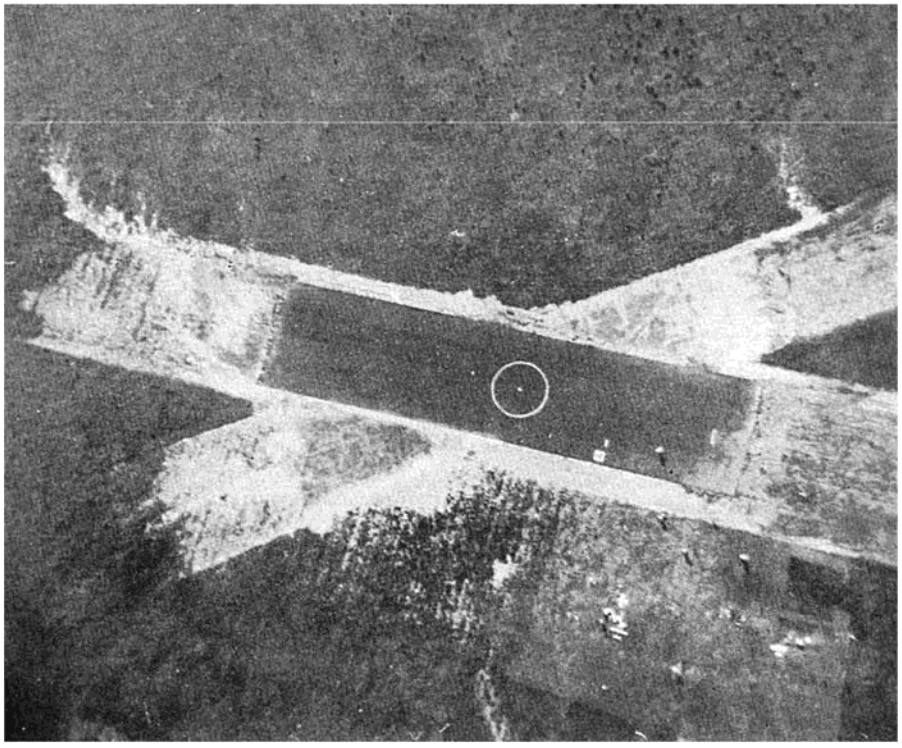
"We'll always use full throttle for best control during take off, Walt!" Wagger yipped loudly. "Forward on the stick as we gain speed to raise the tail, nudging gently with the stick to keep it straight, then back slowly on the stick and WE'RE IN THE AIR! Climb to altitude by circling gently, change to ¾ or ½ throttle and cruise the field. How about that?" he enthused, as the little ship rocked gently by with a purr from what appeared to be a real Model A Ford engine in the front.

"Let me land it," said Walt, snatching the transmitter and changing to idle with one punch of the button. The "Pete 'n' Rand" jumped slightly but recovered and started to sink toward the infield.

Wagger groaned and barked "Use low power to set up an approach to the field, you radio-wrecker! Well, let's see if we can save this one now. Get that nose down to keep up the flying speed so we'll have some control remaining for a nice flare prior to ground contact . . . that's right . . . give us a gentle turn so we approach the field from behind us, and near the ground . . . keep the speed up but don't dive . . . now, as it passes us let it approach the ground and then try to hold it **off** the ground with back-stick as long as possible. That will keep it from crashing too badly. . . ." and just then the little ship touched all 3 wheels to the ground and bounced twice on its Trexlers, then rolled to a stop with engine idling. While Wagger flopped to the ground in disbelief, Walt punched the "Hi" throttle button for ¾ throttle, turned the aircraft around and taxied the bouncing little bird up to the tool box where the ticking prop spun inches away from the lid. With a big grin, Walt bent over it and stopped the prop and then turned to switch off the transmitter.

"Boy, or boy, how's that for multi-realism in a 44" Galloping Ghost aircraft, Wagger old buddy? Wagger? Where are you, boy?" he called, searching to left and right. Sighting the dog's ample hindquarters disappearing down the road toward home, he called: "Where the heck are you headed, Wagger?" but received no reply other than the few grumbled words wafting back on the spring air.

". . . . first time . . . messed-up approach . . . solo flight . . . perfect 3-point landing . . . taxied up to toolbox . . . my genius and his luck . . . phooey. . . ." were the only words Walt could make out as he sighed and bent down to start packing for home.



Actual photo supplied to Air Force Intelligence.

TARGET: NORTHERN VIRGINIA

They say a picture is worth a thousand words . . . here is Air Force Intelligence's report on a single photo provided by the Northern Virginia R/C Club.

SEVERAL members of the Northern Virginia R/C Club are currently serving in Vietnam and, thus, have not seen their club's new blacktop runway since it was put down after they had left the Washington area. In an effort to keep them up to date on this, and other matters, Navy Commander Ernie Green installed a self-winding Kodak Instamatic on a modified Smog Hog and made the attached photo. The photo, in turn, was sent to Bob Scott and Brigadier General Donavon F. Smith, Chief of the Air Force Advisory Group, two of NVRC's absent members.

With tongue in cheek, and with absolutely no explanation, General Smith gave the photo to his Photo Intelligence Officer for interpretation. The results leave no doubt that our Air Force knows its business well. The analyst did not know the camera used was an Instamatic and therefore did not know the focal length of the lens used (a vital statistic in the determination of exact dimensions from photos). In addition, exact altitude was not given, another vital piece of information for the Intelligence Division. Nevertheless, as you can see from the following report the 190 x 45 foot runway has been fairly accurately described, despite these handicaps, and the remainder of the details are accurate in every respect.

CONFIDENTIAL GP-1
IPIR: 6470RTS-IDC SER:GO SPECIAL DAY PHOTO. TOT UNK
CINCPAC CPFL ICOD 5JUN67
PART 1. SIGNIFICANT PHOTO INTERPRETATIONS (VN) B. NEW TARGETS AND SIGNIFICANT CHANGES
ZZZO1: UNIDENTIFIED AIRFIELD — COLLATERAL INTELLIGENCE REPORT
IDENTIFIED LOCATION AS POSSIBLY IN VICINITY OF KONTUM. POSITIVE IDENTIFICATION AS MODEL AIRCRAFT LANDING FIELD. ONE (1) ASPHALT RUNWAY APRX 130 FT BY 30 FT, HEADING APRX NNE SSW, WITH GRADED EARTH OVERRUNS APRX 60 FT BY 37 FT. ONE (1) INTERSECTING GRADED EARTH SECONDARY RUNWAY APRX 235 FT BY 30 FT HEADING APRX NORTH AND SOUTH. ONE (1) SOD PARKING APRON APRX 51 FT BY 84 FT WITH MOBILE REFUELING AND MAINTENANCE CAPABILITIES. THREE (3) UNIDENTIFIED SINGLE ENGINE PROPELLER DRIVEN AIRCRAFT ON PARKING APRON, ONE (1) ACFT with 4.2 FT WINGSPAN, 2.75 FT LENGTH. ONE (1) ACFT WITH 2.75 FT WINGSPAN, 1.3 FT LENGTH. ONE (1) ACFT 3.3 FT WINGSPAN, 2.4 FT LENGTH. TWO (2) UNIDENTIFIED SINGLE ENGINE PROPELLER DRIVE ACFT AIRBORNE, APPARENTLY CIRCLING AIRSTRIP IN COUNTERCLOCKWISE DIRECTION.
AOB: FIVE (5) PROPELLER DRIVEN ACFT
GFW: GROUND CREW/HANDLERS AND TWELVE (12) ADULTS, ONE (1) CHILD; EST FIVE (5) QUART SIZED, HAND PUMPED FUEL CONTAINERS (.00395 METRIC TONS)
CHART: N/A
BEN: 0000-00000 CAT: 80000 CMR: NONE WXR: CLEAR CVG: TOTAL QAL SCL: 000.3M
CLARK E. DAVISON,
LT COL USAF
CHIEF, INTELLIGENCE DEVELOPMENT CENTER

How's that for photo intelligence work? Can *you* find all of the detail they have listed? It's all there.

FROM THE OFFICE OF THE
CHIEF, AIR FORCE ADVISORY GROUP
AFGP-CCH

TO: Bob Scott

THOUGHT YOU AND ERNIE WOULD GET A KICK OUT OF THE P/E'S WORK ON THIS. THEY DIDN'T DO TOO BADLY

DATE:

DONAVON F. SMITH
Brigadier General, USAF
Chief

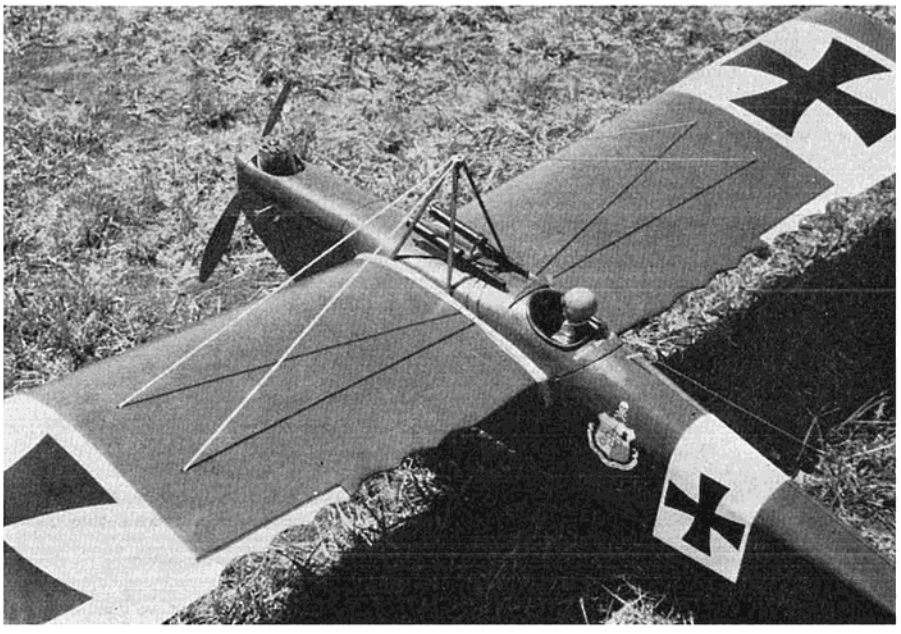
The author with his beautiful WWI type Senior Falcon, dubbed the Falconmeister.

PART I: CREATIVE R/C

THE FALCONMEISTER

Tired of seeing row after row of "look-alikes?" This first in a series of articles on creative modification concerns M. T. Hunsicker's renovation of the popular C.G. Senior Falcon.

Resplendent in red and white finish, the Falconmeister even sports home-made decals.



THE current trend of "buy-today-fly-tomorrow" seems to be robbing the modeler of one of the most rewarding aspects of our hobby: creative thinking, planning, building, and the thrill of seeing the culmination of these in full and graceful flight. It is hoped that this plane will inspire more modelers to add a little of their creative abilities to that next beautiful bird they plan to build.

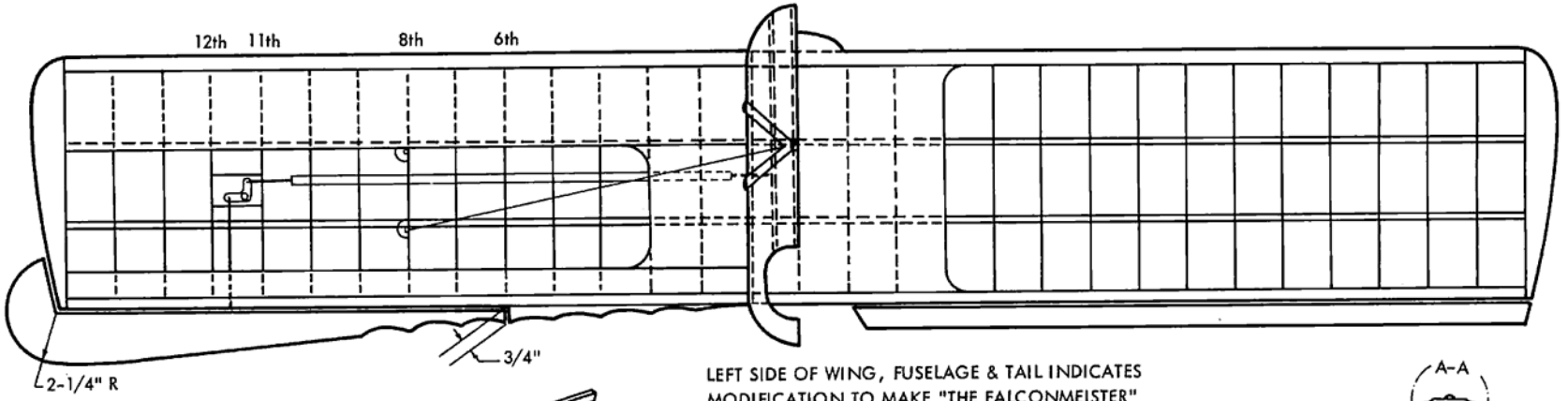
The modification of the Sr. Falcon to the "Falconmeister" is easy and simple, despite the fact that these minor changes completely alter the appearance of this fine plane which so many RC'ers have used for learning to fly. The "Falconmeister" handles well on the ground, is less apt to turn up on its nose in high wind. It takes off with a shorter run and lands at a lower speed, probably because the modification caused a shift of the C.G. about ¾" aft. With an O.S. Max 60 RV up front, I find it will get off on half throttle on rough ground. The original Falcon under the same conditions required full throttle. Another advantage brought about by this modification is a reduction in prop breakage. I have broken only one prop after approximately 60 flights.

In building the "Falconmeister," I retained as much as possible of the original general arrangements, moments, areas, etc. Let's begin with the fuselage. First remove the landing gear, it just doesn't fit a WW I type. Cut a piece of ⅛" plywood ¾" wide and another 1½" wide, both as long as the width of the fuselage where the landing gear is to attach. On the ¾" plywood cement a piece of 3/16" x ⅜" full length on the aft edge. On the second piece cement two pieces of 3/16" x ⅜" maple on the fore and aft edges. (See where the landing gear attaches on the drawing.) These pieces should be cemented to the bottom of the fuselage for locating the landing gear. Directly above the landing gear bearers, drill 5/16" holes in the fuselage, invert and cement two pieces of dowel used for attaching the landing gear. These should extend about ¾" outside each wall of the fuselage.

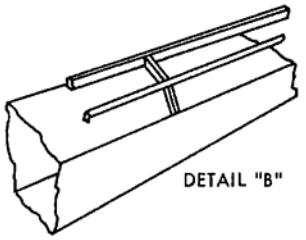
Remove the rudder and elevator, get out the old razor saw and let's start cutting them up. Locate rib S5 of the stabilizer as shown on the drawing. Cut through the leading edge, center spar, and trailing edge on the outboard side of the rib. Save the tip of the stabilizer to glue to rib S5 as a new stabilizer tip. Now cut S5 at the front edge of the center spar and the leading edge at the indicated angle, at the forward end of S4. A new leading edge is made from ¼" x ½" balsa, and cement end in place from the outboard end of the center spar to the angle cut on the leading edge, then to the top edge of the side of the fuselage. The location of the new leading edge at the fuselage should be approximately 11" from the aft end of the fuselage. Balsa should be added to ribs S3 and S2 top and bottom, from the maximum thickness to the leading edge. Sand these rib additions to a smooth contour. Now continue the 1/16" sheeting forward on S2 and fuselage to the leading edge.

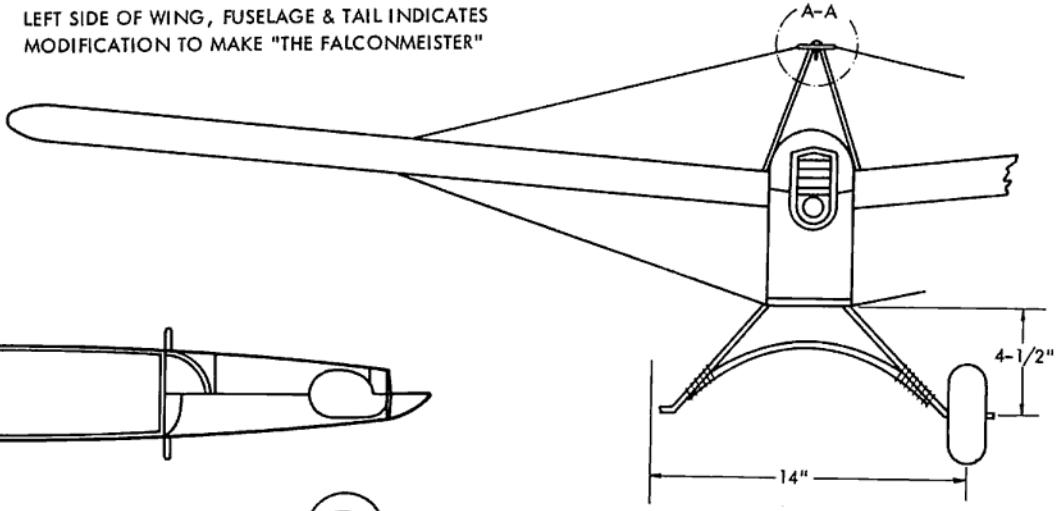
The old elevator should be cut to the proper length for the new stabilizer and additional wood added to it to give it the approximate size and shape as indicated in the drawing.

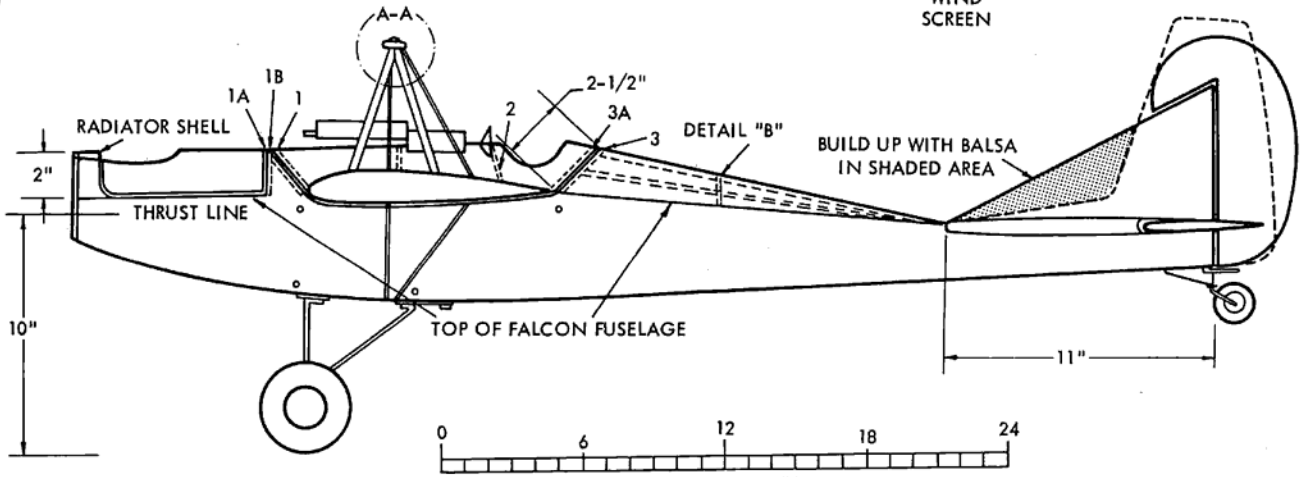
(Continued on Page 26)

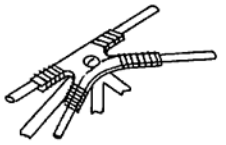


LEFT SIDE OF WING, FUSELAGE & TAIL INDICATES MODIFICATION TO MAKE "THE FALCONMEISTER"



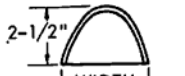






DETAIL A-A

MAKE WEB OF 1/32" PLYWOOD & ATTACH SILVER XACTO LACING W/GLUE & THREAD



DRAWN BY M.T. HUNSICKER
BOWIE CIRCLE HOBBIES
FT. WORTH, TEXAS

THE FALCONMEISTER

(Continued from Page 24)

Measure 5" up on the aft edge of the fin, from the top of the stabilizer. Use a straightedge to draw a line from this point to the foremost edge of the stabilizer. Remove the portion above this line and fill in as indicated on the drawing. Now give the rudder the same type of treatment as the elevator.

The turtle deck is constructed by cutting former #3 from 1/8" or 3/16" sheet balsa, and cementing it to the top of the fuselage at the aft edge of the wing cutout. The shape of this former can be your own but the height should be 2½" as shown on the plans, and should set at the approximate angle indicated. Be sure to allow 3/32" around the contour for the sheet covering which will be added later. Three stringers 1/8" x 1/4", are cemented to the back of this former, one at the top center, and one on each side equally spaced, the other ends are cemented to the top of the fuselage about ½" forward of the leading edge of the stabilizer. The aft ends of these stringers should be tapered at the gluing surface so that the aft end of the turtle deck will be flat and bend into the stabilizer. Now you can take scrap pieces of 1/8" x 1/4" balsa, cut them to size, and cement them between the stringers as shown in detail "B" to form a flase former. Cover the turtle deck with 3/32" sheet balsa.

The nose of the plane should have the appearance of a radiator, so build up the sides with 1/8" sheet balsa about 2" above the old "top of the fuselage line," and about 3/4" fore and aft. Top this off with a cross piece, rounded or roof shaped, and fill in with louvers or honeycomb material to allow for free passage of air for cooling. The radiator shell and former #3 are the control contours for determining the shape of formers #1, 1A, 1B, 2, and 3A.

Cut 2 pieces of 1/8" or 3/32" sheet balsa as long as the width of the formers #1 and 1A. Cement these in place as shown in the drawing. The height of #1 is determined by placing a ruler or other straightedge, from the top center of former #3 to the top center of radiator shell. By moving the straightedge around the edges of former #3 and the radiator shell, and cutting formers #1 and 1A so that there is 3/32" clearance from the straightedge at all points around the edge of #1 and 1A, you will come up with the proper shape and size of these formers. Cover this area with 3/32" sheet balsa.

Cut the ailerons at the sixth rib out from the center of the wing, and remove. Glue additional balsa on the larger portion and shape as indicated on the drawing. Attach the aileron and cement enough balsa to the trailing edge of the wing, between the inboard end of the aileron and the first rib, to form the stationary scallops. In the corners formed by the outboard side of the eighth rib, and the aft edge of the main and rear spar, and cement a length of 5/32" aluminum tubing. The ends of the tube should be flush with the top and bottom surfaces of the wing. Cement a 1/8" half round and quarter round gusset around the ends of the aluminum tube, and sand flush. The sheeted leading and trailing edges are not a part of the "Falconmeister" modification, but was added to my original Falcon for extra strength, because I thought it advisable when using a .60 mill. Move the aileron bellcrank outboard to a location between the 11th and 12th rib. I used "Ny-Rod" nylon tube within a tube pushrod), to connect the servo to the bellcrank in its new location.

Cut two formers #3A and #1B from 1/8" sheet to match formers #3 and #1A, place the wing in it's normal position on the fuselage, and cement formers #1B and #3A to the leading edge and trailing edge of the wing so as to mate with formers #1A and #3. The fuselage width must be maintained all the way across the wing, so cement two pieces of 1/8" x 1/4", laying flat against the wing between the two formers. These will control the width of the fuselage across the top of the wing. When the 3/32" sheeting is applied to this area, the lower edges will be cemented to these 1/8" x 1/4" pieces. Cut a stringer from 1/8" x1/4" and cement to connect formers #1B and #3A at the top center. Make former #2 from 1/8" sheet balsa, cut to the proper length and height, notch it in the top center to fit the 1/8" x 1/4" stringer, and cement in place as shown. Shape the former by straight edging between formers #1B and #3A. Attach two more stringers midway on each side, and make a flase former, the same as shown in detail "B", between formers #1B and #2. Be sure to start at the 1/8" x 1/4" pieces cemented flat to the surface of the wing. Now this over-wing section can be sheeted with 3/32" sheet balsa. Make a tank hatch cover from a block or built up method, with a cut out for your engine. Cut out the cockpit opening and you are ready to silk and dope.

The landing gear is made from two pieces of 1/8" music wire and one piece of 5/32" as shown in the front view. When tread should be about 14" and the distance from the axle to the bottom of the fuselage, 4½". The back brace is bent from 1/8" wire. Bind the latter to the front piece with wire, and solder. Acid core solder, is best for making landing gears, but be sure to apply a mixture of ½ tablespoon of baking soda and one tablespoon of water, to these joints when complete to prevent residual acid from causing severe rusting. Another piece of 1/8" wire should be bent in a curve so that the ends can be attached to the main piece directly above the first solder joints. The top of the curve should be approximately 1" from the bottom of the fuselage. This piece was found to be necessary to prevent excessive spreading of the landing gear on hard landings. Install 3½" to 3¾" wheels and rubber band the gear to the fuselage. Attach your favorite type of steerable tail wheel and we are ready for the finishing touches.

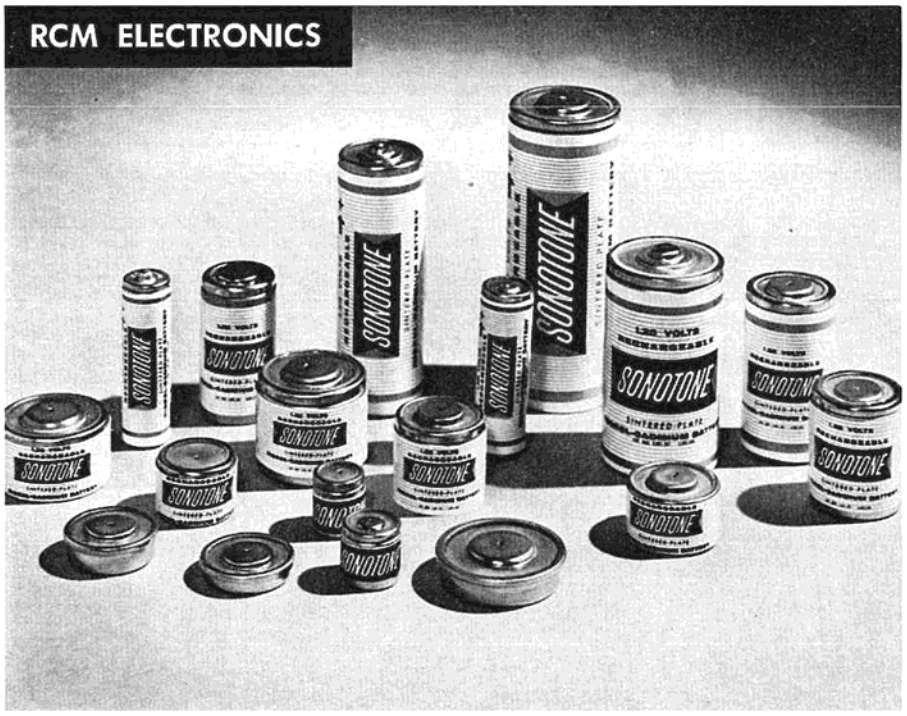
The original model had all movable surface painted white, as well as four square panels near the wing tips, a portion of the fin, and a wide band on the fuselage aft of the cockpit. The remanider of the plane was red. I cut three different size patterns of German crosses from cardboard and traced them onto the white panels, then masked the outline and painted them black. (See the accompanying photos.)

Split some neoprene tubing and attach to the edges of the cockpit opening with contact cement. Cut a wind screen from celluloid and cement in front of the cockpit. This should be flat, or only slightly curved. The machine guns are made from rounded balsa or dowels, and were painted black.

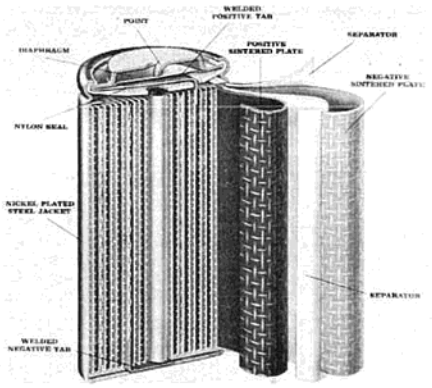
The flying wire brace assembly is made from four pieces of spruce, 1/8" x 1/4" x 5½", sanded to a streamline section and cemented to the wing so that the top will be directly over the front spar. The top of these braces are cementd to a piece of spruce 1/4" x 1/4" x ½" (the ½" dimension laying fore and aft). A hole should be drilled down through this block and a 2-56 blind nut inserted from below. For the flying wire assembly, cut a piece of 1/32" plywood 7/8" x ½" and trim it to the approximate shape as shown in detail "AA," and drill a hole in the center for a 2-56 bolt. Cut two pieces of silver X-acto plastic lacing about 7' long, attach the centers of these to the plywood web with glue and thread, and fasten the web to the top of the flying wire brace assembly with a 2-56 bolt. Push the lacing through the appropriate aluminum tubes in the wing, and pull them under the fuselage as shown in the side view. Cut them to length, the ends extending 3/4" under the fuselage. Fold the ends back ½", and cement and bind with thread, leaving a small eye so that an "S" shaped hook can be attached. The hooks are made from 1/32" piano wire. When flying, all four hooks are bound together under the fuselage with a rubber band. Oddly, these flying wires have never given any vibration problems in flight.

The entire plane should be sprayed with at least one coat of clear dope. I used a 2" scale Williams pilot in the cockpit, and a little piece of white silk tied around his neck for a scarf looks real sharp on a low pass.

Good luck with your brand new "Falconmeister," and I hope you have as much fun with yours as I am still having with mine — but look out for "Snoopy," he may drop out of the sun and be on your tail before you know it.



This is Sonotone's line of commercial sealed, rechargeable nickel-cadmium battery cells, available in a wide range of sizes and in capacities from 150 milli amperes to 6600 milli amperes.



This cutaway view shows the sealed, rechargeable sintered-plate, nickel-cadmium battery cell with its new safety vent. In event of improper use, causing build-up of internal pressures, the cell vents as the diaphragm is pushed against the point, releasing pressure. The venting action does not halt the performance of the cell. The safety vent is a three-part welded unit consisting of cell top, diaphragm and internal positive tab. The strong "thru-weld" construction allows the battery to maintain flat voltage outputs under extremely high current loads.

THE SEALED NICKEL-CADMIUM BATTERY CELL

From a paper by Louis Belove & Robert J. McCarthy

(Reprinted by permission of Sonotone Corporation)

NICKEL-CADMIUM and nickel-iron alkaline batteries first appeared about 1900. Both Thomas Edison in the U. S. and Junger in Europe investigated these systems. Mr. Edison preferred nickel-iron while the nickel-cadmium battery was favored in Europe, chiefly in Sweden about 1910.

During the 60 years of its existence, the nickel-cadmium battery system has undergone continual development. Currently, it is available in two distinct types, the older "pocket" type and the more recent "sintered-plate" type which has been developed since the 1940's, largely by Sonotone Corporation.

The pocket-type cell, produced in the U. S. since about 1946, is one in which the active materials are contained in flat or tubular "pockets" made from perforated steel ribbon. Pockets of the negative plates are filled initially with cadmium salts while pockets of the positive plates are filled with nickel salts, to which is added graphite or flake nickel to increase conductivity. This type of cell is used chiefly for low drain and standby applications.

The sintered-plate type cells, manufactured in this country since 1949, with Sonotone providing the leadership, also uses salts of nickel and cadmium as the positive and negative active materials but differs materially from the "pocket" type in its use of inert, sintered nickel plates of high porosity to contain the active materials. This difference in plate construction gives the sintered-plate cell the advantages of extremely low internal resistance, very high-rate discharge capability, a high-charge retentivity, excellent merchanical strength and good low-temperature performance.

Vented cells of both the pocket and sintered-plate types utilize an excess amount of alkaline electrolyte and contain vents through which evolved gases are released and additional electrolyte may be added as required for proper maintenance.

In a recent development, the sintered-plate cell has been produced in a sealed construction in which no electrolyte vent is provided and a restricted quantity of electrolyte is used. This type of construction reduces maintenance to a minimum by eliminating the need to add electrolyte to the cells.

Construction of Sealed Cell

The sealed sintered-plate cell has five main components — a positive plate, a negative plate, a separator, electrolyte and a container (Fig. 2).

Preparation of positive and negative plates requires the sintering of a fine nickel powder to a woven nickel wire screen. This results in a thin, highly porous nickel plaque. The plaque is then impregnated with nickel salt solutions for the positive plate and cadmium salt solutions for the negative plate.

The separator, a thin absorbent sheet material, mechanically separates the positive plate from the negative plate while holding an electrolyte which permits ions or electrical current to flow between the plates.

The electrolyte used by Sonotone is a 30% aqueous solution of potassium hydroxide.

The usual cell container is a nickel-plated steel can and cover. The cell assembly is made by rolling a positive and a negative plate, separated by an inert, absorbent sheet material, into a tight roll or core. The core is placed into the can. The negative plate tab is welded to the bottom of the can, making the cell case the negative terminal.

The necessary insulators and sealing gaskets are inserted into the open cell case. The cover, which has been welded to the positive tab, is placed in position and the Sonotone cell is sealed after electrolyte is added.

The cell is then charged, discharged and inspected.

Electrical Characteristics

The voltage of a single Sonotone nickel-cadmium cell, regardless of size or shape, is nominally 1.25 volts but a number of other voltage levels other than this may be encountered.

Open Circuit Voltage is the voltage of a cell without a load. At room temperature, this is 1.25 to 1.34 volts, depending on how long the cell has been standing after charge.

Closed Circuit Voltage is the voltage of a cell immediately after a load is applied. The value is dependent on the size of the load and the electrical capacity of the cell. For most practical applications, this is 1.22 to 1.25 volts.

Plateau Voltage is the cell voltage during the relatively flat portion of the discharge curve. This depends on the discharge rate and, in most applications, is about 1.2 volts.

End of Discharge Voltage is the voltage to which a cell is discharged. If you are operating a 6-volt device, you must realize that it has a voltage tolerance. A typical tolerance of a nominal 6.0-volt application could be 4.5 to 7.0 volts. Inasmuch as a 6.0-volt battery would have 5 nickel-cadmium cells, your end voltage would be 4.5 divided by 5, or 0.9 volts per cell.

Charging

The recommended Sonotone procedure is to charge sealed cells at a 14 to 16-hour rate under constant current conditions. Either DC or rectified AC may be used and it is desirable to limit the charge current to a maximum value not to exceed the manufacturer's recommendation. A simple charging circuit is shown in Fig. 3.

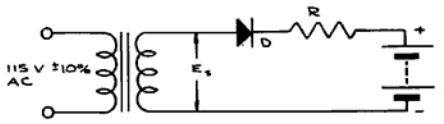


FIG. 3

Minimum Es = 6.4n volts.
Es — RMS supply voltage.
Ic — Charging current at the 14-hour rate.
n — Number of cells in series.

A supply voltage higher than this minimum value may be used if this is convenient and if the consequent increase in power dissipation in the resistor (R) is not objectionable. The value of the series resistance (R) should be adjusted to limit the charging current to the value Ic recommended by the manufacturer.

During charging at the rate shown in Fig. 3, a sealed, sintered-plate, nickel-cadmium cell will have a voltage pattern as shown in Fig. 4.

You will note that shortly after a cell is placed on constant current charge, it has a voltage of 1.40 volts. This voltage can climb as high as 1.45 volts per cell and, in some cases, slightly higher. The average will be about 1.43 volts. The voltage across the cell at the end of the charge, with charge current still flowing through it, is called the "end of charge voltage" and is significant in that a cell is suspect if it does not reflect a voltage somewhat close to that shown on the curve.

Too low a voltage may indicate incomplete charging. Too high a voltage may indicate too high a charge rate or a faulty cell. Experience has indicated that a sealed, sintered-plate, nickel-cadmium cell can be left on charge at a 14-hour charge rate or lower for extremely long periods of time. This is possible because of what is commonly called recombination.

This phenomenon may be explained briefly as follows: During charging, the positive electrode is changed in chemical composition from nickel hydroxide, which the chemist writes as $Ni(OH)_2$, into a different substance, beta-nickel-hydroxy-oxide, B-NiOOH. The charging current brings this conversion about. As long as any nickel hydroxide is present, the conversion can go on, but when the nickel hydroxide is completely converted into hydroxy-oxide, the cell is fully charged and a second reaction begins.

The second reaction corresponds to the over-charging process in that the electrolyte liquid is in turn decomposed, oxygen being generated. This oxygen gas then dissolves in the electrolyte liquid and travels to the negative electrode.

During the normal charging process, the negative electrode has been converted from cadmium hydroxide, $Cd(OH)_2$, to metallic cadmium by the charging current. Now the dissolved oxygen gas encounters the metallic cadmium and promptly reacts with it, forming cadmium hydroxide once again. In other words, during overcharging, oxygen gas is generated at one electrode and promptly used up at the other. As fast as the cadmium hydroxide is produced by this process, the electric charging current converts it back into metallic cadmium.

Since this production of oxygen at one electrode and consumption at the other can keep up indefinitely, such a cell cannot be overcharged, no matter how long the charging current is continued.

To sum up the principle of overcharge, sealed cells can be overcharged for long, possibly indefinite, periods of time if the rate at which gas is recombined is equal to the rate at which it is evolved. Practical experience has shown that this recombination can and does take place if the gas is evolved at a rate equivalent to that of charging the cells at the 10 to 16-hour rate.

Therefore, conservatively, we recommend the 14 to 16-hour rate as the normal and overcharging rate. Ambient temperature must also be considered. We recommend that long-term charging be conducted at a temperature not lower than 50° F. for optimum results.

The overcharging capabilities of the Sonotone sealed cell has been proven by: (1) Laboratory tests in which cells have been on overcharge for more than two years, without failure; (2) commercial experience in which multicell batteries have been exposed to long overcharge and very short periods of discharge for more than three

Sonotone 10-Cell, 12-Volt Disc Cell Package

Here, in a cutaway view, are 10 disc cells stacked to make a compact, rechargeable 12-volt battery. Disc cells can be made up in any number of convenient packages, offering various voltage combinations. The new Sonotone disc cell line is available in three versions: 150 mah, 225 mah and 500 mah. They feature sintered-plate construction for high rate performance, safety vent covers for emergency venting and steady discharge characteristics.

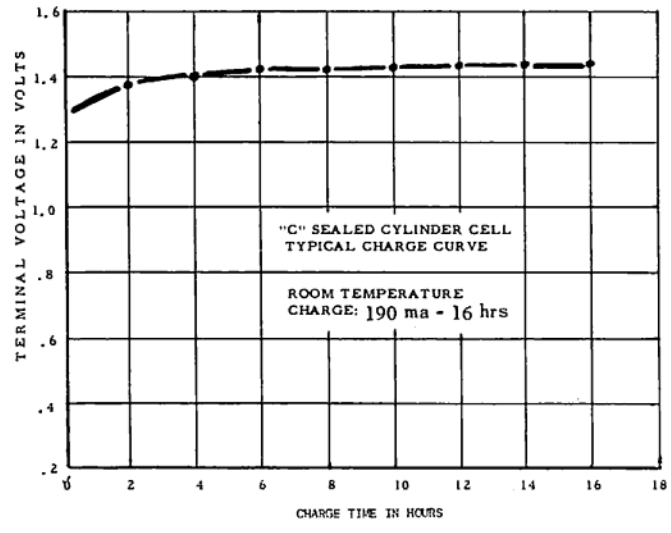
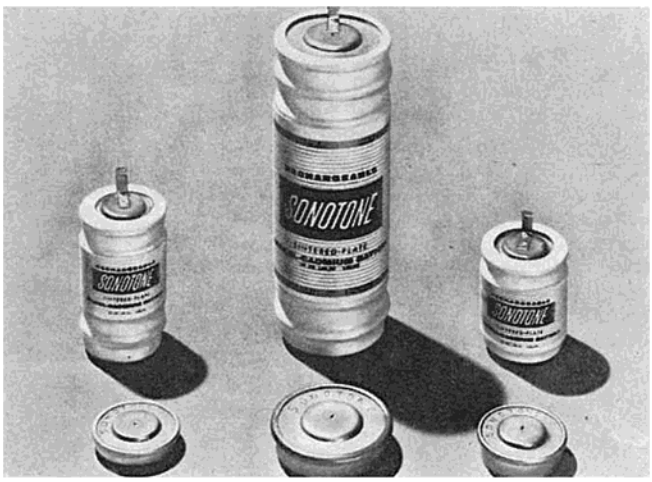


FIG. 4

Sonotone's new rechargeable, nickel-cadmium disc cells feature safety-vent construction, long cycle life, high rates of discharge and complete flexibility in packaging.



years, and (3) satellite operation for about two years in which multicell batteries have performed satisfactorily during extended periods of overcharge over a temperature range of −15° F. to +110° F.

Trickle Charging

As stated, Sonotone cells may be left on charge for long periods of time at the 16-hour rate. Nevertheless, we are often asked to recommend a trickle charge rate. We have found these cells may be trickle charged at a rate equal to 15 milliamperes per ampere hour of cell capacity. For example, a 4-ampere hour "D" cell would be trickle charged at 4 × 15 or 60 milliamperes.

Cells placed on charge at this rate from the beginning of charge will not yield their complete capacity. For optimum results, we have found that if they are charged initially at the 16-hour rate and then placed on a trickle charge, the cells will yield their rated capacity even after long periods of time.

State of Charge

The term "state of charge" refers to the amount of electrochemical energy available in the battery at any particular time. In the familiar lead-acid storage battery, the state of charge can be determined by measuring the density of the electrolyte with a hydrometer. Obviously, the specific gravity of the electrolyte in a sealed cell cannot be measured. Even in the vented cell, specific gravity of the electrolyte cannot be utilized to determine the state of charge. In fact, we know of no practical means for measuring state of charge in either the vented or the sealed nickel-cadmium battery. We can only suggest that where doubt exists as to the state of charge, additional charging be conducted at the 16-hour rate, since overcharging does not affect the battery.

Discharging

Ampere-hour capacity is generally measured to a 1.0 volt-per-cell endpoint and is the product of discharge current and time under load. In many cases, a higher endpoint can be used because most of the capacity in the sintered-plate cell is exhausted at a higher voltage level, usually about 1.15 volts.

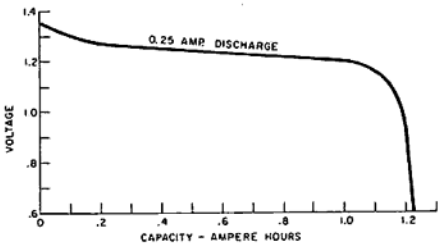


Fig. 5: S-113 cell discharge at 0.25 Amp. rate.

Fig. 5 illustrates this. Note that these cells hold a plateau voltage, at the 1-hour or lower discharge rate, of about 1.2 volts per cell and then drop rather sharply near the end of discharge. This type of discharge differs radically from the standard dry cell, where cell voltage decays almost in a straightline function with time.

Capacity of a Sonotone cell varies with the discharge rate. Figs. 6 and 7 indicate that at a 1-hour rate the cells will yield about 80% of their 5-hour rate, which we consider the standard capacity of the cell. At lower rates, such as the 10 or 20-hour rate, a somewhat higher capacity than that of the 5-hour rate is obtained. As an example, the "D" size sintered-plate cell has a nominal capacity of 4.0 ampere hours at the 5-hour rate of discharge and 3.3 ampere hours at the 1-hour discharge rate. At the 20-hour rate, about 4.2 ampere hours may be obtained.

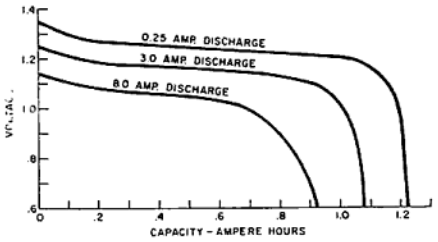


FIG. 6

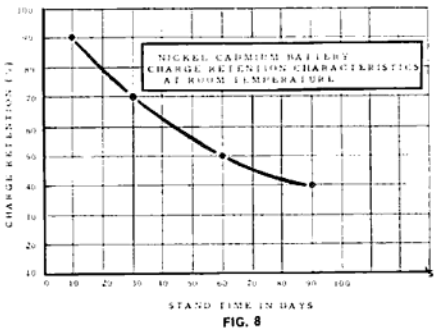


FIG. 8

Fig. 6 also indicates what may be expected in voltage level on any size cell if you change the discharge rate from the 5-hour to the 10-minute rate.

Sealed sintered-plate cells can deliver high pulse discharges in the neighborhood of 10 to 15 times their 5-hour rated capacity. As an example, a "½C" cell with a capacity of 800 ma. hours is used to pulse military equipment at 10 amperes.

Temperature Characteristics

While their discharge performance is affected somewhat at temperature extremes, sealed, sintered-plate, nickel-cadmium cells offer a strong advantage over other battery systems in this respect. At 32° F., the cells will yield approximately 90% of their room temperature capacity while at 125° F. they can be expected to give 70% of their room temperature capacity. The cells can supply useful but reduced capacity over the range of −40° F. to +165° F. Discharge voltage levels will decrease somewhat from those encountered at room temperature as the temperature is either increased or decreased.

Sonotone recommends charging cells at ambient temperatures between 60° and 100° F. for best results. End-of-charge voltages can be expected to be higher (1.55 volts) than those encountered at room temperatures when cells are charged at cold temperatures and can be expected to be lower (1.37 volts) at the upper temperatures.

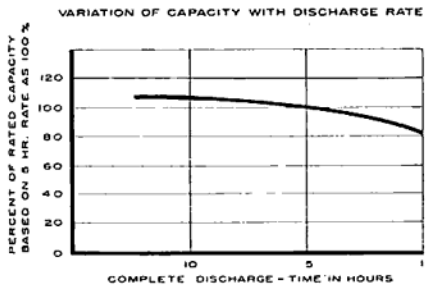
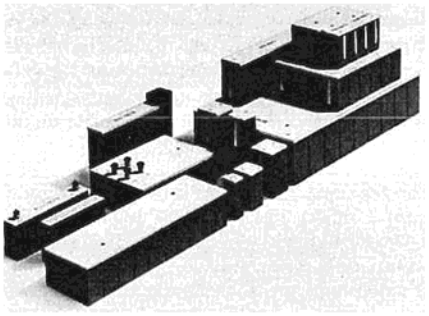


FIG. 7



Like an aerial view of an industrial complex, Sonotone nickel-cadmium module packages appear here in a variety of sizes and shapes. A single rechargeable nickel-cadmium battery cell is housed within a rugged module container. A battery of any size or shape is formed by joining together module blocks.

Internal Impedance

The Sonotone sintered-plate, nickel-cadmium cell will deliver high capacity at the higher rates of discharge because it has an extremely low internal impedance. The low internal impedance is also a strong contributor to the attractive plateau voltage exhibited by these cells. Typical examples of such internal impedance values are: 13 milliohms for the "C" cell, 11 milliohms for the "D" cell and 7 milliohms for the "F" cell.

Charge Retention

The sealed nickel-cadmium cell, like all electrochemical storage devices, loses a percentage of its charge while in storage. The amount of loss is dependent upon the ambient storage temperature — the higher the storage temperature, the faster the cell will lose its charge. Lower storage temperatures will decrease this capacity loss. At room temperature, the cell will retain 70% of its capacity after a 30-day stand and 50% of its capacity after 60 days. Fig. 8 illustrates this. In either case, the loss of charge is of a temporary nature and can be regained on subsequent charging. This is one of the advantages of a rechargeable system over the ordinary dry cell. The loss of shelf life can be prevented by retaining the cells on constant charge of the type described earlier.

Battery Assembly

Most applications involve batteries of a number of cells connected in series. Five cells in series constitutes a 6.0-volt battery. A high quality battery will have cells welded together by means of intercell connector tabs. The terminals may vary depending upon the application. Wire leads, solder lugs, plugs or pressure contacts have been used. The outer packaging of the battery will depend on the intended use and will vary from a simple mylar jacket to a metal enclosure with cells potted in.

New, Fast, Rugged Battery Packaging

This is Sonotone's battery module packaging concept, shown here, limited only by

(Continued on Page 30)

NICKEL CADMIUM BATTERY

(Continued from Page 29)

necessity and imagination. Here is one of the fastest, neatest and most convenient methods of packaging rechargeable nickel-cadmium sealed cells. Packaging lead time is just about zero . . . module units can be pulled from the shelf. Each module block contains a single battery cell. A series of blocks are joined together to form any size battery . . . physically and electrically. This battery package is ideal for large production requirements as well as for prototype designs.

Battery Performance

The performance of a battery is the same as that of a single cell except that the total voltage will be the sum of the voltages of individual cells in series.

Charging

We recommend that cells be connected in series for charging. When cells are charged in parallel, differences in internal impedance will cause different amounts of current to pass through the individual arms of the circuit, resulting in an unbalanced charge. This may result in one string being undercharged and another string being charged at a rate in excess of the manufacturer's recommendation.

Note that all references have been to constant current charging. We consider this to be the best method of charging multicell batteries. We do not recommend charging multicell batteries with constant potential, since experience has shown that sealed rechargeable cells of every type tend, under certain conditions, to exhibit a phenomenon known as "thermal runaway." This condition is characterized by a charge current, which falls rapidly near the beginning of charge approaching zero current asymptotically and suddenly increases in magnitude to a point where it far exceeds the safe charging rate and leads to eventual destruction of the battery. This is the result of internal overheating which lowers the EMF of a cell and, in turn, causes more current to flow in the circuit.

Discharging

As previously stated, the discharge performance of a battery is the same as that of a cell except that the battery voltage will be the sum of the individual cells in the series circuit. However, there is a phenomenon which may occur during discharge. This is known as "cell reversal" and it may seriously affect the performance of the battery.

Reverse charging of a cell can happen during the discharge of a series string although without outward indication. Individual cells do not have identical capacities. The cell in a series string that has the least capacity will most certainly dissipate all of its energy before the other cells.

Consider the case of a 25-volt battery consisting of 20 cells. The normal discharge voltage level of this battery would be 24.0 volts. The end of discharge would be 20.0 volts. We would normally assume any voltage between these two to be satisfactory. If one of the cells dissipates its energy and is down to 0 volts, it is possible that the other 19 cells will still have a total voltage of 22.8 volts, which would appear satisfactory.

However, this one cell is now being driven into reverse polarity and is, in effect, actually on reverse charge. In the case of a 5-cell, 6.25-volt battery, the loss of one cell is immediately apparent, since the battery voltage will drop to 4.8 volts, which is below the normal 5.0 volt endpoint. Thus it can be seen that the greater the number of cells in a series string, the more difficult it becomes to distinguish a difference in performance due to the loss of the contributing voltage of a single cell.

Reverse charging of a cell, if driven far enough, could cause permanent damage. However, a certain amount of protection against reversal is built into the cell and short reversals do not seem to have any deleterious effect. The effect of cell reversal during discharge of a series string depends upon the number of times it is done, as well as the number of cells in series and the length of time on reverse charge.

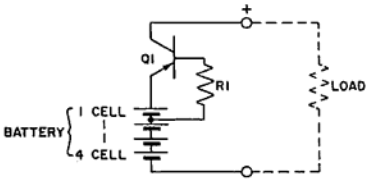
Actually, the situation is not as bad as it may appear. Generally speaking, the cells are fairly well balanced in production batteries and deep cell reversal is uncommon. However, for further protection, there are several techniques that can be used to avoid this difficulty:

(1) Stopping a battery discharge at an endpoint voltage of 1.1 volts per cell, or 5.5 volts for a 6.25-volt, 5-cell battery, would prevent cell reversal, especially in a short series string battery up to about 10 cells. This shutoff could be arranged by either automatic or manual means and would be effective in prolonging battery life with only a small (10%) loss in capacity per cycle resulting from the higher endpoint voltage.

(2) Sonotone has developed a patented circuit that will effectively prevent a battery from being overdischarged and causing a cell reversal. The system utilizes a single transistor and base bias resistor. Only one transistor is required for each multi-cell battery.

The transistor is placed on the cell with the known lowest capacity in the series string.

A simple circuit of anti-reversal is as follows:



Q1 - PNP - TYPE GERMANIUM POWER TRANSISTOR
R1 - BIAS RESISTOR

Cycle Life

Laboratory and field experience has indicated that long cycle life can be expected from the Sonotone battery system. However, the cycle life of a sealed nickel-cadmium battery is dependent upon the conditions under which it is used. A battery should not be charged at rates in excess of the manufacturer's recommendation. A battery should not be charged in deep reverse and it should not be overcharged for long periods of time at high temperatures (above 125° F.).

An example of the system's long cycle life capability is the successful operation of Sonotone sealed nickel-cadmium batteries aboard the Tiros, Transit, Greb and Lofti series of satellites, which have thus far been cycled upwards of 7,000 times. Batteries have also been performing satisfactorily in commercial service for over three years.

Environmental Conditions

Properly designed, sealed cells are capable of meeting the most rigid vibration, shock and acceleration tests. As proof of this, we point to the sealed, sintered-plate, nickel-cadmium cells now flying aboard satellites.

The knowledge gained in development of these cells has been applied to our commercial variety of sealed cells and thus the latter are now capable of meeting almost any of the environmental conditions encountered in most applications.

Briefly, sealed cells are successfully meeting test requirements such as 15 g's to 100 g's constant acceleration, 5 to 3000 Hz vibration under a constant acceleration of 20 g's, random vibration (in each of three mutually perpendicular planes) of 20 to 2000 Hz and shock pulses of 125 g's in two of the major axis.

Individual cells have been designed to operate successfully under the above conditions. If multicell batteries are to be subjected to severe environments they, too, must be designed and built accordingly.

Applications of Nickel-Cadmium Cells

A number of questions must be answered before you can properly specify the nickel-cadmium battery that you need.

What is the battery voltage and voltage tolerance in your application? You should make sure that the closed circuit working voltage is within the voltage tolerance of the device with which it is being used. The closed circuit battery voltage in most cases is generally figured to be 1.25 volts times the number of cells in series.

You must also keep in mind the end of discharge voltage, which is generally in the region of 1.0 volts per cell. In the case of a 12-volt application, the battery would consist of 10 cells having a closed circuit voltage of $1.25 \times 10 = 12.5$ volts. The end of discharge voltage would be 1.0×10 cells $= 10$ volts.

What size Sonotone cell should you use? This depends upon the capacity you require, weight limitations and the space available.

The capacity requirements are determined by multiplying the average current drain by the hours of operation desired. A safety factor should be applied to capacity because the published capacities are generally average values (See Table 1). Any given cell can vary as much as +15% from this average value. A large variety of cells in capacities ranging from 20 milliampere hours to 6 ampere hours (at the 5-hour rate) are available and can be packaged into battery assemblies.

Table 1 gives an idea of the weight and size of each of the most popular sealed nickel-cadmium cells. The weight and dimensions of the battery container should also be included in your calculation. As a rule of thumb, you can consider that this type of cell will give 0.7 ampere hours per ounce of weight and 1.3 ampere hours per cubic inch of volume. Note that this is on a single cell basis and the round configuration of the cells should be considered in your calculation.

(Continued on Page 32)

PRECISION PATTERN AIRCRAFT DESIGN

part IX

A study in Class III Aerodynamics by

JACK CAPEHART
BEN HERMAN

AS we promised (or threatened) last time, we'd like to go into what we consider to be the optimum wing placement; namely, the mid-wing. We should point out that we are not the first ones to "push" the mid-wing, as several prior model construction articles have, at least briefly, mentioned the theoretical advantages of this configuration, although few, if any, actual designs have been published. One reason, we feel, for this apparent lack of mid-wing designs is that, although it may be optimum aerodynamically, it certainly is not from an equipment installation point of view. However, we have designed and built several of these types (we are still experimenting with them) and feel that we have evolved a satisfactory method, both for construction and installation. More about this will be said later, however.

Let's take a look at what we consider to be the advantages of the midwing. First, the center of drag will very nearly lie on the thrust line. This means that there will be little or no pitching torque which is normally present with high or low wingers which have the center of drag a relatively large distance above or below the thrust line. While this effect may not be too important for the old clunkers of yesteryear, and even some of the clunkers of today, at the speeds we are advocating (but unable to attain) the effect is quite important. While it is true that we can always trim a plane out to fly straight and level at any given speed, with speed changes, the plane will no longer be in trim. By locating the wing on the thrust line we have at least partially eliminated one of the contributing factors. Some of you doubters may think we are picking on insignificant points here, but with current levels of pattern flying, it is these seemingly insignificant factors which make the final spread of points. The idea here is to take as much of the burden off of the pilot as possible. Try this with your brand X plane next time. Trim it out for straight and level flight at normal cruising speed (that is, with the engine screaming as fast as possible). Now throttle back as if getting ready for your downwind leg of your landing. Our bet is that, if you're flying a low winger, the plane will initially climb. But the good book says on our downwind leg, no gain of altitude is permissible. Result. If you've got good judges you've lost some points, and strictly because of aerodynamics. The mid-wing will certainly help to eliminate this problem, although it is not the complete solution.

Second, there is less drag at the wing-fuselage junction with mid-wings as opposed to low or high wings. Sorry about that Hal, but our understanding is that repeated wind tunnel tests have shown this to be true. This fact has been utilized in the design of high performance sailplanes which are generally of the mid or shoulder wing configuration. Of course, less drag means greater speed which means better pattern performance for a number of reasons which we have previously mentioned. We noted with interest that, at the recent Buffalo Bisons R/C meet, Hal and some of his buddies clocked the speed on various multi's and concluded that the faster ones were generally better pattern performers. While on the subject, we have pointed out the advantages of a fast plane, but how about the disadvantages? We have a new flying site for the TRCC Club which has a rather limited length of runway. Instead of just fences around it, we have fences plus cactus. We could add nothing to Phil Kraft's description of landing a fast airplane in his article on the Go-Go Fli, except perhaps a description of how to remove cactus from your airplane and body (jumping cactus, no less)!

Third, and perhaps the most obvious advantage of the mid-wing, is that the plane is more nearly the same inverted as upright. If we eliminated dihedral and replaced it with, would you believe, sweepback, we would really go a long ways towards achieving true symmetry. The advantages of symmetry are obvious and have been pointed out previously by us and many others.

Well, so far, what do we have? We have seen the advantages of a 60% tapered wing, mid-wing configuration, no dihedral but instead, sweepback. What about airfoils? Lots of words have been written and spoken on this subject and we won't attempt to improve upon it. All we can say is that, at least until someone develops a better semi-symmetrical section, we'll stick with the full symmetrical. While most of our pattern may well require upright flight, we are still stuck with having to fly at least part of it inverted. We feel that the advantages of the symmetrical section in inverted flight far outweigh its small disadvantages as compared to the semi-symmetrical section, while upright. Further, as we have already pointed out, there appears to be no advantage in going to sections of greater than 15%. One other thing we may point out here is that, when employing symmetrical sections, we avoid the center of pressure movement with changes in angle of attack which accompanies the semi-symmetrical sections. This is a distinct advantage for swept wing designs, as forward travel of the center of pressure would aggravate tip stalling tendencies. Perhaps this is one of the reasons we have not experienced this problem with our experimental designs, as all of our wings have been fully symmetrical.

Let's continue here for a moment, to discuss further one of our favorite subjects, namely, sweepback. We find due warnings from some modelers concerning landing procedure of swept wing designs. For example, Jack Butler, in describing his Vertigo, warned to never, but never, turn the model when close to the ground! As we have already pointed out, theoretically the stabilizing effect of sweepback increases with angle of attack, an advantage not enjoyed by dihedral (this is true up to the stall point, of course). However, in common with dihedral, sweepback will convert a flat, yaw turn into a rolling turn in the same direction. This, of course, is disastrous close to the ground. The best advice here is to make all your "down low" turns with a swept wing in a normal banked attitude and the plane will exhibit at least normal stability characteristics. If you put it into a yaw turn down low, you're on your own. We may add however, that once lined up for the final approach, they are solid as a rock, having more stability and being less affected by side gusts than the normal dihedraled plane. Therefore, sharp

(Continued on Page 32)

PRECISION PATTERN DESIGN

(Continued from Page 31

turns on the final should rarely, if ever, be required.

Let's dwell briefly on the subject of wing loading now. Almost all present day Class III pattern ships will fall somewhere in the range of 17 ozs. per square foot to 25 ozs. per square foot. If you have one on the light limit of this, you have found building secrets which we're not aware of, while if on the heavy extreme, you've probably been peeking in on us during a building session! Actually, much has been written, by us and others, about the benefits of a light plane. We're in complete agreement with this, if, and this is a big if, one always had calm flying conditions. In gusty, turbulent conditions there are definite advantages for the heavier aircraft, presuming the additional weight has created greater moments of inertia about the CG. For with greater moments of inertia (if we can remember our basic formulas without repeating them here), we have greater resistance to any forces having moments about the CG. This, translated, means less susceptibility to trim upset. We might note here that simply loading at the CG to increase the weight will not accomplish the same results, as weight at the CG has no moment of inertia about the CG. However, weight at or near the CG does give the plane greater "resistance" to linear momentum changes. Thus, the heavier plane, while taking longer to gain speed, will also tend to lose speed at a slower rate. For example, we have compared a heavier than normal and a lighter than normal El Gringo. While the heavier one required a dive to gain speed prior to entry into most maneuvers, once that speed had built up it tended to persist through the entire maneuver. In fact, it would go through the 3 consecutive rolls with no noticeable slowing down, a characteristic, unfortunately, not true of the present, lighter version.

So we have taken both sides of the fence. Where do we stand? We feel that with a swept-wing with little or better yet, no dihedral, a lighter wing loading is preferable since, with lack of dihedral, it will be less sensitive to side gusts anyway, and the lighter loading has definite advantages in landing characteristics of this configuration, as previously noted. For the more standard dihedraled aircraft, we probably prefer a compromise loading of 20 to 22 ozs. per square foot, at least for average conditions if these ever exist.

Turning now to power loading, we're of the school, if you haven't already guessed, that the more, the better, at least as far as aerobatics are concerned. For the current, .60 powered bombs, our average power loading is in the neighborhood of 7 lbs. per horsepower. There are many who believe that this loading is ridiculously high and that we are flying way out of proportion to true scale. If you are comparing our planes to a Piper Cub this is true. But how many of you guys who are in favor of the .61 engine size limitation have noted the power loading figures of some present, full scale competition aerobatic planes. The current world champion YAK 18-PM has a 300 hp engine lugging its 2000 pounds around the sky. This figures to a power loading of 6.7 lbs. per hp, slightly more potent than our current average. We'll venture a prediction and say that the above figure will become even more impressive within the next few years. We'll also predict that if the .61 rule stays in effect, the manufacturer who develops the most powerful .61 will sell the most. It'll be as simple as that. Of course, this "engine of the month" trend has already been in evidence for the past 2 years or so.

We have already covered our ideas on vertical fins and rudders. To re-iterate briefly, we feel that both should be made somewhat larger than the current designs sport. Also, an effort should be made, when laying out the fuselage, to get as much of the fin and rudder below the thrust line as possible in order to minimize torque effects, and also to help track in inside loops when the high portion is partially blanketed.

In a previous issue, we had discussed the subjects of moments in considerable detail. The question now arises as to what we want — long or short moment arms. As a general rule, the plane with long moment arms will have greater moments of inertia about the pitch axis. This, if you will remember, will lead to smoother, but slower pitch response. Also, it has been our experience that these planes track inside and outside loops much better. This, we feel, is due to the greater damping effect provided by the stabilizer, thus preventing rapid pitch changes which can lead to high speed stalls, particularly at the bottom of outside loops. Of course, this same effect can be had by increasing the stab area on the plane with shorter moments. This was done on a Beachcomber and the outside loop problem was promptly and completely corrected. As far as the nose moment is concerned, we are stuck with building it so that the plane balances at the proper point with the given tail arm. There are 2 ways to do this. For the long tail arm, we must increase the length of the nose arm, or make it heavier. We might note here, that the longer the nose moment, the more effective will engine offset be. This is due to the fact that the component of force to the right and/or down (with right thrust and/or down thrust) has a longer moment arm about the CG with the longer nose arm configurations. This means that less engine offset is required for the same effectiveness with a long nose moment.

Next time we'll sketch some of the various configurations that we have been experimenting with, or in some cases, just dreaming about. With the sketches we'll give some of the reasoning which we have used in arriving at the particular configuration.

NICKEL-CADMIUM CELLS

(Continued from Page 30

As far as charging the batteries are concerned, we refer you to the information presented previously under cells and batteries. Fig. 3 illustrates a simple charging circuit. This can use either half wave rectification as shown or, if desired, full wave rectification by adding a second diode. We again repeat that we recommend constant current charging at the 14 to 16-hour rate and that cells may be left on charge safely for long periods of time.

These questions are often asked — What should we do with a battery which has been stored for a long period of time? Should the battery be discharged to 0.0 volts before being charged up again?

Actually, what is being asked is: What is the best procedure for storing a battery? The answer is to keep the battery on either a 14-hour charge rate or on trickle charge. On the other hand, for a battery that has been stored for a long period of time without charge, the best procedure appears to be to discharge it as individual cells, if possible, down to 0.0 volts and then recharge it as a battery. This technique may tend to "equalize" the cells and also prevent "reversal" and possible damage to any single cell in the battery.

As far as the use of DC or rectified AC is concerned for charging a battery after long storage, we do not believe one method is better than the other either in this case or in normal charging of a battery.

Cole Palen, Curator of Old Rhinebeck 1918 Aerodrome poses with Lou Perretti's Fokker DRI and Bill Underkofler's Sopwith Tripe.

RCM visits the

1st World War I R/C Aircraft Jamboree

Held at Rhinebeck 1918 Aerodrome, the 1st WWI meet is limited to 1918 or earlier scale aircraft, with prizes made from vintage aircraft instruments!

ALTHOUGH World War I has passed into history, and Rhinebeck Aerodrome is located in New York State, the scene could well have been somewhere in France or Germany in early 1918. In the air, the Aces of WWI lived again at the controls of their infamous flying machines.

The occasion was the WWI R/C Jamboree sponsored by the IBM R/C club. Entries were limited to scale ships of 1918 or earlier vintage. Twenty three ships appeared, with seventeen actually flying in competition.

The events consisted of Scale, WWI maneuvers, balloon burst-spot landing, and mock combat — a list well in tune with the type of ships required, as well as being quite impressive from the spectators' viewpoint. A loud hand from the spectators was not unusual after a good flight — something we have rarely witnessed.

Dick Allen, CD of the event, had been told before hand that only one balloon would be required for an entire day of balloon bursting. Imagine the surprise as Jim Hoover scored a direct hit with his Halberstadt on the **first** pass. Later, Nick Ziroli almost turned his Moraine Saulnier inside out attempting to burst his balloon, but had to settle for snagging a line and carrying the bobbing red balloon, into the blue, slung across the Moraine's back.

Vince Al Gozino with Fokker DVII. Kraft propo, Enya .60.

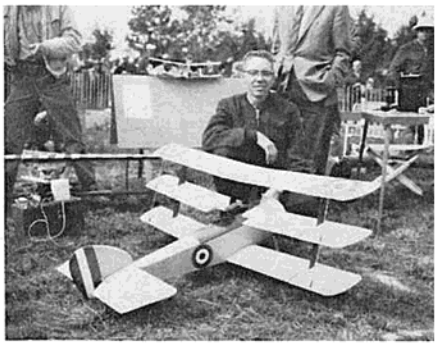
Joe Tschirgi with Fokker EV. Bonner 4RS, S.T. .61.

The mock combat was a team effort, attemping to present a dramatic and realistic show, a real crowd pleaser! As the planes attacked each other, Cole Palen, owner of the Rhinebeck Aerodrome, added to the realism by firing explosive charges into the midst of the ships. These guys were really living, and the attitude of the flier's was one of fun as well as competition.

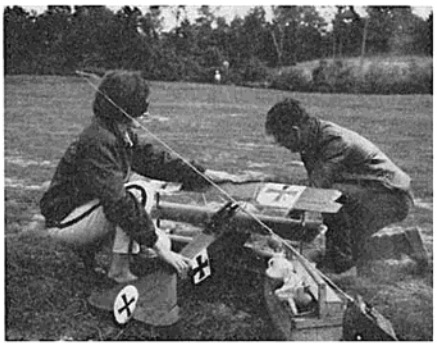
Unique trophies were awarded the winners. These were made using antique aircraft instruments donated by Cole Palen, a real prize.

On the second day of the affair, we were treated to a full scale show. Again it was WWI in the skies above Rhinebeck, as we watched Cole Palen's Fokker DRI Triplane lift into the air in search of that funny looking dog with the big black nose. Dick King's Sopwith Pup rose to the challenge, and a fun filled chase ensued. Cole's Fokker D VII also flew for the crowd. This is livin'.

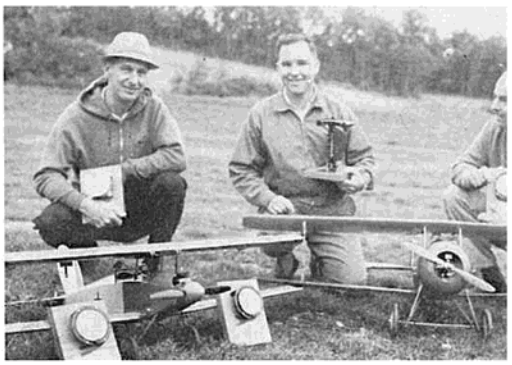
In all, everyone had a great time, and it was obvious that next year would see an even greater event, as WWI scale grows even more popular.



Bill Underkofler and S.T. .60 powered Sopwith Tripe.



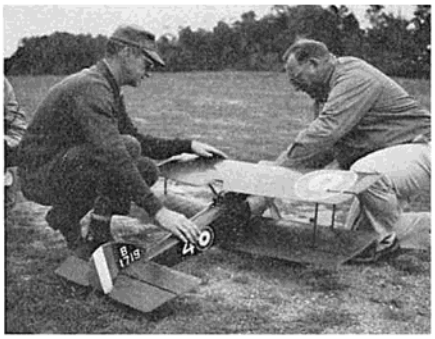
Lou Perretti and Fokker DRI. S.T. .60, Logictrol.



The winners, L to R: Jim Hoover, Bob Noll, Hale Wallace.

Vern Krehbiel of VK Models with Nieuport 27. Logictrol, Merco .61.

Ralph Jackson with Fokker DVII. ACL propo, S.T. .60.



A beautiful Sopwith Pup.

Nick Ziroli with Merco .61 powered SE5. Logictrol.

Jim Hoover with Halberstadt CL-2, K&B .45.

Nick Ziroli with Moraine Saulnier, Merco .35 R/C.

Hale Wallace with Fox .59 powered Bristol Bullet: Dee Bee.

Bob Noll with Nieuport 27, S.T. 60. Orbit. 1st Place, Scale.

JERRY KLEINBURG

1968 — ITS PROMISE

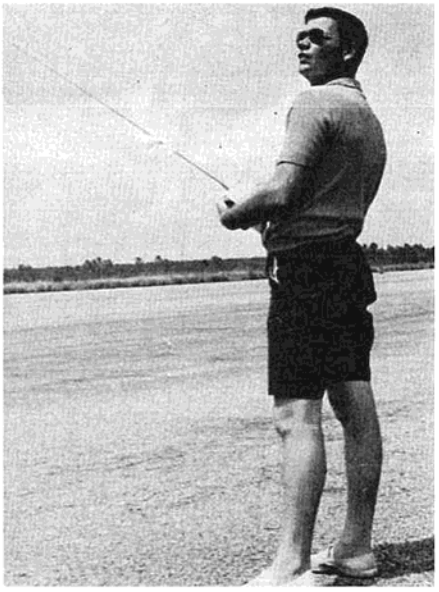
MC DONNELL, Memphis, Grand Rapids, Kalamazoo, St. Louis, Jacksonville, Wallops Station, Hastings, Baton Rouge, West Point, Madera, Clarksdale . . . these were just a few of the names that flooded in as the R/C contest season reached its peak. As anticipated, 1967 saw outstanding contests in almost every section of the country. Being an Internats year, there was also Ajaccio in Corsica during 1967 to give the past 12 months a full R/C flavor. Significantly, R/C'ers also provided outstanding shows at a dozen or more Air Force bases where their performances and R/C's varied potential gained wide notice during 1967.

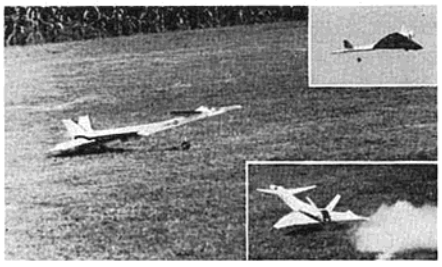
As the season went on, record after record fell as propo gear conclusively proved its worth and brought more and more planes into the air — and kept them there! Aided by better contest organization—such as the dual-site Nats — even the new 72-75 mc frequencies (despite initial fearful pronouncements) succumbed to the searching technology of radio equipment manufacturers and gave significant service in the field. As radio gear developments stabilized, attention shifted to other equipment needs and planes blossomed to new sophistication levels with front and rear rotor engines, better carburetors, fancy pushrods, retracting gears, and a host of hardware gimcracks as well as widely accepted electric fuel pumps. This is by no means a full list, but whatever struck the R/C world's fancy was asked for in amounts that taxed the ability of the distribution community whose warehouses were also increasing their capacity to match the record trade. Here, too, computers were introduced as business rates indicated feasibility of their use. All in all, 1967 very well lived up to its promise. . . .

And looking into 1968, nothing is seen on the horizon to warrant anything but optimism. Optimism for the business world as products grow in utility and attractiveness to a widening circle of customers; for AMA as its added membership continues to reflect the new growth in R/C's ranks and a maturing understanding of the Academy's role in making the hobby/sport useful; and finally, for the fliers, who while enjoying their current advantages, will continue their demands for more and better equipment and facilities.

While giving pause to the thoughts, here's a collection of pictures and contest results that kaleidoscopes 1967's happy moments R/C'ers created and enjoyed. . . .

Above: "Doc" Woodall of Thomaston, Ga., maker of dandy twin mills, helps Walt Schoonard during 1967 Rebel Rally pattern workout. Right: Tom Drake guides a vortex tipped Thunderstormer to 2nd place in Jacksonville's Class IIIE, took 1st at Sebring.

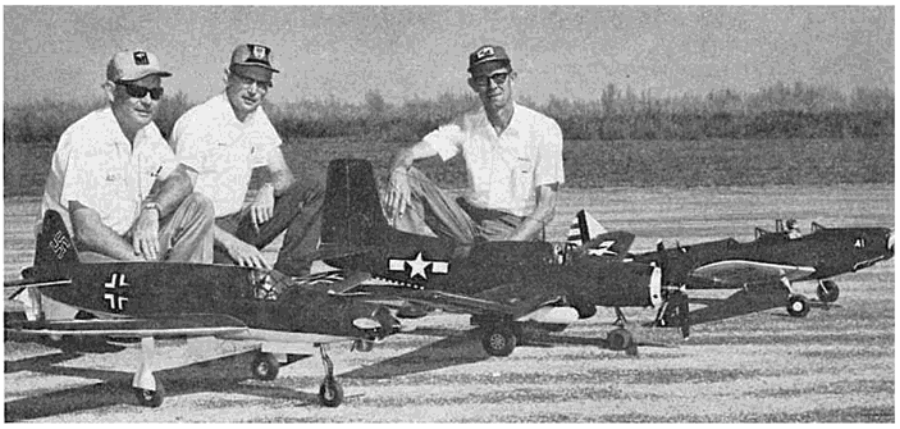




Left: Earl Witt's XB-70 Praying Mantis showed flying form at Scott AFB open house. In lower right pic lime dust gives afterburner effect as the RCM replica crosses landing spot boundary line.

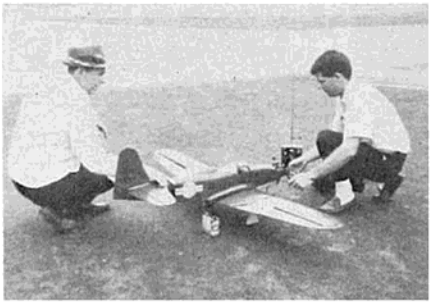
Above: Centerville Cadets, helped by McDonnell R/C Club, Spirits of St. Louis, the Signal Chasers, and the Campus R/C Club helped Scott AFB celebrate its 50th Anniversary with a flying show and display of R/C planes and gear. About 100,000 visitors attended.

The biggest of them all in 1967 — the Alamo R/C Society found itself entertaining a huge throng established at over 376,000 persons during the Kelly AFB Golden Anniversary in San Antonio, Texas. R/C clubs in many cities gave similar shows during the year, helped build interest in R/C.



Hastings, Nebraska saw some of the country's finest scale masterpieces and their creators. Maxey Hester (R) took 1st place with his PT-19 while Bud Atkinson (L) placed 2nd with the unusual twin powered (catch the prop in the back!) Dornier DO-335. That left 3rd place (during a tough day on scale judges) to the master, Claude McCullough, with his well-known Douglas XTB2D-1, with contra-rotating props.

The traditional winners' picture — Memphis trophy-ites were: Sattler (1st IIIN), Benzce (3rd Scale), Edwards (1st Scale, 3rd Pylon and IIIE), Wood (2nd Scale), Coleman (2nd Pylon, 1st IIIE), Von Seutter (2nd I), Gardner (1st I) — front — Thomas (1st II), Hover (2nd IIIN), and Jenkins (2nd II).



Bob Wood—Jr. and Sr.—prepare to crank Bob-the-younger's scale P-63 at Memphis. Logictrolled, the neat ship placed 2nd. K. K. McClure and Joe Harris were Memphis co-directors.

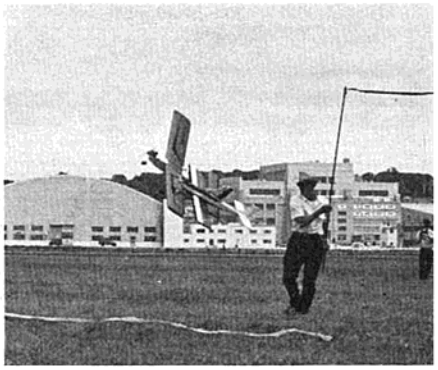
If you please, Professor! Prof. Micklos Benzce helps Dr. Jim Edwards wind his 1st place scale Chipmunk at the 1967 Memphis meet. Prof. Benzce's Skylane was 3rd. More scale kits showing at contests. . . .

Starting small — Mr. and Mrs. Jerry Cole of Huntsville, Ala., flew shrunken Kwik-Fli in Class IIIN. Made from Tri-Squire kit, it flew well at Memphis.

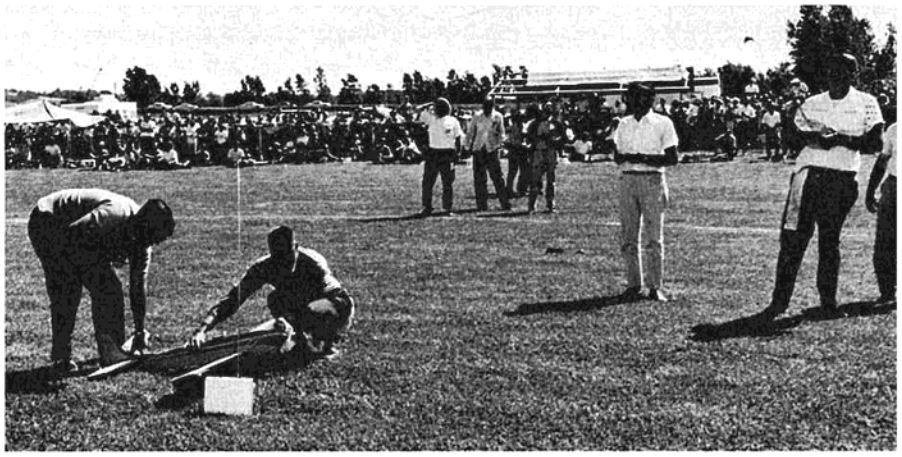
Joe Sokol and his oily No. 7 head contestant line-up at Wallops Station, Va., where they combined to win Class III Expert. Cliff Morris and his C&S equipped Class II is next to Joe. Meet had good turn-out with monitoring equipment help from NASA.

The Kansas City Reeds — Bill and Charlie — typify father and son teams too infrequently seen at contests. Bill is a Class III expert while dad Charlie (the balder) rides the Class II expert merry-go-round. Smiles were for a 2nd place for Bill and a 1st place for Charlie at the McDonnell Annual. Dail Stone won Class IIN. . . . About the McDonnell Club — Rich Sadler is president of this well known club which is now limited to employees of the McDonnell Aircraft Co. of St. Louis. The club's Annual is an established high point of the contest season.

Don Sump, retired Wyoming accountant, toured the country with his wife Elenor in a homemobile, took part in many contests from Tennessee to California. Flew the Krackerjack in Class I at the McDonnell meet. Don, congenial and well liked for his spirit and devotion to R/C and modeling, now makes his home in Lewiston, Idaho. Dallas Armstrong won McDonnell Class IE while Bob Schlisser took Class IN. (This was only sanctioned contest during 1967 to offer Ex. and Nov. events in **all** 3 pattern classes!)



Remarkable photo catches unusual limbo accident at Dayton contest. Lynton Younger has a close-up view of the mid-air mixup. Close examination shows low wing plane's engine has stopped after chewing into the high wing ship's left wing. Limbo isn't usually flown this way — or is it tight formation? (WORKS pic.)



What an R/C contest looks like — two ships in the air and another getting ready . . . Scene was 10th McDonnell Annual in St. Louis where Jim Grier of Chicago won Class IIIE. J. Rawlings CD'd.

West Coast R/C Championships

Class I
Willie Gardner

Class II
Bror Fabor Paul Steiner

Class IIIN
Joe Stream Harry Gould
Lou Governale

Class IIIE
Phil Kraft Joe Foster
Jim Spurlock

Scale
Randy Mytar Floyd Carter

Goodyear
Joe Foster Joe Bridi
Bob Snyder

Contest Director
Bob Morse

7th Annual RARC Meet — West Point, Va.

Class I
Dick Tannis

Class II
Lin Gregory Bill Conkling

Class IIIN
Ron Clem Scott Singlevick
Pete Rawlings Lt. Col. Jacobson

Class IIIE
Austin Leftwich Paul Innis
Joe Solko Frank Boykin

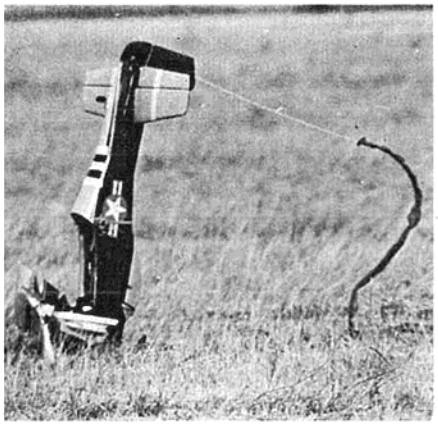
Open Pylon
Austin Leftwich Paul Innis
Joe Solko

Goodyear
Joe Solko Austin Leftwich

Contest Director
F. Gregg

Jackie Gardner, Jackson, Miss., totes his famous Class I Penetrator after completing round during Dayton contest. Jackie won 1965 and 1966 Nats, set Nats record by also winning the event in 1967. Veco 61, Orbit propo, with Bristol covered foam core wings, huge rudder are features of Jackie's original plane.

Hal Parenti, Chicagoland RCer, dominated Grand Rapids and Kalamazoo Class IIIE contests—took first in Furnitureville, and lost to Jim Hoffer in a tight race by 2 points in Kalamazoo.



Combat casualty. Another Dayton scene caught desolate P-51 with its streamer wrinkled and the nose crinkled. . . . Dayton Wright Bros. Memorial contest, previously reported, is country's most popular club R/C meet, attracted most contestants for a 2 day affair in 1967, 95. . . .

Denny Sawyer and Sportmaster prototype won Class III at late season Northern Connecticut R/C Contest. (Photo by Stu Richmond.)

Pete Reed's very nice scale bi-plane — pair took scale 1st place at N. Connecticut R/C Meet. (Photo by Stu Richmond.)

1st Spirits of St. Louis Meet

Class I
Charlie Yost

Class II
Dail Stone Trav McGinnis
Larry Killian

Class IIIN
Mark Vanxant Bob Michaels
Noble Heider

Class IIIE
Guy Oliver

Open Pylon
Noble Heider Bob Michaels
Trav McGinnis

Contest Director
R. Williams

Baton Rouge Annual

Class I
Buddy Brammer

Class II
Bill Feldschau Sr. Mel Trosclair

Class IIIN
Jerry Meyers John Pagan
L. P. Lord

Class IIIE
Norm Rhodes Don Coleman
Cal Scully

Scale
John Pagan Len Hudson

Contest Director
Lee Bontwell

Norm Page topped Class IIIN at Kalamazoo and graduated to Expert. Went on to win 2nd at Grand Rapids where Johnny Wolfin CD'd a well done meet.

Dick Grieve and his Toranado outlasted Ralph Miller at Grand Rapids in Class IIIN, while Paul Schmitz and Bart Fury placed 2nd, 3rd Kalamazoo where Clayton Groves CD'd.

Mel Santmeyers was satisfied with back-to-back thirds in Class IIIE at Kalamazoo and Grand Rapids. That's his original Chipmunk. . . .

Walt Schoonard, Rebel Rally spin Champ — 102 turns!

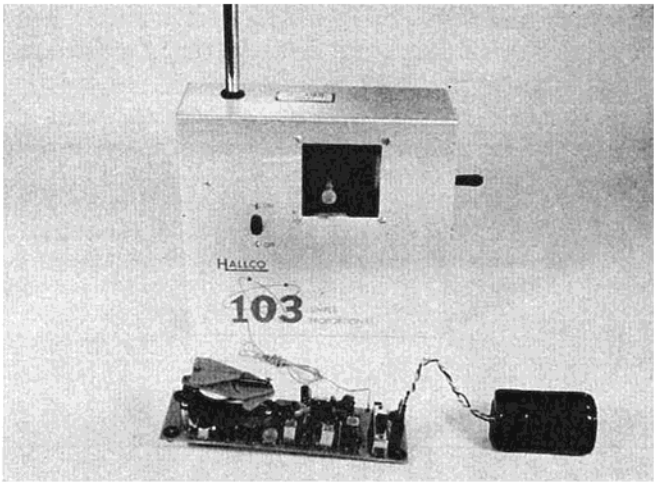
SHOP & FIELD

DON DEWEY
Editor

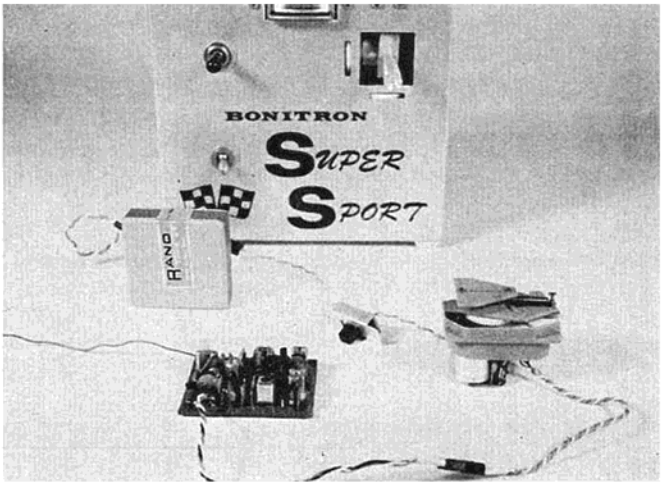
•

KATHLEEN ACTON
Assistant Editor

FUNDAMENTALS OF R/C • PRODUCT REPORTS • HINTS AND KINKS



Hall Co.'s new Galloping Ghost system. Factory wired and Ready-to-go.



Bonitron Super Sport Galloping Ghost transmitter and receiver with Rand GG Pak.

LAST month, we discussed the first of two categories of beginning RC'ers — the non modeler entering radio control. Certain specific recommendations were made as to "first" aircraft for the various types of systems that would be purchased by these beginners. In this installment, we will consider the second category of R/C apprentice — the novice with some modeling background.

2) The Beginner With Some Modeling Experience

This category of beginner RC'er would have to be qualified by the type and amount of modeling experience the individual has completed. We are assuming, for the purpose of this article, the individual in this category is one that is entering R/C from free flight or control line — one or the other of the model aviation categories where the basic fundamentals of model building and flying have been attempted, mastered, or at least understood to some degree.

As with any beginner, the first decision to be made is, again, what type of equipment to buy. If you refer to last month's Shop & Field, you will see that you can get into this hobby with an equipment investment from $75 to $400 or more, depending upon your finances and interest level. The recommendations made in that issue hold true, in our opinion, for all beginners, and we urge you to read, or re-read, that chapter. Both ends of the scale were covered — from the simple and reliable Testor single channel, rudder only proportional system, to the full-house digital equipment. If you decide on either of these categories, then those specific recommendations will hold true for you, as well. If you decide to go down the "middle of the road," so to speak, purchasing a Galloping Ghost system or single channel decoded pulse proportional system, then the following recommendations are for your consideration.

Until just recently, or until the advent of what we like to call the "renaissance of pulse proportional," single channel proportional was, at best, an experimenter's hodge-podge of components, loosely woven into what was often called a "mickey mouse proportional system." For the beginner, who would soon call it something else in much stronger language, it was, more often than not, a nightmare!

Today, the situation has changed. This is due in large part to the Rand actuator and its unique mechanical design — the first reliable actuator for this type of control. Why, you might ask, is the actuator, itself, so important to single channel proportional? The answer is the key to understanding the potential for success, as well as the limitations, of this type of control system.

For a better understanding of just how the whole thing works, we suggest that you read "The Exciting Renaissance of Pulse Proportional," which appears in the April 1967 issue of RCM. Basically, a single "tone" from a single channel tarnsmitter is modified in several different ways to achieve the functions of rudder, elevator, and throttle control. This modification of a single transmitted tone, is converted into mechanical energy by a **single servomechanism,** or actuator, which must handle the functions normally controlled by three separate servos in a full house system. Obviously, this is demanding quite a lot of a single mechanical device. Too, there will be certain limitations, such as one control function interacting upon another, since the entire actuator is in motion, and one function is relevant to, and dependent upon the others — all of which are operating from a common electric motor drive unit. The minimizing of this undesirable feature — interaction — has been the key to success, or failure, in single actuator proportional, or Galloping Ghost, systems. This is not to imply that this is the only criterion for successful Galloping Ghost, since it is absolutely essential that **all segments of the system** — transmitter, receiver, actuator, and battery supply — **work together as a system**, in complete harmony, in order for that system to adequately meet the demands imposed upon it.

If you will re-read the last couple of paragraphs, you will note that we have stressed the word **system**. This has been done deliberately, for **if the beginner picks up**, at random, various **unmatched components, his chances of success are almost nil**. As an example, if our tyro were to pick up a Controlaire relay receiver, Rand actuator, separate battery pack, and a Min-X receiver, he probably wouldn't be in the air by this time next year. Each of the manufacturers in this field have designed specific units that are designed to work with other **matched units of the same manufacture**, and unless used in this fashion, you are only asking for trouble. Therefore, if you are going to purchase a single channel, single actuator Galloping Ghost set-up, or the slightly more expensive dual actuator system which uses two actuators to separate

the elevator function from the rudder and throttle actuator (thus eliminating a large percentage of unwanted interaction), **we consider mandatory for success the purchase of a complete system; wired, pretuned, and factory aligned.** Several of these systems are being reviewed in the February issue, and we recommend that you read these reviews carefully before making your decision.

The next step, after deciding upon the equipment you will purchase, is the aircraft you will use as a trainer. Since we are considering the new RC'er with some model building experience, we will make our recommendations, based upon our own test program with such beginners, upon both available kits and magazine plans.

A) Single Actuator Galloping Ghost

For the single actuator system, our choice for a first aircraft for the beginner, insofar as kits are concerned, is the Top Flite Schoolmaster, designed by Ken Willard. This is a second overall choice, however, since the Headmaster design, published in RCM, is the best overall design, and also the most versatile. We say this simply because the Headmaster can be used for single actuator, dual actuator, or full house proportional system — depending upon which you have purchased.

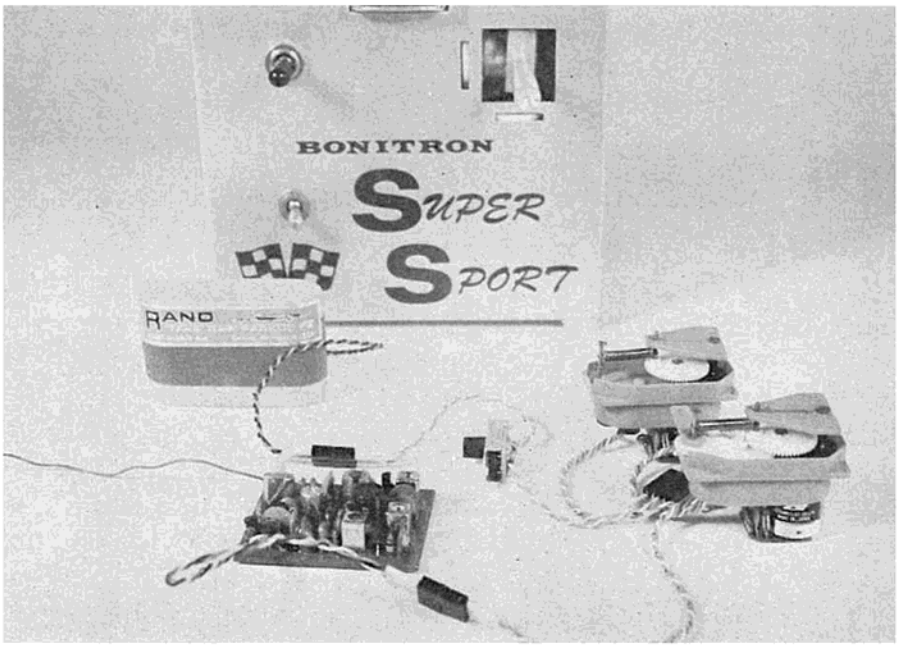
Again, in the kit line, if you prefer a larger aircraft than the Schoolmaster, we recommend the C.G. Falcon 56 with a .15 or .19 engine. This is an easy-to-build, tried and proven airplane with forgiving tendencies, although we would prefer to see it flown with a dual actuator system. Other good kits include Top Flite's "Top Dawg" with an .09 or .10 engine; Midwest's Astro Mite with an .09 or .10; Andrews' H-Ray or S-Ray with a .15 mill; and Sterling's Royal Coachman with an .09 to .15. There are many other good designs, both in published and kit form, but these have been tried and proven by the RCM staff for the purpose specified.

B) Dual Actuator System

For the RC'er purchasing one of the dual actuator, single channel proportional systems, we recommend the Li'l Swinger by Chuck Cunningham (RCM plan) with a .10 to .15 engine, or the Headmaster by Ken Willard (RCM plan) with a .15 mill. In the kit line, our first choice is the C.G. Falcon 56 — an excellent choice for the dual system. For the latter, use a .15-.19 engine, depending upon your final, all-up weight. The larger aircraft listed under the Galloping Ghost recommendations can also be used.

These, then, are our specific recommendations. Obviously, we have not covered all possible, or suitable combinations, but rather, only those combinations that we know will guarantee a greater degree of initial success for the beginner. Subsequent installments of Shop & Field will cover actual construction techniques, covering and finish of model aircraft, equipment installations, and basic and advanced flying techniques. The latter will include text, photo construction and flying instruction by the RCM Shop & Field Staff, followed by a series of exclusive flight instruction by Phil Kraft, World R/C Champion, in conjunction with the RCM staff.

Don't miss these forthcoming articles!



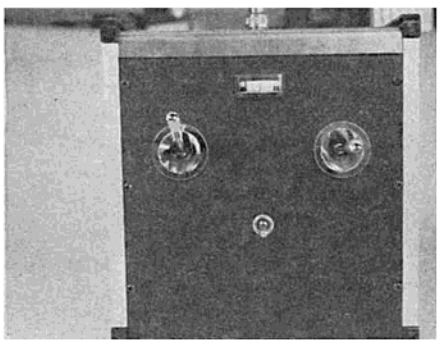
Bonitron Super Sport at fast pulse rate and using Rand Dual Actuator System.

SHOP & FIELD

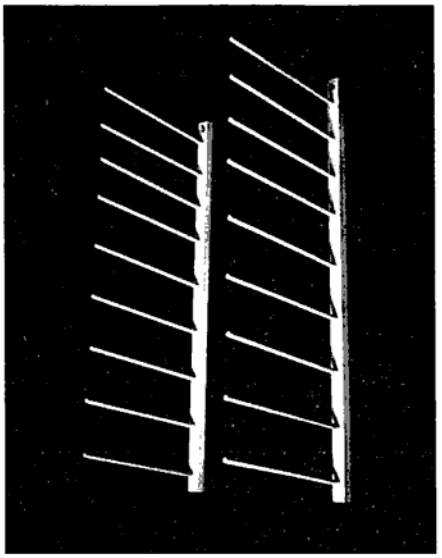
PRODUCT NEWS

FliteGlas Laminates, 1211 Thompson Avenue, Santa Cruz, Calif. 95060 has announced that molded fibreglass spinners, canopies, and exhaust stacks are available separately for those modelers building Frank Baker's P-51D which appeared in a recent issue of RCM. Prices were not available at the time of this writing. Also from FliteGlas comes word of a foam wing using a pre-impregnated .010 fibreglass skin requiring no additional finish unless desired. Reportedly, this skin weighs 13 ounces as opposed to 16 ounces for a similar balsa and dope covered foam core.

Justin, Inc., Electronics Products Division, 2663 N. Lee Avenue, South El Monte, California has released an electronic enclosure suitable for housing an R/C transmitter. Designed for home constructors and technicians, the unit features extruded aluminum side rails, plastic top and bottom caps, and vinyl clad front and back panels in camera case pattern. Complete will all fasteners and instructions, Gearbox Model 60 sells for $13.95 postpaid. Case size is 9" height by 8¾" wide, by 3½" deep.



Su-Pr-Line Products, 34 Copper Drive, Plainfield, Illinois 60544, manufacturers of Ny-Rod pushrods, has manufactured a 35c package containing four each 2-56 studs and nuts for use with their NyRods. A second item from Su-Pr-Line is the Su-Pr-Rak, an adjustable storage rack which is ideal for all types of wings and fuselages. Readily adjustable, it is made of fine selected hardwoods and is assembled, ready for use, in minutes. The Su-Pr-Rak can be hung anywhere, and is quite convenient for storing RC aircraft between flights. Price is $4.95. Tested and recommended by RCM.



For those in the market for a completely ready to fly aircraft, complete with radio, **Custom R/C Craft, Route 2, Box 111, Salem, Oregon 97303,** offers a complete "ready-to-fly" system for the busy RC'er. Each complete system will include a radio of the buyer's choice, completely installed and linked to the controls of any "pre-fab" type aircraft of the buyers choice, completely built and trimmed with engine mounted and including all accessories necessary to unpack and fly. The systems will be test flown if the buyer so desires. An example of an order for someone in the complete beginner category would be a Bonner 4RS (with three servos), the Lazott Solo MK 1

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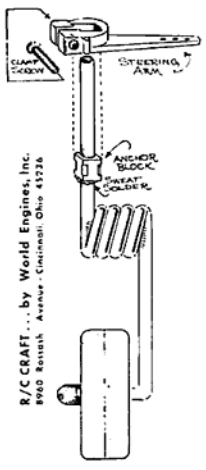
PRODUCT NEWS

(Continued from Page 40)

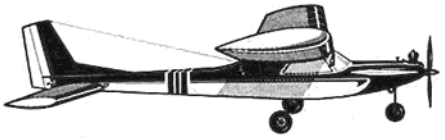
aircraft, an O.S. Max .30, and all accessories, with absolutely nothing left to buy. Price is $394.95, F.O.B. Salem. Other complete systems with any combinations of radio and plane and engine will be available on request, including Goodyear racers. A complete Galloping Ghost system featuring the Rand Dual-Pak will be available soon.

"A Beginner's Guide to Building and Flying Model Airplanes" by Bob Lopshire is the perfect antidote to the frustrations of the young novice model airplane builder. Mr. Lopshire clarifies practically everything there is to know about model airplanes — from the simplest glider to RC and competition models. Basic model terminology is defined. The book presents a complete picture of airplane parts and their functions, construction tools and their use, materials, etc. Easy-to-follow diagrams and line drawings illustrate every aspect of the text. For the beginner who opens his first model airplane kit, or for the more experienced builder who runs into difficulties, Mr. Lopshire's explicit handbook of basic terminology and techniques will be invaluable. Published by Harper & Row, the price is $4.95, and recommended for modelers in the 8-12 year bracket. Recommended by RCM.

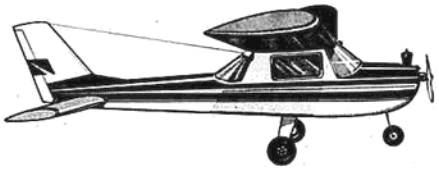
World Engines, Inc., 8960 Rossash Avenue, Cincinnati, Ohio 45236 has produced a new landing gear bracket under the R/C Craft trade name. This 59c bracket will not twist on the landing gear shaft as will those held by set screws. A square block of brass, sweat soldered to the shaft, prevents this unwanted slipping. Available to dealers and jobbers at customary terms, price will be 59c retail. Large wire and wheel shown in drawing are not included.



Two new foam wing kits from **Midwest Products, 400 South Indiana Street, Hobart, Indiana 46342,** have arrived at local hobby dealers. The Whiz Kid and Cessna 150, both Owen Kampen designs, featured in RCM, have injection molded foam wing and stab. This leaves only the fuselage for you to build, and this is simplified with a minimum of parts and clean die-cutting. Both kits contain formed nose and main gear, hardware, and easy-to-read plans. Also included is Midwest's new pamphlet, "Care and Finishing of Foam." The Whiz Kid is recommended by RCM as the finest trainer available for the newcomer to RC. The kit sells for $8.95. The Cessna 150 is a semi-scale which will take single channel, Galloping Ghost or small multi-channel, handling engines from .049 to .10. Retail price is $9.95. Both kits recommended by RCM.



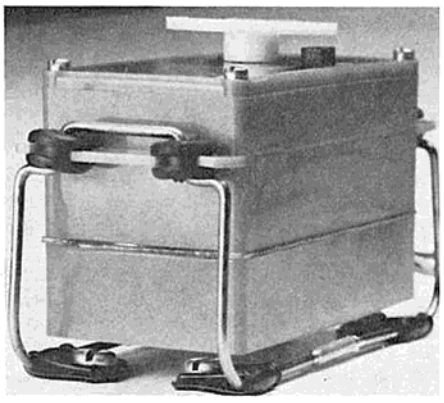
WHIZ KID



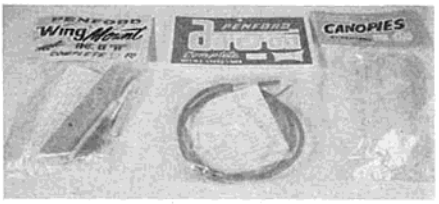
CESSNA 150

Kraft Systems, 2466 Seaman Street, South El Monte, California 91733, is manufacturing an all-new servo. Currently being shipped with all new Kraft proportional systems, this new servo features lighter weight, smaller size, and the convenience of two linear outputs as well as one rotary output. The nylon case material is practically indestructible. There is no troublesome "pot" wiper to get dirty. All this, plus higher output torque and a stronger gear train adds up to a highly reliable servo-mechanism. Phil Kraft reports that a nationally known testing lab ran vibration shock tests on the new servo up to 30 G's with no failures! As a comparison, I.S. Government missile instruments are normally expected to withstand up to 10 G's, while most hobby servos begin to fail at 5 or 6 G's of vibration shock. The new servo is completely compatible and interchangeable with all "single deck" Kraft receivers. Price separately is $39.95 each.

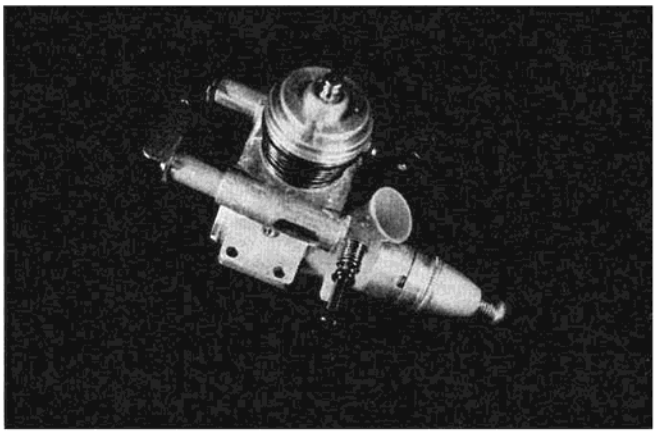
Dav-Ons Models, Box 17089, Tucson, Arizona 85710, has produced a convenient, shock-absorbing servo mount for Orbit-Micro-Avionics type servos. This is the best unit of its type we have seen and we recommend them to your consideration. The photograph illustrates the method of installation.

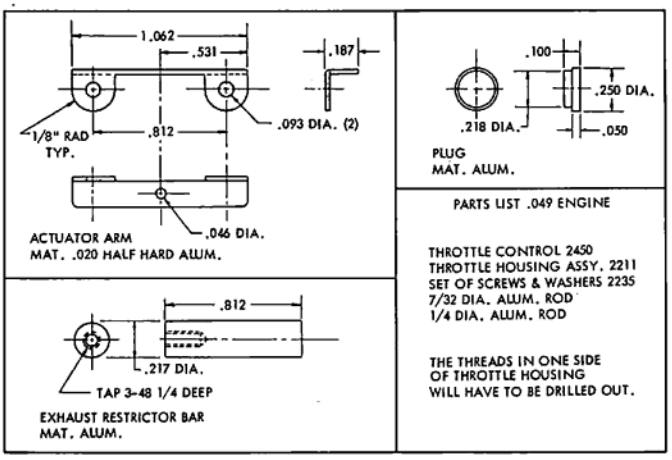


Penford Plastics Corporation, P. O. Box 134, Prospect, Ohio 43342, is a new company with an excellent initial line of R/C accessories. The first item is the Penford Airerod, a nylon within nylon pushrod that is available in both 30" and 48" sizes. Priced at $1.75 and $2.00, respectively, both pushrods come complete with metal pushrod end extensions and two speed links for connection to control horns. The next item is a complete line of heavy duty RC canopies in 8" and 10" lengths at $1.75, and 12" and 14" sizes at $1.95. These canopies are virtually indestructible compared to competitive items and readily take butyrate dope. The last item is the Penford Wing Mount Kit which eliminates unsightly rubber band wing hold downs. Included is a pre-drilled hardwood block, two lengths of locator dowel, and two nylon wing hold down bolts. Price is $1.25 per set. All Penford items mentioned in this release have been tested and are approved and recommended by RCM. Dealer inquiries are invited by Penford Plastics.



D & B Industries, 3655 Calumet Rd., Decatur, Georgia 30032, has produced an excellent field carrying case that includes a built-in electric fuel pump, gallon fuel bottle with all necessary tubing and hardware, plus space for props and tools. Constructed of plywood and hardwood, and painted with a fuelproof "spackle" finish, the field case is complete with the exception of the required battery for the fuel pump. The unit has been tested, and is approved and recommended by RCM. Price is $24.95.





HAVING recently purchased a Rand Galloping Ghost Pack, I decided to install it in a CG Junior Falcon that had been gathering dust in my basement. Unfortunately, however, the Cox Baby Bee .049 that had done a beautiful job with the lightweight receiver and escapement with which the Falcon had originally flown, proved just barely adequate with the added weight of the Rand unit.

After replacing the Baby Bee with the more powerful Cox Medallion .049, performance went from marginal to excellent! The next step was to make use of the motor control on the Rand LR-3 actuator and install a Medallion throttle assembly on the engine. The engine ran well, but seemed to lack power with the throttle installed. Flight tests bore out this conclusion, and the plane did not fly as well with the throttle as it did without it. It was my conclusion then, that the throttle assembly restricted the exhaust unnecessarily, so I set out to remedy this condition.

After making the modifications shown in the drawings and the accompanying photograph, top end performance went to that of an engine without a throttle, while the idle, itself, remained extremely good and unaffected by the modifications. An added bonus was the ease in which the Medallion could be started each time.

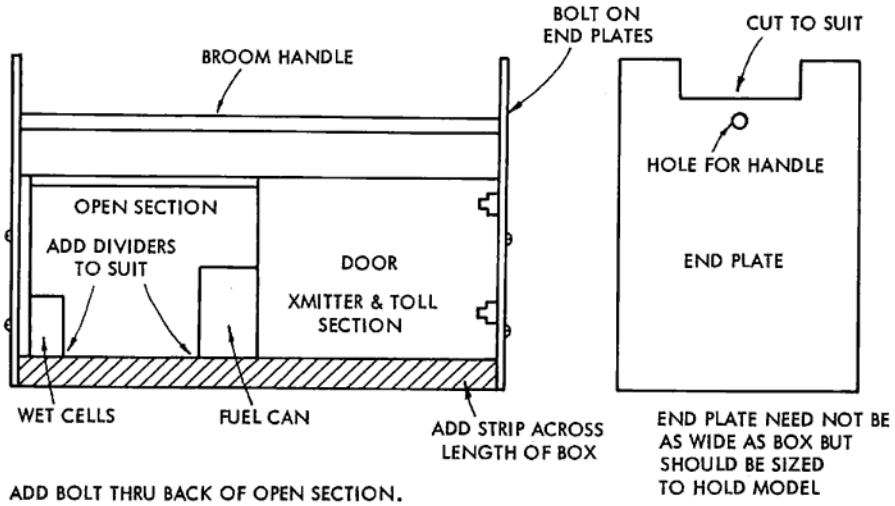
I am certain that this type of modification could be made to the Medallion .09 and .15 with the same amount of ease. The added power, coupled with reliable throttle, would make this modification most desirable for this otherwise fine engine.

Here's a quick way to make up your own printed circuit boards. Trace out the runs on your board on a piece of transulcent type drafting paper, making a little round circle each place the PC board is to be drilled. Next, tape the tracing to a piece of copper clad board and lightly center punch each place you find the small circle. Next, the tracing paper is removed and the appropriate punch marks are connected up with a felt tip marking pencil. Many of these pens make an excellent resist, and once the lines are drawn, your board is ready to drop in the etching solution. Do not leave in the etchant too long, as it will eventually eat through your penciled "resist." Try your felt marker on a scrap piece of board, first, to make sure you have one that will do the job.

— *Joe Knox*

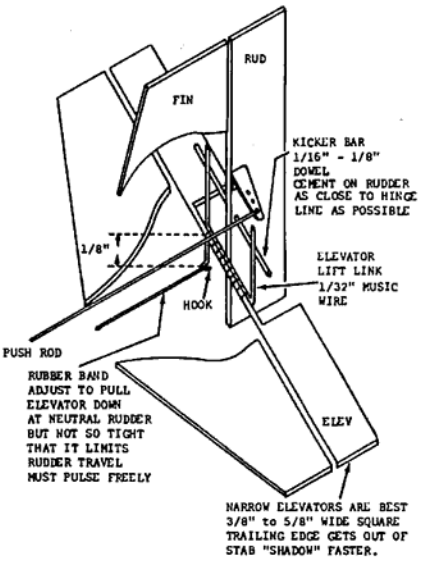
A very nice field box can be made from an empty whisky box. These boxes, or cases, come with a partition, so all that is required of the intrepid modeler when he sobers up is to add a door and two end plates — the latter to cradle his latest pride and joy. The total cost of this unit is about 25c for hinges, 5c for aspirin, and $25 for the booze that the case is wrapped around. Of course, if your local liquor store is benevolent, they will just give you an empty case for free.

— *Dick Hill, South Jersey Fly-Aways*



ANY one with a rudder only ship all trimmed out and in operation has only to make the installation shown and wait for the glue to dry and then if you have a Min-X Pulsmite, Controlaire Galloping Ghost or Jansson Triple Treat transmitter, you can go flying Galloping Ghost without much further ado.

It's immaterial whether you are using an Adams Actuator, Rand HR1 or HR2, Strader Go-Ac or just a plain old Mighty Midget or Bellamatic servo to drive the rudder with pushrod or torque rod. With the kicker bar installed as shown, the rudder takes care of all control of the elevator. Full right or left rudder will deflect the elevator to full up and as the rudder passes through neutral, the elevator is pulled to full down by the rubber band down load. With stops installed either at the rudder or the actuator, push buttons on the transmitter for full right and left besides the stick for proportional control and an educated pair of thumbs you can slow the pulse rate down to get some nice flairouts on landing. Don't stay on either button long enough to cause the ship to veer right or left, just enough to give you a very definite up elevator condition.

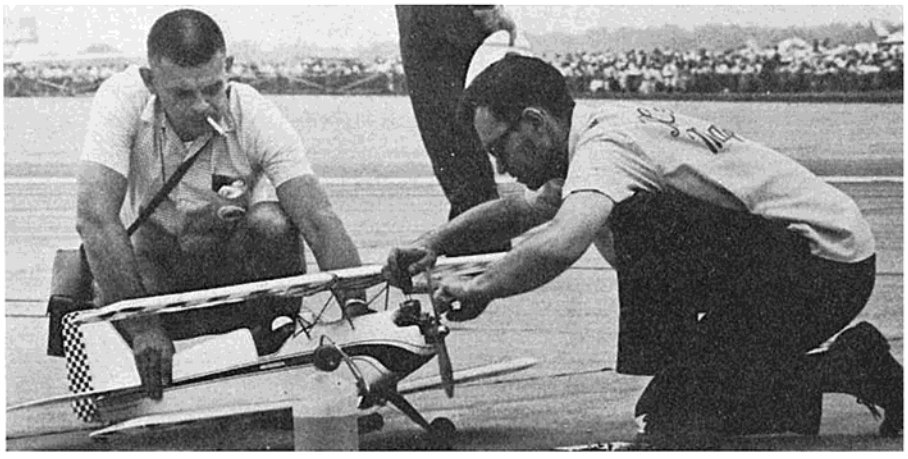


Down elevator occurs each time the rudder passes through neutral but this condition doesn't last very long with the Adams Actuator because the transit time from one

(Continued on Page 43)

KITS & PIECES

BERNIE MURPHY



Your columnist and Joe Davis with Aeromaster at Dulles Air Show. John Worth in background.

AS we sit down to piece together this month's column, we nostagically feel that in some way we have run in a circle. Those of you who were with us almost three years ago, April '65 to be exact, may remember our first "RCM ship," the little 42-inch Cessna Skylane by Carl Goldberg. At that time we suggested to Carl that he consider a larger version of the same ship. Many R/C'ers expressed the same desires and true to form, Carl has come through, with a 62-inch ship capable of flying with most any equipment from rudder only to full multi.

Assembly of the Skylane 62 proved to be almost identical to that of the ½A ship, with the exception of a little "beefing up." As usual, we began with the fuselage, which is basically a box type construction. The open cabin structure requires the use of a few extra pieces, mostly ⅛ plywood. The added effect is well worth the extra effort here. Once the basic fuselage box has been assembled, it **MUST** be carved and sanded to cross section shape. No leaving square corners on this one! Omission of this step will not only destroy the appearance of the ship, it will also make it tremendously tail heavy. Die cut sanding templates are provided, use them! The main landing gear is of the same torsion bar type used on the Sr. Falcon. Steerable nose gear is also from the Sr. Falcon.

Installation of the motor bearers, while considered adequate for .19 class engines, was felt a trifle weak for a .35. These can be easily strengthened by "nailing" the engine bearers to the nose block beneath, using ⅛" dowels at two or three points along each bearer.

The fact that the wing is of the flat bottom, lifting type, simplfies its construction. The bottom sheeting of one panel is pinned to a **flat** building board. The lower spars are added, followed by the ribs, top spars, dihedral joiners and top sheeting. When this panel has thoroughly dried, it is removed from the board and blocked to the correct dihedral angle. The remaining panel is then built onto the dihedral joiner stubs. Ailerons are built into the wing structure complete with hinges. The completed wing is removed when dry, ready for sanding and covering.

Stabilizer construction is open framework similar to the Sr. Falcon and should present no problems. The fin, rudder, and elevators are all of sheet stock.

The wing struts are fitted to the ship with plastic tubing ends, forced into oval eyelets. This system proved quite practical on our little Skylane, since it will allow the struts to pull free without damage to either struts or ship.

Although our Skylane 62 still requires covering and painting, we have seen and flown several others. Here is a ship that appears to be capable of being exactly what **YOU** want it to be, short of a hot competition stunt ship — this it ain't! The Skylane 62 is a ship that the beginner can learn with — the Sunday Flyer (sorry Ken) can have fun with — the Hot Shot can relax with. Whatever, tailor the engine size and number of controls to your abilities, and keep it light! With rudder, elevator and throttle controls the ship is a natural for the new Dual control pulse proportional rigs, such as Bonitron, Min-X and Controlaire, all of which utilize the Rand Dual Pack.

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Through the years our shop has accumulated some unusual "tools." One of the most often used, and cheapest in the shop is the simple flat toothpick (750 for a dime). They are just right for mixing small quantities of epoxy, dabbling glue or epoxy into place, and shaping small fillets. A few of the other household items that have found their way into the shop are Q-Tips, emery boards, rubbing alcohol (for clean-up), Scotch Brite scouring pads (for paint rub down in lieu of steel wood) and on occasion a drop or two of food coloring to add "class" to some exotic home brew fuel. A handy item during repairs is Scotch 33 electrical tape. This tape will stretch and conform to most any shape and can be invaluable when holding a surface break. Simply force as much white glue as possible into the break, wipe off the heavy excess, then tape tightly together. When dry, remove the tape and wash glue residue from exterior surfaces with a damp rag.

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We have received one of the fiberglass Tiger fuselages from Fiber Foam Products, Box 12091, Plantation, Florida 33314. The Tiger is designed to use a Falcon 56 or similar wing. Stabilizer is also of Falcon 56 planform, but is shaped from balsa sheet. The fin is molded onto the fuselage, as is the stab opening. The fiberglass fuselage is exceptionally well made with more resilience than most. From initial indications this would appear to be a ship for fliers

(Continued on Page **44**)

Absent The Previous Page By Scan

SHOP & FIELD

(Continued from Page 42)

der will shorten to a point where the surface is just about frozen in neutral with a full down elevator condition. When the ship is in nose down condition and moving fast, very little rudder is necessary to turn it quite sharply. Lots of rudder will decrease the down effect on the elevator and let the nose come up.

Actually this system works best on a pulser that is set up to give about 6 to 1 pulse rate change, i.e., 4 to 24 cps. Most unijunction pulses can be modified by removal of the limiting resistor to the wiper connection of the rate pot or by replacing the rate pot with one of higher total resistance. This will give more resistance change, rate change, for a given movement of the stick.

The rubber band loading to down condition on the elevator must be **very carefully adjusted** so that the actuator pulses through full travel to the stops on normal neutral elevator pulse rate. Too much elevator down loading will result in restricting the rudder travel which will in turn reduce elevator up travel. Spreading the elevator lift link arms wider will result in more up travel, narrower will reduce up travel but down travel will remain constant. Start out small with the elevator movement and get used to the system before trying anything too violent. Use a fairly long and light rubber band with very little stretch beyond static condition in down elevator. Golf ball rubber is excellent on ½A ships, about 3".

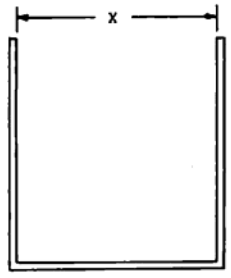
If the rudder ship you are converting is trimmed out and flying good, don't change CG location or retrim the ship by shimming. Just get the elevators adjusted so their average position at neutral pulse rate gives straight and level flight. From there on it's just a function of how much up and down travel you adjust into the elevator lift link. **Remember,** the wider you adjust the lift link the more UP travel you have, but down stays constant. You'll have to also adjust a little more down into the elevators or the new average will change trim to nose up at the same neutral pulse rate.

On all motor driven pulse actuators incorporating a neutralizing spring, the spring may be removed from the actuator itself and installed on the elevator to pull it down.

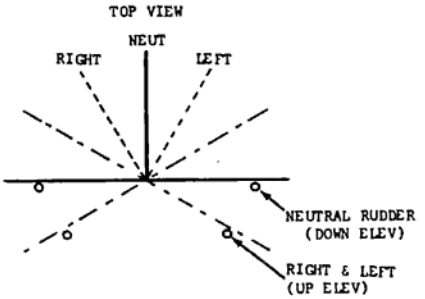
The advantage of this system is that only the rudder function needs to be controlled by the actuator, and only one pushrod or torque rod is needed.

Motor control is not sacrificed on the motor driven, go round type actuator but you don't have the advantage of full locked rudder right and left for push button use. With the Adams Actuator, motor control can be obtained with the ACE HPR rate detector. Have fun!

INCREASE "X" FOR MORE ELEVATOR TRAVEL



1/32 PIANO WIRE KICKER
SOLDER TO ELEV CONNECTOR
WITH ELEV DOWN AT NEUTRAL



KITS & PIECES

(Continued from Page 43)

beyond the "beginner" stage. More on this after flight tests. Available direct at $32.95.

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Pardon us, but our enthusiasm is showing! Last month, we recommended the retractable whip antenna from More Craft (Anten-Away). It wasn't until after the magazine had gone to press that we realized some of the potential problems. The design of the system is excellent, as is the finished product. The $2.00 price tag is quite reasonable and we like the unit — however — some of the manufacturers of the more complex digital radio systems warn in their instructions against cutting, or changing the length of the receiver antenna, since the receiver has been tuned with this antenna in place. Three proportional manufacturers have even stated that their warranties are void if the antenna is altered.

Still, there are some R/C systems flying that can use all the help they can get from a vertical antenna. Many of the smaller and less expensive systems could surely benefit from a vertical whip. We have completely eliminated some unnerving "holes" in our Controlaire Galloping Ghost rig with the Anten-Away. GG rigs are prone to finding "holes" since every miss is transferred directly to the elevator — where another system might simply "fly through."

The decision is yours. If in doubt, check with the manufacturer of your control system. At this time, RCM does not recommend the More-Craft Anten-Away for digital systems unless a vertical antenna is recommended by the radio manufacturer.

We're cutting it a little short this time in order to make room for the Rhinebeck photo story. We usually aren't contest oriented, but this one was something different, more than a contest. A beginning, a trend, a preview on the evolution of R/C.

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Till next month — Brrr.

Joe Busch's 27" Army Design Diesel Tug uses Pittman motor and Galloping Ghost for control!

POWER & SAIL

ON October 1, 1967, the Blue Dolphins R/C Club, Inc., of Bakersfield held a Multiple Boat Racing contest at Lake Woollemes, Delano, that turned out to be quite a challenge to both boat and driver. The man of the day was Jim Gale of the Modeleers who managed to keep himself busy running three boats during the course of the day, which began at 9:00 A.M. and finished up late in the afternoon. Jim's new 80 cu. in. hydro appears to be a real contender with two K&B 40's in a Sanger Hull. In all, Gale ended up with a 1st in A Class, a 2nd in B Class and a 3rd in E Class! In the latter category, Duane Turner of Fresno topped Gale in the big E hydro class after a running battle with positions being swapped on almost every turn — a race that turned out to be the most exciting of the day. Finally, Jim's twin .40 decided it had had enough, froze up, and quit. Duane went on to win the heat and eventually the Class Trophy.

According to Jim Whitlatch, this was the first time on the West Coast that hydros were run separately from the monoplanes, being broken down into two engine sizes. The Ski boats ran in three engine size classes, making for closer and more competitive racing. Yet another innovation was the method of starting the races. The starter selected a "pace" boat after the heat was called to the starting pits. After launching, all the boats were required to "close in" around the pace boat and thus cross the starting line as close together as possible. This made for some thrilling starts, to say the least! As a conclusion, it has become quite obvious that it is almost impossible to hold a boat meet and try to mix lap speed, speed obstacle, steering precision, etc., with part-time multi boat racing. Meets will have to be one or the other — timed "events" or racing. The two just don't mix in the time available.

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The Fifth Annual Model Boat Regatta of the Radio Control Marine Modelers Club of Rochester, N. Y. was held on September 9-10 with seventy entries from the neighboring clubs of Buffalo, N. Y., Barre, Ontario, Canada, and Toronto, Canada. Events run on the three-quarter mile long man-made lake included Electric Precision, Gas Precision, 1/10th Mile Speed, 1/4 Mile Oval, and Multi Boat Racing with a Le Mans start. Trophies were awarded for the first three places in each class. An added feature was the High Point Trophy which encouraged all contestants to enter each event.

The contest was sanctioned and run under the rules of the Great Lakes Model Power Boat Association, according to Hibgard Smith Sr., Secretary.

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The Regatta One-Design R/C Model Yacht Association's fall regatta was held at Westlake Lake near Thousand Oaks, California, Sunday, September 17, 1967. Hosting the participating model yachtsmen was the American-Hawaiian Land Company at that location. The model sail yacht competition this year was for the Westlake "Little Cup" which was presented by Bob Tatum for the company.

Nine of the model radio yachts, designed as the Regatta One-Design Class, were skippered to close sailing and scoring throughout the two and a half hour series of races. The model racing sloops proved of great interest to the crowd of spectators watching them being controlled around marks set up like an ocean racing course layout raced by full size yachts.

Top skipper for the day's "A" group scoring was Charles E. Donnelly of Los Angeles, with three straight wins. Second place went to Matt Jacobson, Burbank. Spirited sailing in the "B" group established a 3-way tie between Fred Forrester of Glendale, Dr. William E. Meacham, and Dr. Lawrence Warner, both of Encino, California. A sail-off is scheduled at a near future date. The success of this first "Little Cup" regatta promises to have it featured by the Association as a regular Fall competition for Regatta One-Design class yachts.

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The photos of the Army Design Diesel Harbor Tug, built by Joe Busch of St. Clair Shores, Michigan, was originally a kit manufactured some years ago by Model Shipways. Found in the back room of a local hobby shop, the kit had been replaced on the display shelves by the more popular racing hydros. This 27" LOA plastic model was just what Joe was looking for, however. Being a beginner in R/C, he wanted a boat with minimum construction time and the least amount of complexities insofar as equipment was concerned.

Construction was started, and a few weeks later, Joe had his single channel equipment installed. A Pittman electric motor was used, geared down three to one, and power supplied by a small 6V motorcycle battery.

The launching of the tug took place in Lake St. Clair. Starting out with the scale

Interior of Joe Busch's tug. Note Rand LR-3 actuator.

prop furnished with the kit, the tug pulled away like a speed boat! Working his way down to a 3/4" plastic prop, and finally to a GM stamped brass unit, Joe was able to simulate scale speed.

Things were working out quite well, but the turns were something to behold! When given a signal to port or starboard, the stern would swing out and the vessel would tip to the outside of the turn and then rock from side to side in a most unrealistic fashion. What was needed was a proportional control for the rudder.

After checking the prices of available propo equipment, Joe decided to try Galloping Ghost — in a tugboat! A few evenings later the harbor tug was ready for the water, this time equipped with Controlaire receiver and Rand LR-3 actuator, providing motor control forward, stop and reverse (through a center-off switch) and

proportional rudder. Turns became much more realistic with this system, and the "gallop" on the rudder is of little significance since it is only necessary to build in a little extra play in the linkage, causing the rudder to move 3/32" off center in each direction. This slight movement has no action on the vessel underway. Galloping Ghost in boats — why not?

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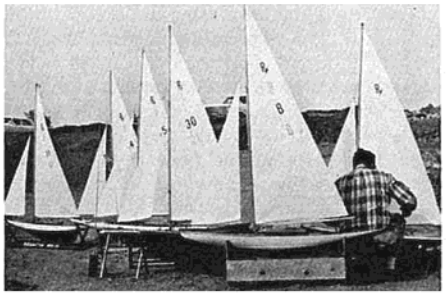
It is with deep regret that we report the death, on 16 August, of Mr. Carl L. Borchert of San Diego, California. Carl was an enthusiastic model boatman who served two terms as Vice-Commodore of the San Diego Argonauts R/C Model Boat Club and was, until his death, a member of the Board of Governors of the Argonauts.

Members of the San Diego club, and Western modelers in general will miss

A portion of the Regatta One-Design yachts at Westlake "Little Cup" regatta in a typical lineup on the shore. Caught candidly is Charles E. Donnelly, first place winner, checking his yacht between races.



Charles E. Donnelly (left) wins the Westlake "Little Cup" for sailing to first place in the radio control Regatta One-Design class model yacht races held at Westlake Lake, near Thousand Oaks, California. Bob Tatum, of the sponsoring American-Hawaiian Land Co., presented the awards. Matt Jacobson, designer of the yachts, won second place in the event on Sunday, September 17, 1967.

Carl's cheerful spirit, and will remember him for his service to our hobby as well as for the numerous contest events and speed records he won.

Our deepest sympathy is extended to Mrs. Borchert. The hobby shares her loss.

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Good news for K&B .40 racing fans — chrome plated "working face" of the rear rotor valve casting, providing less friction and longer wear, is now being shipped with all new K&B rear rotor .40's, and available separately from K&B as replacement units.

For O&R C-111 compact engine fans, the Octura racing carburetor is now available. Helping to further increase the output of your O&R, whether air or water cooled, the new carb is designed to work with either gasoline/oil or alcohol/nitro castor oil fuels. It also solves the problem of connecting to the servo by providing an adjustable length arm on the offset barrel throttle. Servo strokes from 1/2" up to 1" can be accommodated to give full throttle range and the arm can be reversed to give pull-close, push-open, or vice versa. Idling is improved greatly over stock carburetor and the top output is substantially increased. The Octura carburetor installs in place of the stock unit without filing or machining. Price is $12.75 plus 25c packaging and postage.

Also available from Octura for the C-111 is their new rotary valve. This unit, together with the Octura racing carburetor and using a hot fuel will make a Class F boat power plant that is hard to surpass! Again, no machining or filing is required for installation. Price of the rotary valve conversion unit is $21.95 plus 5% postage and packaging. The rotary valve is designed for the O&R C11 and C-111 but will not fit the 3/4 HP version.


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