

RADIO CONTROL MODELER

MARCH — APRIL

1964

RM

50 CENTS

60¢ FOREIGN



**Barry Halsted's
CARDINAL**

•
**Simple Proportional
Part I**

•
**CUSTOM FINISHING
by Ken Person**

•
**From Buffalo
to
Tokyo**

Λίγα λόγια για μένα.

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

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

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

Το χόμπι του αερομοντελισμού το πρωτογνώρισα τον Οκτώβριο του 1973.

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

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

Έχω δημιουργήσει μια πολύ μεγάλη προσωπική συλλογή από αυτά.

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

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

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.

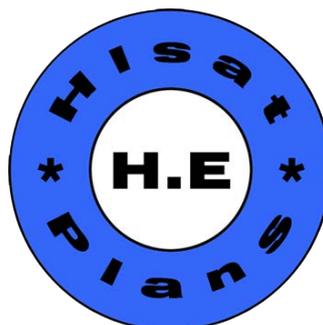
Δεν είναι η μητρική μου γλώσσα γιατί είμαι Έλληνας.

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 Ευθυμίουπουλος.(Η.Ε)

Το ψευδώνυμο μου Hisat.

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



A few words about me.

I am Electronic Engineer and this is my true work job.

From small two things attracted my interest and I dealt with them.

First electricity and secondly the blue sky and the air him.

The model aircraft hobby met him in October 1973.

I love the wooden structures from scratch airplanes and boats.

I started collecting plans, articles, books and anything else that could help the hobby of many years ago.

I have created a very large personal collection of them.

Since 2004 I became involved with the digitization, clean them and to share with you since the public on the internet (as many of them are allowed reason of copyright).

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.

Certainly it is a very long, difficult and tedious task but I believe with the help of all of you to finish in a good but long time.

I apologize in advance because my English is poor.

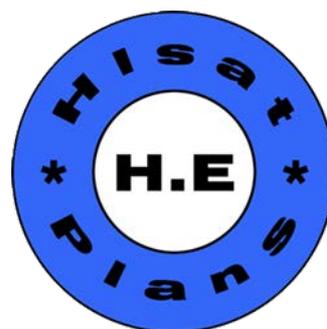
It is not my mother language because I am Greek.

I wish all of you who choose to collect and read this my work good enjoyment and good construction.

My name is Elijah Efthimiopoulos. (H.E)

My nickname Hlsat.

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



RCM Magazine Editing and Resampling.

Work Done:

- 1) Advertisements removed.
- 2) The building plans of airplanes in full size can be found on websites listed in the table.
- 3) Articles building planes exist within and on the websites listed in the table.
- 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.hippoketaeronautics.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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Cover : Miss Regina Jay Pearce and Capt. Dale Willoughby's fully-scale Cessna Skyline. To be featured in RCM.

WHAT HAPPENED TO MARCH?

We did. You didn't miss it — it just got lost in the shuffle. Or maybe this is the March issue. But we've called it April. Somehow, we found ourselves pushed back two and a half weeks by our contracted production services during the Holiday season, and due to the necessity for maintaining national newsstand release dates, were forced to bypass the March issue. Or combine March and April. Or something. Anyway, all subscribers will still receive a full twelve or twenty-four issues on their one and two year subscriptions. And if you like March better than April, this is your March issue.

EDITORS MEMO



SINCE OUR EDITORIAL in last month's issue, setting forth our policy concerning honest and factual product evaluation, we have been deluged with mail and telephone calls. The vast majority of modelers and manufacturers alike have concurred with our stand — a few have subjected it to criticism, as is their right. And, as was expected, we have been asked to "re-evaluate our editorial position" — which to our way of thinking, is spelled compromise.

There shall be no compromise.

You cannot compromise an ideal or set of moral obligations. This magazine was founded by modelers, for modelers, on an ideal of attempting to produce a specialized publication that would bring the radio control modeler the material he wanted, when he wanted it, and in the manner he wanted it presented. It was our original and sustaining ideal to publish the finest magazine of its kind in the world. Perhaps we will never reach that goal. But we can try. And in trying, we have a moral obligation to each and every modeler — to you — to present the facts, the finest material we can obtain, and above all, the truth.

Let's see what has happened since we have publicly spelled out our feelings on this matter of product evaluation. First, it has been suggested that we have "thrown sour apples into a barrel where none exist." That is to say, all radio control equipment works to perfection and we have merely thrown doubts into the minds of the modelers. This seems to imply that you, the modeler, were not aware that some of your equipment works more dependably and reliably than others — that all of your equipment, kits and accessories, regardless of the manufacturer, was produced and performs to the same high and consistent standards.

We both know better than that.

We know that the majority of equipment available is the finest the manufacturer can produce at the price we are willing to pay. It is not our intention to tear a product apart and find some fault with it. The product testing facilities at our disposal contains instrumentation that far exceeds that maintained by any single, or group, or manufacturers. Theoretically, I would imagine that some fault could probably be found with the smallest individual component of any system, if you wanted to carry the tests to an infinite and exhaustive point. This is not the purpose. The idea is simply to evaluate each product on its relative merits, determining whenever possible its potential as to dependability and reliability. In short, does it work or doesn't it? Does it meet the manufacturers specifications? Will it do the job for which it was intended? Does it compare favorably with competitive products of the same genre? Are good quality components used in its construction? These facts, the modeler wants to know *before* he makes a decision as to his purchase. That is why Tom McCahill tests automobiles. That is why the public reads the consumer report magazines. The vast majority of modelers do not want to know the fine details of what makes his rig work, or if the latest space-age exotic components are used — what he *does* want to know is — will it work when I go out to fly on Saturday and Sunday?

It's as simple a matter as that.

During the recent Flying Bisons Conference in Buffalo, New York, a panel comprised of leading representatives from the major model magazines were

asked a question from the floor: "Why don't the American publications tell the truth about new products? Why is every item always presented in the same glowing, press-agent terms?" And each representative of our publications answered this question, somewhat apologetically, to the effect "that they would like to do so, but it would be financial suicide for their publication." RCM's Managing Editor, Chuck Waas, when confronted, replied that we would stand on our policy presented in the February issue.

And that is exactly what we intend to do. We will continue to attempt to earn your confidence and faith by presenting the facts and material you want, and to present the advertiser with a medium for presenting news of his products to you. We feel this will benefit both the modeler and the advertiser — and this feeling is borne out by the fact that, following publication of the February issue, both the circulation and advertising content of RCM was marked by a sudden, and somewhat overwhelming increase. The fact that you, the RC'er, have faith in the publication is evidenced not only by your letters, but by the fact that Reader Service Cards requesting product information more than doubled following the publication of that issue.

But what about the manufacturer? Who is he? How does he develop and produce the equipment we use? What are some of his problems? How does he arrive at the price we pay? Let's turn over the coin and look at the other side.

In most cases, the radio control equipment or accessory manufacturer is an avid modeler with several years of modeling experience behind him. His products are, for the most part, a labor of love, and his friends think he is "some kind of a nut" for working the long hours he works for the

(Continued on page 7)

EDITOR'S MEMO



(Continued from page 6)

kind of money he takes home each week. For this part, he wouldn't have any other type of job at twice the income and despite the headaches, problems, criticism, and continual threat of a second mortgage.

He is a modeler, and he makes his living at his hobby. He is rare individual, for he spends his labors on something he loves to do. He may work out of his garage or basement — he may have another part-time job to supplement his income so he can continue his hobby and business. Conversely, he may have a small to medium size modern industrial facility.

How does he develop his equipment? How does he arrive at a retail price and how much does he make for his efforts? As an example, a single channel transmitter produced by one of our leading manufacturers, lists for \$29.95 to the modeler at his hobby shop. The manufacturer must sell this transmitter to the hobby shop distributor for slightly less than \$15. His cost for direct time and material for this individual unit is \$11 — and this does not include final checkout labor! This means that he has realized a *gross* profit of \$4.00. After subtracting his cost of operating, his general overhead, advertising, service, etc. he *may* have made as much as \$2.00 on this transmitter we purchase for \$30! Do you think he is getting independently wealthy?

What about the proportional systems — there must be quite a profit in these rigs — they sell for \$500-\$600? One West Coast RC manufacturer has spent \$30,000 over a one-and-a-half year period in development

costs alone, and to date, has not realized any financial returns. Why? Was he unable to perfect a workable system? Not at all. It works well, but he as a modeler, felt that there were certain further refinements to be made — refinements that he felt other modelers would want and expect. And he did not believe in making his experimental prototypes available for sale — his customers would have only the finest he could produce. How many sets will he have to sell to offset these research and development costs?

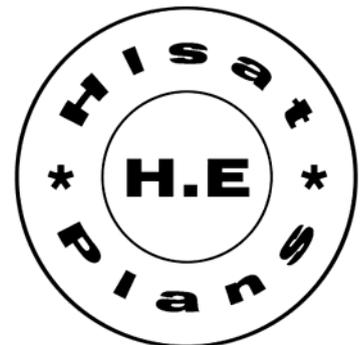
These are but a few of the problems confronting the manufacturer — he is a modeler producing equipment for a limited market of other modelers. He must produce the finest equipment to sell in a competitive market at a price we are willing to pay. And he must make a profit in order to support his family and stay in business. If it wasn't a hobby with him he wouldn't be in this business, and he views his end product as a modeler. When he completes the development of a new product he offers it for sale — and he offers it to the model publications for editorial comment and for presentation in display advertising.

Now, when there are competitive products being marketed, each will have certain comparative advantages and disadvantages. Yet, what may be a disadvantage to one modeler may be an advantage to another — it is the model publications obligation to point out *all* the facts, to the best of their ability, so that the individual may choose the system that will best fulfill his own particular requirements. There are very few products in our industry that are simply inferior items. But suppose that all products are rated in "glowing, press agent terms" — does this help you — the modeler — to select the product best for your needs? How can you possibly know the difference between any two given products supposedly fulfilling the same function? And what happens when, on rare occasion, an inferior piece of merchandise does come up for its turn in the limelight? If it, too, is viewed through the rose colored glasses, what happens when you find out it wasn't quite as pictured — that it will not perform? You then lose confidence in the magazine

that pictured the item in the first place, then in the manufacturer that produced the product, and undoubtedly wonder how many other products would fail in the same manner. Chances are, none of them would fall short of their performance specifications and standards, but a simple evasion of responsibility on the part of your publications would cause you to wonder, and in turn, lose a valuable feeling of confidence in the entire industry. In the long run, everybody loses.

That is the problem as we see it. We will adhere to this policy and responsibility you have asked us to accept. We hope that perhaps we may have been able, at the same time, to present an insight into the problems of that rugged individualist, the hobby industry manufacturer, who has the courage to make his hobby and his daily labors one and the same.

We're on the same team — modeler and manufacturer. When we can understand our individual problems, the gap has been bridged, and we're working toward a common goal of improving the state of the art of our hobby — and business — of radio control.





ib.

Ed Barbier's magnificent Rudder-Only Sopwith Pup. Detroit I

DEAR RCM:

ADDRESS R/C MODELER MAGAZINE • P.O. Box 487 • Sierra Madre, California

Proportional— Consumer Reports

I'd like to pass on a comment on the new Digicon proportional system. I've had mine for a couple of months now and have never been quite as pleased with anything before. This system is the most positive proportional system I've ever had the pleasure to fly. The controls on the transmitter operate the movable surfaces on the aircraft as though they were directly linked by rods or some such things. The slightest movement of a trim pot or control stick gives instant response from the aircraft, regardless of pressure loading. There is no delay at all — none. Centering is positive regardless of temperature, humidity (we have lots), or battery condition. The fact that the electronic components for the servos are in the receiver allows me to outfit a couple of planes without taking a second mortgage on the national debt. Also, the control layout on the transmitter made me feel that I was up there with the ship — just like flying a light plane.

We could certainly use more equipment of this calibre. Hurrah for your review of the Digicon system — it was correct in all respects.

W. J. Murray
Van-Del R/C Club
Canada

Van-Del R/C Club?

I am writing to you in response to your request for owner's reports on their proportional rigs. I have been active in RC modeling for the past ten years, and while attending the Chicago Nationals with Jim Martin of Florida, who had and flew a Sampey 404 prototype, decided to make the move to proportional. I was successful in obtaining the Sampey rig by removing it from one of Harry's planes that he had on display at the DC/RC Symposium in the early Spring of 1963. I have been flying

this system ever since and can only say that it is the most dependable equipment I have ever owned and I am more than satisfied with it. There is, however, one thing I feel compelled to bring out, and that is, that the operation, maintenance, and handling of proportional gear is very much different from that of reeds. Regarding this, I did experience some difficulty until I learned the proper handling procedure. One point in regard to the 404 system is that the airborne power supply has a male plug attachment, and of course it is very easy to carelessly lay this on a table against any metal object and damage the power supply. I have, in fact, done just that — it is easy to do the same thing with the metal retaining ring around the power junction plug in the model while attempting to "plug-in" the power supply. It is also very simple to plug in any of the servos, receiver, or power supply incorrectly and cause extensive damage. I do believe that all manufacturers should realize that the majority of the RC fliers really don't care too much about how or why their gear works — the important thing to them is that it does work whenever they want to fly. It should be made as foolproof as possible in regard to having all plugs polarized so that the average modeler, in haste, won't plug it in wrong.

The whole point of this matter is that the average RC modeler does not think along the same lines as manufacturers do and are not as technically advanced — so, they need "built-in" protection for themselves. I have had my 404 nearly a year now, and have made many hundreds of flights with it. In fact, I have actually "worn-out" three airplanes and completely destroyed one — the latter due to an elevator push rod coming loose at the elevator. I have had to do some minor

patching on the other three planes, but this came about from pilot error and not equipment malfunction. I have, however, had my airborne power supply go down while in the air — the original pack had about seventy-five minutes "on time" and this is not much when you fly all day. Sampey will have available a still further improved power supply with five hours "on time" that is smaller and lighter than his present three hour model.

To sum it all up — it's been ten very enjoyable years. The best part being the very fine people that I have met and had the pleasure of associating with.

Blake Honeycutt
Hickory, N.C.

Sand, and The New Haven Reed Bank

Since your article denouncing the use of the New Haven reed bank, based on your superior technical skill and certified by your position as editor, we now have many people writing to find out if they should use string around their contacts even though they have no problem as noted. I am sure that after this fine build-up, many more will not even write or touch our products.

My answer to this is, maintain the excessive drive or reed vibration but open the contacts farther, thus no critical adjustment is required and you still have self-wipe contacts. They are designed to never hit twice in succession at the same point on the reeds. I challenge anyone to fly other reeds under our design test condition — that is, eyeball in the contact adjustment, fill receiver with sand and dry dust, seal receiver tight, and see which ship flies back. Note: this has been performed twice already — I am not saying it cannot miss.

As per the Vanguard conversion, enclosed you will find two letters pertaining to a simple conversion transaction with Mr. Livin. When a person asks for technical help, he (I believe)

is looking for a way out which is not provided by books or manufacturers services — something which he can sink his teeth into to accomplish an end result with some circuit, not just a bunch of words running down someones product based on one isolated case.

It may be my feelings are hurt because we design equipment for home constructors with no skill required. Enclosed you will find our new instruction manual for the Telstar B receiver. Please note the warranty which we back up.

Jack Day Fisher
New Haven Electronics

We're not quite sure what the sand is for nor so we make any claims for superior technical skill. Nor are we always right. By the same token, we do not make snap decisions regarding any product based on "one isolated case." We have worked with two earlier models of the Telstar and three separate New Haven reed banks. These may be "isolated cases" and the newer production models may be far superior in both quality and performance, and we certainly invite New Haven to submit their products for evaluation. We also invite you to read Part II of our Open Letter From The Editor in this issue.

On Finishing

I couldn't help but notice in the Dear RCM department of your last issue the letter from the lad who had trouble with the painting of the Taurus. I teach Automotive Painting at a General Motors Training Center and couldn't help but think of some of the questions that are asked of me. To this lad what I might say would probably sound like a stuck record to some of you, but here are some of the tips I feel are essential. Use sanding blocks with something like sharp 100D grit paper to get the model smooth — and I mean smooth and leveled. This can be finished up with 220 grit paper. The thing that usually happens to beginners is that someone tells them they must sand it smooth, and to them this means real fine sandpaper. What usually follows is that the sandpaper plugs up and only cuts the soft balsa that is usually already too low, making the problem even worse. When a glossy finish is achieved, it looks like ocean waves. When my models are smoothed to my own personal satis-

smoothed to my own personal satisfaction, I paint on three or four coats of dope with only enough sanding to knock down the nibs. This is followed by doping the silk on with two coats of dope followed with three or four coats of talcum powder and dope, mixed to a ratio of one part dope and one part thinner, then thickened to a heavy cream-like consistency with talcum powder. These talcum powder-dope coats are sanded smooth between each coat and finally followed with one coat of dope right out of the can. If you can let the model dry one day between each coat of dope and at least a week after the last coat, all the better. At this time, wet sand model with 500 grit wet-or-dry, then dry it off thoroughly. Use a tack-rag for final wiping, then spray on two coats of colored dope. I usually follow this up with one coat of clear after the trim and decals are all on.

One Hobbyoxy tip I might pass on is this — this material seems to take on a characteristic like fibreglass, plexiglass, and other thermoplastics, in that very little rubbing on it will create an extreme amount of static electricity. To overcome the lint problem created by this effect, let the model set as long as possible after the last sanding, then just before you paint it, go over it very carefully with a tack rag. Try not to rub any more than necessary, as the more the static electricity, the more lint.

Ken Person
Buffalo, N.Y.

Elmic Escapements

I would like information on the English Elmic Commander single channel escapement if it is still possible.

Wayne Schultz
Lincoln, Neb.

The I.M.P. Elmic Commander is available for \$11.95 from International Model Products, 33 Union Square, New York 3, N.Y. We have tested this unit, and its companion motor control escapement, the Elmic Corporal. The Commander is small and compact with snap-on torque rod connections for ease of installation and removal. We are using this unit in a Wildfire biplane and have found it to be not only very powerful, but extremely reliable. We can recommend it highly. We experienced difficulty with the Elmic Corporal, which may have been

peculiar to our individual unit. The push-pull throttle linkage is very smooth and we ended up transferring this linkage to a Bonner SN. Used with a Cox .09 throttle the results were excellent.

Transfilters

I would like to purchase a ten channel superhet receiver to operate on 52.6 mc. There are only two receivers which I know of which are advertised for 50 mc. I like the idea of I.F. transfilters so this limits me to either one of these units. Would you give me your recommendations?

Luckett M. Smith
Webster Groves, Mo.

There are many pieces of equipment available on six meters that are not advertised. For example, both Kraft and Orbit have offered this frequency for some time. All of the Kraft line is available on six meters.

In your letter, you mentioned a preference for a receiver utilizing the solid state IF transfilters. While there seems to be a problem with transfilters, it appears to lie in the fact that the normal tolerance of operation of the transfilters do not allow you enough latitude in the crystal frequency of the transmitter to guarantee that the tuning is right on the nose. For example, at fifty megacycles, a crystal with a tolerance of plus or minus .005% is allowed a change in frequency of approximately 2600 cycles. This also means that the local oscillator in the receiver is allowed the same tolerance. This, then, makes a total possible difference, if the errors are in opposite directions, of 5200 cycles. This means that when the transmitter and receivers are both turned on that the IF transfilters are already operating on a very low part of their passband. The normal IF transformer allows you to make tuning adjustments in the IF frequency to compensate for the crystal tolerances of the transmitting and receiving crystals. This is very important — especially at six meters because the problem here is twice as bad as that on 27 megs. Some of the problems we have experienced with transfilters equipped receivers have arisen directly from this inability to tune directly to the difference between the transmitter frequency and the local oscillator frequency. With the standard IF transformers you have a tuning range of approximately plus or minus 5 or 6 kilocycles.

Continued on page 14

CUSTOM MODEL FINISHING

Part One by

KEN PERSON

Winner of Buffalo Conference Best Finish Award outlines finishing methods, including exotic "candy" effects. First of several complete articles on modern materials and techniques for painting and finishing R/C aircraft.

In this writer's opinion, it is very discouraging to see so many well-built models lacking the necessary finish to make them really outstanding. My belief is that part of this is due to the lack of good basic information on the subject. It is my hope in this article to lift the fog a little on the subject, and to replace some of the mysticism with good common sense. We will try to cover the material in such a way that it will be helpful to the novice and expert alike.

Due to the fact that a good finish starts with the basic model construction, we will start at that point and move through all phases of finishing — including brushing, spraying, polishing, and methods of attaining the more exotic "candy" finishes.

It is said that the main difference between a good and bad finish is sandpaper. I believe this statement is a little harsh, but it does have a lot of merit. The speed, quality, and economy of it is directly relative to the painter's ability to select the proper sandpaper in the proper form to fit the needs of the job at hand.

To begin with, no paint job is going to be any smoother than the surface over which it is applied. We have two choices — sand the wood until smooth or use a commercial or home-made filler to fill digs, scratches,

and other irregularities. Since weight is a definite factor in an R/C model, it would seem that if we could make the model smooth by taking off weight (sanding), it would be better



than adding it in the form of fillers, especially when the ultimate aim is merely to make the model smooth. One thing that is absolutely necessary is an assortment of various sized and shaped sanding blocks. There is no one who can sand a model really smooth with his fingers. I make most of my sanding blocks out of good soft pine. — Long ones, short ones,

curved ones — in fact, every time I find a contour on a model which will not mate to one of my sanding blocks, I make another. The X-Acto company has several commercial blocks available. Another one I use in my workshop is available from Autobody supply stores under the name "File-board." This model is about 18" long by three inches wide and works extremely well for the initial sanding of fuselage sides, stab ribs, etc., all down to the same final contour.

One prevailing misconception is the feeling that you must use fine sandpaper to achieve a smooth surface, with the end result that the novice uses nothing but fine sand paper and ultimately quits sanding from sheer disgust. Alternately, he sands away the soft wood, leaving only the hard grain and an extremely wavy surface. I use fine sandpaper, but only after the model is sanded and contoured to satisfaction with #80D or 100D production paper. Keep in mind that on a finished glossy model the eye can detect a few thousandths variation in final smoothness, making it imperative that all waviness, depressions, and irregularities be sanded out with the use of sanding blocks and good sharp sandpaper. The paper should

CUSTOM FINISHING

be sharp enough so that the weight of the block is all that is necessary to make it cut properly. If any more pressure than that is used, the wood will bow down where it is not supported and the end result will be a wavy finish.

At this point the model should be smooth and evenly contoured. Any remaining nicks and gouges can be filled with a little plastic balsa, and when dry, sanded smooth. Small nicks can be dampened, and again, when dry, the grain will usually raise enough to remove the nicks. A trick to help avoid these small nicks and scrapes that invariably show up is to cover the work bench with a piece of old carpet. Then, whenever a section of the model is placed on the bench it has a cushion beneath it.

The next step is to sand the model with #220 or #4/0 sandpaper, just enough to remove the sand marks made by the coarser paper, finally sanding it lightly with #400 grit. This progressive method of sanding is the best, fastest, and most economical method I have discovered.

At this stage you can give the model a coat or two of sanding sealer followed by a light sanding with #400. This step can be played by ear, because if you have a good grade of fine grained wood, the sealer is not essential. Keep in mind that any substance added to the model is weight, and if not needed, why use it?

In either case, two or three coats of butyrate dope can be applied to the entire model. Sand lightly with #400 sand paper and then apply two more coats to the fuselage. I use this method because I cover the wing by the dry method and the fuselage wet, feeling that the fuselage needs a little more protection to prevent moisture penetration.

I do not like to apply wet silk to a wing because I feel that a majority of wings regardless of construction

strength, has been warped by this process. Anyway, with a little practice, it's just as easy, and you are then sure you have not distorted it in any way.

With all the silk in place, give the entire model one more coat of clear dope to insure that the silk has adhered to the wood. When this is dry, give the open areas of silk about four coats of dope, or until all of the grain of the silk is full.

Instead of merely applying just enough dope to fill the grain in the open areas, you could apply the color at this point. If, however, you want a good smooth finish, you are going to have to persevere through a few more preparatory steps. Remember — no finish is any smoother than the surface to which it is applied. To make this surface glass smooth, I mix up a filler consisting of clear dope thinned about 50% and mixed with about 25% unscented talcum powder (available at local drug stores). Give all areas of silk covered wood a coat of this mixture, and when dry, sand lightly with #400. Continue this filling, drying, and sanding process until the model is glassy smooth. This usually takes about four or five applications. Remember to sand the filler down to the silk each time to avoid excess weight build up. Be careful not to sand into the silk itself any more than is absolutely necessary. Unless you are of a totally impatient nature, do not apply more than one coat of dope in any twenty-four hour period. Now give the model one good coat of butyrate straight from the can, and if possible, hang the model up and forget you have it for a couple of weeks.

The applied theory is this: a quart of clear butyrate dope, when dry, leaves about four or five ounces of dry film. This proves that by now you have applied a lot of material that must evaporate or "gas off" into the air. Remember that all these thinners have been absorbed into the molecules of the dope, and for one substance to absorb another, it must expand so conversely that when one substance avaporates from another it must shrink. I think all of you can recall the model that looked pretty good when first painted but after a while began to look dull and show the wood grain again. This can al-

ways be attributed to building the finish up too fast. It takes at least two weeks at normal temperatures for all solvents to leave the paint film. Until they are completely gone, there will be some shrinking.

When this shrinking process is completed, wet sand the model with #400 wet or dry sandpaper until it is again glassy smooth. Now, if the paint is applied properly, it will be, and remain just as smooth as this surface.

This brings us to the point of applying the color. I have just about given up brushing color dope on the model. Not that it can't be done and look just as good as a sprayed finish, but it certainly takes longer. The only suggestions I will make regarding brushing are to mix about six drops of wintergreen with each four ounces of mixed color and brush it on with full coats. Sand this smooth and keep this brushing-sanding up until the desired finish is obtained. Be sure and use a good long-bristled artists brush and remember to only dip about an inch of it in the dope. If you get the color up into the base of the brush it is just about impossible to wash it all out, with the result that the next time you paint a light color down comes the old residue, spoiling the job.

When the last coat is good and dry, rub it out with rubbing compound. Remember that the main purpose of a rubbing compound is to remove the slight surface irregularities from the paint finish to produce a smooth, glossy surface. Rubbing compounds are made from selected abrasive powders which are dispersed in water, solvent, oils, and other vehicles. As the compound picks up paint particles and packs them into the rubbing cloth it turns into a sludge, the color of the finish. The compound loses its sharp cutting and converts to a polishing action. As this takes place, the hand pressure is eased until a final polish is developed to reflect light uniformly with minimum diffusion.

As I mentioned before, I prefer spraying just about all of the color, as I feel it is much easier to obtain a quality job, to say nothing of a lighter finish. Immediately prior to spraying the color, I scrub the entire model with a good detergent, water, and a Brillo pad. Dry with a cloth

and go over it with a tack rag.

For the uninitiated, a tack rag is made of cotton cheesecloth treated with a non-oxidizing type of varnish which remains tacky or sticky, and designed to wipe dust and dirt from surfaces prior to the application of paint. Dust and dirt particles are removed completely from the surface since they adhere to the "tacky" varnish on the rag. It is best, when not in use, to store tack rags in a closed fruit jar or can. With prolonged exposure the rag will dry out and become stiff and useless.

I believe that the prime reason for most modelers shying from a spray gun is due to their lack of familiarity with spray equipment. I would suggest that you take the techniques presented here and practice them as much as possible prior to spraying your model. One good tip would be to get next to your neighborhood auto painter and have him save some old automotive lacquers for you to practice with — they have a lot of the same spraying characteristics as butyrate. This will give you some inexpensive practice material.

One of the most common questions is how much paint should be thinned to obtain a good spraying quality. This is too big a question to answer with a flat percentage. I would say that the only reason we reduce or thin paint at all is to be able to achieve proper atomization when we spray. Atomization can be attained in two ways — raising air pressure or thinning paint. Since most of our home workshop spray equipment has a fixed and marginal air supply, we must rely on the reduction of the material viscosity in order to atomize the material. Atomizing is the breaking up of a stream of paint by counteracting streams of air, forming tiny, uniform globules of paint which are deposited on the surface being sprayed. While this is happening, some of the thinner which was necessary in the reduction of the paint, is "gassed off" or vaporized, and never reaches the sprayed surface. However, most of the thinner does go along with the solids and serves as a medium in which the solid particles can flow out and settle uniformly, providing a smooth, even surface.

The best way to find out how much to thin the paint in order to achieve

the proper atomization is to purposely start with a thick mixture. Try several excessively fast passes across a vertical sheet of clean paper of appropriate background. If the paint particles are of varying sizes (especially if the greatest majority of particles are quite large), the mixture is too thick. Reduce the mixture a little at a time, making passes at each pressure increase, and check the sprayed particles for size and uniformity. At a given reduction the paint particles will appear very fine, small, and sandy, and will uniformly spread over a given area. The amount of reduction that produces this effect is the proper reduction for the given air pressure your equipment produces, and is now at a point of correct atomization. If your equipment is such that you can vary the air pressure, you can reach the proper atomizing effect by raising or lowering the air pressure until that point is reached. Increasing air pressure or reducing the mixture beyond the point of proper atomization will not decrease the size of the particles appreciably. This proves that higher than normal pressures or overreduction is not necessary. They will only cause excessive vaporization which leads to many finish discrepancies, such as excessive "orange peel", overspray, dry spray, and rough surfaces. These conditions require more rub-out and polish than usual. The objective of the painter is to get maximum atomization of the paint material with the least vaporization of the thinner.

When a satisfactory mix is obtained, spray a coat of paint on the model, let it flash dry (surface dry) and spray again. Continue this process until you achieve the desired results. (Usually, two coats is sufficient). Remember — if the model was smooth before you applied the color, and you spray the color on properly, there is no reason for the color to dry other than glassy smooth.

In order to obtain a final lasting high gloss, spray a coat of clear HobbyPoxy on the model. If you want to do some repair work on the model, you can take the area in question, brush on a coat of butyl cellulose (automotive fuel tank additive carburetor cleaner such as Gum-Out works just about as well), let it set

a few minutes, then wipe the HobbyPoxy off of the spot so the repair can be made in butyrate with no epoxy interaction. When the repair is complete, spot spray the HobbyPoxy clear and the job is as good as new. When spot repairing, be sure and feather edge the spot well (taper sand the damaged area) with fine sandpaper, then apply enough talc-dope filler to bring this area up to surface level, sand smooth, and apply color. To achieve a good blend of the repaired spot into the old finish, take a second spray cup filled with thinner and spray some of this on the surrounding area. Immediately spray the repair spot with color, blending into the thinner wetted surface. This way, all spot blending is done into a thinner wet surface with a resultant automatic blending and no telltale ring of dry spray to be subsequently rubbed out.

The foregoing is just one of the ways to obtain a good sharp finish. There are many others. For example, Hal deBolt came up with a good quick finish on his P-Shooter (low-wing Jenny), although he feels it costs him about four or six ounces of additional weight. His finish consists of one coat of butyrate on the bare wood as a filler, followed by applying dry Silron instead of silk to complete the model. Two coats of butyrate are applied to the wing. Two coats of HobbyPoxy filler, reduced to brushing consistency, is applied to the fuselage and stab. This is followed by one coat of HobbyPoxy color to the complete airplane.

Bob Dunham likes to build his finish up with nitrate dope, spray automotive lacquer on the model, followed by a coat of Fuller's clear Plast. This gives him the desired gloss and fuel proofing for the undersurface and final color.

Some beautiful finishes can be obtained with automotive acrylic paints, but be careful! Acrylic does not adhere well to butyrate, although nitrate is okay. If you use butyrate spray a coat of DuPont #22 clear, or equivalent sealer, on the model prior to applying the acrylic lacquer. This paint is much too hard and brittle for a model as it comes from the can, so be sure and add some additional plasticizer before using. A few drops of Almond Oil is best. If this is not

added, the finish will probably "spider web" crack.

I have not mentioned HobbyPoxy in any great detail except as a method of obtaining a final gloss. I have used HobbyPoxy colors on five or six models with good results, but some additional care must be taken. My advice is to follow the manufacturers recommendations *to the letter*. For example, when it is stated that the mixture should stand forty-five minutes before spraying, they mean *at least* that long. It also helps to warm the mixture to about 100 degrees before applying, as this greatly speeds up the drying time. I feel the only way to apply HobbyPoxy is to spray it with good spray equipment, my favorite being a Binks Model "B" Airbrush. With the air pressure set at twenty-five pounds, the mixture should be thinned about twenty percent, and will flow out like glass. Be extremely careful when cleaning the model in preparation for color application. Use the method previously described. Since static electricity attracts lint, and since HobbyPoxy is a type of plastic which has a talent for becoming charged with static electricity, I like to avoid as much rubbing on the model as possible just prior to spraying. Using detergent and water to clean the ship helps to dissipate this static charge. If you want an example of the static characteristics, take a section of an old model, and with a rag, rub the surface vigorously for a few minutes. Now clean it, tack it off, and spray it. If there is one piece of lint in the room it will probably end up on the freshly painted panel! This is not meant to be a criticism of the product, but merely an inherent characteristic that must be considered.

If you have had problems with surface separations on a freshly painted surface such as fingerprints, etc., try adding a few drops of silicone additive (available at auto supply stores) called fish eye eliminator to the paint, and immediately apply another coat of this right on top of the first wet coat. I have used this material with good results in butyrate, HobbyPoxy, and lacquer. What it does is add strength to the paint film allowing it to bridge over the area without separating, thereby making the surface smooth. If, however, too

much surface is affected, keep in mind that wherever there was a separation there will be no adhesion, as the paint is bridging the area by its surface tension.

On the purely aesthetic side, I have been getting tired of painting my planes in the solid primary colors — red, blue, yellow, etc. and have been doing quite a lot of experimenting and research with some different colors, such as the automotive type "metal flakes," "candy colors," and fade-out finishes. Since metal flake paint, as the name implies, utilizes large metal flakes to achieve its effect, I do not recommend it for model finishing as it demands extreme paint film thickness to get the desired results.

My personal favorites are the candy colors, as these are relatively easy to apply, fairly easy to repair, and certainly do give some interesting results. In reality, candy colors are a see-through finish. This is, in essence, what gives them their effect.

To begin with, the prepared model is given a coat of brilliant bronze or silver paint. This is made from a very fine, bright bronze or silver powder. (Available from the Crescent Bronze Powder Co., Chicago, Illinois). I use the powder called #261 Brilliant Bronze. This is the same as used in custom car finishes. About a tablespoon of this is added to just enough clear butyrate to enable it to be sprayed. Then a coat is applied to the model. You will find this covers extremely well, and a light coat will cover the entire model. This is followed by a spray coat of clear butyrate that has been tinted just enough so that it appears as a transparent shade of the desired color. I use Duco automotive lacquer mixing colors for tinting at a ratio of about 8 tablespoons of color to one gallon of clear. Experiment a little until the desired shade is found.

It might also interest you who are weight conscious to know that there was less than two tablespoons of pigmented color used in the complete job!

If you've read this far it's time to get out the spray gun, dig up something to practice on, mix well equal parts common sense and imagination, add a dash of research, and come up with some beautiful and interesting finishes this year!

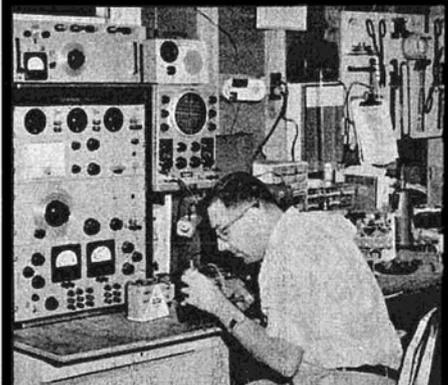
DEAR RCM:

Continued from page 10

This allows you to tune the entire IF strip in order to place the center of response of the IF amplifier directly where you need it for optimum operation of the transmitter/receiver operation. We recommend that receivers utilizing transfilters, not be used on six meters unless you have the facilities for padding the crystal frequency of the transmitter or the local oscillator in order to place the passband of the IF exactly where you want it. This is a ticklish and time consuming job and hardly worth the effort — the good old IF can is still here and will remain so for quite a while.



BENCH BITS



HANK GIUNTA
Technical Editor

With the increasing number of superhet receivers appearing in the hands of modelers, many installation practices need to be reviewed, and in some cases, revised. The superhet receiver, with its increased selectivity and sensitivity over the classic super-regenerative receivers used for so many years, offers the modeler of today an improved control system which for the most part can be taken for granted. However, as with all technical advances, certain precautions must be taken to insure that all the advantages are realized.

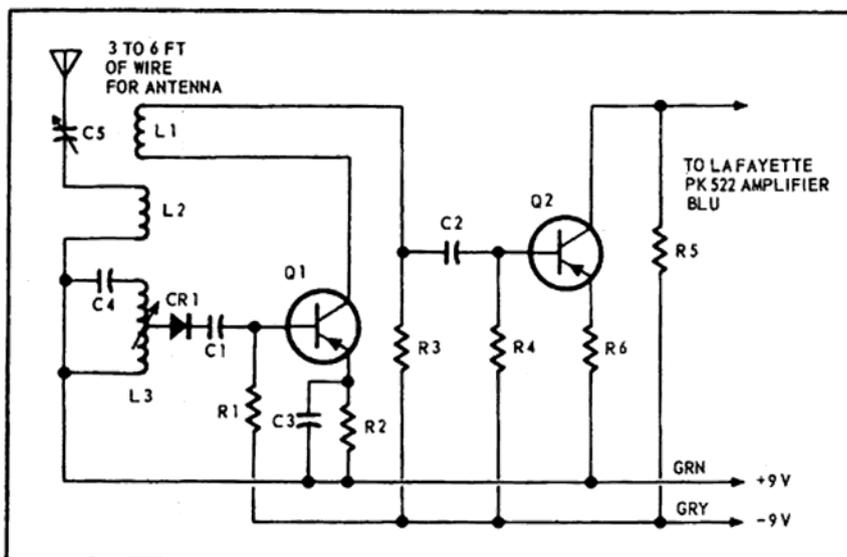
An example in point is the increased demand on transmitter frequency stability made necessary by the better selectivity of the superheterodyne receiver. While frequency tolerances in the order of .01% hardly bothered the superregen units, a drift of this magnitude can seriously impair the operation of a fairly "sharp" superhet receiver. This is **not** to imply that any of the transmitters commercially available today will offer trouble, as all of them to my knowledge, are manufactured to meet the FCC requirement of $\pm .005\%$ frequency accuracy. While accuracy and stability are not the same, in order for a transmitter to be accurate within $\pm .005\%$ the stability must be at least $\pm .005\%$. These are exaggerated figures, as most transmitters we have tested easily meet the stability requirements with ease, even at extremes of temperature and voltage fluctuations. Incidentally, the fact that a transmitter is crystal-controlled is not an iron-clad guarantee that the output fre-

quency is that marked on the crystal. (Okay — for doubler circuits, twice that frequency marked on the crystal can.)

Again, I wish to make it clear that the above discussion of transmitter stability is only a partial review of the additional requirements of a superhet receiver over that of superregen receivers, and is **not normally** a practical problem.

Another factor to take into consideration is the problem of noise with the superhet rig. This is probably the most prevalent problem which confronts the modeler, and it usually rears its head when a poor installation is made. Assuming that the usual "boobs" have been made during an installation, let's take a look at a hypothetical system installation. We will assume a single-channel system, as this is where most problems arise due to the lack of a selective audio system. (Reed banks are **usually** extremely tolerant with respect to random noise). The airplane is a beginner's first attempt, having been given the control system by a benevolent individual. Every time the switch is turned on, the entire system goes haywire — surfaces flapping uncontrollably, engine shifting speed, and the entire ship looks for the most part as though it were ready to disassemble itself. A compassionate modeler (far too few of these) strolls up and offers a helping hand. The conversation goes something like this:

"Well, you seem to be having prob-



BENCH BITS

lems, don't you? Hmm, where's your ship's antenna?"

"Oh, I wanted to make a neat job, so here it is, neatly twisted with the receiver wires and connected to that spare pin there on the plug. From there it runs back to the tail section with a string tie on the escapement for strain relief. I sure had a hard time getting it to fit — had to cut off about a foot so I could keep it concealed. Nice neat job, though, even if I do say so myself!"

"Do you always install that motor control pushrod so that it rubs the receiver case when it moves?"

"A slight miscalculation on my part when I installed the motor control escapement — just couldn't see going through all that trouble to relocate it. Sure works all right, though, plenty of rubber power on that escapement."

"Where did you get those AAA size pencils?"

"Sure are tiny, aren't they? They make fitting the battery pack a cinch! Anyway, my buddy had them in his transistor radio for a while and offered to let me use them."

"Have you flown that thing yet?"

"Nah, just getting ready to try it now. That gear will quit jumping around as soon as the ship is airborne. Hey, mister — how come you look so pale?"

While the previous dialogue was (obviously?) written with tongue-in-cheek, many times those very problems may singularly be the direct cause of many a crackup. The following list of Do's and Don'ts may help ease this problem:

DON'T:

- carry the antenna wire along with any other wiring.
- allow metal parts to rub or grate on each other. (If this is unavoidable for some reason, bond the two parts together with a flexible wire soldered at each end.)
- skimp on the batteries. (Or use old ones!)
- fly the airplane until everything works to perfection.

DO:

a) keep the antenna clear of the escapement and pushrods (or torque rods) when stringing it out. It really doesn't look bad on the outside of the plane.

b) use non-metallic push or torque rods whenever possible. Wire ends less than 6" long should give no trouble.

c) use a micarta, nylon, or similar material bearing for the torque rods.

d) use the largest batteries you can, and if at all possible, use separate battery supplies for the receiver and escapements. This alone can cause a host of problems.

e) use sleeving on all wires which join plug contacts or switches to prevent breakage due to fatigue.

f) use arc suppression on the relay contacts (usually supplied with the receiver).

g) heed the advice of experienced RC'ers if it is offered. Every RC enthusiast I know hates to see a ship auger into the ground from any cause. Besides, you won't put them into a position where they will be able to walk up and say, "I told you so, buddy!"

We received a very practical circuit for a superregen diode RF monitor from Major D. C. Hatfield, USAF, a B47 aircraft commander stationed at Lockbourne AFB. Hooked up to the Lafayette PK 522 amplifier, the field monitor is used in a plywood box with a 4" permanent magnet speaker. Instead of a 9 volt battery, Major Hatfield uses a six foot cord with an auxiliary cigarette lighter plug on the end. This in turn is plugged into the lighter receptacle in his car. A three foot piano wire antenna is used. There is plenty of volume, and the unit draws approximately 12 mills at full volume.

Most of the parts can be found in your electronic goodie box, or readily obtainable at any parts house. Place-

ment is not critical and the schematic is self explanatory.

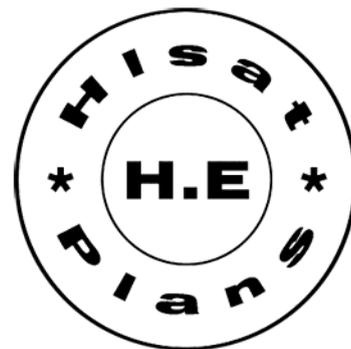
Parts List

- L1 3 turns — adjust
- L2 3 turns — adjust for best volume
- L3 3/8" red dot slug, 8 turns
- R1 500K
- R2 1K
- R3 10-12K
- R4 500K
- R5 10K
- D1 1N91, 1N60, or equivalent
- C1 .02 uf ceramic
- C2 .02 uf ceramic
- C3 25 uf elect. 10V
- C4 15 uuf
- C5 5-30 uuf ceramic
- Q1 and Q2 2N408 or equivalent (PNP)

Note: (a) if unit squeals, R3 can be increased to 10K-15K or use 15K pot.

(b) volume control at PK 522 will also control squeal.

(c) 9V input can be converted to 6V for use from car battery.



Full Size RCM Plan Available

A trip to the local flying field will probably convince you that most rudder-only planes, and certainly the 1/2-A ships, are nothing more than "flying boxes." The only excuse for the existence of these "squares" is that they are supposedly stronger and faster building than the sleek, streamlined ship with a generous expanse of window area.

The Cardinal was designed around a Bonner VariComp and a Cox Tee Dee or Medallion .049 — the most important consideration being an attempt to produce a good, fast-building sport rudder-only ship with no sacrifice in strength, yet one that would be something more than the run-of-the-mill flying box. Since the Cardinal appeared on the cover of the December issue of R/C Modeler, a host of letters have been received asking for plans and construction details on this ship — makes me believe that there are others who are ready for a departure from the everyday designs.

With the aforementioned Tee Dee .049, the Cardinal flies fairly fast and with excellent wind penetration. The first flights were made on a windy day and a stall was immediately apparent. A 3/32" shim under the trailing edge of the wing corrected this condition and subsequent flights were made without mishap. This shim should be removed in calm weather.

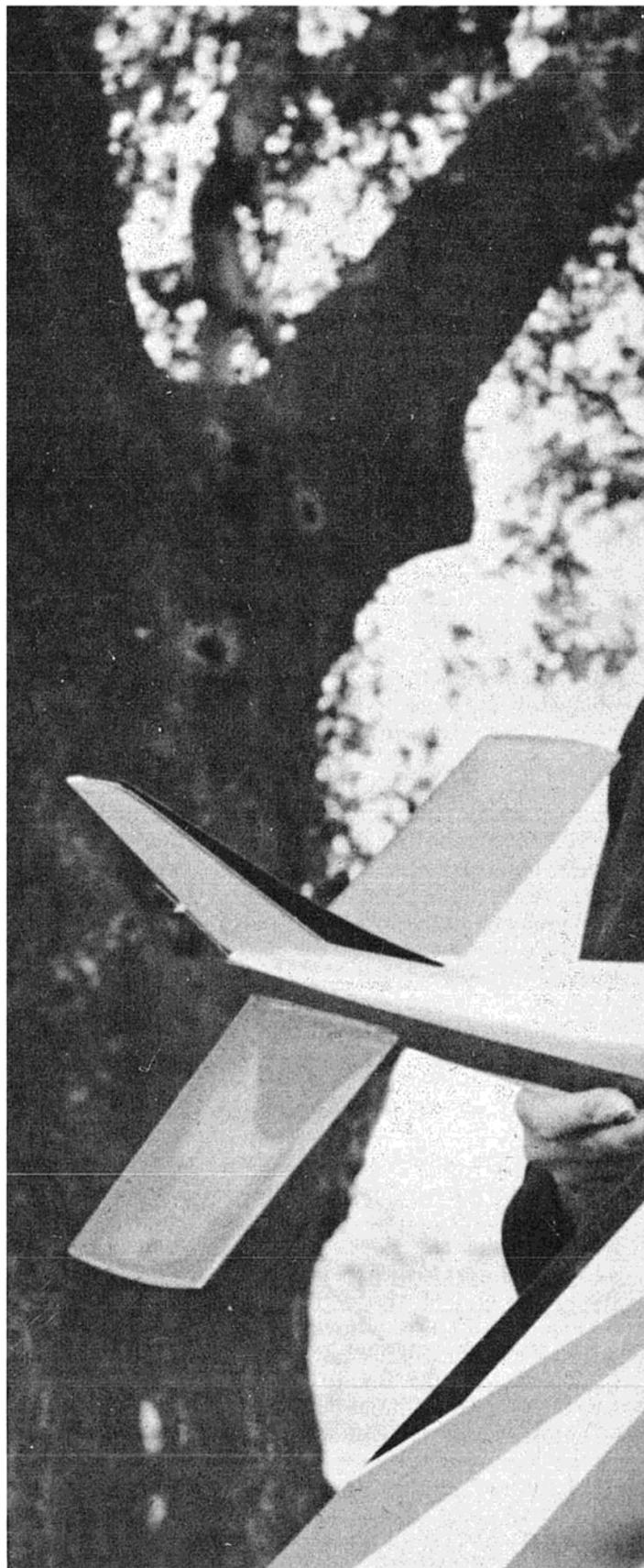
If you feel that the Cardinal is the change-of-pace Sunday flier you've been looking for (it'll fly on weekdays as well), order a set of plans, read the instructions through twice, and you're on your way!

Wing

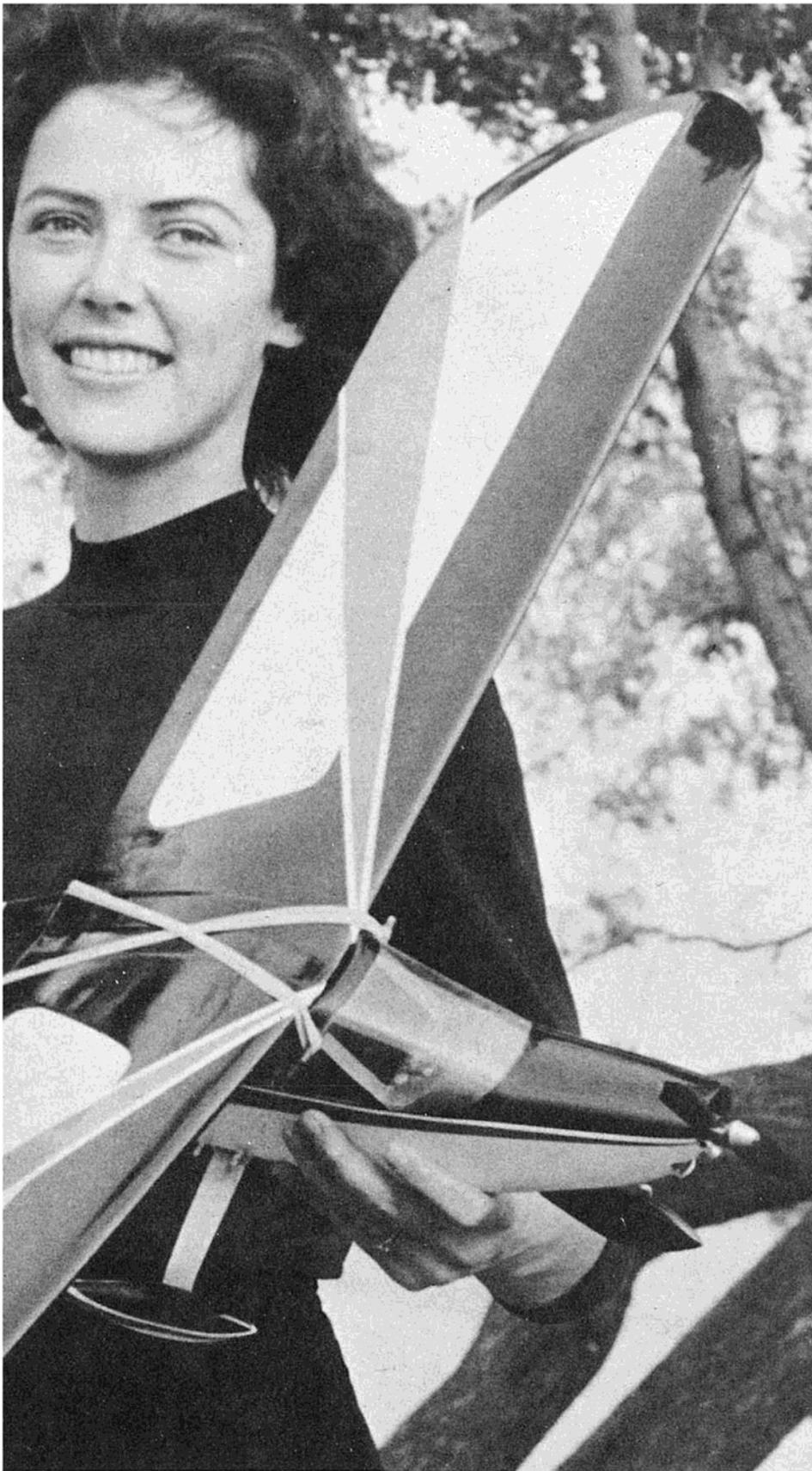
Inasmuch as building wings is the most painful part of modeling to me, I usually start with them in order to get this part of the construction out of the way first. The wing of the Cardinal is unique in that it is almost completed when lifted off the building board. (I apologize for the word "board", but our editor has his Magna-Jig under round-the-clock surveillance!) Construction time is shorter if both panels are constructed at

(Continued on page 20)

by Barry Halsted



The Cardinal



1963 single channel sport design.

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the same time.

Notch the trailing edges and pin down over the plan. Pin the bottom leading edge sheet in place. Glue the $\frac{1}{2}$ " square leading edge and the bottom center section sheeting in place. Cement all ribs except R-3 and R-4 in place. Cut out the tip pieces T-1 and T-2. Glue the bottom tip piece T-1 to the leading edge sheet. Do not glue T-1 to the trailing edge at this time. Glue ribs R-3 and R-4 in place, but do not cement R-3 to the trailing edge. Score the bottom leading edge sheet just outboard of R-4. Block the tip up $\frac{3}{8}$ " at the point of the leading edge sheet and T-1. Glue the leading edge joint you just scored. Block up T-1 $\frac{1}{16}$ " at R-3 and glue R-3 and T-1 to the trailing edge. Note that the tip swoops upwards from R-4 at the leading edge and from R-2 at the trailing edge. This automatically puts the correct amount of washout in the wing.

Glue the spar in place, scoring just outboard of R-4, if necessary. When dry, glue on the top leading edge center section sheet. Allow the wing panels to dry completely.

When dry, lift the wing panels from the board, carve and sand the leading edge, bevel the center ribs R-1 and glue the wing panels together at the correct dihedral angle. ($1\frac{1}{2}$ " under each tip, or 3" if one panel is pinned down flat). When the wing is removed from the board or jig, add a $1\frac{1}{2}$ " strip of gauze or Celastic around the entire dihedral joint.

Empennage

Cut the stab from $\frac{3}{16}$ " medium sheet and sand to shape. The fin and dorsal are made from $\frac{1}{8}$ " sheet and the rudder from $\frac{3}{32}$ " sheet. Cut and sand these to shape at this time.

Fuselage

Begin construction on the fuselage by cutting out the sides and all the formers. Glue the $\frac{1}{32}$ " plywood and $\frac{1}{8}$ " balsa nose doublers to the fuselage sides. Note that the $\frac{1}{8}$ " doublers are notched to receive the nose gear mount. Grain here should be lengthwise. Add the $\frac{1}{16}$ " x $\frac{3}{16}$ " truss structure, $\frac{1}{32}$ " plywood gussets, and $\frac{1}{8}$ " x $\frac{1}{4}$ " pieces. Glue the upper half of F-2 in place on one fuselage side, followed by F-3 and F-4.

(Continued on page 21)



THE CARDINAL

(Continued from page 20)

Glue the other side to this structure and let dry. Make sure at this point that the fuselage is aligned — **any warps in the fuselage must be removed at this point.**

Glue F-1 and F-5 in place. The fuselage sides will bend in to the lower half of F-2. Glue the lower half of F-2 at this time.

Bent the nose gear from 3/32" music wire and bind it to the 1/8" plywood nose gear plate. Glue the plate in the fuselage. At this time, install your tank and engine — I used a deBolt 1 ounce Visual Flow tank and a TD .049 on a Tatone mount. When everything fits properly, remove the engine.

Glue the upper and lower nose blocks in place. Note that these blocks go both in front of, and behind, the firewall. The nose structure on the Cardinal is exceptionally strong and you should encounter absolutely no difficulty with loose firewalls.

Glue the stabilizer in place making sure it is straight. Add the fill pieces under the stab. Sheet the top of the fuselage with 1/16" sheet, the grain running cross wise. Glue the fin and dorsal assembly on the fuselage making sure it is aligned properly.

Install the escapement and torque rod. I used a Bonner VariComp installed in the following manner: The VariComp was installed vertically with the wires near the left side of the plane. The two mounting holes on the bottom of the VariComp were cut so as to become "slots". (See plan) These slots fit in a jig glued

to the bottom and sides of the fuselage. The top of the VariComp was bolted to a crossmember. In this way, either part of the escapement could be easily removed by unscrewing the retaining bolt and lifting the part upward.

When the escapement and torque rod have been installed, glue the 1/8" plywood main gear platform in place and plank the bottom of the fuselage. Carve the nose blocks to shape and sand the entire airplane.

Wheel pants were used on the original Cardinal. These were made

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Available in limited quantity: October, November 1963.

NOT AVAILABLE: February 1964.

from 1/2" sheet as a core and 1/8" sheet for the sides.

Covering and Finishing

On the prototypes of the Cardinal, lightweight silk was used on the wing and heavy grade silkspar on the fuselage and vertical and horizontal tail surfaces. Silk, however, can be used for the entire ship, if so desired.

It is suggested that the wing be finished first in order that the dope may thoroughly "cure" while working on the balance of the Cardinal. Apply two coats of full strength dope to the open framework, followed by one coat of talcum powder and butyrate dope filler mix. When dry, sand this mixture almost all the way off with 320 wet-or-dry paper used dry. Now cover the wing in the standard wet-covering method. When the silk has dried and become taut, spray or brush on several coats of thinned clear dope, repeating this process until the pores of the silk

are completely filled and the grain no longer apparent. Allow to dry at least overnight, then sand lightly with wet 600 wet-or-dry paper. Spray on several coats of colored dope, masking as necessary, then follow with one coat of sprayed clear dope for final gloss. We used standard Aero Gloss spray dope throughout.

Two coats of full strength dope followed by one coat of talcum powder-dope mix is also used for the initial preparation of the fuselage. This, again, is sanded almost all the way off with dry 320 wet-or-dry paper. The silkspar is now applied. When dry, brush on two coats of full strength clear dope. Allow to dry thoroughly. Follow this with one heavy coat of brushed talc-dope mixture. When this has dried for about an hour, dry sand with your 320 paper. Allowing the talc/dope mix to dry too long gives a harder surface and is to be avoided.

Now, brush on about six coats of 70% dope mixed with 25% thinner, working down to a 50-50 dope thinner mix by the fifth or sixth coat. Wet sand with 400 wet-or-dry between the last three coats. The final step in the surface preparation is to brush on a prime coat of white dope thinned 25%. When dry, this is sanded almost off so that the only white still visible is in the pits and low spots. If necessary, add additional coats of white until all low spots are filled.

When satisfied that the surfaces are level, spray two coats of color dope, sanding the final coat with 600 wet until smooth. You should now have a perfectly smooth, but dull surface. One coat of clear will bring up the gloss without rubbing and will complete the finish of the Cardinal.

Add windows, wing and landing gear dowels, wheels, engine, and R/C gear. Sew the rudder to the fin, finish hooking the torque rod to the rudder and you should be about ready to fly.

The Cardinal is not too large to benefit from a few test glides. Any noticeable turns, stalls, or dives should be corrected. When satisfied that everything checks out — FLY!

Good luck and have fun with the Cardinal.

AMA

What Is The AMA Doing For Radio Control?

AMA is conducting the only organized effort in the U.S. to obtain relief from Citizens Band interference. Here's how:

a. Through the AMA FCC Committee a firm of specialist attorneys have been providing professional representation before the FCC to obtain: *revision of existing regulations to restrict unlicensed and also irresponsible Contest Board operation, new and possibly exclusive RC frequencies, coordination of interference reporting.*

b. *The Committee is AMA appointed and is composed of RC leaders from the ranks of flyers, the hobby industry and the modeling press, such as: Ed Lorenz, Walt Good, Paul Runge, Jack Port, John Phelps, Vernon McNabb. It is non-profit operated utilizing the services of AMA headquarters for communication, for administration of the FCC fund to accept contributions from donors and to disburse the funds for the Committee.*

c. *This AMA activity which has already raised \$4,000 for legal and other professional support is serving all RC modelers in the U.S., whether AMA members or not.*

d. *How can you help? Send your contribution, made payable to the Academy of Model Aeronautics, marked "F.C.C. Fund", to: A.M.A., 1025 Connecticut Avenue, Washington, D.C. 20036.*

AMA is conducting the only organized effort in the U.S. to produce the greatest National RC Championship meet:

a. *By surveying contestants, officials, RC leaders and flyers AMA is producing the know-how to conduct maximum effort meets. The problems of organizing and operating the RC meets with 200 or more entries in stunt, scale and speed categories, are being analyzed and lessons learned from past history are being applied to 1964 and future National meets.*

b. *The effort is being aided by*

an AMA Advisory Committee of flyers, industry and press leaders: Walt Schroder, Don Dewey, Howard Bonner, John Maloney, Carl Goldberg, Paul Runge, Ed Manulkin, Bill Winter, Al Lewis and Bob Dunham; assisted by an Advisory Board: Dale Root, Ed Kazmirski, Doc Clark, Hal deBolt, James Kirkland and Maynard Hill.

c. *The '64 Nationals planning has been underway since the '63 Nats. Meet officials have already been selected, planning meets have already been held, AMA Headquarters is contributing support, advice from the AMA Advisory Committee and Board is being directed to the planning.*

AMA is conducting the only organized effort in the U.S. to establish World Records in all categories of RC:

a. *The 1963 achievement of new World records in RC altitude and speed by U.S. modelers has initiated a concentrated effort by AMA to lead a drive to produce new World records in all categories. The effort is being greatly aided by an AMA headquarters effort to streamline the considerable paperwork involved, to prepare and distribute details of record attempt requirements, to promote and stimulate interest in record trials.*

b. *The AMA effort has uncovered new record categories: AMA officers in late 1963 studied World record files in the FAI office in Paris and has since initiated a request to FAI for clarification of many record details. It is expected that this will result in the availability of World records in speed, duration and distance for rudder only and other model categories.*

c. *The AMA is the only organization through which it is possible for U.S. modelers to establish World records. Only AMA is franchised to represent the U.S. in FAI affairs. Through this franchise, which AMA pays \$1,000 for directly and adds a substantial value in headquarters services, the U.S. has won the RC World Championships the past three times in a row! The U.S. Team selection process is AMA conducted, the U.S. teams are provided with overseas transportation by AMA, basic expenses and team entry fees are paid for by AMA.*

The AMA is producing the model show portion of the greatest aviation show to be held in the U.S. The International Air Pageant is planned

for January 1965 in Palm Springs, California. AMA is organizing the model show which is to feature RC stunt and speed flying, among other model events, in front of a grandstand crowd. Simultaneous racing of pylon models, four or more at a time, are to be included in an overall program involving full scale racing, parachuting, soaring, rocketry, etc. This effort is planned to initiate a series of model air show type RC spectacles across the country.

AMA is continuing its traditional competition administration:

a. *Through the years AMA contests have been the backbone of model activity in the U.S. National RC records and standards of competition are administered by AMA, as are the contest rules — while there are many differences of opinion as to what rules and standards are best, the fact is that only AMA has been able to maintain continuity and a fair degree of standardization.*

Without AMA's administration there would be no standards. Our highly perfected RC equipment is the product of AMA competition activity. Sport flying, which benefits tremendously from AMA insurance protection, has also been greatly spurred by the availability of reliable competition developed equipment. Whether or not flyers are contest minded many would probably not be flying for fun without contest proved gear.

AMA is improving its RC services.

a. *Recognizing that a large portion of membership is primarily RC inclined, AMA is continuing to give special attention to RC interests. In response to the failure of independent interests to fulfill RC needs, AMA is studying how to best provide the services members want. AMA is already providing special support for RC'ers as indicated by the foregoing material, but further improvements are anticipated. The big need is for RC people to say what they need. If there are advantages in doing this through an AMA affiliated separate organization, this possibility will be developed. Meanwhile, AMA is actively serving ALL RC flyers by its services to its membership. Much more can be done if those RC flyers not now AMA members help share the cost by joining the only National organization looking out for their interests.*

Buffalo

MID-WINTER CONFERENCE

The 1964 version of the Flying Bison's Mid-Winter Conference was held at the Airways Hotel at Buffalo International Airport, January 31 through February 2, and boasted an attendance of nearly six hundred modelers, manufacturers, members of the press, and spectators. The facilities this year were a vast improvement over those provided for past conferences, and at no time did the exhibits seem to be overcrowded. One excellent feature was the use of separate rooms for manufacturer exhibits, providing closely grouped privacy and convenience for interested registrants.

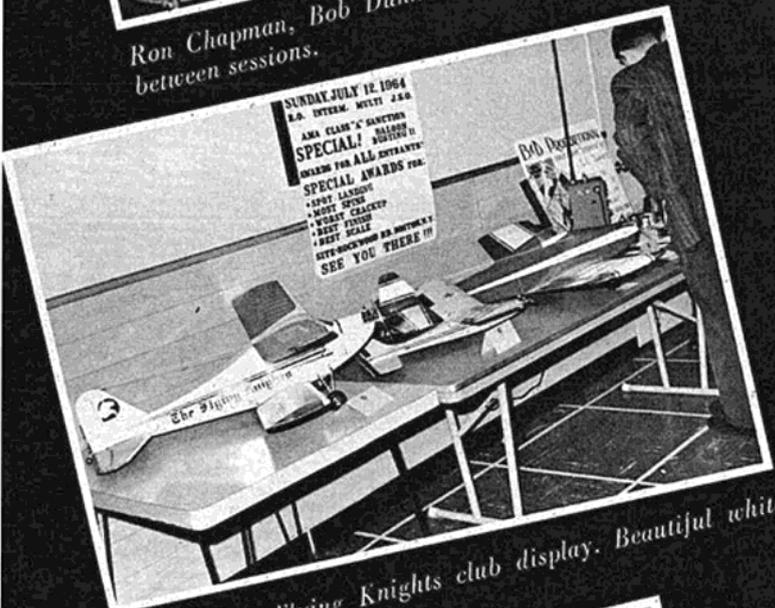
The Club Exhibit event, another innovation with the 1964 conference, was not only well accepted, but provided the individual clubs with a means of demonstrating their pet projects. Two of the displays that drew the most attention were the B & D Proportional set-up by the Flying Knights R/C Club, which was complete in every respect, workable, and illuminated by tiny mirrors and lights so that each component was visible. The second was a demonstration by the Syracuse group on forming cored, styrofoam wings for multi ships — a process that entailed no more than five minutes per panel, and resulted in beautifully tapered wings with a surprising amount of inherent strength.

We were quite impressed with the beautiful, and almost undecipherable, finishes achieved with HobbyPox and on display at this manufacturers exhibit. You would have to see these magnificent ships to believe it!

The winning model in the "most attractive model" category was a finely built Perigee, finished in candy apple green and gold by Ken Person of Buffalo, N.Y. (See "Model Finishing Techniques" by Ken Person in this issue). The finish on the models in this group was fabulous when you consider that Ron Chapman's third place winning Norseman (Feb. RCM) was a duplicate of Canada's "Golden



Ron Chapman, Bob Dunham, and Ed Kazmirski relaxing between sessions.



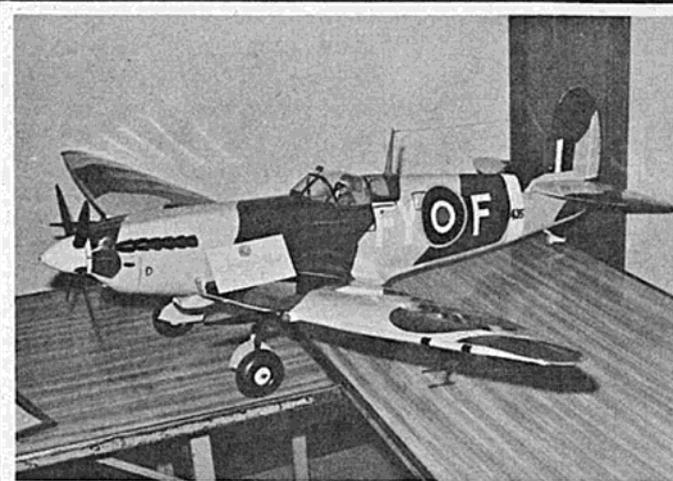
Part of the Flying Knights club display. Beautiful white Bi-Fl in foreground.



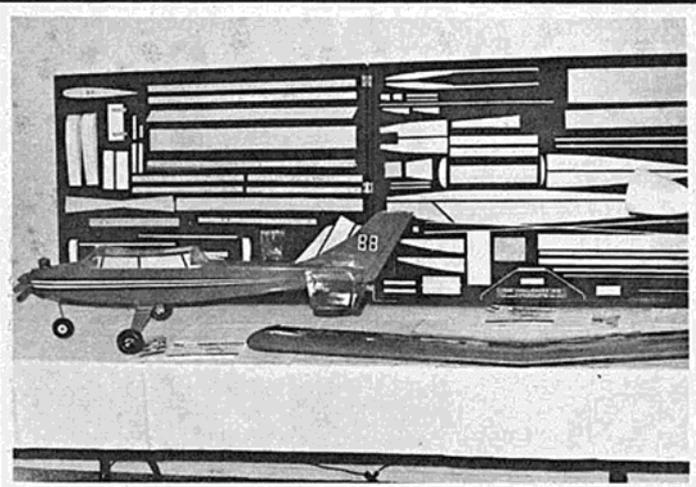
Ed Izzo demonstrating cored styrofoam wing construction at Syracuse display.



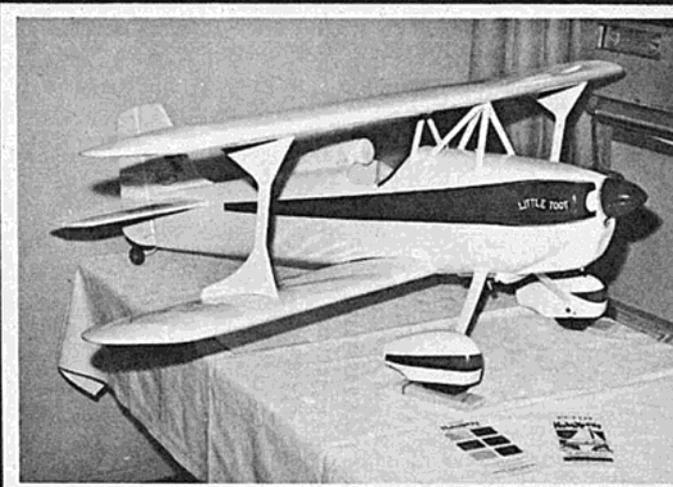
The display room and a few of the excellent models on exhibit.



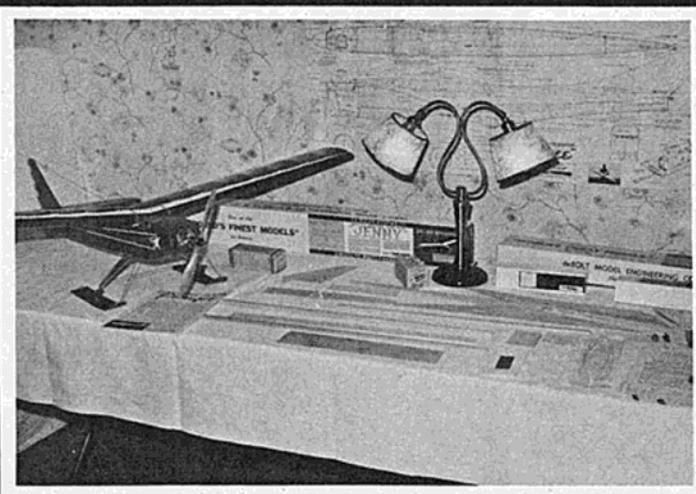
Tom Dietrich's IX Spitfire.



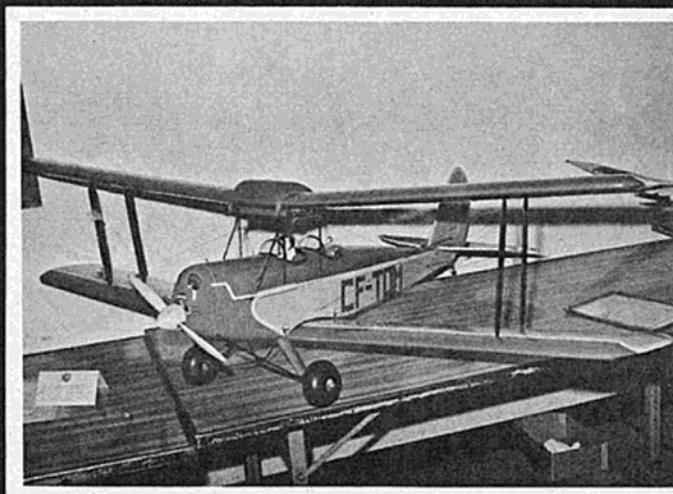
The very popular VK Challenger. VK Model Products display.



You'd have to see this one to believe the spectacular finish HobbyPoxy exhibit.



The deBolt Jenny . . . complete with skis.



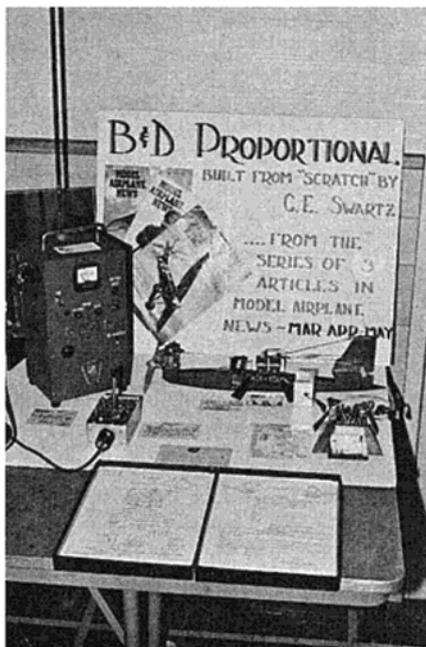
Scale Gypsy Moth, also from Ontario's Tom Dietrich.

CONFERENCE

Hawks" stunt team paint scheme in the resplendent gold color! Second place in this event went to Ed Izzo of Syracuse.

The award for best in scale, or original design, went to Dick Spidel of Ft. Erie, Canada, who entered a large and finely detailed scale model of a WW I Albatross DVA. Tom Detrich, also of Canada, took second, and H. Bussman of Buffalo, third.

On Saturday evening, nearly two hundred people attended the annual banquet and award presentations. Chuck Waas, Managing Editor of RCM, made the presentation of the Flying Bison's VIP Award to one of the best known and best loved members of the RC fraternity, Bob Dunham of California. Dr. Walter Good and Harold "Pappy" deBolt were former VIP award winners. Following the banquet, a four piece combo with Tom Brett at the piano provided music for dancing and for the enjoyment of the ladies in attendance. Movies and slides of various RC activities were shown for the unescorted gentlemen.



*Excellent display by the Flying Knights
—B & D Proportional system.*

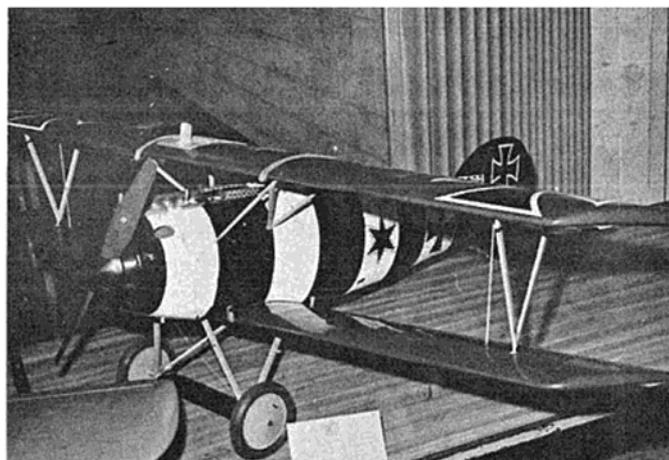
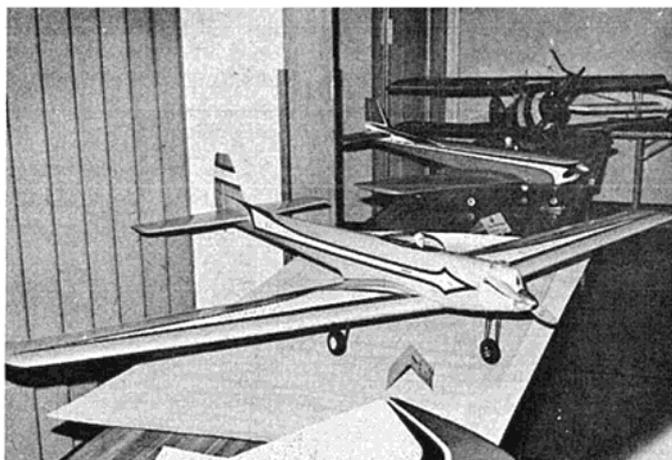
During the conference, many RC notables took their turn at the speaker's rostrum. Among them was Ed Lorenz, speaking on the FCC Committee; Bob Dunham on RC events around the world; and Ed Kazmirski on general modeling ideas. The question and answer panel was comprised of Dunham, Kazmirski, Howard McEntee, Ed Lorenz, Bev Smith, Ed Izzo, Tom Brett, Bill Winter, and Chuck Waas. Most of the discussion centered around the new proportional systems, many of which were featured and demonstrated at the show. Tom Brett, Kazmirski, and Dunham led a discussion of the single versus twin proportional, with the general consensus of opinion leaning toward the single stick models.

The new AMA rules were another topic of discussion with the vast majority feeling quite strongly toward establishing a Novice event — particularly in Class I where the less experienced modeler with single channel equipment and escapements is forced to compete against ten channel rigs used in Rudder Only competition.

All in all, the photographs tell the story. Congratulations to the Flying Bisons for a memorable weekend, and for their excellent hosting of this annual Conference.

Ed Izzo's Javelin — cored styrofoam wing.

Dick Speidel's prize-winning Albatross.





Bill Weaver, RCM's Editor in Japan, taxis his modified Stormer at Silver Wings Tokyo meet. Space Control gear and Merco .49. First in Multi.

Tokyo Silver Wings R/C Meet

U.S. equipment dominates multi. Japanese favor own single channel gear.



Kurata prepares to launch his Tokyo Echo, excellent single channel low wing. Designer Kudo watches. Uses aileron and motor control. Enya .15. To be featured in RCM.



Nakamura holds Kudo's twin engine version of Tokyo Echo. Two Enya .06 mills, single channel. Uses auxiliary fin offset, 20° directly behind each engine, allowing single engine operation.

H. Oki steams out with smoke bomb in demonstration flight. Space Control, ST .56, and special airfoil developed by Japan Aero Lab Wind Tunnel. Exceptionally stable with good stall characteristics.



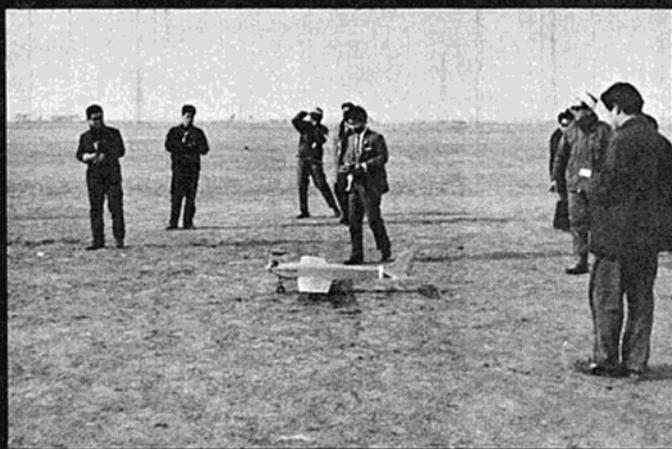
Isobe prepares his Taurus with Vecò .45 and Orbit radio.



Capt. Dejarnette with his Taurus.



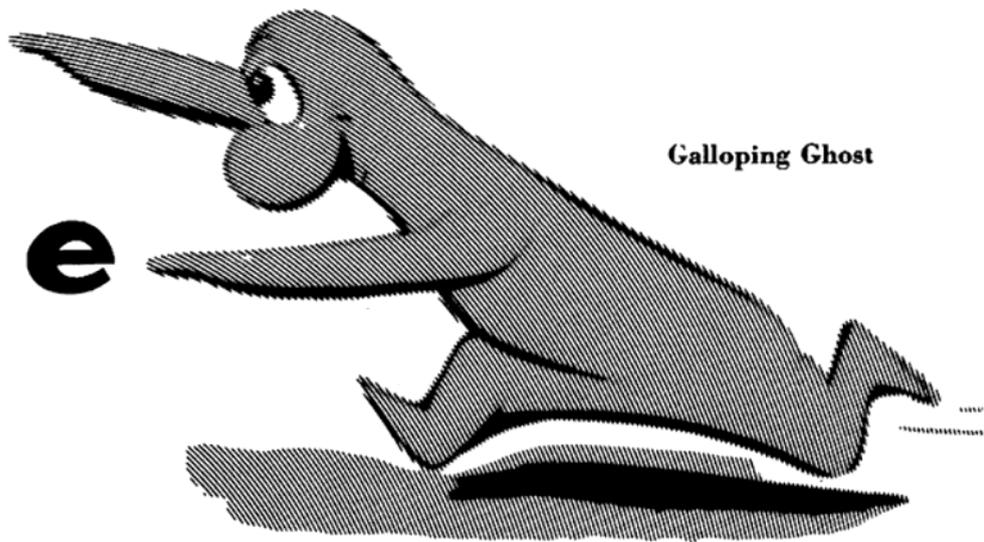
Silver Wings club members gather as Saito's 3rd Place Royal Grace 5 prepares to take off.



Kando's Bictaire breaks ground on takeoff. A reed ship, it uses 2° dihedral, thick section, and short moments.

Simple

Proportional



Galloping Ghost

Part I of a series of articles on simplified proportional control for Class II.

With the tremendous, but expected, widespread sweep of interest in the new simultaneous proportional systems appearing on the market, there has been a corresponding increase in interest in single channel, Class II proportional systems. Commencing with this introductory article, RCM will present a series of features on various types of units, including an article by Ted Strader on Galloping Ghost; and RCM superhet conversion and refinement of the B & D system; and a complete article on the installation and flying of the Glass City Multiplex Master proportional system. As with all material presented in these pages, the emphasis will be on "flyability," rather than experimental and unproven systems. This, we feel, will provide the modeler who does not wish to spend several hundred dollars on one of the multi proportional systems, a variety of ideas on proportional control that can be put to practical use and still give many of the features of the more complex, and expensive, proportional rigs.

Proportional Rudder with Elevator

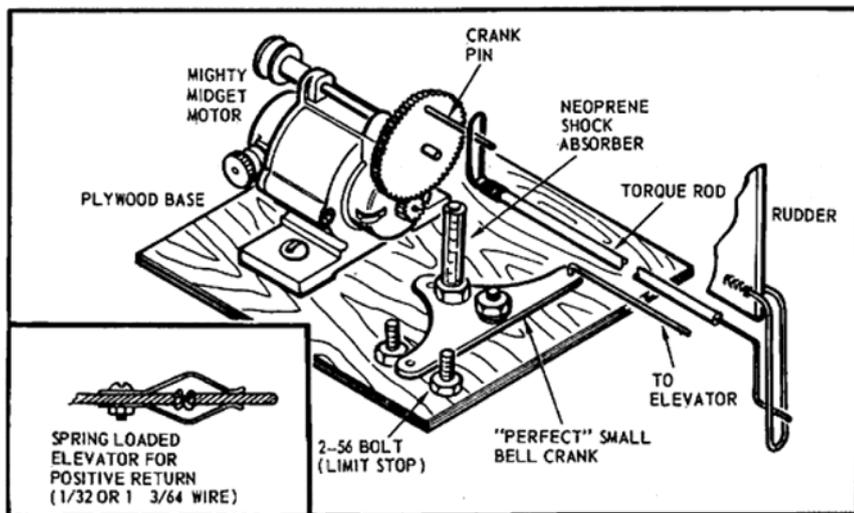
One of the simplest forms of proportional rudder is to utilize the very popular Mighty Midget motor as a pulse actuator. Adding "bang-bang"

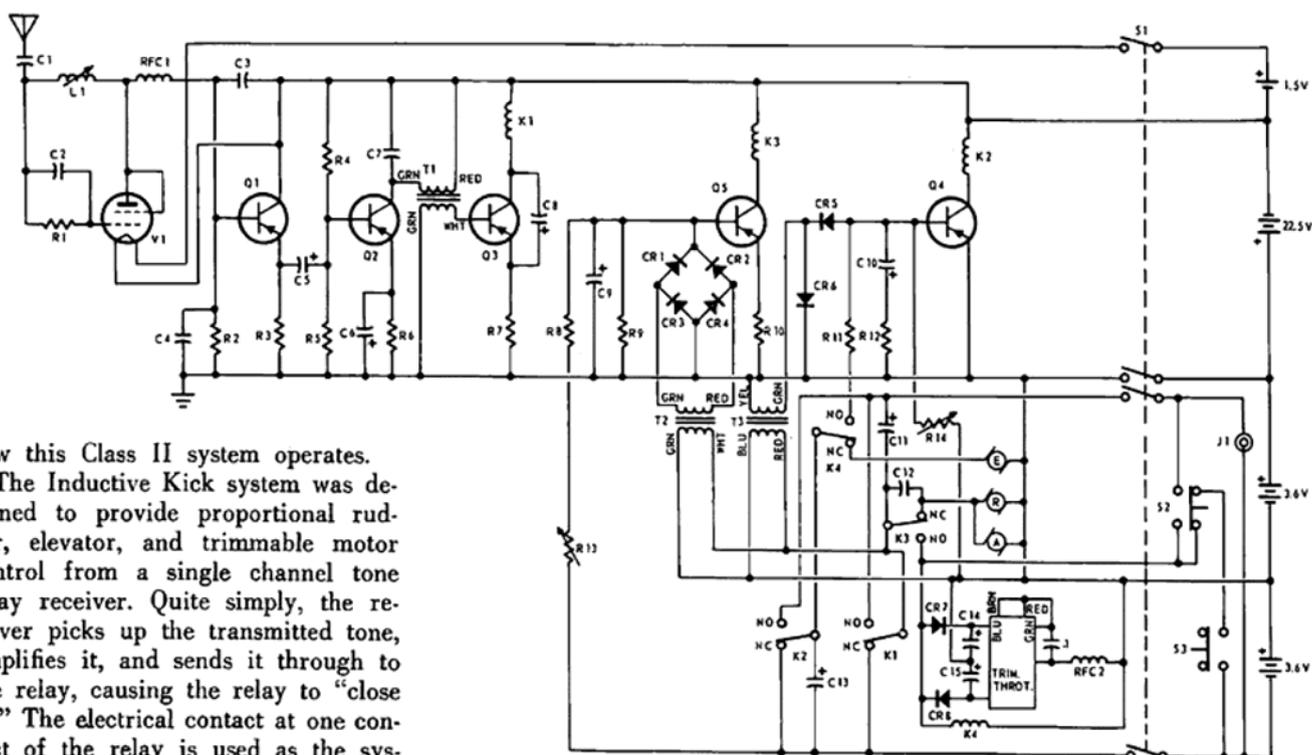
elevator to the same ship is a relatively simple process. The illustration from Chuck Cunningham, Forth Worth, Texas, shows this hook-up. No additional changes need to be made to your rudder-only pulser, as this operation requires only the full ON and full OFF buttons normally used for motor control. For elevator, full signal ON rotates the crankpin on the Mighty Midget until it hits the pin on the bellcrank, giving neutral rudder and full up elevator. (Or full down, depending upon how the fail-safe is set up — either lost signal or interference). This system can be

blipped by the ON and OFF buttons exactly as in multi-control. The rudder stick can be held in a turn position and the elevator blipped. Between blips, the rudder will return to the signal position held at the stick. Add light springing to the elevator, as shown, to insure positive return to neutral.

Kickin' Duck

Although we are not at this time presenting a construction feature for the Kickin' Duck system, an excellent schematic by Ernie Reuther appeared in the NJRCC Printed Circuit, and is reprinted here with an explanation of





how this Class II system operates.

The Inductive Kick system was designed to provide proportional rudder, elevator, and trimmable motor control from a single channel tone relay receiver. Quite simply, the receiver picks up the transmitted tone, amplifies it, and sends it through to the relay, causing the relay to "close in." The electrical contact at one contact of the relay is used as the system is working with a centered position on the pulse box by putting them through a miniature transformer to get the inductive kick out of it, and utilize it, by amplification in a transistor circuit to operate another relay which controls the elevator servo.

With the pulse box stick in the neutral position, the elevator relay is pulsing equal amounts of ON and OFF signals to the Mighty Midget actuators. If the pulser stick is moved forward, increasing the speed or rate of pulses, through a transistor circuit, it causes the relay to stay closed longer than it remains open. The elevator servo then will drive the elevator to the down position. If the stick is pulled back, the pulses are slowed down and the elevator relay subsequently remains open more than closed, resulting in up elevator. The system itself, as explained, depends upon pulse rate and width variations to operate the rudder and elevator independently and simultaneously. The Mighty Midget actuators are basically the same as the ones used for rudder-only proportional control except that they have been reworked to some extent and have double gearing to provide smoother operation and additional power to the control surfaces.

The motor control is operated by a pulse omission detector (P.O.D.) using a multi servo such as the Ann-

co 2R which provides trimmable throttle by momentarily ceasing the pulsed signals. All moving control surfaces go to neutral position when changing engine speeds.

The required pulser is equipped with two pushbuttons, one full ON which advances the throttle, and one full OFF which retards the throttle. The pulser to be described for Galloping Ghost systems can also be used for the Inductive Kick system.

The parts call-out for the Kickin' Duck circuit is as follows:

V1	1AG4 Raytheon tube
Transistors:	2N404 or 2N215 (selected)
Diodes:	1N645 (except D7-D8 power diodes)
RY1	5K (receiver)
RY2	5K (elevator)
RY3	5K (P.O.D.)
RY4	100 Ohm (elevator fail-safe)
R	MM rudder servo
E	MM elevator servo
A	MM aileron servo
TH	Ancco 2R trimmable throttle servo
TR1	CR-60 transformer
TR2	CR-60 transformer
TR3	TR-98 transformer
S1	4PST slide switch
S2	SPDT momentary pushbutton
S3	SPST momentary pushbutton
C1	2.2 uf (NPO)
C2	47 uf (NPO)
C3	.001 mf
C4	.01 mf
C5	10 mf 25V electrolytic
C6	10 mf 25V electrolytic
C7	.01 mf
C8	1 mf 25V electrolytic
C9	20 mf 6V electrolytic

C10	100 mf 3V electrolytic
C11	100 mf 15 electrolytic
C12	.02 mf
C13	50 mf 15V electrolytic
C14	30 mf 15V electrolytic
C15	30 mf 15V electrolytic
R1	2.2 meg
R2	39K
R3	39K
R4	100K
R5	10K
R6	4.7K
R7	56 ohms
R8	3.9K
R9	15K
R10	110 ohms
R11	62K
R12	75K
R13	10K
R14	10K
J1	Charging Jack
RFC1	20 Micro Henrys
RFC2	24 Micro Henrys

Galloping Ghost

Galloping Ghost is, basically, a simple form of simultaneous dual proportional control. Again, pulse length is used for rudder and pulse rate for elevator. In this system, however, only one Mighty Midget, or other actuator, is used, with interconnected elevator and rudder, and with mechanical rather than electrical separation of control signals.

The photos illustrate the new Phelps, high-stability pulser to be

SIMPLE PROPORTIONAL

kitted by Ace Radio Control. This prototype was one of six sent to various individuals across the country for final checkout prior to kit production. It was designed by John Phelps to fill the demand for a reasonably priced (\$28.95 in kit form) pulser capable of complete precision, and having immunity to drift with battery voltage by utilizing a unijunction transistor. The new high performance GE 2N2924 transistors are used in place of the original, and large, 2N-1694 units. Since high rate is possible by changing the value of the electrolytic capacitor, the pulser will provide the precise accurate encoding signal needed for both Galloping Ghost and Kickin' Duck systems to perform at an optimum level.

This pulser in this form is recommended for all so called single channel uses. This usage includes Kicking Duck, Galloping Ghost, etc. Since high rate is possible by changing the value of the electrolytic capacitor, the pulser will provide the precise accurate encoding signal needed for such systems to perform at an optimum level.

The pulser has a section that is responsible for the generation of the essential wave form, a rectangular wave whose duties cycle and repetition frequency are variable, independently, as control commands.

The first portion, a unijunction oscillator, furnishes a saw tooth beginning near ground and rising to

approximately 12 volts. The frequency or period of the saw tooth is determined by the value of the timing capacitor, C, the intrinsic standoff ratio of the unijunction and the rate elevator stick pot setting. Since the period is defined by the relation among 3 variables, 2 of which are predetermined (unijunction transistor characteristics and timing capacitor tolerance) a trim provision of sufficient range is provided to absorb these variables.

The elevator stick pot is a standard 270 degree linear 50K ohm pot, and should be positioned on the stick assembly so that the moving wiper hits the pot stop with the stick all of the way forward. This position gives the greatest possible frequency change ratio (4:1) for the 80 degree stick travel. Less elevator control can be had (and a lower pulse frequency at center position) by rotating the pot away from this initial adjustment.

The two stage high gain squaring amplifier is a NPN PNP direct coupled pair. Both transistors are turned on and the PNP saturated by the one meg resistor in the plus 22 volt rail.

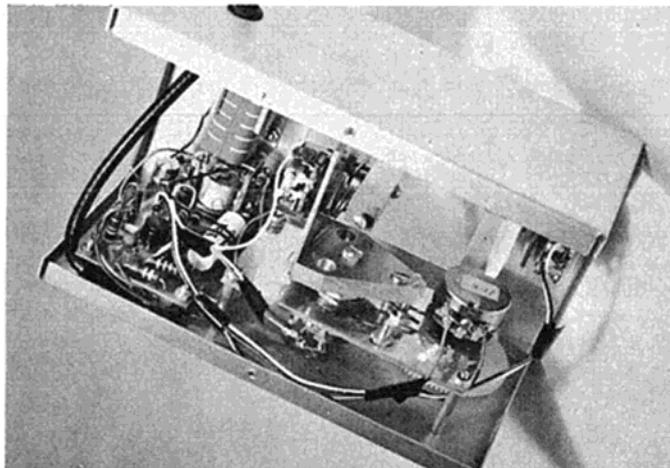
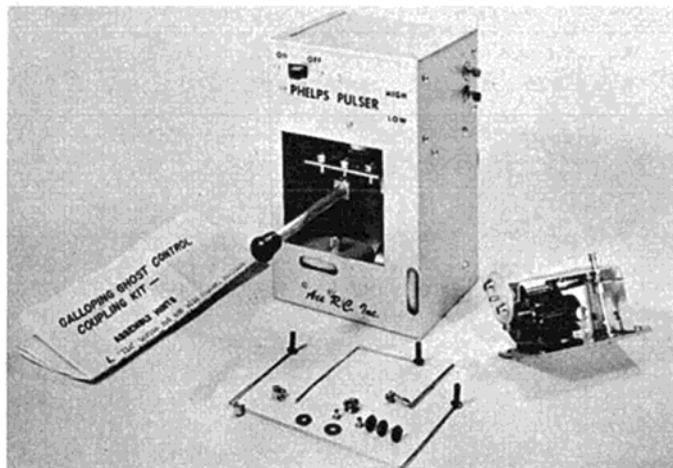
The stick pot in the emitter of the 2N2926 (a standard 10K linear taper 270 degree pot) sets a DC voltage which determines the voltage level at which the saw tooth turns off the squaring amplifier. The scheme of calling upon the saw tooth only for turn-off duty assures light saw tooth loading (22 micro amperes maximum) and assures a low control interaction and exceptional temperature stability. The result of squaring at various voltage levels, determined by the rudder stick pot, is a variable duty cycle square wave. Eighty degrees of stick travel changes the duty cycle from

80% to 20% off, to 20% on, and 80% off. The duty cycle should be set for 50% with the trim pot at center travel, and the stick straight up. An ohmmeter connected between the relay armature and either contact will read duty cycle directly as a mid-scale deflection (average) for 50% duty cycle.

Shielded cable with the outer shield connected to both transmitter chassis and the pulser box is necessary to prevent transmitter RF from creeping into the pulse box and raising hob. Transistor choice and component values team together to guarantee 10 degrees Fahrenheit to a 140 degrees Fahrenheit pulser operation. Weak dry batteries are readily exposed by low temperatures, so check by cold soaking the battery. Pulsers will stop at a level determined by relay spring tension.

Two additional items that will aid the Galloping Ghost fan to achieve a greater degree of reliability and air time, are the Go-Ac servo and GG control coupler from Special Editions Plans. The Go-Ac is a go-around type servo utilizing a Mighty Midget and spring-return worm gear that provides the normal GG functions plus trimmable throttle without the necessity for additional servos or circuitry. The control coupler is an accurately made linkage for Galloping Ghost which eliminates the four or five hours usually necessary to form the surface linkages.

With this basic information as an introduction to simple proportional, Part II by Ted Strader in the May issue, will involve a complete discussion of Galloping Ghost from start to finish.



RCM PRODUCT REPORT

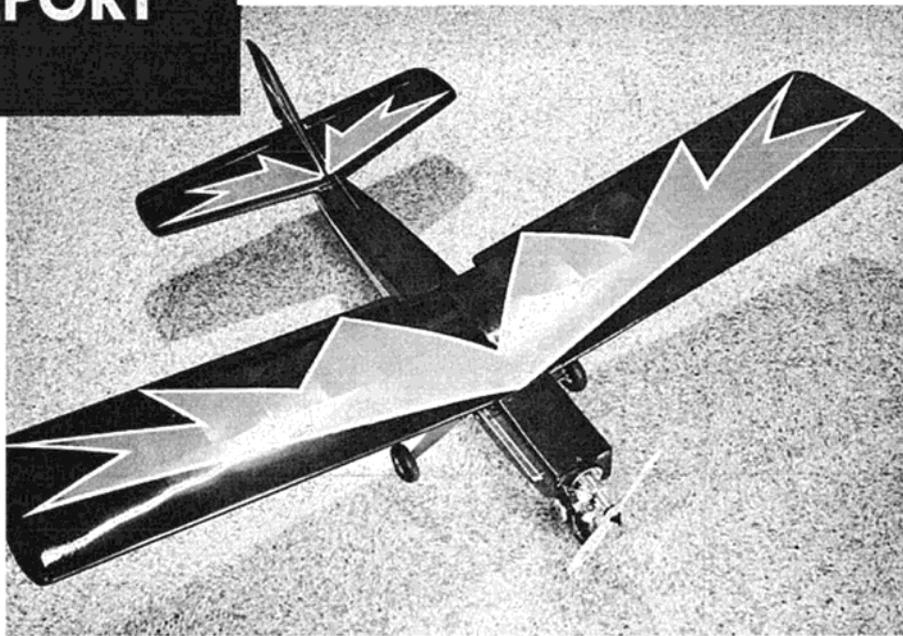
This month, RCM has selected and constructed two new kits in the radio control field. The first is the Livewire Jenny from deBolt Model Engineering Company. This new addition is a definite departure from the usual Livewire kit, not only in design concept, but in prefabrication and construction techniques.

The Jenny, designed for single through full-house proportional use, has a wingspan of 57" and an overall area of 620 square inches. All up weight is up to five and one half pounds with motor requirements varying from a hot .19 through the larger .45's, depending upon the weight and control system used.

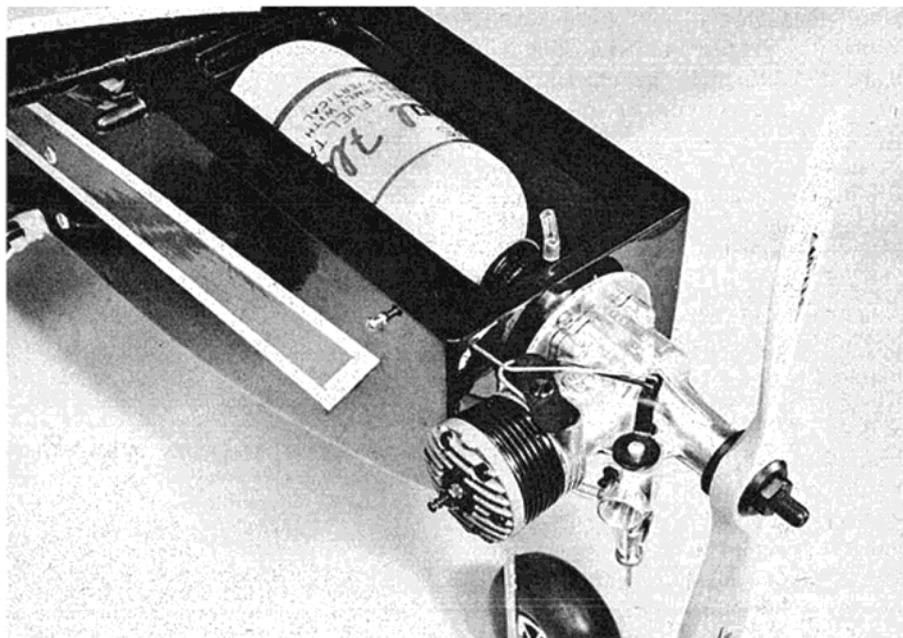
The Jenny, by any stretch of the imagination, does not strike you as a raving beauty with flowing contours. When you have finished the ship, however, you will be amazed at its overall appearance. The photos of the RCM prototype constructed by Don Dewey, finished off in PolyAqua black, red, and white, will give you an idea of just how striking this basic "box" can be.

The Jenny kit, itself, is one of the finest kit efforts we have seen. The fuselage is a combination of plywood and balsa — the forward two-thirds of the fuselage being constructed of straight plywood, butt joined to balsa to complete the unit. All servo mounting holes, dowel holes, etc. are pre-drilled and are exactly accurate! deBolt has gone to such an effort with this kit that every conceivable piece of hardware is included — and this means hardwood dowel pieces, pre-drilled, for push rod bearers, the push rods themselves, all control horns and screws, aluminum tubing for motor and nose wheel push rod bearers, etc. All wood in the kit we purchased from a local hobby dealer was of the highest quality. Die cutting was outstanding, although this can be expected from the first run on new dies.

The plans were completely detailed and the instructions covered every step of the assembly, finishing, and



RCM Editor's Jenny, resplendent in black, red and white Poly-Aqua finish.



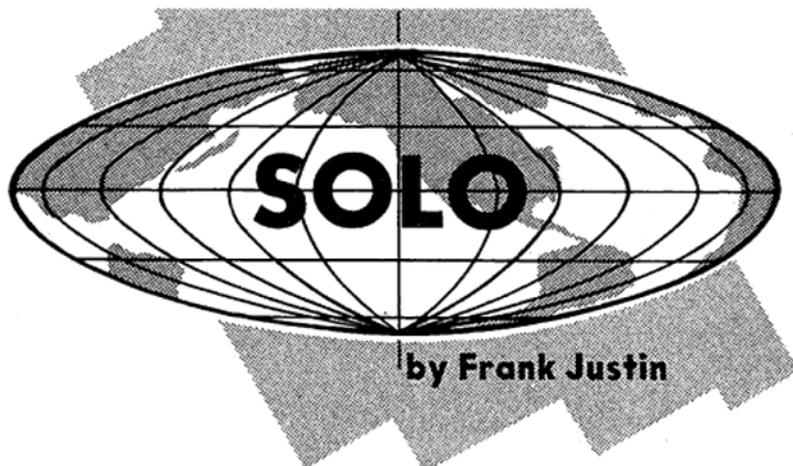
Side-mounted KB 35 ample power for 5 lb. Jenny.

flight trim. We do not personally care for single spar wings, with no leading and trailing edge sheeting, although deBolt feels that the wing gains strength from its inherent flexibility. Despite this, we sheeted the wing top and bottom and carried the spar up to the tops of the ribs by webbing top and bottom. This produced an extremely tough wing. If you follow

this procedure, be sure to use a jig or you'll discover you've built-in the warps!

We used a deBolt RC7 tricycle nose gear (not furnished) and installed a reducing arm between the rudder servo and nose wheel. The direct linkage shown on the plans

Continued on page 33



Since we have been flooded this month with almost no requests for our sage advice born of years of continuous airborne malfunctions, we will once again bring you for the first time the answers to all of the problems in R/C. If you have a problem that isn't answered here, then you don't have a problem, so forget it.

Q. There's a guy at our field who flies a single channel Bootstraps. His transmitter is not only over the FCC regulations for power, but he splatters on all the 11 meter frequencies. What makes it even worse, he hogs the air, flying forty five minutes at a time, one flight after another. None of us get a chance to fly. What do you suggest we do about him?

A. First, there's one thing we can't stand, and that's a multi-snob like you — what have you got against single channel? Second — find out what kind of equipment he's using!

Q. I recently purchased a K3V relayless receiver kit. I hooked the red and white wires to my Babcock 9V escapement and the long brown wire from the other end of the receiver together with the short black wire to two flashlight batteries. I have followed the manufacturers kit building and installation instructions exactly. What should I do?

A. Wrap the whole mess with several loops of heavy solder and send it back to Phil Kraft — you just can't trust these receiver manufacturers!

Q. I have read your reviews of the new proportional rigs and watched some of the local flyers

that fly with these systems. I'm at a loss, however, as to which one to buy. What do you feel is the most important criterion in purchasing a new proportional system?

A. Money.

Q. My husband's firm advertises in your magazine. When he is not working he's in the garage building planes. I would like to spend some time with him and have asked him to teach me something about radio control. My husband, however, says it is too complicated and technical for me. Can you help me?

A. Your husband's firm advertises in our magazine... radio control is too complicated and technical for you.

Q. Most of the technical editors of the other model magazines write in such a complicated fashion that I can't understand them. Your technical editor is simple.

A. True.

Q. My boyfriend spends most of his weekends working on his models instead of me. What should I do?

A. I beg your pardon?

Q. I've heard the word "modular" mentioned — what is it?

A. One who builds modules.

Q. A neighbor of mine has a ham rig and I found there isn't much activity on the six meter FM band. Would you please tell me how to convert my RC rig to this frequency?

A. No.

Q. I have a friend who has been most helpful — when I smashed up my Taurus he help-

ed rebuild the wing and stab. When I stacked my Stormer in the creek he waded in and retrieved it for me. What can I give a guy like that?

A. Your equipment.

Keep those questions coming — it does my heart good to help people.

In a more serious vein, the conversation at the field always includes a hefty discussion of proportional, and since I promised last month to talk about this matter from a personal involvement, let's take another look at the issue.

A month has past and I have a new ship built, Phil Kraft's Kwik-Fli, which will appear in the next issue of RCM. Still, I have not received my new proportional rig. I respect the manufacturer for not releasing anything of which he is not one hundred percent confident, however this fact, in itself, points up some of the conditions that should give cause for consideration to the prospective purchaser. Only a very limited number of RC'ers fly with one of the top three proportional rigs who are not personally acquainted with the manufacturer and who do not have unlimited "manufacturer assistance."

You may ask why this is the case. Simply, the proportional system is still very complex, prone to interference, and loaded with components subject to failure. Something more to consider is that no one agrees on which system concept to use. Let me list a few rigs that I have had a chance to look over: Sampey 404, Kraft, Orbit, Digicon, Klinetronics. Of those just listed, no two use the same system of coding and decoding.

Yet, look at reeds — all the top rigs are essentially the same in system, packaging, battery complement, etc. Reeds have evolved to a level where we can buy and use them with trust and confidence. In my opinion, the evolution of proportional control needs two more years to reach this same level of reliability. The manufacturers are spending considerable time and money to perfect proportional control and we owe them a great deal for their efforts.

This is not intended to be a negative attitude toward the new proportional systems — if I didn't believe in them, I wouldn't have one ordered. Rather, it is meant to be a word of caution to anyone who can't afford to experiment. Reeds will be around for a long time, and if you are ready for multi they are still a good investment. If, however, you are an advanced sport flier considering the competition trail, you will need proportional to make one of the top three places in an event.

While we're on the subject of manufacturer efforts, and since nobody asked, here's a few items I'd like to see: a really good single channel superhet at a price the new modeler could afford. How about upgrading reeds while reducing the price to less than \$200 complete with batteries? We need new servos with new design concepts — compare an old Duramite with a new Transmite and you will see what happens to tooling over long-term runs. The Ancco is good, but the present motor leaves much to be desired. Ancco's push-pull output is definitely a step in the right direction. While on the servo kick, let me say that I doubt if any of the aforementioned proportional manufacturers has a servo he wouldn't like vastly improved, although the new Accutronics Trio looks very good.

Too, I've often wondered what would happen if we had an electronic pulser for a reed rig. For the contest flyer, his concern is in the precision pattern, then the stunts. Most of the precision pattern is flown with many small beeps to keep things looking smooth, then for stunts a lot of full control movement is in use. If we had a pulser that was slow enough for reeds to follow — one that could be cut in or out with a simple push-button on the side of the transmitter — with a variable pulse rate to match

the ship, we would be able to give full deflection of a control switch and get gentle turns or large smooth loops. With the pulser switch off, rapid rolls and fast changes in pitch would be available. I don't personally believe it would be necessary to have the pulser operate anything more than the ailerons and elevators. RCM would like to have your opinion on this idea and will print any circuitry that looks promising.

RCM PRODUCT REPORT

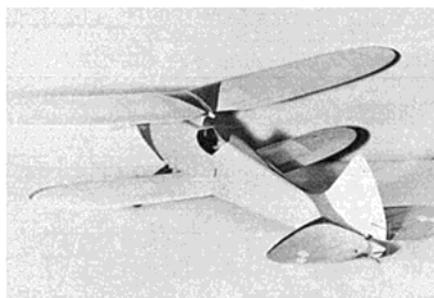
Continued from page 31

provides an excessive amount of control to the nose gear.

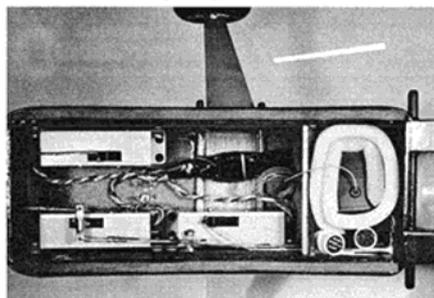
The total weight of our prototype, with Orbit six channel equipment, beefed-up wing, and several coats of epoxy paint was just slightly over five pounds. A K&B .35 proved to be more than ample power.

The Jenny is not only an excellent kit, but is an outstanding flier. As the manufacturer claims, it is stable on rudder only, an excellent trainer for multi reeds and proportional, and a competition machine in Class II. We might also add that it is extremely rugged. Our consensus of opinion warrants our highest recommendation for the Livewire Jenny.

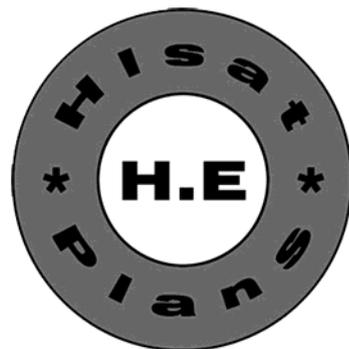
In the single channel sport flying category, we built the Chicken Hawk from Kustom Kit. The little biplane, designed by Ted Strader and featured in Flying Models last spring, turned out to be one of the most delightful projects we've undertaken. When you open the kit, you'll find the die cut sheets wrapped in paper and rubber banded together. When you remove this material, you'll find out why — the parts *fall* out of the sheets! The die-cutting is, without question, the very finest we've seen. The balsa wood is top quality and matched grain. The Chicken Hawk has a top wing span of 34" and a lower span of 25", and is designed for .200 through .049 power. We recommend a Baby Bee for rudder only sport flying. Two penceils, a CS 505A relayless receiver, and Babcock Mk V constituted the equipment used. Formed dural gear, Hillcrest wheels, and all hardware were included in this \$7.95 kit. Here is a small-sized single channel kit with all of the finery of the more exotic, and more expensive, multi ships. We recommend it without exception.



Kustom Kit's .049 Chicken Hawk — a beautiful sport biplane!



Six-channel Orbit installation in RCM's Jenny.

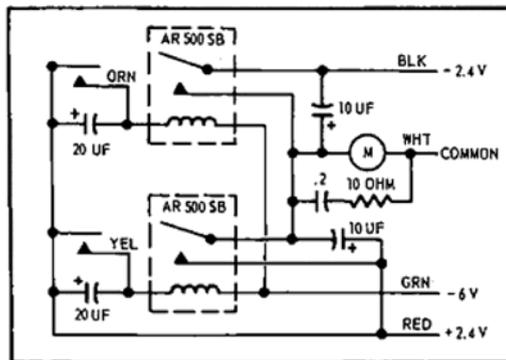


Hillcrest servo conversion for relayless rigs.

Using the old Hillcrest servo for motor control is ideal due to the slip clutch, eliminating the need for turning the equipment on to get high motor, then turning it off again until your motor is started. We have used the new reed relays from Omega for converting the Hillcrest unit for use with relayless units. These new relays seem to be just the ticket — they are light and vibration proof, and feature small, gold-plated sealed contacts with no springs to adjust. Model AR500SB with a 500 ohm coil is available from Omega Sales, Racine, Wisconsin. If a 100 ohm coil is desired, specify #AR100SB. Current is nominal on both units.

The circuit and PC board for control of the Hillcrest unit is quite simple. The board may be made up in a matter of minutes, using strips of electrical Scotch tape as an etch resist. After constructing the board, drill all component mounting holes. Components are then mounted, soldered, and excess leads snipped off.

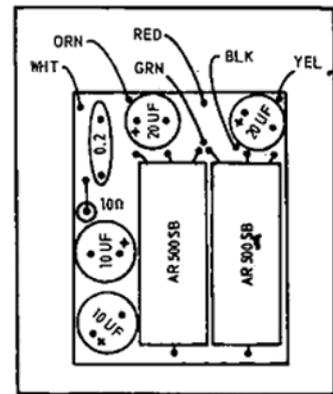
The PC board with all components in place fits into a small plastic box which is glued to the bottom of the servo as shown in the sketch. The plastic box is from a Walsco line which is sold at most electronic shops, originally containing miscellaneous screws, knobs, washers, and the like. Cut the box in two, to the size required to accommodate the PC board. Drill three holes in the bottom of the box after placing it on the back of the servo and locating the exact position of the two wires and protruding motor shaft. Drill a 3/16" hole for the wire outlet to plug for batteries and reeds. When the PC board is wired up, feed the two wires from the servo and solder as illustrated, making sure that these two wires go on the PC board. The board is then fitted into the box. Fit a plastic top to the unit, glue in place, then cement the entire unit to the servo.



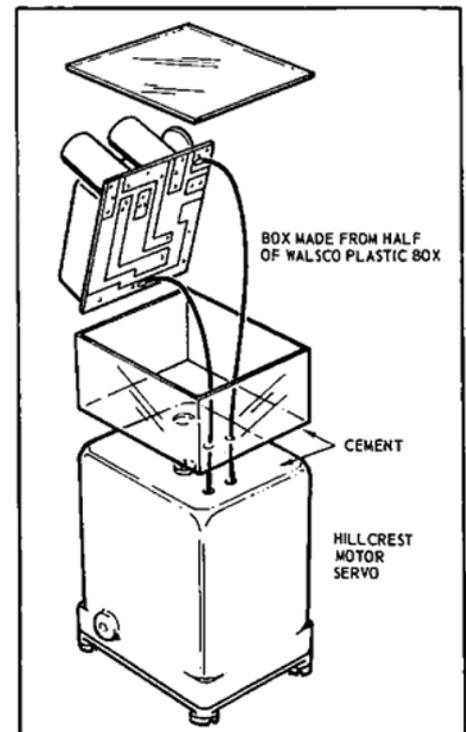
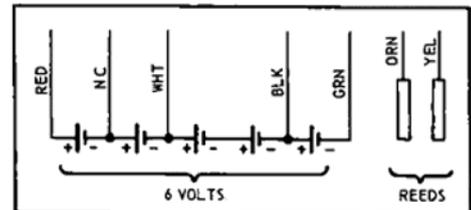
Some variation may be required for the 2-10 mfd filters across the reed contacts. 5 mfd has been tried and found satisfactory. These are to provide suppression for arcing and excess resonance. The .2 and 10 ohm resistor is for the servo motor filtering. A .1 and 10 or 15 ohms is also satisfactory.

When mounting the servo, be sure to install stops after the required servo travel is determined. The wires to the servo plug are formed in a standard hookup as for a Bonner or Ancco servo, therefore if properly wired, would be interchangeable. If a lower voltage is used, the AR100SB relay can be used in lieu of the 500 ohm AR500SB. These relays are ideal, and are being used to control a Bonner servo for trim function. Other uses are for single channel work and pulse proportional. The filtering for the contacts should be carefully checked in high current circuits. The DRG-1 (form "C" contact) can be used for single channel work and fits nicely on the Kraft single channel superhet in place of the reed bank or relay.

(From Steve Baxter in the 13th Channel, paper of the Edmonton RC Society)



BOTTOM VIEW OF PRINTED CIRCUIT BOARD



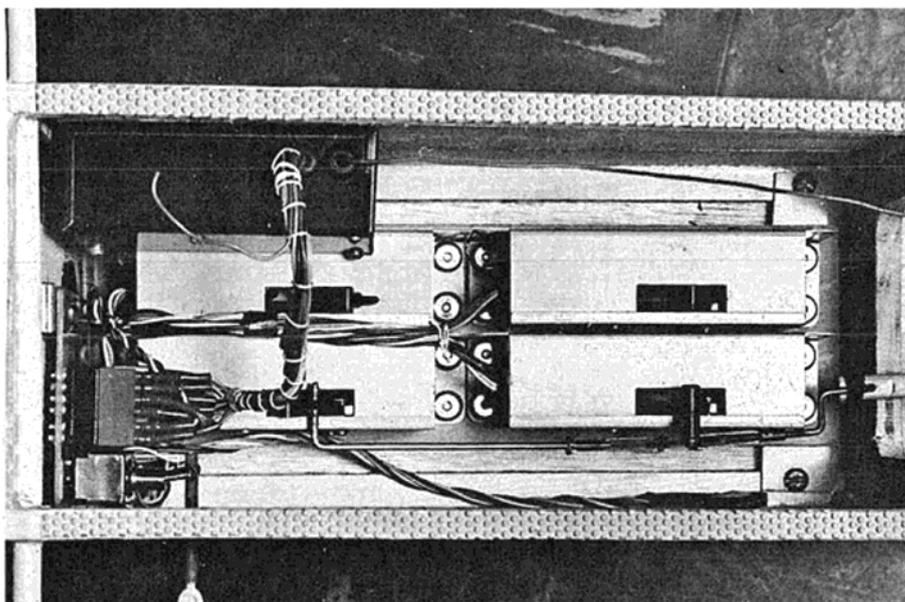


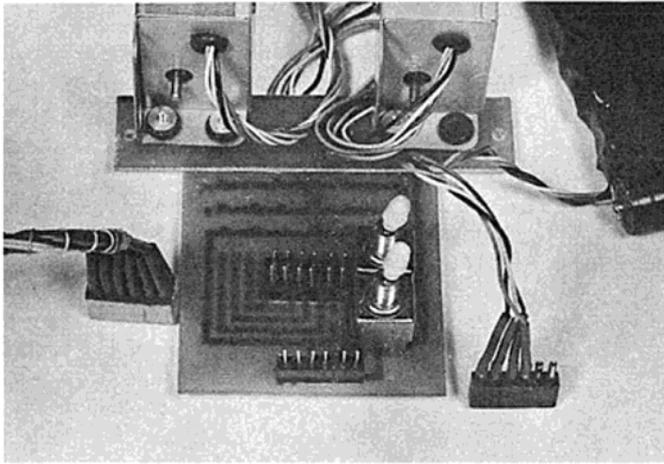
Printed Circuit Board For Multi Installations

by Bryce Petersen, WA8KER

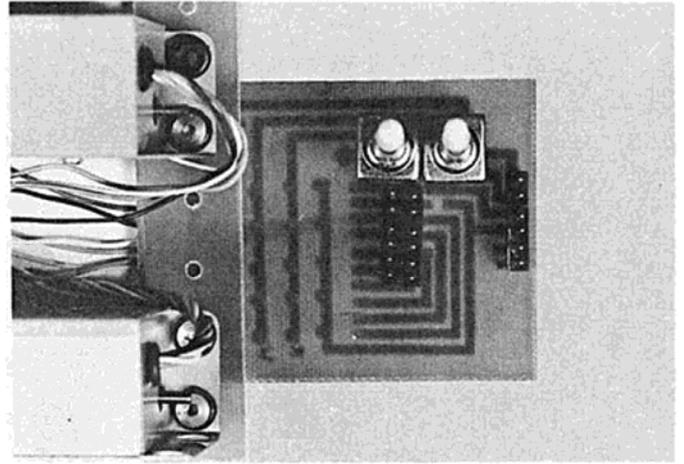
The compact hook-up board, designed to simplify multi wiring, was conceived by Bryce Petersen WA8KER, 444 Forest Circle, So. Charleston, West Virginia, when a friend experienced a ten-channel flyaway due to improper wiring. Determined that any such mishap would be the result of pilot error and not due to the installation, Bryce designed the printed circuit board reproduced here full size. The only additional items needed are the two Orbit plugs and two sub-miniature switches. After the circuit board is etched it is drilled to match the plugs and switches, becoming a press-to-fit installation. The jumper from B plus and ground is to match most any voltage requirement for the different receivers. (See photo showing one servo wired). The board can be mounted anywhere in the ship as long as an external rod can reach the switches. The two extra pins on the power plug can be used for external charging of the Ni-Cads.

As a matter of general interest, Bryce's LiveWire Champion is completely beefed-up with no attempt at saving weight, and complete with Orbit ten-channel gear. All up weight is only four pounds.

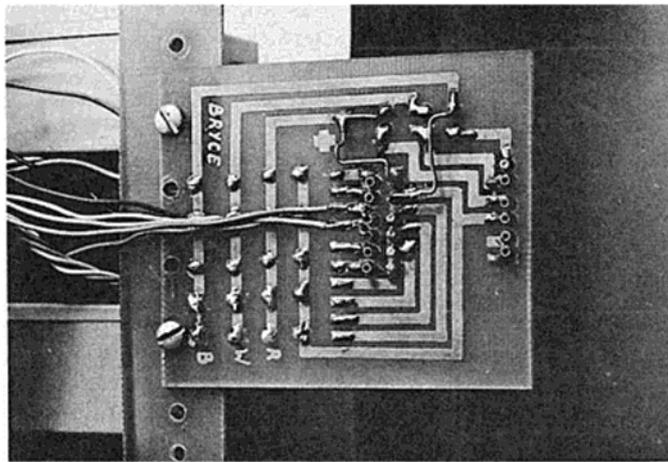




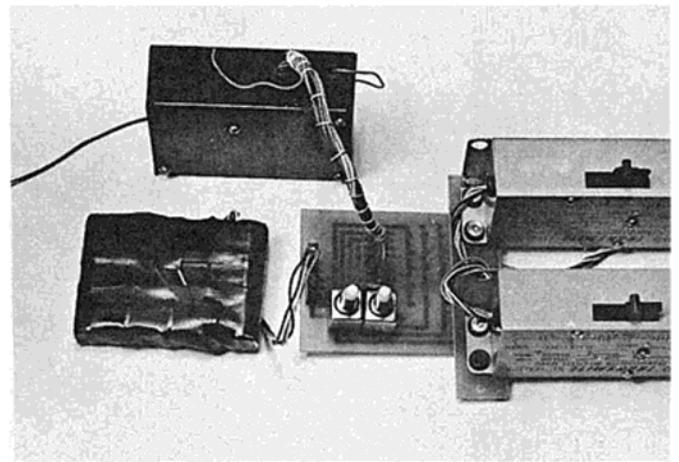
Installation of board. Two extra pins on power plug for charging NiCads.



Close-up of installation, showing mounting to servo rails.



Underside of board illustrating wiring.



Versatile unit can be used for any number of servos and mounted anywhere.

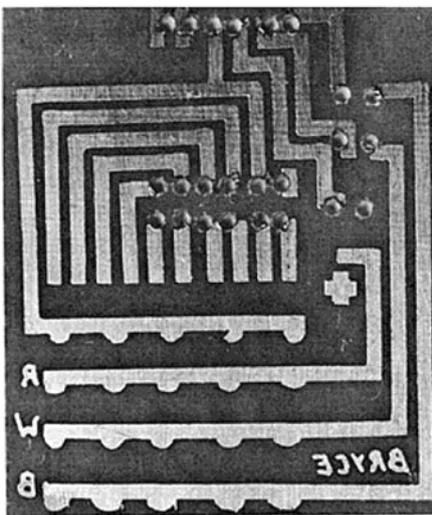
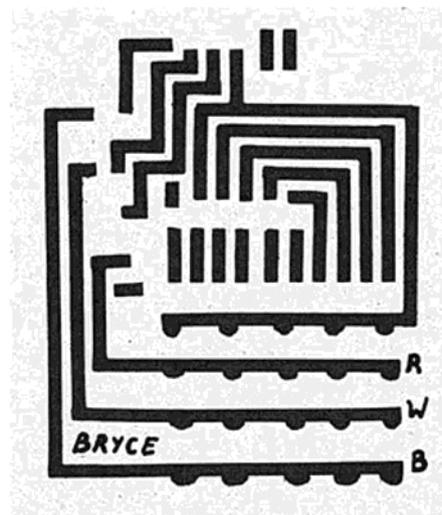


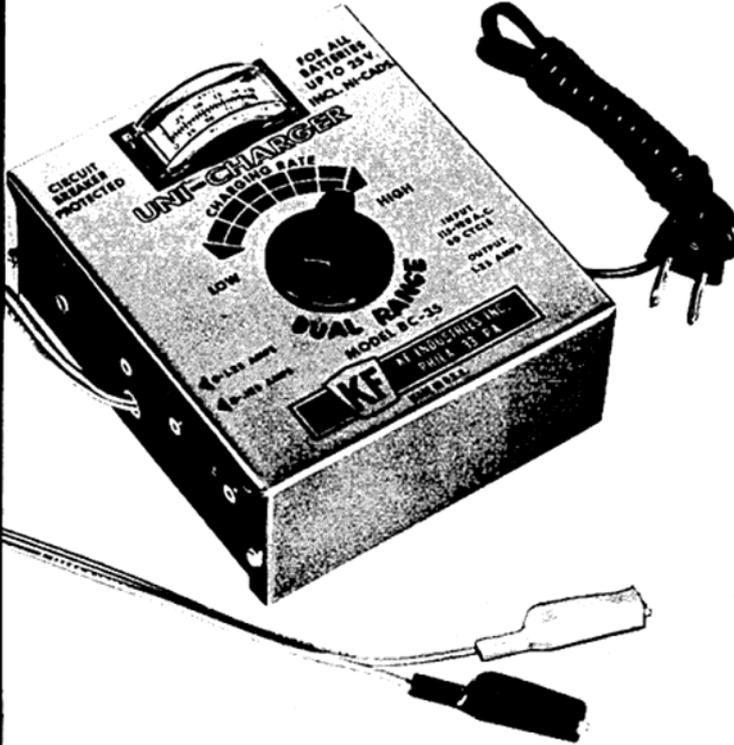
Photo of completed board.



Full size layout for PCB.

SHOWCASE

'64



Kraft KT-1 Transmitter. It sometimes becomes a bit confusing to read the advertisements of various manufacturers all claiming to have the "most powerful single channel transmitter." Perhaps, as with automobiles, we have become too "power conscious," for there are many more factors to be taken into consideration than just the output of a given transmitter. The newest release from Kraft Custom Radio seems to incorporate most of these desirable features — all adding up to that important element of reliability. The KT-1 is an all transistorized nine volt unit with 400 mw of input power to the RF final. Sine wave modulation is utilized to eliminate splatter. Tone frequency is approximately 500 cps. We have examined, tested, and flown with this unit and find it to be excellent for single channel work. We liked the heavier gauge material used in the gold anodized case, and the fact that sheet metal screws were used on the sides, as well as the top and bottom, in order to keep out a maximum of dust and foreign material. The antenna is a 54", 5-section collapsible base-loaded whip with a microphone connector at the top of the can. Controls consist of a push button and on-off switch. Internal circuitry is arranged to stand off from the case at a sufficient distance for the addition of an electronic quick blip arrangement if desired. Price will be \$29.95. PE Rating: Excellent. Circle #1 on the Reader Service Card.

Kraft KR-1 Superheterodyne Receiver. This is the companion receiver to Phil Kraft's KT-1 single channel transmitter. The photos show the prototype unit examined by RCM. This is a very compact 9 volt, single conversion crystal controlled superhet which is a "shrunk" version of the popular Kraft superhet reed receiver. Arc suppression is supplied for the relay. Vital statistics: ± 5 kc at 6 db down, sensitivity 2.3 microvolts. PE Rating: Excellent. Circle #2 on the Reader Service Card.

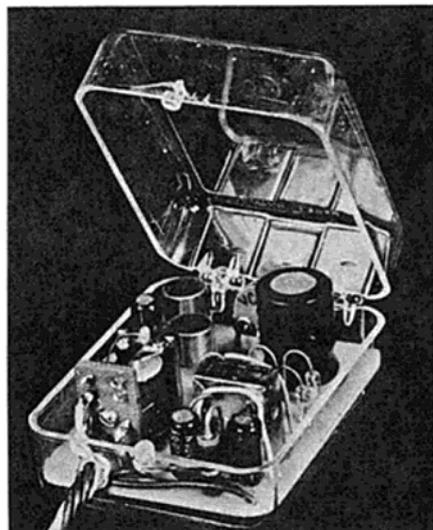
RSH Superheterodyne Receiver. Citizen-Ship Radio Corporation sent RCM the first of their new relayless selective superhet receivers which was unveiled at the recent Chicago Trade Show. This is the



Excellent new single channel relayless superhet from Citizen-Ship.

smallest superhet receiver we have seen, and probably the smallest such commercial unit in the world. The physical dimensions of this unit are 2" x 1 1/2" x 3/4" with a weight of 1 1/4 ounces. Operating from a power supply consisting of two E91 or equivalent 1.5v energizers, single channel fliers finally have a unit that can be used in the popular 1/4 and 1/2 a planes. Since superhet receivers are almost a must in virtually every part of the country, we were very anxious to see this new unit — our anticipation was more than justified. We will go on record as saying that we have flown a great majority of Citizen-Ship equipment, all of which was noted for its dependability, performance, and

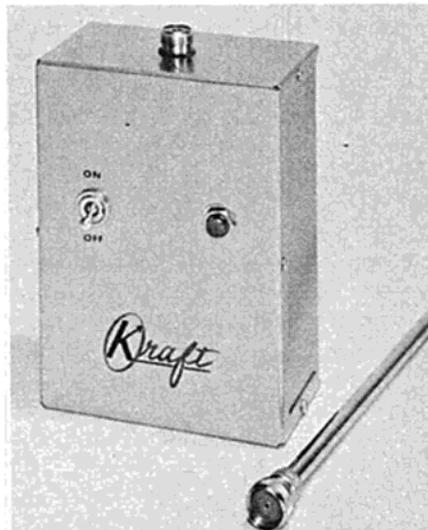
Andy Wright proportional rate control unit.



RL-6 six-channel relayless receiver, new from Citizen-Ship.

reliability. This new RSH receiver is no exception. It exhibits excellent workmanship and design concept. Its performance meets the standards of all Citizen-Ship equipment. Seven transistors are included in this crystal controlled oscillator set. Idle is 5 ma and delivers 2.8V to the escapement. Although not necessary, we prefer to use a separate battery supply for the actuator when used with a superhet and would recommend this practice whenever space and weight conditions permit. There was no overload noticed at any distance. High quality epoxy glass was used in the printed circuit board. Our unit was furnished with a 27.145 mc crystal and all six frequencies are available. Price is

New Kraft single channel 9V transmitter.



SL-6 six-channel all-transistor transmitter.

\$34.95 — quite low for a superhet unit. PE Rating: Excellent. Circle #3 on the Reader Service Card.

6 Channel Receiver & Transmitter. Also from Citizen-Ship, and new for 1964, the SL-6, six channel all transistorized 9V tone transmitter and RL-6, six channel, relayless, all transistorized superhet reed receiver. Although we have not as yet seen these units, the manufacturers specifications suggest that this may be an excellent addition to their new line, designed for the sport or contest flier in Class I, II or Pylon events. Price: SL-6, \$74.97; RL-6, \$54.95. PE Rat-

Kraft single 9V superhet relay receiver.



SHOWCASE '64

(Continued from page 38)

ing: Not evaluated. **Circle #4 on Reader Service Card.**

Spacetrone Adds To Single Channel Line. The Spacetrone Opal 400 3V relayless single channel receiver now includes a tuning lamp, although the price remains at \$18.95. The lamp is connected across the receiver load (escapement or relay) and lights when receiving a tone signal. The lamp eliminates the use of a meter or earphone for tuning, and may be permanently wired in the plane if desired. If properly positioned, it can be used to aid in locating a downed plane after dusk. A double ended output is now available for the Opal 400, permitting proportional control operation when used with a magnetic actuator such as the Septalette or equivalent. This unit can also be used in place of a relay for quick blip motor control. Price is \$4.95. A Ni-Cad power pack, 2.4 volts, 250 mah, utilizing American made Burgess batteries and complete with mating connector is available for \$6.95. A companion charger for the above is also new for 1964. The receiver, double-ended output, and Ni-Cad pack are all encapsulated and carry a full two year guarantee. Designed for the Opal 400 receiver, the accessory items can be used with almost any 3-volt, single channel tone receiver. Spacetrone also announces their Cougar I all-transistor, 9V tone transmitter to be available in the early spring. PE Rating: Not evaluated. **Circle #5 on the Reader Service Card.**

Altair .99 R/C Mill. Altair Enterprises of North Hollywood, California announces the release of their .99 cu. in. displacement RC mill. Displacement is .9905, Bore 1.20, Stroke .900, H.P. 1.5 at 11,700 RPM, Prop. 12-8 to 18-6 (turns 12,500 with a 14-8), O.A.H. 4.2", O.A.W. 2.4", O.A.L. 4.5", Weight 16 ounces. Two precision ball bearings are used in

the crankshaft, the piston is a two ring aluminum unit, and the throttle allows an RPM range from 1500 to maximum. Price is \$49.50. PE Rating: Not evaluated. **Circle #6 on the Reader Service Card.**

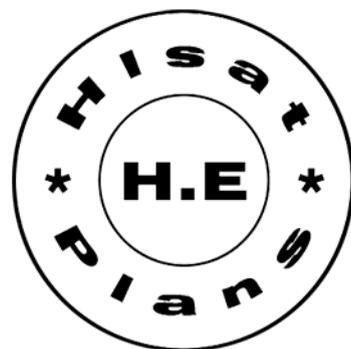
Altair 1.2 Marine Engine. A second unit from Altair is their new mill for RC boat enthusiasts. Specifications: Disp. 1.20, Bore 1.240, Stroke 1.00, H.P. 2.75 at 16,500 RPM, O.A.H. 4.2", O.A.W. 2.4", O.A.L. 4.5", Weight 19 ounces. The same features are used for the crankshaft and piston as in the .99 unit. Cylinder has a full length water jacket. Throttle is available. Price is \$65.00. This should be a real power unit, to say the least! PE Rating: Not evaluated. **Circle #7 on the Reader Service Card.**

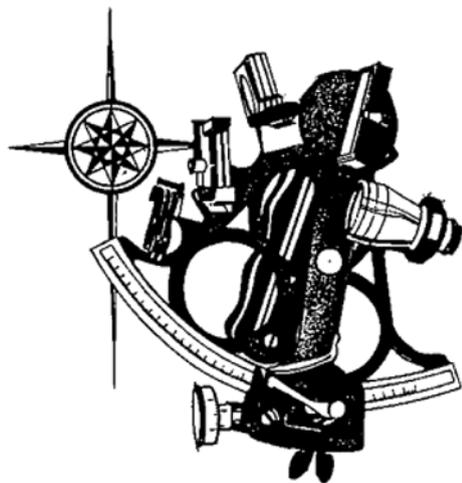
KF Uni-Charger. The Uni-Charger from KF Industries is designed to charge any battery from 1 to 25 volts, offering a continuously adjustable charging rate control which allows regulation to factory recommended charging rates for any battery. A dual range is provided — 0-125 milliamperes for small Ni-Cads and 0-1.25 amperes for larger Ni-Cad or lead-acid batteries. A raised dual range ammeter automatically indicates charge rate at any time in either range. Equipment protection is built in to this unit by means of a specially designed automatic self-resetting circuit breaker. Price is \$13.95. PE Rating: Not evaluated. **Circle #8 on the Reader Service Card.**

Wright Proportional Rate Control. The Andy Wright Rate Control unit provides proportional fliers with an independent auxiliary control which may be used for any additional function, such as motor control, etc. Designed for single channel usage, it is triggered through increasing the pulse rate at the transmitter. This allows you to fly with either stick or buttons without accidentally triggering the control unit, a common problem with pulse omission units. The Wright circuit operates directly from the actuator batteries without the need for a separate power supply. This is a fully transistorized unit which weighs 2 ounces and measures 2 1/4" x 1 3/4" x 1 1/8". Price of the unit is \$14.95 from your

local dealer, or direct. It is fully assembled, tested, and guaranteed. PE rating: Not evaluated. **Circle #9 on the Reader Service Card.**

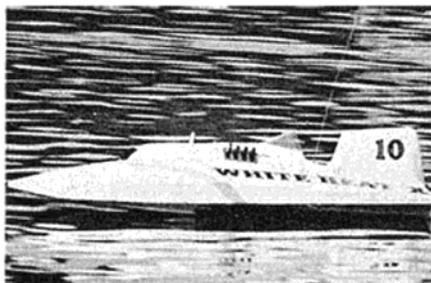
Model Cam Locs. At a recent Flying Bisons conference in Buffalo, N.Y., our Managing Editor was able to "obtain" a set of model Cam Locs, similar to Dzus fasteners from Pappy deBolt. deBolt Model Engineering Company is now supplying these excellent fasteners to the modeling consumer at a price of \$1.50 per pair. One of our pet peeves has been the necessity for using rubber bands for wing hold-down, in lieu of something better. We go to a lot of effort to put a beautiful finish on a model, then lash down the flying surfaces with rubber bands as if they were all an afterthought. These new Cam Locs are excellent and should prove very popular. PE Rating: Excellent. **Circle #10 on the Reader Service Card.**





REGATTA

RCM's Guest Editor: T. R. Perzentka



There are a number of hobbyists eager to try their hand and abilities at R/C. However, either due to the lack of flying sites, their experiences with free flight planes or — let's face it — their age, have considered building a model boat as the vehicle for their initial R/C venture. There are some advantages to building a boat; more available running sites (60% of earth's surface is water); no thermals to worry about; no corn field to chase across and to date no boat has been recovered from a tree! Also the life span of an R/C boat (excluding speed hydros) is usually much longer than that of an R/C plane.

You can make the same mistake twice with a boat that could prove disastrous with a plane. Construction of a model boat can be simpler and take less time than a model plane (no wings, stabilizer to build, just the hull). Fine. Then why haven't more R/C enthusiasts gone in for model boating?

First off, the lack of good proven designs and construction articles for boats. Second, the necessary fittings

and information were lacking. What size engine? What size boat? How do you cool the engine? What size flywheel? What size prop? How do you connect it to the engine? What about the drive shaft? How do you make a stuffing box? How do you start the engine? How big a rudder? and on and on. You probably have had these questions pop thru your mind many times if you have ever considered building an R/C model boat.

Let's try to answer your questions one by one starting with the power plant and its related fittings and working up to the hull itself.

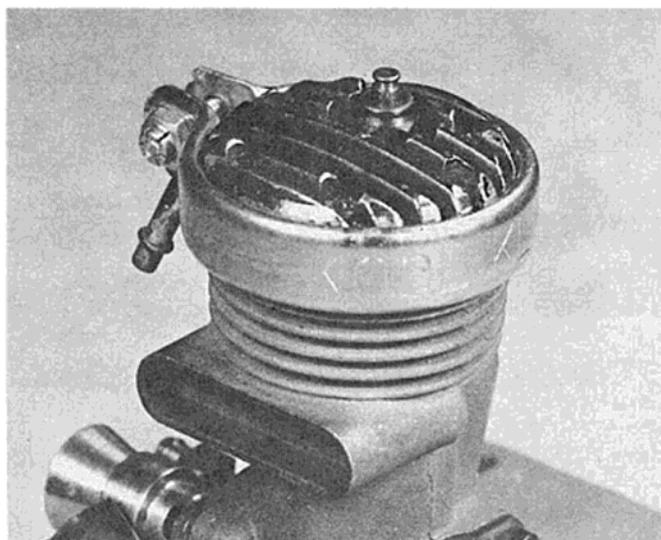
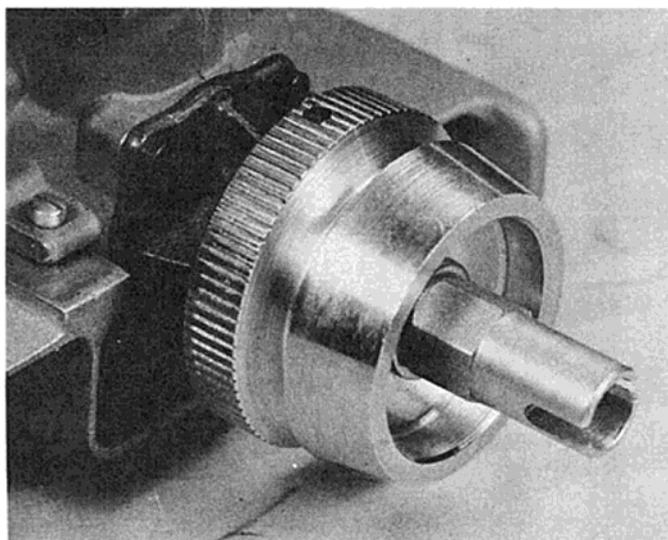
R/C model boats can be powered a number of ways — by electric motor or motors, by steam engine and boiler or by internal combustion engine of either 2 or 4 cycle, single or multi-cylinder. Each power plant has its pro's and con's. Electric is clean, quiet, no starting problems and not too costly to install. The speed on the other hand will not be any challenge to your reflexes. The steam powered boat is quite fascinating to operate, quiet, and powerful. It can be more expensive to install than electric or gas. The gas engine offers many advantages — power with low weight; slow speed or fast; noise and exhaust disposal are its main problems. Because most modelers have had some experience with model plane engines we will consider this form of power plant for our tentative R/C model boat.

As a rule most of the model airplane engines from .15 up to .60 make

a good power plant for an R/C model boat. The .15 engines will handle boats from 24" up to 48" long and weighing up to 9 or 10 lbs. The .29 engines will power boats from 30" up to 48" long and weighing perhaps up to 12 lbs. The .35 to .45 will handle boats 36" to 48" long weighing up to 14 lbs and the .60 will power boats 36" to 50" long weighing up to 16 lbs. Naturally a 48" hydroplane weighing 10 lbs. is not the boat for a .15, a .29 or even a .45 engine but a displacement hull of this size and weight would give satisfactory performance with any of these engines.

Engine Flywheel:

Let us assume you have a .45 engine equipped for R/C with throttle control and perhaps an exhaust restrictor and you are interested in building an R/C model boat. First a marine engine needs two important features — a flywheel and cooling means. We will consider the flywheel first because without it the engine cannot be started nor will it run with any sort of a load. What diameter flywheel would be suitable for a .45 engine? As a rule of thumb if we take the stroke of the engine and multiply it by 2.00 to 2.50, this will give us the approximate diameter. The figure will indicate a flywheel of between 1 $\frac{5}{8}$ " to 2" diameter. The width should be about $\frac{1}{3}$ to $\frac{1}{2}$ the diameter. This may seem like a wide range of flywheel selection but if the engine is to be mounted in a planing or semi-planing hull swinging



a 2 blade propeller of $1\frac{3}{4}$ " diameter with about a $1\frac{3}{4}$ " pitch then the $1\frac{5}{8}$ " diameter flywheel might be your choice. If, on the other hand the engine is to drive a heavy semi-planing hull or a displacement hull and swing a propeller of $1\frac{7}{8}$ " to 2" diameter with about the same pitch, then the 2" diameter flywheel would be the better choice.

A good flywheel, one of the proper weight and balance will contribute to the smooth running of your engine. Better no flywheel than one that is out of balance, as such a flywheel will not only prevent your engine from developing its maximum power but will hasten its wearing out. An out-of-balance condition will play havoc with the crankshaft bearing or bearings, hammering them out of round or loose in the casting in a short time. In extreme cases the engine mounting lugs will be cracked or broken off. If you've worked with model plane engines, the experience of having the prop kick loose is an old story. The better flywheels use a collet to lock on to the crankshaft, instead of relying on clamping action between the rear washer and the retaining nut or coupling. Be sure the collet is slipped on the crankshaft first, then the flywheel put on as the reverse could jam the collet into the flywheel making it difficult to remove. A good flywheel may cost a little more but it is worth it as it doesn't wear out nor does it abuse your engine.

The engine can be started by either wrapping the starting cord (use chalk line, venetian blind cord or shoe

string) around the flywheel groove and, maintaining a light hold on the trailing edge of the cord, crank the engine over. The other method consists of using a shoe lace and inserting the tip into the hole provided in the flywheel and proceeding to reverse wind the cord on the flywheel by turning the flywheel backward by the propeller or the knurled rim. Whichever system you find convenient is the one to use.

Cooling The Engine:

So much for the flywheel and starting. How about cooling the engine? Mounted in a plane the propeller provides the cooling. The propeller on a boat does provide the cooling but in a slightly different manner. Most full size marine engines have a water jacket that is cast as part of the cylinder. Your engine does not have this so a substitute one has to be provided. A glo engine to operate efficiently has to run in a certain temperature range. Too hot and the engine might seize up. Too cold and the engine will not develop its maximum power. A simple solution has been developed in the form of a clamp around cooling jacket that contacts the cylinder head rim and the upper fins on the cylinder itself. Water circulating thru this cooling jacket absorbs the heat from the cylinder head and fins. Heat from the head and fins is transferred into the cooling jacket and from it into the water which is then exhausted overboard. The pump that circulates the water thru the cooling jacket is the same propeller that propels the boat.

This is accomplished by locating a bent $\frac{1}{8}$ " dia. tube behind the prop (see illus.). The same action could be obtained by locating the pickup tube any place on boat that stays in contact with the water but behind the prop assures a flow of water even if the boat is not moving. A piece of gas-line tubing or rubber hose connects the water pickup tube to the cooling jacket. So much for cooling the engine.

Mounting the Engine:

Now for mounting the engine in the hull. Normally in a model plane, beam mounts with side mounting lugs are used. An engine mounted in a boat can also be installed on wood blocks but certain problems will develop. First, unless machine screws with nuts are used, as the wood becomes oil soaked the screws will loosen. Wood compresses and allows the engine to work loose. Wood is also a heat insulator which is undesirable in this case. Metal mounts are recommended for mounting an engine in a model power boat. First, the oil soaking problem is eliminated. Second, screws can be fastened into metal with no shrinkage or compression problem. Now before you dash off and bend up a couple of angles of $\frac{1}{16}$ " or $\frac{3}{32}$ " steel, brass or aluminum, a word of warning. Bent sheet metal mounts show a tendency to fatigue and fracture after a relatively short time. So use an extruded piece of angle if you wish to try this type of

tube slipped over the drive shaft can be epoxyed into the bottom of the hull after the shaft is positioned top and bottom. A sheet of paper wrapped around the shaft will center the tube around the shaft and keep it that way while the epoxy is hardening. Well that doesn't sound too difficult, does it?

Propellers:

The next big question, what size should I use? Again a rule of thumb starting point for submerged props with a diameter-pitch ratio of 1:1 or less — 2.75 times the stroke. For props with diameter-pitch ratio of up to 1:1.5 use 2.25 times the stroke. This will give a propeller that should load your engine efficiently. Now we are assuming you were interested in adapting a .45 glo engine to marine use. Assume it has a stroke of .790 (which is about average for .45 engines) $.790 \times 2.25$ gives a recommended prop dia. of 1.775 for a high pitch prop, for use on hydros, fast runabouts, light planing hull; $.790 \times 2.75 = 2.17$ dia. for a suitable low pitch prop for use on cruisers, displacement hulls or heavier planing hulls. If you had a .29 engine with a stroke of .687 then 2.25 times it would call for a high pitch prop of 1.55 dia., while 2.75 times would show a lower pitch prop size of 1.89 dia. The above applies to glo engines only. Slightly larger props can be used on diesel or spark ignition engines.

Well, now that we've determined the prop size suitable for the engine we intend to use only a few items remain to be answered. The type and size hull and the propeller location.

Types of Boats:

Displacement Hulls:

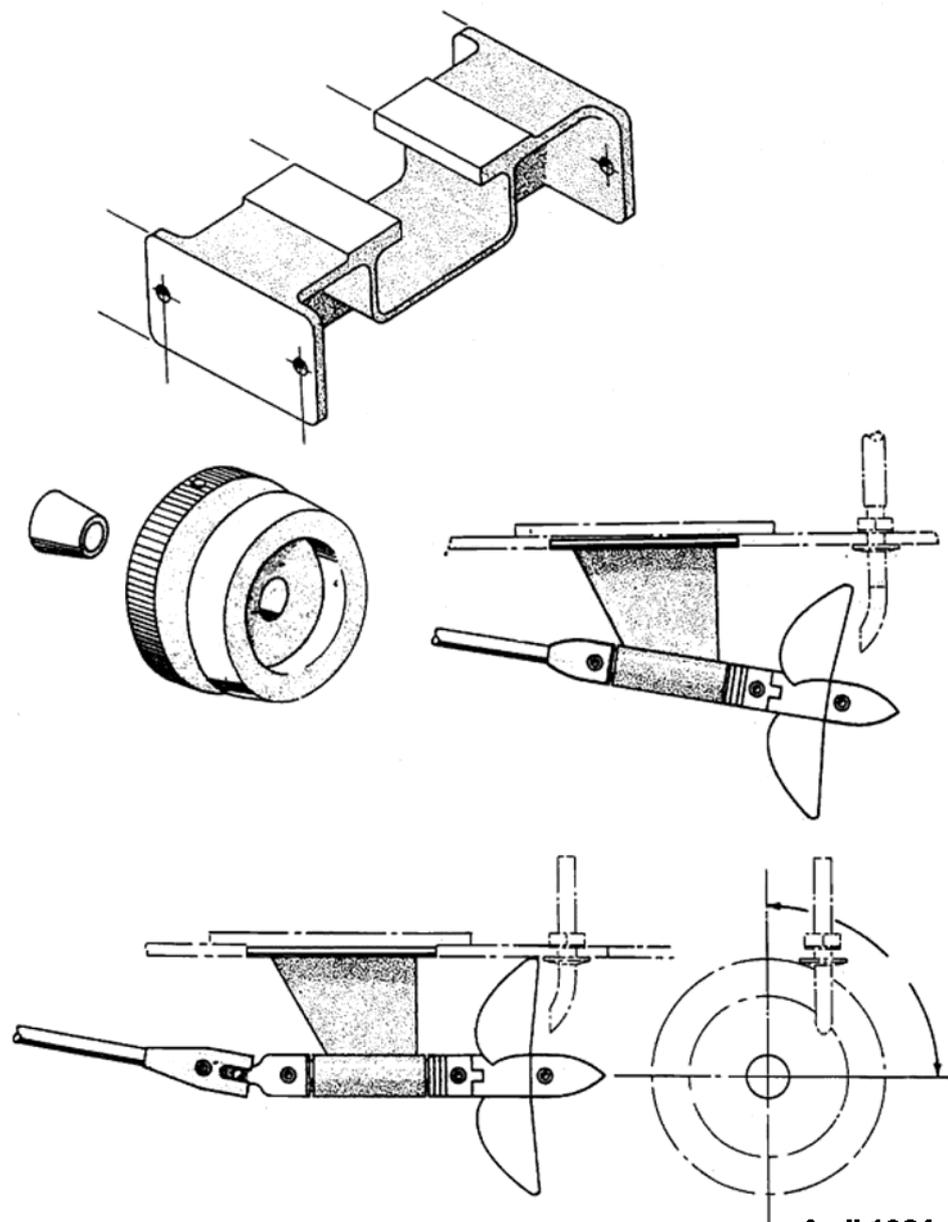
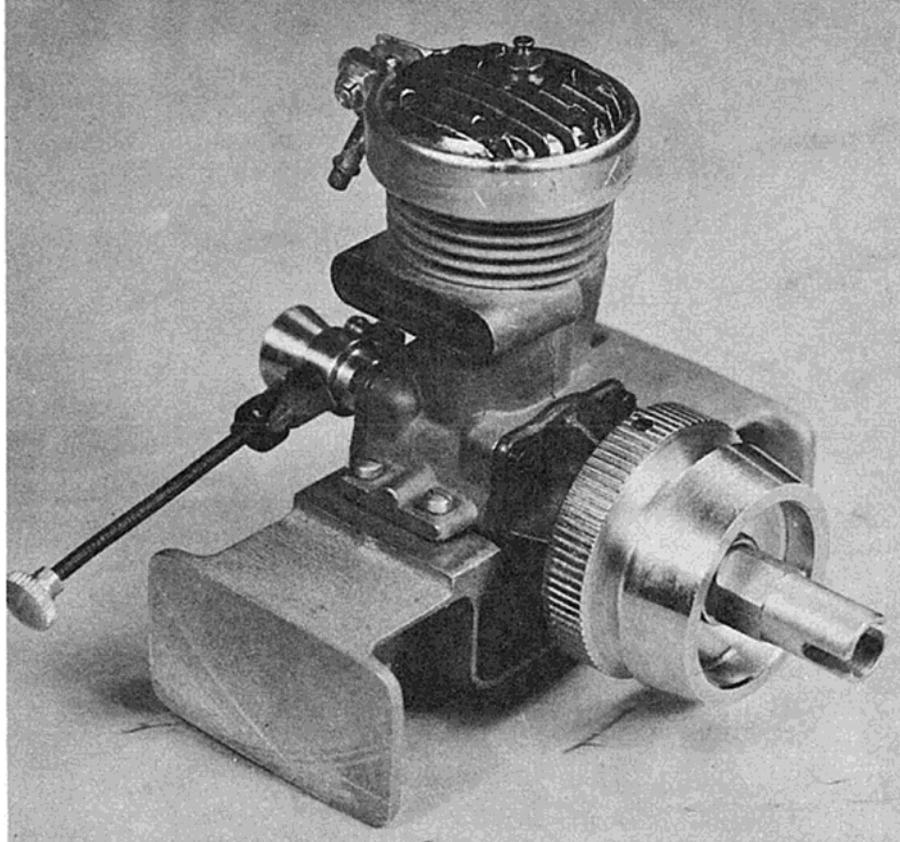
These hulls, as the name implies, displaces water as it moves through it. An extreme example would be a submarine, while a rowboat, canoe, ocean liner, tugboat and some cabin cruisers are well known examples of this type of hull.

Semi-Planing Hulls:

The average "V" bottom runabout either inboard or outboard are excellent examples of this type of hull. Express cabin cruisers are also of this type.

Planing Hulls:

The outboard and inboard hydroplanes, skiboats and the large 3-point hydroplanes are all of the planing type.



In some respects, in model plane language "it is a matter of wing loading". The displacement hulls usually are heavy, sitting deep in the water, power to weight ratio is low and there is little change in the attitude of the boat when moving as compared to at rest.

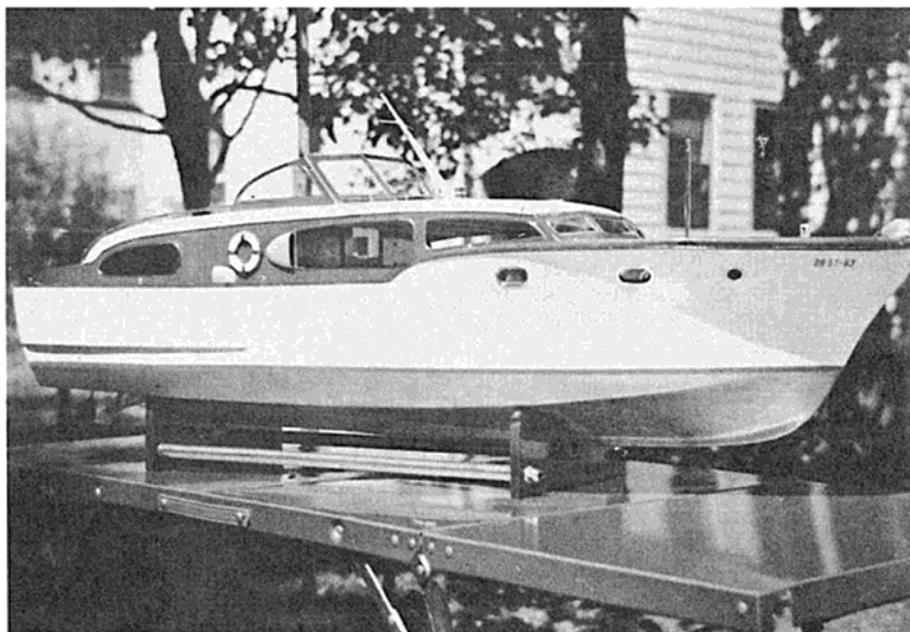
The semi-planing hull, on the other hand, has higher power-to-weight ratio. It is usually lighter in weight than a displacement hull of equal length and there is a definite change in the angle of incidence of the boat to the water when running as to its position at rest. Some percentage of the hull is in the water when running.

The planing hull has the highest power to weight ratio and is usually the lightest in overall weight for its length.

The stepped-hydro usually does not change its angle of incidence to the water radically when running compared to at rest but rather raises itself to a point where it is just touching the water as it skims along.

G.E.M.'s Challenger II

The Challenger II, shown in the January issue of RCM, has been the subject of constant inquiry since it was released last June by G.E.M. Models. In spite of the fact that the Challenger is a fast boat, 35-40 m.p.h. with a .60, it makes an ideal sport boat with an RC 45 for those not interested in the competition aspects. With the latter size mill, four channel non simultaneous radio gear (self-neutralizing rudder and trimmable throttle) and a vertical fin as shown on the plans, you will have a lively performance without the skill necessary to operate a high speed racing boat. For competition, simultaneous radio is recommended in order to allow you to change the throttle setting while turning. For those who don't mind a little extra reed wear, high throttle may be left self-neutralizing so that high throttle must be held. When it is released, the throttle automatically returns to the medium setting (about 20 m.p.h.) — medium to low is left trimmable. If straightaway speed is your pleasure, the vertical fin is for your boat. As with all speed boats, they turn better in one direction than the other, depending upon prop rotation and design. The vertical fin will allow a full speed turn to the right. If the engine is throttled down, the turn will get small-



er. To make a left hand turn, the boat must be first throttled to 15-20 m.p.h. to avoid spinning out.

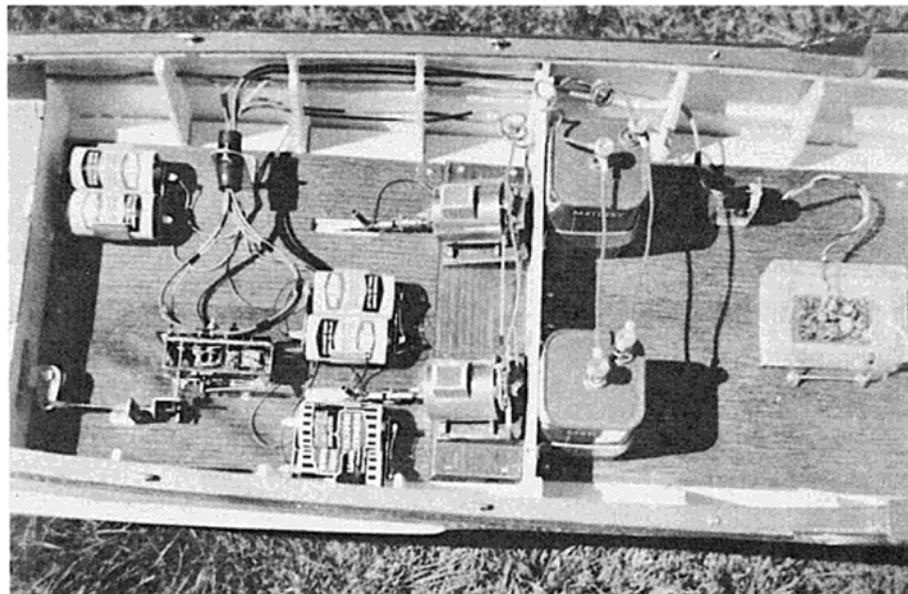
Over the past year, G.E.M. Models has developed a way to allow a very tight turn (under 50' diameter) without throttling down the engine. They used a fin of the same size, shape, and in the same location as always, but tilted 30° toward the center of the boat. This allows the inboard step on a full speed right hand turn to remain in the water to give the boat "traction" to resist the force of gravity. With a small loss of speed, an additional fin may be installed on the opposite side to allow full speed right and left hand turns.

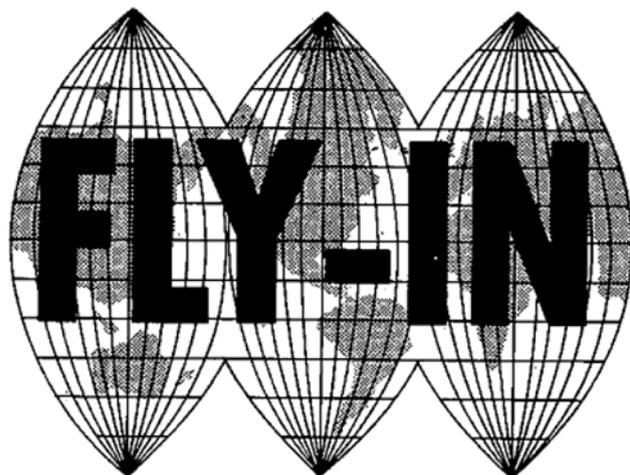
The Challenger II, incidentally, holds the IMPBA straightaway record for 1/16 of a mile of 35.15 m.p.h. and for 2 laps of the 1/8 mile IMPBA of 42.5 seconds.

Dick Bookner's Corvette

Although the black-and-white reproduction photos can hardly compare to the color prints originally submitted, it's not hard to see the craftsmanship in Dick Bookner's 48" Chris Craft Corvette. Power is by twin Pittman motors. The receiver is an OS Max 5. Motor and rudder control is a GM Botomatic. Dick uses a Citizenship TTX transmitter for this first try at RC.

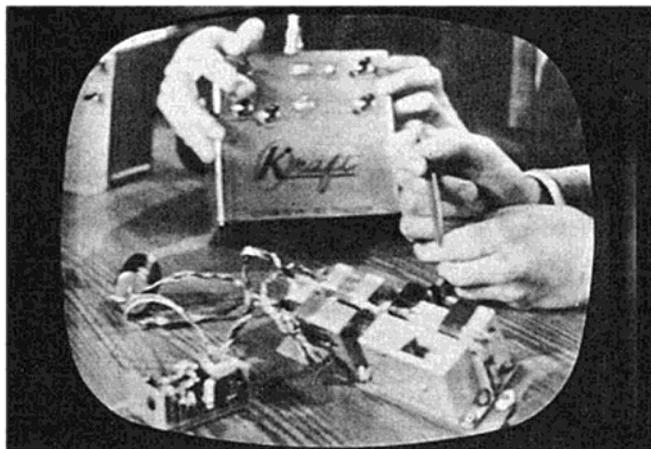
The windows in the Corvette are all of 1/16" plexiglass installed in HO gauge model railroad track. The latter can be formed to any radius or contour, installed, at which time the plexiglass is ground down to fit the frames. The "glass" then snaps into the frames sans glue.





SWISS TV PLUGS RC

ZURICH, Switzerland — Received just prior to press date were several photos from Alexander Stockli of Radio Control & Electronics, Zurich, taken of a Swiss television program concerning radio control activities in that country. As the photos illustrate, the panel is discussing the finer points of a Kraft Custom 10 channel reed rig. It is reported that this presentation created enough interest so that an entire program on radio control building and flying is scheduled for late February.



FCC POSTPONE FILING FEES

WASHINGTON, D.C. — The Federal Communications Commission, in accordance with a Federal court order, postponed indefinitely its schedule of license filing fees which had been scheduled to go into effect January 1st.

Acting on a case filed by several licensees, the Seventh Circuit Court of Appeals in Chicago ordered that the schedule be held up for 60 days while it studies the question.

Prior to this court injunction, license filing fees affecting radio control modelers were set at \$8.00.

It is also to be noted that previously it was suggested that RC'ers suffering from interference on the Citizens Band frequencies provide the FCC with a tape recording of such interference. In regard to this matter, the FCC has advised that such a proposal is illegal as per FE & M Bulletin #6, Section 605, which specifically prohibits the interception, divulgence, or publishing any part of radio communications not specifically intended for the individual.

ARCS REAP GOLDEN HARVEST

PITTSBURGH, Pa. — High on the list of the nation's top RC clubs, the Greater Pittsburgh Aero Radio Control Society enjoyed, in 1963, one of the best years since their formation. Based on the idea that success in any endeavor depends upon working together as a group toward a common goal, the ARCS are reaping the well deserved rewards of a year of service to their community, state, and to the advancement of the art and science of radio control. Among their many contributions were a Variety Air Show and SOLOC hobby demonstration for children.

The esteem and praise the ARCS have earned from modelers, manufacturers, and hob-



by publications, is not due to the efforts of any single individual or small clique, but rather, is the result of every member of the Pittsburgh group aiding in these projects by accepting and assuming the responsibility of membership and its common objectives.

In 1964, the Pittsburgh ARCS will enjoy flying from one of the finest model airports in the country. Work is scheduled to commence in early spring to move 250,000 yards of dirt into the valley west of the new asphalt landing strip. This project will, upon its completion, more than triple the existing flying area, and enable the club to accommodate an unlimited number of flyers. The safety factor will also be improved by moving the parking and spectator facilities to a less hazardous area.

Congratulations to the ever increasing membership of the ARCS — an RC club continuously setting patterns well worth following.

NEW USE FOR CARD BOXES

POUGHKEEPSIE, N.Y. — Many greeting card firms sell boxes of cards which come with heavy celluloid or plastic covers. According to Harry Braun, these boxes and transparent see-through covers make excellent and inexpensive storage and parts trays.

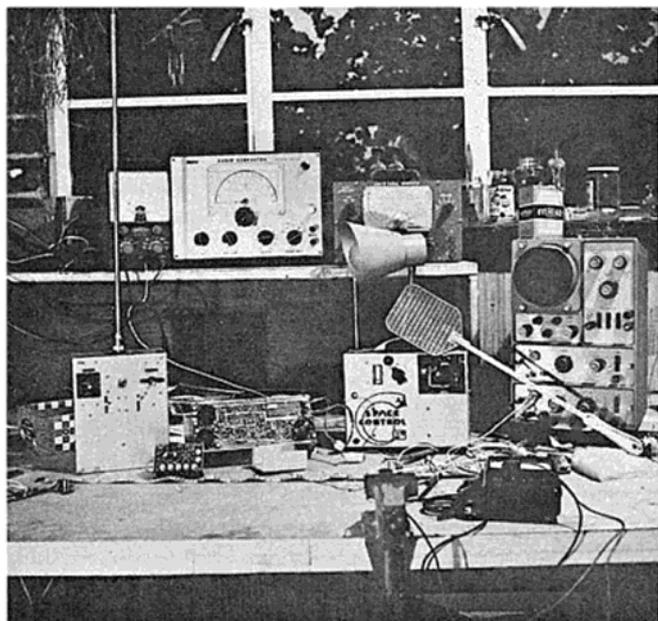
Prop Rig Makes Debut In South Africa

PRAETORIA, S.A.—The Constellation 7, an advanced fully proportional R/C system, designed and developed by Dr. Derek Ashpole of Praetoria, South Africa in cooperation with Monte Malherbe, noted competition flier, has been scheduled for production in the immediate future.

The Constellation 7, so named for seven independent and simultaneous control functions will, in all probability, be imported into the U.S. and retail for approximately \$500-600 complete. Two prototypes have been continuously test flown

and demonstrated in this South African community during the past several months with complete success. All reports indicate that this system will probably dominate the winners circles in the forthcoming South African Nationals.

The photographs indicate the general construction of the new rig, and the bench shot gives a comparison size to the old Space Control proportional system — note the vast difference in receiver sizes. The transmitter has the same physical dimensions as a present day Kraft transmitter.



SVRCC DESIGNS NEW POINT SYSTEM FOR MOY PROGRAM

SAGINAW, Mich. — As part of an outstanding program to promote and sustain radio control building and flying through friendly competition, the Saginaw Valley Radio Control Club, Inc. recently disclosed their new point system for the coveted Modeler of the Year Award. This new individual rating enables each member of the SVRCC to participate in the competition for the annual trophy from January 1st through November 30th of each year. Points are awarded as follows:

For scheduled club contests, 50 pts for 1st place, 26 pts for 2nd place, and 17 pts for 3rd place. An attempt, without placing, earns 5 pts. First place in an AMA sanctioned contest is worth 100 pts, a second 51 pts, and a third 35 pts. Again, an attempt without placing earns 10 pts. Serving as a judge in either club or AMA meets merits 25 pts. A member who breaks an existing club record is awarded 100 pts. Any member may break his own record after 30 days for full points.

To promote attendance at scheduled meetings, 10 pts are awarded to both regular members and Board members.

100 points are awarded to each member who builds his own ship and trims it out to fly dependably, the initial flights being observed by another member. 50 points are awarded for each additional plane during the year with a maximum earned potential of 250 points. If the plane is the first RC ship the member has built, he will be awarded an additional 100 points as a beginners incentive. To further encourage the novice, 100 points will be awarded to the tyro completing ten unassisted flights of one minute or more. These flights must be observed by SVRCC members who may give verbal assistance only.

For individual "extra-curricular" projects benefiting the club as a group, such as time devices, monitors, etc., 10-50 pts will be awarded at the discre-

tion of the Board of Directors. Members who demonstrate RC models or activities to interested groups, arranged for by the SVRCC, will earn 40 additional points.

A club member who assists a beginner in the form of construction advice, trimming, installation, or flying, in order to aid the individual to become an active flier will receive a merit award of 10-40 pts as determined by the Board.

Serving on a duly appointed SVRCC permanent committee for the year is worth an additional 25 pts.

Rounding out the activity point system are several Bonus Awards, consisting of 25 pts for each engine of a multi-engined RC ship, the engines to be part of the design and not merely added in order to gain points. Biplanes and Deltas will also be awarded 50 additional points. If any of the above ships are built to scale and achieve one controlled flight, the member may collect an extra 100 points. Best Finish and Special or Original Design awards will be given at a contest to be held this Spring, with 100 pts for 1st place, 51 pts for 2nd place, and 35 pts for 3rd.

ALUMINUM POWDER AS FILLER

OAKLAND, Cal.—From the *Carrier*, publication of the East Bay Radio Controllers, is a finishing tip that employs the use of aluminum powder and dope as a filler coat.

Used in a ratio of 3½ to 4 ounces per quart of dope, the aluminum powder served the same purpose as talcum powder, but has the added advantage of producing a hard finish rather than the customary soft talcum finish. Instead of using sandpaper to sand down the filler, a razor blade was employed to scrape the surfaces, producing an extremely flat surface for final painting, and eliminating the usual lumps and hollows associated with sanding.

RADIO CONTROL MARKET PLACE

SEND FOR LIST

of new and used R/C items — 35 cents. Fifty cents will list your items until sold. New and used equipment in stock with 90 day guarantee in writing. Example: C & S "Oriole" 10 channel (new): \$40.

R/C Center, Hudson Heights Sta., Box 91, N. Bergen, N.J.

UP TO 50% TRADE-IN

allowance on used radio control units for a new single or multi channel unit in most popular makes. Send 70 cents for a complete 120 page catalog listing all types of planes, radio units and accessories (refundable with first order). Listing of used equipment sent free upon request.

PHIL-NICK HOBBY SUPPLY, P.O. Box 84, Oaks Corners, N. Y.

ENGINE COLLECTORS

Have Viking 65 Twin, Ignition. Needs small connecting rod bolt. Make offer.

W. F. O'BRIEN

3012 Eisenhower, Arcadia, Calif.

FOUR CHANNEL ORBIT

Brand New — \$80

HOWARD RICE

7142 Orangethorpe, Lot D9
Buena Park, Calif.

CONTEST CALENDAR

All RC clubs are invited to submit their contest schedules for publication. Calendar items must be received by R/C Modeler's editorial office, P.O. Box 487, Sierra Madre, California, 45 days prior to publication.

MARCH

- 22 EBRC Fly-In. EBRC field, Oakland, California.
- 29 Ventura County Comets Fly-In. Oak View, Ventura County, Calif.

APRIL

- 5 Cobb County R/C Modelers Rudder-Only contest. Fulton County Airport Industrial Flying Site, Cobb County, Georgia.
- 12 Harbor Slope Soaring Society Scale Contest. Emphasis on slope soarers modeled after power driven WW I aircraft. Back Bay, Newport Harbor, Calif.
- 19 RCL/OC Open meet. Mile Square, Santa Ana, California.
- 25-26 Turlock Aero Robots Fly-In, Turlock, Calif.

MAY

- 3 LARKS Pylon/Speed event. Mile Square, Santa Ana, California.
- 10 Harbor Slope Soaring Society FAI altitude record trials. Back Bay, Newport Harbor, California.
- 29-31 10th Annual RC/NC Invitational, Modelers Paradise, Monroe, North Carolina.
- 30 Fresno Radio Modelers Open. Fresno, California.

JUNE

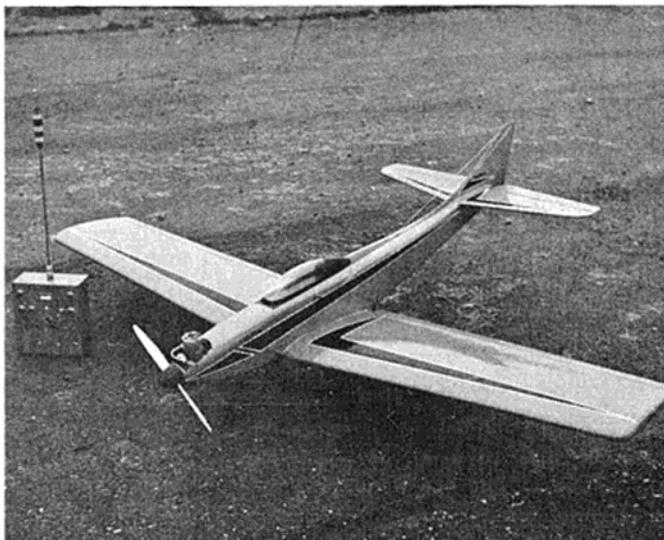
- 6-7 Lincoln Sky Knights Fifth Annual R/C Contest. Lincoln, Nebraska.
- 13-14 LARKS Open Nationals warm-up. Bakersfield, California.
- 14 St. Paul Radio Controllers Spring Contest, St. Paul, Minn.
- 14 Harbor Slope Soaring Society Pylon Race. Back Bay, Newport Harbor, California.
- 20-21 Forest City Flyers 11th Annual International R/C Contest for multi only. London, Ontario, Canada.

BRISTOL MEET SHROUDED BY FOG

BRISTOL, Eng. — A scheduled Pylon Race at the Bristol Aerodrome, 65 miles from Leicester, was postponed until Summer due to a typically heavy English fog that blanketed the field. Although official competition was cancelled, entrants flew strictly by sound. A majority of competitors were flying the very popular Pylon

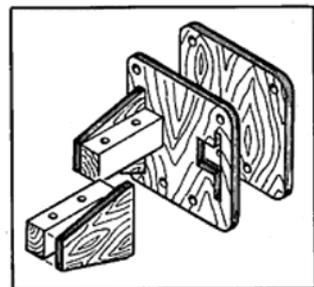
Duster, as evidenced by the photo from Great Britain.

One very unusual design was Geff Franklin's Olympus with McCoy .60 mill, sporting a high vertical tailplane. RCM Editor Maurice Franklin displayed his orange, black, and white Veco .45 powered Orius (see photo). Orbit gear predominant.



'CRASH PROOF' MOTOR MOUNTS

ALHAMBRA, Calif. — The drawing illustrates an idea by Gary Wedge for a motor mount unit which, it is claimed, will withstand much more abuse than conventional mounts now in widespread use. One-eighth inch, five ply plywood and 1/2" x 3/8" stock is used with epoxy cement welding the unit together.



FIRST LARKS CONTEST OF YEAR

MILE SQUARE, Calif. — Twenty-eight contestants, averaging four flights each, vied for the hardware at the first LARKS contest of the year. In Class III, 1st place was taken by Jerry Pullen and a Stormer with Kraft proportional gear, 2nd by Nate Rambo with a Candy (RCM Nov. '63) and Kraft proportional, and 3rd place by Zel Ritchie with his original Phantom and Space Control proportional system.

Don Crow was victorious in Class II with his '64 Nat's winning Miss Witchkraft/Kraft 12 combo. Duane Shappell and Will Powers captured second and third places respectively.

In Rudder Only, Lloyd Sager, Bob Daly, and Pat Daly emerged the winning trio.

An optional event was featured which consisted of each contestant dropping twenty-five cents in a five foot diameter circle. Attempts were then made to touch down in the circle, which entitled the contestant to the cash in the circle at the time of the spot landing. The end result saw Zel Ritchie the only one to touch the circle, and that was early in the morning. At that time, there was only one quarter in the circle . . . his!

The FAST club provided the pylons and scanners for the events, while the Radio Control League of Orange County provided their refreshment and snack stand.

TOP FLITE TO ADAM TO LANGDALE

ANAHEIM, Calif. — Brad Langdales tri-colored Orion features a standard Top Flite kit wing matched to a magnificent fibreglass Orion fuselage by Adam. The radio equipment includes Orbit ten channel gear, five Bonner Transmites, and the Justin Micro-Tie. All up weight is 8 lbs., 1 ounce with a K&B .45 for power.

WE GOOFED!

In a recent issue of RCM we seemingly held our own nominations and elected a new present of the Edmonton Radio Control Society. Just for the record, Stephen Baxter is the actual club prexy, while Mel Klimchuk serves as Secretary. Our apologies to all concerned.

O'BRIEN ST. PAUL PREXY

ST. PAUL, Minn. — Al O'Brien, newly elected President of the St. Paul Model Radio Controllers, Inc., started his model building career in 1931 with a rubber powered four-and-a-half-foot span NC-4 seaplane and two props. On the first flight, taking off from water, the plane disappeared into the wild blue yonder and was never seen again! Al also tried his hand at building gliders and managed a three minute flight from the famous Chucker glider. In 1943 he built a 40 inch P-38 which he left hanging from the rafters at an NCO club at Fort Knox, Kentucky. This marked the end of Al's modeling career until 1961 when he built the Schoolboy for his son and subsequently became interested in RC himself. Al is presently flying a DeBolt Champion.

WILKERSON ELECTED LVRCS PREXY

BETHLEHEM, Pa. — During the last monthly meeting in 1963, the Lehigh Valley Radio Control Society elected their officers for 1964, with G. Wilkerson, President; F. Wolfe, Vice-President; J. Eisele, Treasurer, and C. Yaindel, Secretary. Meetings for the LVRCS are held the first Tuesday of each month at the Keystone Building and Loan building, Ninth and Broad St., Bethlehem, Pa.



DCRC SYMPOSIUM SLATED FOR MAY

WASHINGTON, D.C. — The 1964 DC/RC Symposium has been scheduled for May 16 and 17 at the John Hopkins Applied Physics Laboratory in suburban Washington, according to John Spalding. Admission will be \$4.00 which includes the printed record of the meeting.

LONG ISLAND FLYERS FORM NEW CLUB

RIVERHEAD, L.I. — Seventeen active RC enthusiasts recently formed a new flying club in the Riverhead area on Eastern Long Island, named the Suffolk Falcons. Charter members comprise a well-balanced group of single channel, proportional, and reed fliers. The Falcons are fortunate enough to have gained access to a large flying site, free of obstacles, with several acres of smooth terrain for ground maneuvering.

All members of the new organization are members of the AMA and are currently seeking an Academy Charter. An invitational contest is being planned for the near future. Interested fliers in this area should contact Lloyd Green, 30 Flanders Road, Riverhead, N.Y.

POOR WILLIE!

Willie Smith, designer of the twin-tailed Torero which appeared in the Dec., '63 issue of RCM, was a pretty nice guy that used to fly a Kraft Proportional. His fellow club members even tolerated him when he added a Digicon Proportional system to his stable. Now Willie is flying the new Bonner Proportional prototype! A few weeks ago, the sad tale of Willie Smith took on a new twist. It seems that our hero appeared at the Los Angeles Model Airport with the Bonner rig in a new Torero. After a few successful flights, he gassed up his Stormer, complete with the Digicon system and thoroughly wrung it out. And then, alas, it happened! Willie found that he couldn't fly his other Torero with the Kraft system because the Ni-Cads weren't charged!

As Willie stalked off the field, muttering to himself, his problem came to light — there weren't enough electrical outlets at home into which he could plug all of his chargers!

Some guys are just born with bad luck.

CHALLENGER 6 AT FRANKFURT

FRANKFURT, Germany — The photograph of the VK Challenger is from Clark Kreidler of the 66th Aviation Company stationed in Frankfurt. Built from the standard kit with the exception of minor modifications to the nose, Clark's red, white, and blue Challenger is powered by an OS Max 35, with Ecktronics six channel

gear and Duramite servos. To date, the ship has over fifty-five flights to its credit. There are four fliers in Clark's group, plus an Air Force sergeant from Wiesbaden, who fly at the Army airfield during weekends. Their major problem seems to lie in the length of time it takes mail orders for RC equipment to reach them.





Airport Xanthi 1



Airport Xanthi 2



Airport Xanthi 3



Airport Xanthi 4



Airport Xanthi 5



Airport Xanthi 6



Airport Xanthi 7



Pilots (Hlsat,Savvas,Kostas)