

THE WORLD'S LEADING PUBLICATION FOR THE RADIO CONTROL SPORTS ENTHUSIAST

JULY 1968 75c





## A few words about me.

I am Electronic Engineer and this is my day job.

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

The first was electricity and the second the bluesky.

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

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

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

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

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

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

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

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

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



## Λίγα λόγια για μένα.

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

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

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

Το χόμπι του αερομοντελισμού το πρωτογνώρισα τον Οκτώβριο του 1973.

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

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

Έχω δημιουργήσει μια πολύ μεγάλη προσωπική συλλογή από αυτά.

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

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

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

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

Δεν είναι η μητρική μου γλώσσα γιατί είμαι Έλληνας.

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

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

Το ψευδώνυμο μου Hlsat.

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



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

### **Work Done:**

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

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

**All Plans can be found here:**

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

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

**AeroFred Gallery Free Plans.**

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

**Hip Pocket Aeronautics Gallery Free Plans.**

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

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

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

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

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

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**Thanks Elijah from Greece.**



# R/C MODELER

JULY, 1968

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MAGAZINE

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Miss Susan Wright poses with P-51 Mustang built from Fliteglas Laminates kit. 4 x 5 Extachrome by Whitey Pritchard. Full-size Mustang courtesy of Keith Larkin Aircraft.



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CLIFF WEIRICK



DON DEWEY

## A Left Front Seat In Hell . . . AMA President Cliff Weirick Speaks Out

I have just finished reading the editorial in the May 1968 issue of R/C Modeler, and quite frankly I agree with some of the things that were said, while with others I do not. I do feel that maybe a little bit of an explanation is in order. First, maybe we could answer Jack Dunn's letter and this will also probably answer quite a few questions that have been in a lot of the members' minds.

The first thing Jack brings up is the fact that the membership cards got out late. This year we were held up while waiting on the rule books. We had one of two alternatives. Either we could have gone ahead and mailed out the membership cards themselves and then sent the rule book at a later date, which alternative probably would have made most people happy. However, the expense involved in two separate mailings is just a little more than what we could hack. The work involved by the staff at headquarters would have entered into the game as well as the postage cost. Now, there is no way in the world you could possibly start six months earlier in sending these things out. One, because of the fact that you have to wait for the rule book itself. It takes time for the contest boards to get these done and ready for final printing. Then you have the printing time itself. Secondly, how in Heaven's name could you begin to know just who was going to join the Academy? You have to wait for the applications to get in before you can send them out. Now when these things flock in at the end of the year, and I'm talking about thousands of them all at once, right around December and January, I don't see how in the world you could possibly process these things immediately. It takes time to do these things. Jack states that he waited a month. Now quite honestly, I waited a month, too. What really is the

difference? It doesn't cause any big problems. Generally speaking, there are no contests during the month of January, or very few at any rate, and I have yet to go to a contest where the fellows wouldn't take my word for it that I had applied for a new license. You might think here, "Well, so Cliff Weirick is well known and everybody would assume that he has a license." Well, Jack Dunn is pretty well known, also. As a matter of fact, I've known Jack for quite some time, and I quite frankly don't believe that he would have any problem at all going to a contest without a license. As far as the rule book goes, I might mention that this is the first year in quite a long while that the R/C contest board has not been involved in getting the paperwork in for the rules (any changes that might have been made). Jerry Nelson did a tremendous job, along with the rest of the members of the board, in getting this done. There was a lot of controversy, but he still achieved the goal. I am quite sure that most of the people that belong to the Academy do not understand the mountains of paperwork involved in getting this thing ready to go. It is really fantastic, and as everybody knows, these things take time.

I think maybe I can put it this way. I sit out here in California as President of the Academy and I get copies of 99% of the paperwork that is sent to headquarters. Initially, when I took over as President last year, I could safely bet that when I got home in the evening and got my mail out of the mailbox, that I would have to spend at least three hours sitting there in the evening digesting all of this paperwork and trying to decide, "does this involve me, or is it strictly for information?" Now let's take my three hours a night and then go back to headquarters

and take a look at the reams of paperwork that go through there that I don't begin to see. I'm talking about applications, information packets, things like this. The amount of paperwork that goes through that place utterly amazed me the first time I went back there. The Academy, as everybody knows, does not have a lot of money. We just about break even each year. Yet, the paperwork involved gets larger each year. If we don't have the money to put on a larger staff and get larger quarters, how in thunderation can you hope to expedite these things? I sincerely wish that some of the people throughout the United States who holler about this and holler about that would go back to Washington and go into the small offices back there and take a good look at what transpires. I doubt seriously that they would ever have any other comment than, "My God, how do they do it?" When I first took over as president and went back to Washington, as a lot of people know, I was quite prepared to really raise some thunder. I was unhappy with the whole operation, I wasn't there but about two days and my comment was, "Good God!" When I went, it was in February and they were in the middle of this licensing procedure, and I saw nothing but stack upon stack of licenses, rulebooks, things of this nature. I was truly amazed. My opinion of what went on back in the Academy at that particular time changed immediately. The point I'm making here is that before you holler, take a look into what you're hollering about, and see whether you really have a legitimate gripe. I'm sure there are cases when you do, but I am also sure that there are more cases when there is not a legitimate gripe.

Now let's get into the matter of the F.A.I. pattern at the Nats this year. I'll lead off by saying that if anybody wants to holler at someone about this pattern, they'd better holler at me. I made the final decision using the F.A.I. pattern. Now if I get lynched, fine. But I made a decision and I had my reasons for it which I will attempt to explain now. Initially, when we set out to get ready to select the F.A.I. team this year we wanted to do it just like it was done at Oklahoma City two years ago. That was probably one of the finest contests I've ever been to. I enjoyed myself. I got plenty of flying. I watched it run very efficiently. We wanted to do this again. However, we had to come up with a site. There were sites volunteered for this. The one that we had really chosen was at St. Louis, which would be hosted by the McDonnell club, there. However, due to circumstances beyond the Club's control, they had to pull out. We had been banking on this. All of a sudden we were up in the air. We had no place to go. There were other sites that had been offered, however, the criteria for the sites, even though possibly it may have been too stiff, had already been set. Number one, I felt the troops should fly off of asphalt or concrete. A hard surface, at least. We were offered deals that had real short grass, but I did not feel this was the type of site that we were looking for. A lot of things thing entered into the selection of this as well, but primarily the type of site we had, its location in

relation to the rest of the United States, things of this matter. At any rate, we decided that the best thing we could do at that time was to have the team selections at the Nationals itself, which have been done in the past. Again, using the Nats as the team selection site would save one whole of a lot of work for the Academy itself, and a lot of other people. It doesn't cost a nickel more to do it, whereas having two sites would cost money, and quite frankly, the money spent on having a separate site at that time was not available. I personally feel that any money brought in by the F.A.I. program for R/C should be used for the team itself. Now I will grant you that in the past there have been quite a few manufacturers on the team. Everybody says, "Well, big deal. The manufacturers have all kinds of money. They don't have to do this." To a certain degree, this is true. However, having been on the team twice myself, let me guarantee you that in both cases I spent nearly \$1,000 out of my own pocket going and coming back, that the company just flatly does not pay for. Now let's get on into the F.A.I. pattern selection itself.

The F.A.I. pattern is an authorized A.M.A. pattern no matter what some other people may think. It is recognized by the Academy and always has been and as far as I'm concerned, it always will be. Quite honestly I don't understand the real gripe here. The fellows come to the Nats to fly. Really what difference does it make what pattern they fly? They're there to have fun and fly. The F.A.I. pattern and the A.M.A. pattern are very close in maneuvers. Granted, we have a few tougher maneuvers in the A.M.A. pattern than are in the F.A.I. pattern, however, overall, they will run a very close parallel. One big advantage to the F.A.I. pattern as compared to the A.M.A. is the fact that there is no ground handling. Now taxiing an airplane takes no real degree of skill and we all know that, yet it is a real time consuming thing. Taxiing before and taxiing after. What does this prove? In my mind absolutely nothing. With the F.A.I. pattern you go right from a dead stop to take-off. Now here, as was done in Oklahoma City, you can have a fellow's time start immediately upon the previous contestants turning off his transmitter. This way you get a maximum amount of flights in minimum time. We proved that at Oklahoma City. Granted, the guys at first balked at this, however it worked out very well and there is no reason why it can't work here equally well. Much the same thing was done at Los Alamitos on the qualifying part.

Now for the specifics as to why I feel the F.A.I. pattern should be flown in this case. Let me state that had we not had the team selection here, then the A.M.A. pattern would have been flown. However, my thinking on the pattern was influenced by the fact that it is team selection. Frankly, I am of the opinion that we want to send over to Europe in 1969 the three best flyers that the United States has to offer. This is a must. The people over there fly the F.A.I. pattern continually, contest after contest. This tells me one thing. The three fellows that go from here better be extremely

good or they better fly nothing but that F.A.I. pattern for at least a year before they go over there. There was a long period of time when the United States flyers were so far and above the European flyers that it was unbelievable. However, as everybody should know by now, they have caught us. That was quite obvious in Corsica. We had one man there, Phil Kraft, who was quite a ways above the best that Europe had to offer, but he is only one man. To win the team championship requires two other men equally good. We lucked out in Corsica simply because Fritz Bosch lost his engine on one flight, or the United States would not have won the championship. Quite frankly, I am the first to admit that my flying was not up to par there. I did not have the time to practice. You can bet your life that if I should happen to luck out and make the team again there will be some practicing done. There is enough difference between the F.A.I. and the A.M.A. patterns to warrant two different types of aircraft. I think most of the fellows are aware now that to fly the A.M.A. pattern with the loop and the snap and half at the top requires a little bit different type of a stunt aircraft than what we have been using in the past. I know; I found this out real quick like. Generally speaking, a shorter tail movement seems to work out very well. Now the fellows that go to Europe should be flying and living with the same airplane for quite a long period of time before they go over there. Let's face it. Phil Kraft has lived with the Kwik Fli for a long period of time. He knows the ins and outs of that airplane like nobody else. I flew with a "Candy" for a long period of time. I knew its ins and outs. That's why we had a degree of success. Not so much that we're any better pilots than anybody else, but we live with the same airplane for a long while. This is the sign of a good contest flyer—he selects a good design and then sticks with it. Consistency is what pays off. Quite honestly, I felt, and still feel, that the fellows that are going to be picked to go over to Europe should be flying the F.A.I. pattern where they would be using the type of aircraft we have used the past couple of years—aircraft that they are used to. As I said earlier, we want to pick the three best possible people. I don't want them to have to design new aircraft to go to Europe. Maybe you may call me flag waver or something like that, however I feel the culmination of R/C activity is at the World Championships. The contest flyers, and I mean all of them, would give their left front seat in hell to be on that team, and the only way you can get on that team is to end up in one of the first three places at the Nationals this year. I personally feel that the R/Cer's that I know, and I'm sure most of the rest of them, can handle the F.A.I. pattern much better than the new A.M.A. Therefore, this would give them an added advantage.

To get back to this flag waving thing, I want the United States to win that team championship. I really and truly don't care who wins first place. Oh, it's nice if an American does win that, but it is that team thing that counts. Let's face it, the World Championships is the Olympics of model aviation, and it is team effort that wins that thing. Therefore the team

championship is what counts. Say what you will, that's how I feel about it, and I personally feel that using the F.A.I. pattern to select this team was the best route we could take to get the best three guys to represent the United States over there in 1969. 1969 is going to be an even rougher year. It's being held in Germany. I think everybody will agree that the best team that Europe usually puts out is the German team. We're going to be on their home ground under their conditions. We better be ready and we better be good. Those, in a nutshell, are my reasons for deciding to fly the F.A.I. pattern at our Nationals this year. Those of you who disagree with it, I'm sorry. Those that do agree, thank you. I can't make everybody happy. I make decisions for what I feel is best and that's the best I can possibly do.

Now let's talk a little about that thing in here that refers to the democratic organization. It has been my experience since being president that you lead a horse to water, but you can't make him drink. As you all know, when I took office I formed the R/C Advisory Board. This was to let me know through the area representatives what the R/Cers wanted, or the U-controllers wanted, or the free-flyers wanted. Let me tell you right now that there was absolutely nothing that went through any of these boards. No one submitted anything! The guys prefer to sit around and holler. They want this and they want that, but getting them to put it on a piece of paper; forget it! They aren't even remotely interested. Generally speaking, modelers are the finest people I have ever known in my life. That's why I enjoy this hobby. Not so much the flying, or the building, but the fellowship that I have with my fellow modelers. But by the same token a good majority of them are the biggest bunch of gripers that I have ever run into in my life. Generally speaking, the gripers are the guys who are not flying. They belong to this and they belong to that, but they don't take their airplane out to the flying field and fly. No, they don't have time. They are too busy griping about something. So then the officials in the Academy have to make a decision about something. OK, they have no information as to what the modelers want, but they talk to the contest boards and such as that. Nobody says anything to the contest board members. Very few of them do. Yet, when we make a decision that affects the modelers, if we happen to make a decision which does not agree with their philosophy, oh, my God we've got an undemocratic organization. They are railroading something through. Quite honestly, I'm getting sick and tired of hearing this. Fine and dandy. If you people want something done, then let the people in the Academy know what you want done. There are those that do write in. But who do they write to? Oh, no they can't run through any kind of a chain of command. They write directly to headquarters. They don't have enough to do. They've got to play with this mess. Throughout the United States we have area representatives for just about anything you can name. Write to them. Let



By R. JESS KRIESER



# AERO COMMANDER 100



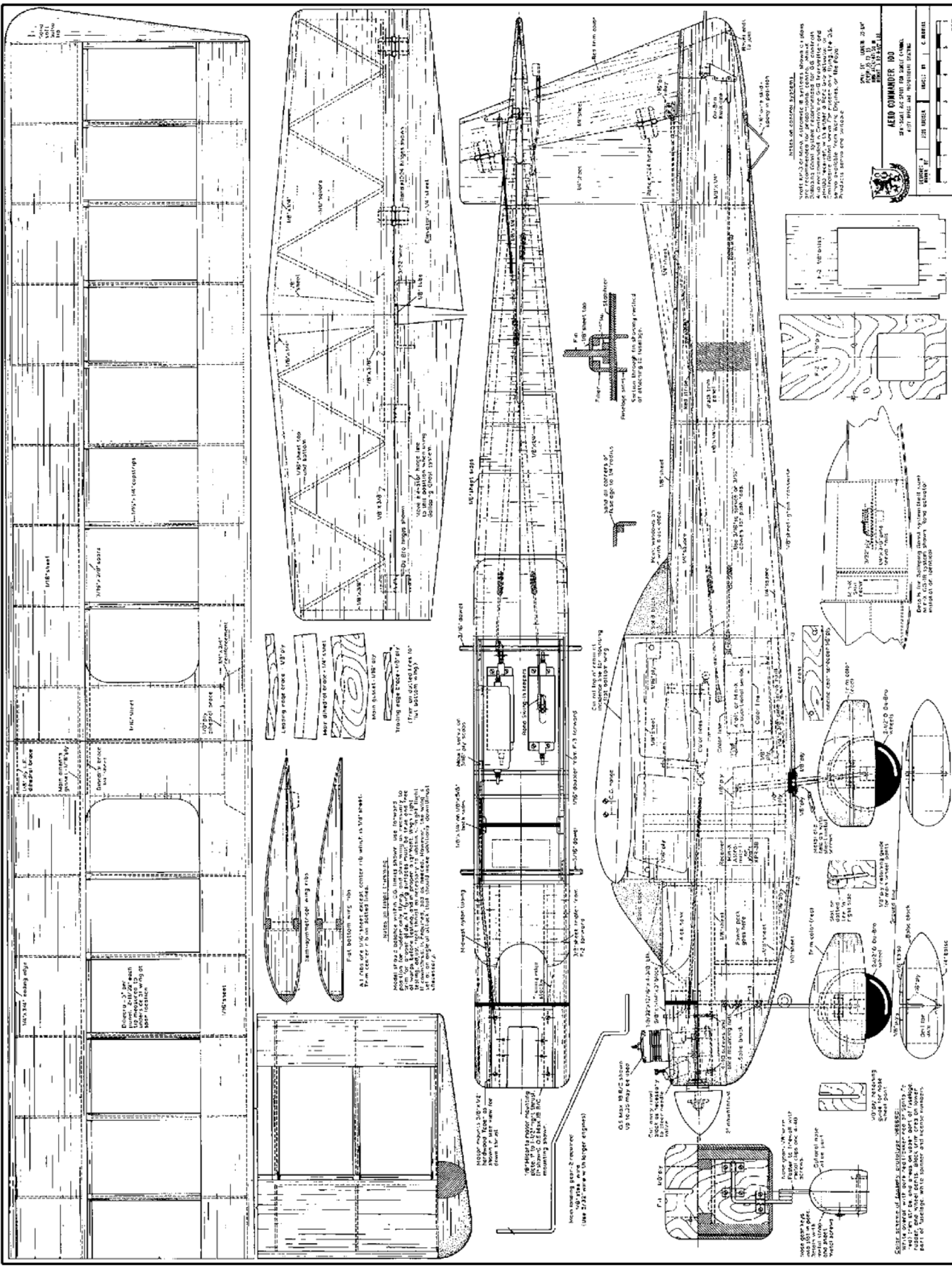
AN RCM CONSTRUCTION FEATURE

1966 Aero Commander 100  
Product of Aero Commander Albany,  
Division of Rockwell-Standard Corp.

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For digital, or pulse proportional, this 54" span semi-scale version of the AC 100 is ideally suited for the sport flier.

In an unofficial sort of way, this article has become part 2 of a 3-part series that began with the Cessna Skyhawk features that appeared in the January, 1968, issue of R/C Modeler Magazine. Part 3 will appear in a future issue, and will feature the Aeromacchi-Lockheed AL-60 "Santa Maria." Those of you who read the Skyhawk article will recall how the Skyhawk was developed, and how I reworked the Skyhawk configuration so that it would resemble the Aero Commander 100. The results have been most gratifying, as the Aero Commander 100 has all of the good performance characteristics of the Skyhawk, with a slight advantage thrown in for extra measure.

That advantage is due to the swept-forward "Mooney-like" fin and rudder on the 100. It gives the ship better stalling and spinning characteristics than the Skyhawk, as the rudder is never blanketed by the elevators when at extreme angles of attack, as is the case with the swept-rudder designs. Recovery from spins is faster and more positive, too. Another advantage of this will be evident to those who fly with Galloping Ghost systems, as the swept-rudder will always give a component of up-elevator in turns, which at times can be undesirable. This characteristic is not present at all with the "Mooney-like" fin and rudder. Herb Abrams, the Rand man, was quick to recognize this when looking over the original Aero Commander 100, and pointed out the obvious advantages of this for G-G systems. He liked the 100 so much that he left my workshop with it in his possession, and is now flying the pants off of it. In his comments on the advantages to G-G of the tail configuration, Herb stated that the Aero Commander 100 "has got to be the prototype of all G-G designs."

When Orv Broberg (of Du-Bro Products) and I got together to figure out what we could come up with in the way of a good design to be molded in plastic, for the growing "Almost-Ready-to-Fly" market, we kept Herb's comments firmly in mind. We settled on the Aero Commander 100 as an ideal ship to be the first in Orv's new line of ARF airplanes. However, we decided to scale it down slightly, to make it more ideally suited for .09, .15, and .19 power, and hence, more appealing to the G-G flyer. At 85% of the size of the original model, this gave us around 380 square inches of wing area, small enough to handle G-G systems, yet large enough to take the new compact proportional systems and provide top performance with a .19 in the nose.

The results have been excellent, and Orv is now on the home stretch on the project. By the time this appears in print, the first production run should either be on the shelves in hobby shops, or on the way. So those of you who would rather

fly than build can get your AC 100 in the air by simply going to the nearest hobby shop. Those of you who are die-hard "balsa butchers," and still prefer to work with the traditional building materials, and like the smell of butyrate permeating your workshop, can simply put in your order to R/C Modeler for the plans, gather together all materials you will need, and sit back and wait for the postman to arrive.

I became interested in the AC 100 some time back, when it was still the Volaire. It began its life in Alquippa, Pennsylvania, as the Volaire 10, designed by Jack Gilberti, and certified as a 2-place aircraft in November of 1962. It was modified into a 4-place design and certified as the Volaire 10-A in June, 1965, and very shortly thereafter the entire assets of Volaire were acquired by Aero-Commander. Aero-Commander, in turn, became part of the Rockwell-Standard Corporation, and manufacturing of the 100 was moved to Albany, Georgia, where the Aero-Commander Division of Rockwell-Standard established a complete new facility for producing both the 100, and the 200, the latter being the former Meyers low-wing design which bears a slight resemblance to the Navion. Aero-Commander acquired all of the assets of Meyers Aircraft about the same time that it acquired Volaire. Since then, Rockwell-Standard has merged with North American Aviation, and the Albany works is now part of the Aero-Commander Division, North-American Rockwell Corp.

Upon acquiring the design from Volaire, Aero-Commander made a few minor design improvements to the ship, such as redesigning the wheel pants and the instrument panel, changing the wing tips, and adding a more streamlined rear cabin window to the ship. The latter not only improved the appearance considerably, but added an extra 2 mph to the cruising speed.

The Aero Commander 100 probably represents the most airplane for the money in today's private aircraft market. While there are other comparably-sized aircraft that offer higher performance, with more deluxe features and plushier interiors, they also carry a considerably higher price tag. When it comes to buying an honest-to-goodness basic airplane with excellent performance, with a payload of four people with baggage, the 100 can't be beat for sheer dollar value. Of all-metal construction with fiberglass engine cowls, landing gear parts and wheel pants, it is powered by a Lycoming O-320, rated at 150 hp at 2700 rpm. This gives the ship a full-load cruise of 128 mph at 75% power. Range is 560 miles with 45 minutes of fuel remaining. Take-off run is 750 feet, after which it climbs out at better than 850 feet per minute, with an operational ceiling of 13,000 feet. Landing speed is moderate,

with stalling speed in clean configuration at 52 mph, and 48 mph with  $\frac{3}{4}$  flaps. Landing roll is only 650 feet. The wing features the 23012 airfoil, which gives a smooth stall, with fast, clean-break characteristics, and is fitted with flaps that can be set at 10, 20, and 30 degrees.

The 100 has a roomy cabin with big doors, and can accommodate six-footers with ease. Cabin carpeting is in nylon, with a Royalite interior, and the ship comes equipped with hydraulic brakes on each main wheel, and an altimeter, air-speed indicator, magnetic compass, tachometer, stall warning indicator, oil pressure gauge, oil temperature indicator, cylinder head temperature indicator, ammeter, and left and right hand fuel tank gauges, all as standard equipment. All of this for only 8500 bucks! I expect that quite a few 100's will show up at private airports throughout the country during the next few years.

In the meantime, maybe a number of 100's will show up in 54-inch span, radio-controlled versions at R/C flying sites throughout the country. That is, if many of you fellows out there get as much of a kick out of this ship as have those who have built and flown it to date. You don't need to worry about power handling, as it has handled everything up to .40 size engines to date! Construction of the 100 is virtually identical to that of the Skyhawk, with the exception that many of the parts are shaped differently.

Wing construction is very simple, and it can be built in one piece, or in two pieces, joining the halves after completion and adding dihedral braces and gussets. Simply be certain that your center joints are well-glued, and strong; you may use epoxy here, if you wish. I prefer to build wings in one piece. You can do this by making a simple jig for it, or by propping up two flat boards at the correct dihedral angle, joining them at the center. Tabs shown on the ribs help keep things in proper alignment when building on flat boards. All sheeting and capstrips on the top of the wing are glued to place and allowed to dry thoroughly before removing the assembly from the board or jig. The tabs get cut off the ribs after this stage is completed, and the bottom sheeting and capstrips are then installed. Tips are solid blocks of light-weight balsa, carved to proper shape.

The tail assembly is very simple, with the fin and rudder made from sheet balsa. You have two choices on the stab. You can build a framework, and sheet with 1/16 balsa on both sides, as shown on the plans, or, if you want things to go faster, simply use a solid piece of  $\frac{1}{4}$  sheet. Just make sure it's light, and quarter-grained, so that it doesn't add unnecessary weight in the tail, or warp when you dope it. Either method is okay; it's simply a matter of which you prefer.





Use 6-inch wide sheets of  $\frac{1}{8}$  balsa for the fuselage sides. If you can't get stock this wide, join some narrower pieces to get the proper width. The  $\frac{1}{16}$  sheet doublers are laminated to the sides with Hobby-poxy No. 2, as are the  $\frac{3}{8}$  sheet triplers. The plywood plates that locate and retain the top shanks of the main landing gear struts are epoxied to the inside surfaces of the fuse sides in their correct position before assembling the sides. Longerons and uprights are also added before assembly. Install the hardwood motor bearers, too, before assembling the sides. Join the two sides by gluing formers F-1, F-2, and F-3 in place; then add the plywood cross-pieces for the landing gear on the bottom of the fuselage. Sheet the bottom of the cabin area at this time, as this helps keep the entire assembly in squared alignment when you pull the sides together and glue them at the rear.

After adding the cross-pieces to the rear of the cabin, top and bottom, you can sheet the top and bottom all the way to the tail. Then you can return to the nose area, box off the fuel tank compartment, add

the nose gear as shown (or your favorite steerable nose gear), and box off the battery compartment. Then sheet the bottom forward of the landing gear cross-pieces, add the nose blocks, cowl blocks, windshield and turtleback blocks, and, when dry, start carving and sanding to shape.

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

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

From here on, how you finish your ship is up to you. You may wish just a simple utility finish, or a mirror-like finish that would win a finish award. For my part, I just want a ship to look good, but with a

minimum of work. Since writing the Skyhawk article for January R/C Modeler, I have simplified my finishing technique even further, and it results in a very fine-looking product. After silking, I give the entire ship three coats of clear dope, thinned 50% with thinner. Between the second and third coats, I sand lightly with 400 wet or dry sandpaper, used dry. I let this dry for several days, then sand lightly again, and apply two coats of thinned out clear with talcum powder added. I let this dry for at least three days, then sand thoroughly with 400 paper until smooth and slick. But be careful not to go through the silk where it has pulled over the capstrips on the wing! Top this with one more coat of thinned out clear, sand when dry, and you're ready to add color.

I spray my color finish on, using butyrate dope thinned out to good spraying consistency. Spray on several finish coats until you're satisfied with the coverage and the depth of the color. Mask off trim areas, and apply the trim colors. When completed, and thoroughly dry, spray on two coats of thinned out clear Aero-Gloss. These last two final coats help even out ridges left by the masking tape, and add an over-all sheen and lustre to the ship. They also add to the fuel-proofing qualities of the finish. The main thing to keep in mind is to get as good a finish as is possible with as few coats as possible.

Install your equipment, fuel tank, engine, check for proper location of the O.G., and decalage angles, and you're ready for your first test hop. Make sure all surfaces are true, and warp-free. If any warps have set in, remove them before flying. If you're satisfied that everything is true, and according to specifications, you should have no trouble on your first test hop. If you're a bit shaky about that first flight, get an experienced pilot to hop it for you. You probably won't have any problems, except for normal flight trimming. If the O.G. is as specified, and all settings are according to the plans, trim as necessary to get true, straight flight with just a slight climb when under full power and all controls at neutral. If the ship climbs too much under power, but has a good flat glide, add down thrust as necessary. If it wants to stall slightly in the glide, add a bit of down trim to the elevator. If it doesn't want to climb properly under power without holding a good amount of up elevator, and sinks fast in the glide, add some up trim to the elevator. Make these changes permanent by adjusting the Kwik-Link as necessary at the elevator horn. If the ship turns in either direction under power, but is straight in the glide, adjust side thrust as necessary. If it wants to turn in the glide as well as under power, adjust the rudder to get a straight flight path.

When properly trimmed, you can have a ball with this ship, even though it doesn't have ailerons. One modeler says he even does four-point rolls with it, using a 3 plus 1 propo system. I'm sure you'll have just as much fun out of this ship as with the Cessna Skyhawk. Since that article was published in January, I've received a number of letters commenting favorably on how the ship performs, as well as comments from modelers who have built my "Sky Squire," and are looking forward to the same fun with the Skyhawk.



Part IV of Ed Thompson's versatile two to six channel digital proportional system. Designed exclusively for R/C MODELER MAGAZINE.

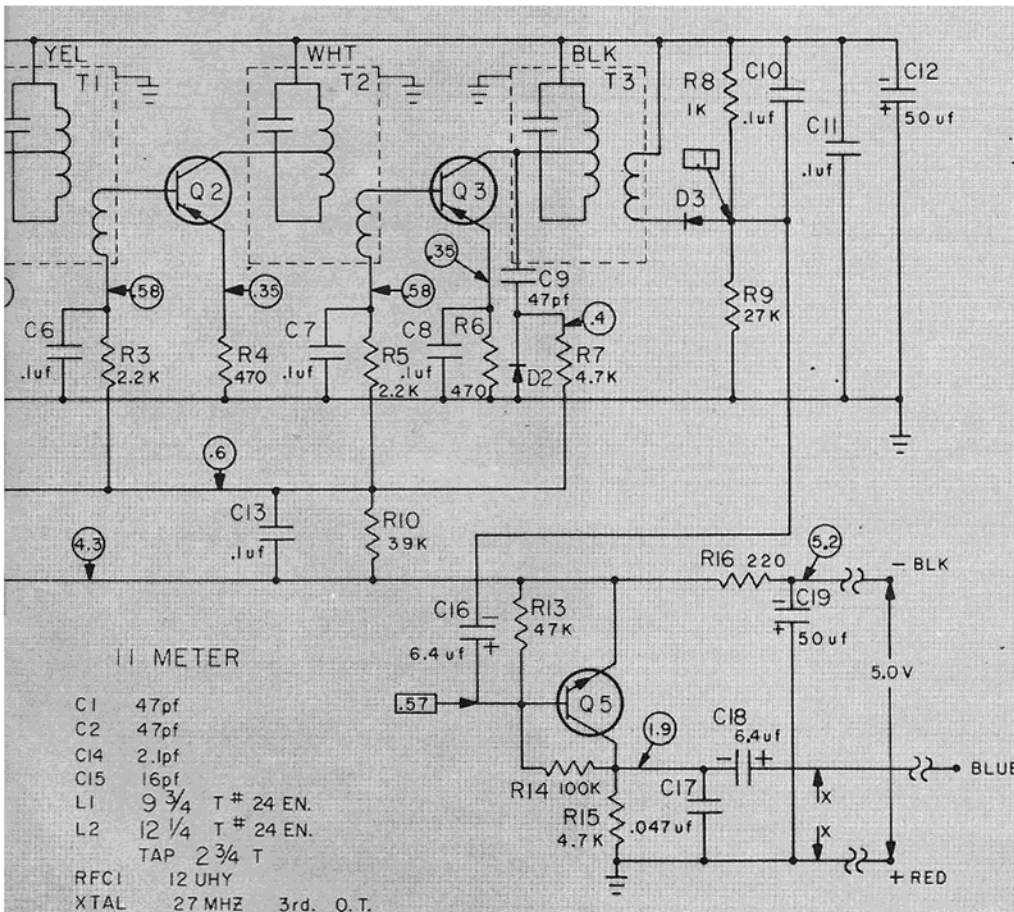
# RCM CLASSIC

per volt and an AC sensitivity of 5K ohm per volt. Cheaper meters of lower sensitivity will load the circuitry and give different readings than those shown on the schematics. A VTVM may be used but again may give different readings. Differences will be smaller and should generally be within the tolerances shown. The largest drawbacks to using a VTVM is its sensitivity to RF pick-up and the possibility of capacity coupling the line voltage to the semi-conductors which may cause junction breakdown. This same capacity coupling is possible with 110 V soldering irons and a low voltage transformer operated iron is recommended.

The workbench should be kept clean at all times, especially during electrical checks where discarded component lead remnants may cause shorts and damage the P.C. board under test.

## Theory of Receiver

The Classic system uses a receiver of the superhetrodyne type. Much has been written about superhetrodyne receivers previously in RCM so I won't spend too much time explaining the more elementary features of this type receiver. I will attempt, however, to carry the interested reader through the receiver, stage by stage, applying only enough theory as is necessary for a basic understanding of signal flow. Assume that we are transmitting our pulse trains at 26.995 Mhz. The signal is impressed on the antenna and fed to the tuned circuit of L1 and C1. This tuned circuit is tuned to 26,995 and will basically reject all others. Since our antenna is short at this frequency it presents a high impedance at the connecting point (top end of the tuned circuit). This is proper since a parallel-tuned circuit at resonance presents maximum impedance. The signal voltage present across L1 is coupled to L2 by mutual inductance. L2 and C2 form another tuned circuit which is tuned to 26.995 and will also, basically, reject all other frequencies. The use of a double-tuned input provides superior "front end" selectivity when compared to a single-tuned input. L2 is tapped to provide an impedance match to the base of Q1. This allows the signal to be transferred out of the tuned circuit of L1 and C2 without loading it and destroying its "selective" properties. C4 provides the RF ground for the bottom end of the tuned circuit of L1, C2. D1 is a high-level AGC/protective diode. When the signal across L1 exceeds the conducting point of D1 it will conduct and limit a signal amplitude. So far we have the signal going to the base of Q1. Q1 is the mixer stage and will mix the incoming frequency with that of the oscillator and produce an intermediate frequency of 455 KHz. Let's stop at this point and look at the oscillator (Q4). Q4 operates the series mode crystal oscillator at 26.540 Mhz. R12 provides forward bias for this stage. R11 provides temperature compensation and emitter isolation from ground. RFC1 provides collector voltage while maintaining a high impedance to RF at that point. C15 increases the collector-emitter capacitance to allow easier oscillation. C14 couples the oscillator signal to the base of Q1. Assume we have just applied voltage to the circuit and Q4 starts conducting. This rapid conduction develops a voltage across the RFC. This instant-





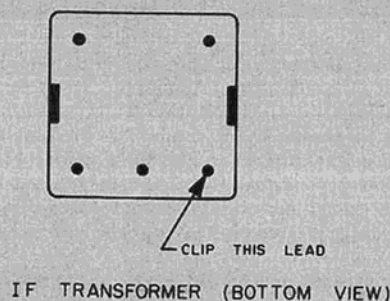
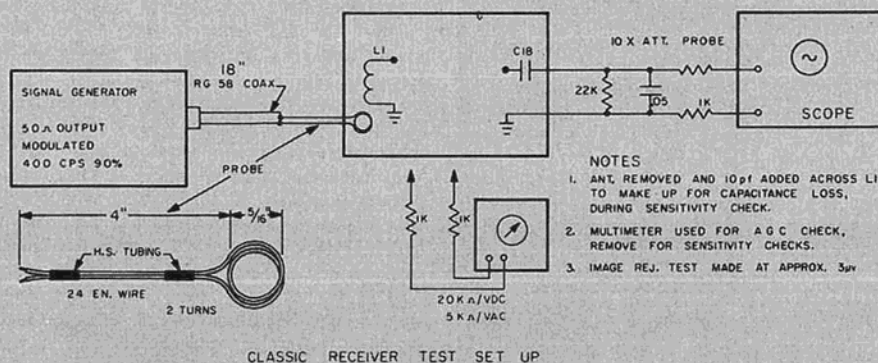
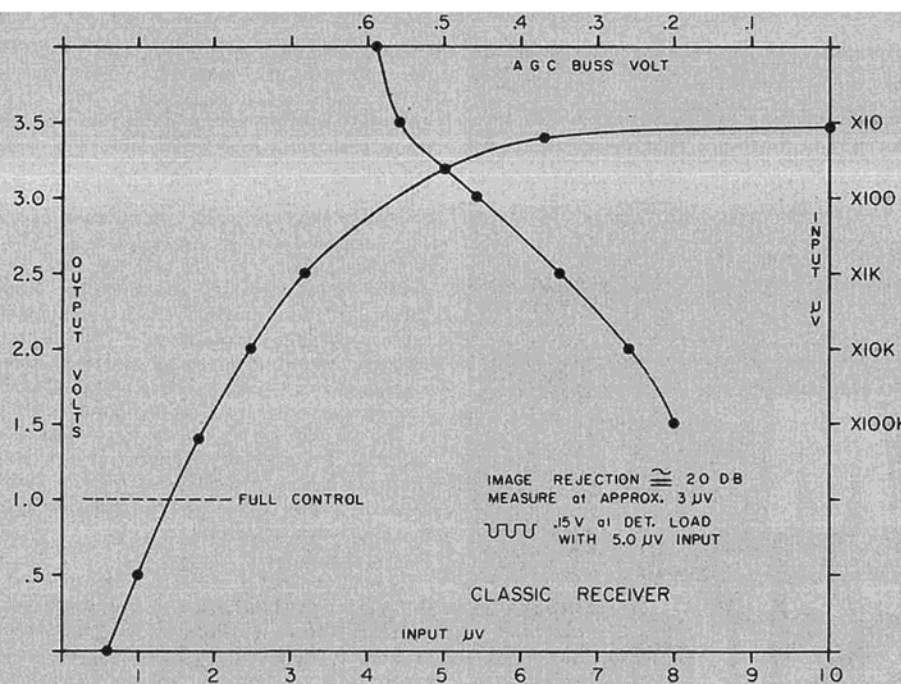
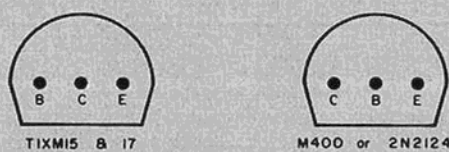


FIG. 1



BOTTOM VIEW of XISTORS

FIG. 3

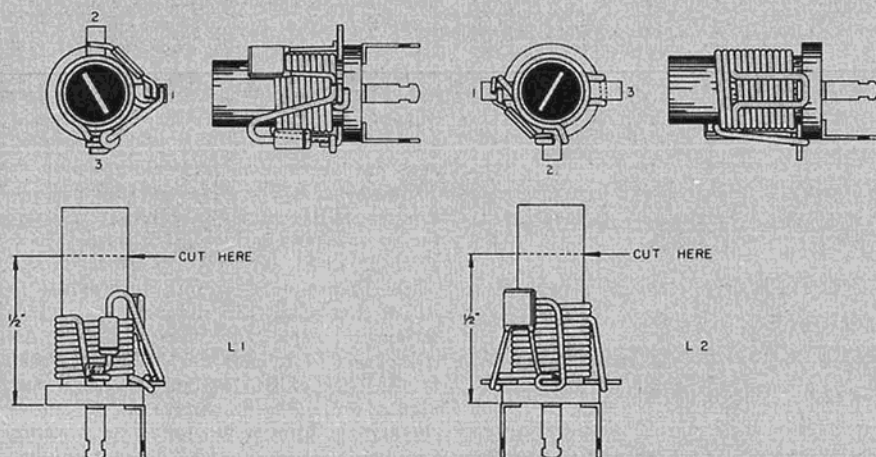


FIG. 2

neous conduction will be a sharp rise of current rich in harmonics. At some point the multi-frequency characteristics of this sharp wavefront will correspond to the series resonant frequency of the crystal. Since the crystal impedance is low at its series resonant frequency, and there is a 180 degree phase shift across it, regeneration will occur. The crystal's impedance rises sharply on each side of its series resonant frequency so oscillation will occur only at the series resonant frequency of the crystal. As mentioned earlier, C15 allows easier oscillation. It provides regenerative feed-back to the emitter and its value is high enough to swamp the inherent collector-emitter capacitance and make oscillation relatively independent of transistor parameters. The fact that we have two paths of regeneration, the circuit is fairly tolerant of transistor characteristics, and is lightly loaded, makes it a very reliable circuit. The next step is to mix the oscillator frequency with the incoming signal. To get successful mixing action we must operate Q1 in the nonlinear portion of its dynamic characteristic curve or drive it hard enough to exceed the linear portion of its curve. In this case Q1 is biased in the low current portion of this curve (close to non-linear knee). The oscillator drive then automatically exceeds the linear operating point, and mixing, as well as amplification occurs. The output of the mixer Q1 contains four frequencies as follows:

1. Original signal input 26.995 Mhz.
2. Oscillator input 26.540.
3. The difference between the two inputs, 26.995 minus 26.540 = 455 KHz.

4. The sum of the two inputs 26.995 plus 26.540 = 53.535 Mhz. T1 is tuned to 455 KHz and will pass this frequency on to Q2 while rejecting the other three. This signal will be a replica of our incoming signal, differing only in frequency. The selection of 26.540 Mhz for our crystal should now be obvious. T1's primary is tapped to provide proper impedance matching to Q1's collector and the primary-secondary turns ratio provides inter-stage impedance matching between the mixer and the first IF stage (Q2). C6 provides signal ground to the bottom of T1's secondary. R4 is not bypassed with a capacitor to provide degeneration which enhances the receiver's overall stability. Q2 amplifies the signal and T2 passes it on to the next stage. T2 is also tuned to 455 KHz and the signal is further amplified by Q3. Q3 serves as the second IF amplifier and the AGC circuitry is fed from its collector. T3 is again tuned to 455 KHz and passes the signal on to D3 which is the detector. D3 rectifies the IF signal and passes only the negative half. C10 removes the 455 KHz signal component. So far we have processed the signal into a train of audio frequency pulses. These pulses are applied to the pulse amplifier stage via C16. Amplification takes place in Q5 and the amplified signal is applied to the decoder through C18. The AGC circuit works as follows: a DC voltage is applied to D2 via R10 and R7. D2, under these conditions, is forward biased and the voltage at the junction of R10 and R7 is applied to the bases of Q1, Q2, and Q3. This establishes our quiescent AGC buss voltage. When a signal is applied to the receiver the collector voltage variations of

Q3 will be rectified by diode (D2) and the voltage at the junction of D2 and C9 will rise in a positive direction to an extent determined by the peak voltage variations present from a collector at Q3. This will cause the AGC buss voltage to become more positive which in turn decreases the forward bias on Q1, Q2 and Q3. This reduces the overall gain of the receiver in proportion to the amount of signal received.

The largest single advantage of this type AGC is in the small signal area. It allows our receiver to utilize its full sensitivity characteristics on small signals. A look at the graph of the sensitivity curve and AGC curves for the receiver will show that the AGC is not overly effective below 10 micro-volts input. From that point on it becomes very linear up to 100,000 micro-volts. It allows a much steeper sensitivity curve than possible with some of the more conventional AGC circuits. The receiver is fully temperature compensated throughout and has adequate bypassing to make it exceptionally stable. The block diagram for the receiver can be used as a visual aid to go through the theory one more time.

#### Receiver Construction

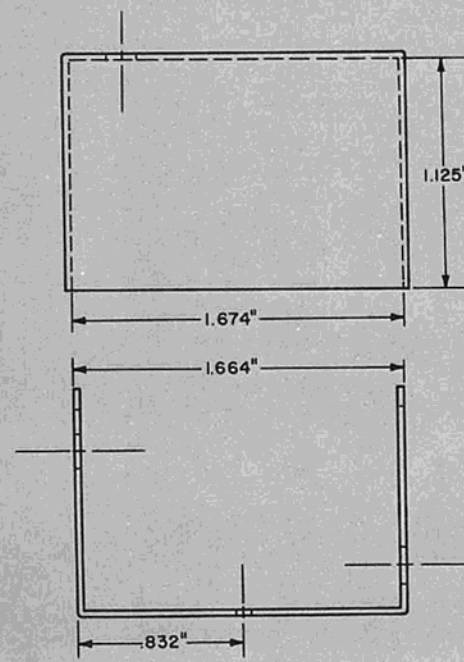
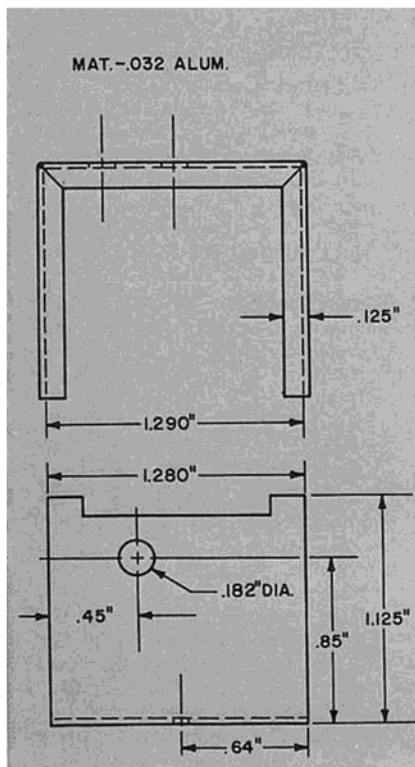
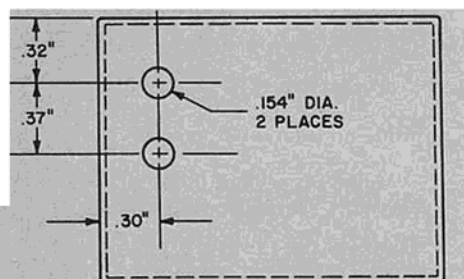
##### Preliminary

- ( ) Check P.C. board for fit in case and carefully make minor corrections if necessary (see photo for P.C. board placement).
- ( ) Clip off one lead of each IF transformer flush with the bottom of the can. See figure 1 for lead identification.

Note: If solderable wire is not used to wind L1 and L2 the ends must be scraped of enamel prior to winding. To check if the wire is solderable or not, heat one end with a soldering iron and apply solder. The coating of solderable wire will melt at soldering iron temperatures and allow tin-

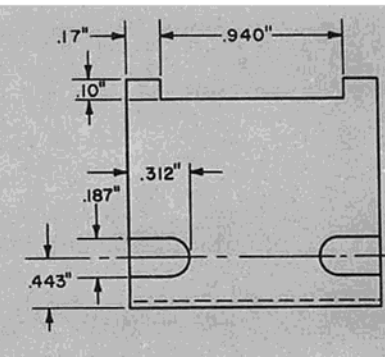
ning. When using solderable wire use only enough heat to complete the solder joint—excessive heat may cause adjacent wraps to short.

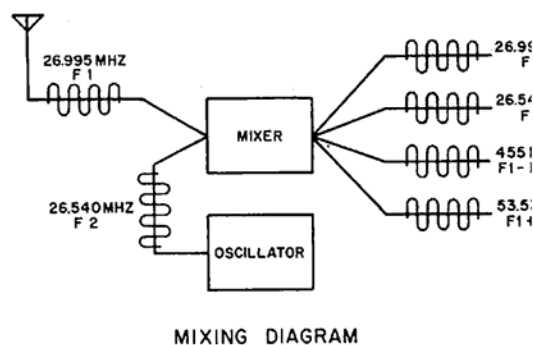
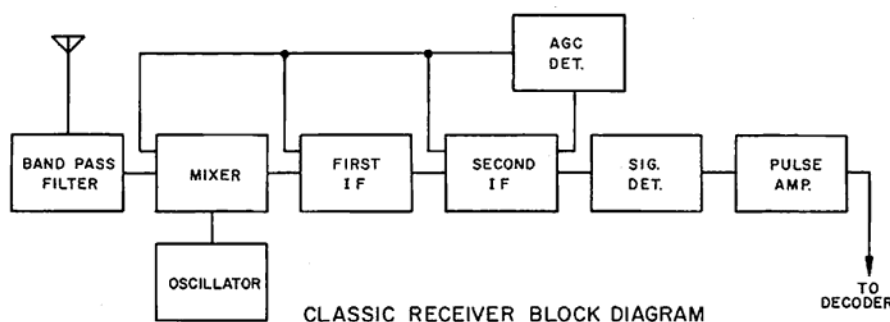
- ( ) Prepare L1 as follows:
  - ( ) Remove tuning slug and with a razor saw cut the coil form to  $\frac{1}{2}$ " height (see figure 2). Replace slug when finished.
  - ( ) Place the coil form as shown on



the overlay to identify the lug numbers.

- ( ) Using a 12" length of solderable #24 enameled wire, secure one end to lug #1 with a single wrap (do not solder).
- ( ) Winding from the bottom of the form upwards in a counter-clockwise direction, wind 9 turns. Keep turns tight!
- ( ) Continue on for  $\frac{3}{4}$  turn and secure the other end of the wire to lug #3 with a single wrap (do not solder). Clip off excess wire.
- ( ) Secure the leads of a 47 PF cap (C1) to lugs #1 and #2 with a single wrap (solder at lug #2). Mount cap close to coil form.
- ( ) Secure the leads of a silicon diode (D1) to lugs #1 and #3 with a single wrap as shown on the overlay (solder at lug #3).
- ( ) Solder at lug #1.
- ( ) Inspect the lugs insuring that all component leads and coil wires are soldered properly. Clip off excess lug lengths.
- ( ) Prepare L2 as follows:
  - ( ) Remove the slug and cut L2 to  $\frac{1}{2}$ " height the same as L1. Replace the slug.
  - ( ) Place the coil form as shown on the overlay to identify the lug numbers.
  - ( ) Secure one end of a 14" length





- of #24 enameled solderable wire to lug #1 with a single wrap (do not solder).
- ( ) Winding from the bottom of the form upwards in a counter-clockwise direction, wind 9 turns (keep turns close).
  - ( ) Continue  $\frac{1}{2}$  turn and pass the wire down and under lug #3.
  - ( ) Bring the wire up from lug #3 and continue winding  $2\frac{3}{4}$  turns.
  - ( ) Secure the other end of the wire to lug #2 with a single wrap (do not solder).
  - ( ) Secure the leads of a 47 PF cap (C2) to lugs #1 and #2 with a single wrap. Mount capacitor close to coil form.
  - ( ) Solder all three lugs.
  - ( ) Inspect the lugs insuring that all component leads and coil wires are soldered properly. Clip off excess lug lengths.
  - ( ) Coat the windings of both L1 and L2 lightly with model airplane dope.
  - ( ) Center the  $\frac{1}{64}$ " sheet insulator in the receiver case and mark the antenna tuning holes.
  - ( ) Remove the insulator and drill the two tuning holes slightly larger than the case holes. Install the insulator with Plibond cement.

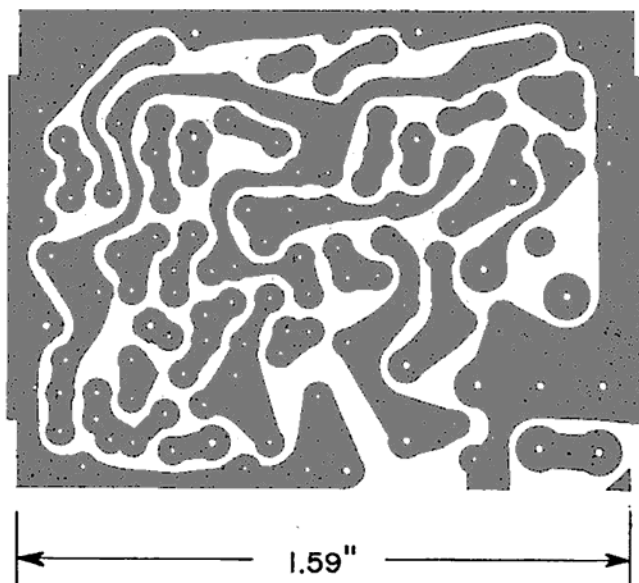
#### P.C. Board Wiring

Note: Use the construction overlay to

- insure proper parts placement.
- ( ) Install three I.F. cans—T1, T2, and T3. Make sure that the core colors match the overlay. Mount them flush with the P.C. board. Clip the case mounting lugs to  $\frac{1}{2}$  their original length and bend them over before soldering.
  - ( ) Mount the crystal flush against the P.C. board.
  - ( ) Mount the two 50 MFD electrolytic capacitors. Observe polarity—the negative end (marked with black band) of both caps should be up.
  - ( ) Mount the two 6.4 MFD electrolytic capacitors. Observe polarity—the negative end of both caps should be up (the positive end has a double crimp and should be down). Use a  $\frac{1}{2}$ " piece of insulated tubing over the bare leads of both capacitors.
  - ( ) Mount three 2.2K resistors (red, red, red).
  - ( ) Mount two 1K resistors (br., blk., red).
  - ( ) Mount two 470 ohm resistors (yel., vio., br.).
  - ( ) Mount two 4.7K resistors (yel., vio., red).
  - ( ) Mount one 27K resistor (red, vio., or.).
  - ( ) Mount one 39K resistor (or., wh., or.).
  - ( ) Mount one 47K resistor (yel., vio., or.).
  - ( ) Mount one 1.5K resistor (br., grn., red).
  - ( ) Mount two 100K resistors (br., blk.,

- yel.).
  - ( ) Mount one 220 ohm resistor (red, red, br.).
  - ( ) Install one silicon diode (D-2) observe polarity—the end with the black band should be up.
  - ( ) Install one germanium diode (D-3) observe polarity—the end with the color bands should be up.
  - ( ) Mount one .047 MFD disc capacitor.
  - ( ) Mount one 16 PF disc capacitor.
  - ( ) Mount one 2.1 PF disc capacitor.
  - ( ) Mount one 47 PF ceramic capacitor.
  - ( ) Mount nine .1 MFD ceramic capacitors.
  - ( ) Mount the preassembled L1.
  - ( ) Mount the preassembled L2.
  - ( ) Mount the RFC.
- Note: When mounting transistors study the overlay carefully to insure the leads are inserted in the proper holes.
- ( ) Mount Q1 (TIXM15).
  - ( ) Mount Q2 (TIXM17).
  - ( ) Mount Q3 (TIXM17).
  - ( ) Mount Q4 (M400 or 2N2124).
  - ( ) Mount Q5 (M400 or 2N2124).
  - ( ) Strip  $\frac{3}{16}$ " both ends, tin and install a  $\frac{36}{16}$ " piece of white hook-up wire for the antenna.
  - ( ) Flat the solder mounds with a fine file.
  - ( ) Clean the copper side of the board thoroughly with dope thinner. Inspect the circuit pattern for shorted lands or marginal solder joints.
  - ( ) Inspect the component side of the P.C. board for adjacent component lead shorts and foreign material. Install insulating tubing over any suspect component leads.

Note: This completes receiver P.C. board construction.

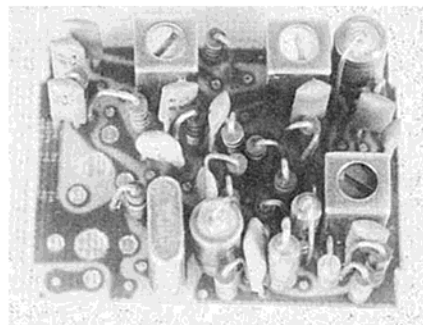
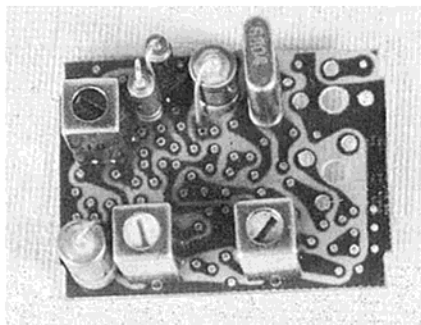
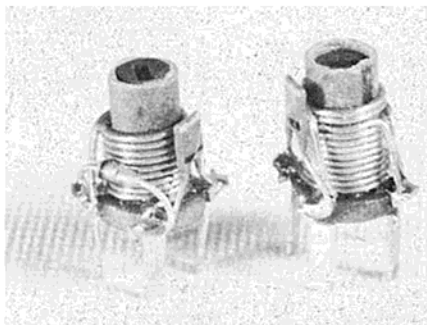


P/C BOARD SHOWN TWICE SIZE

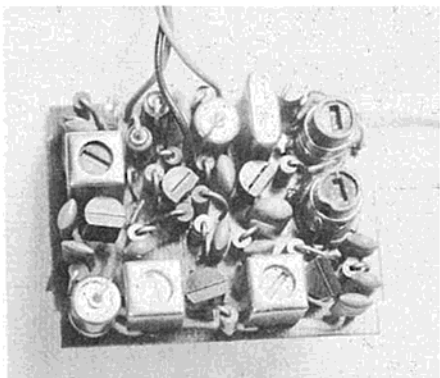
#### Preliminary Checks

- ( ) Observing polarity measure the resistance between red and black wires. The meter should read approximately 2K ohms.
- ( ) Connect the red wire to the positive terminal of a 5V battery pack (4 nickel cadmium cells in series). If necessary the battery pack can be temporarily wired for the following steps.
- ( ) Adjust the test meter selector switches to read milliamperes and connect the black meter lead to the negative terminal of the battery pack. Connect the red meter lead to the black receiver wire. The meter should read approximately 4 MA.
- ( ) Remove the meter and connect the black receiver lead to the negative

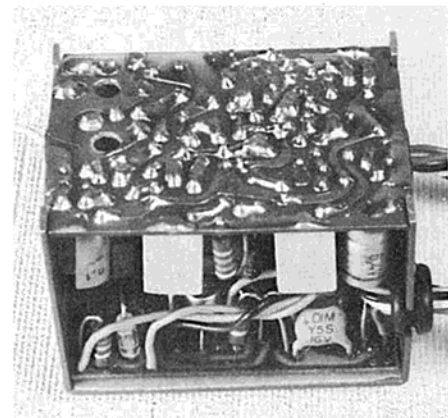
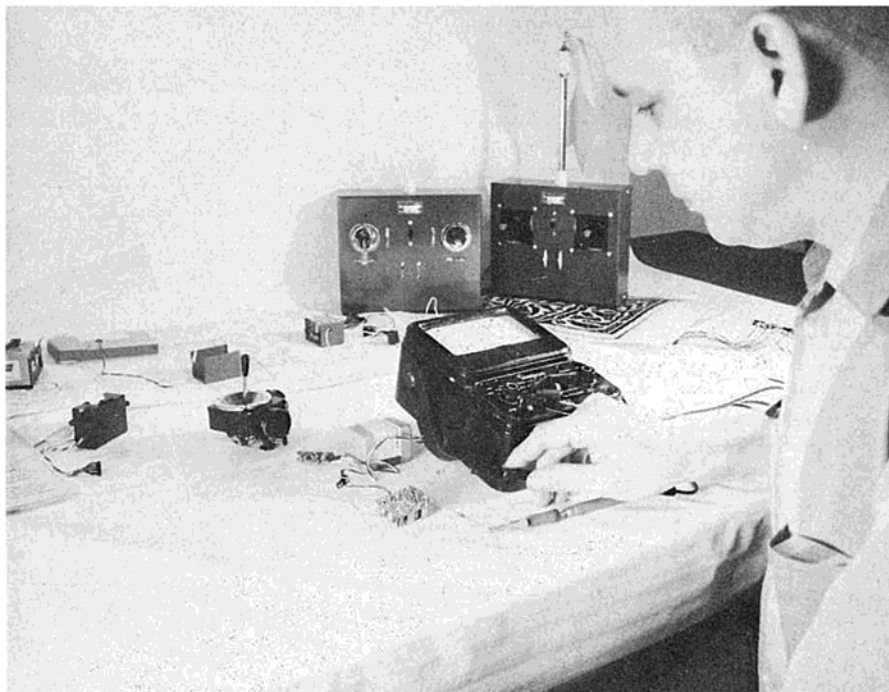




Above, left: L1 and L2. Above, center: Crystal, I.F. cans, and electrolytic capacitors installed. Above, right: Everything installed except L1, L2, transistors, and RFC.

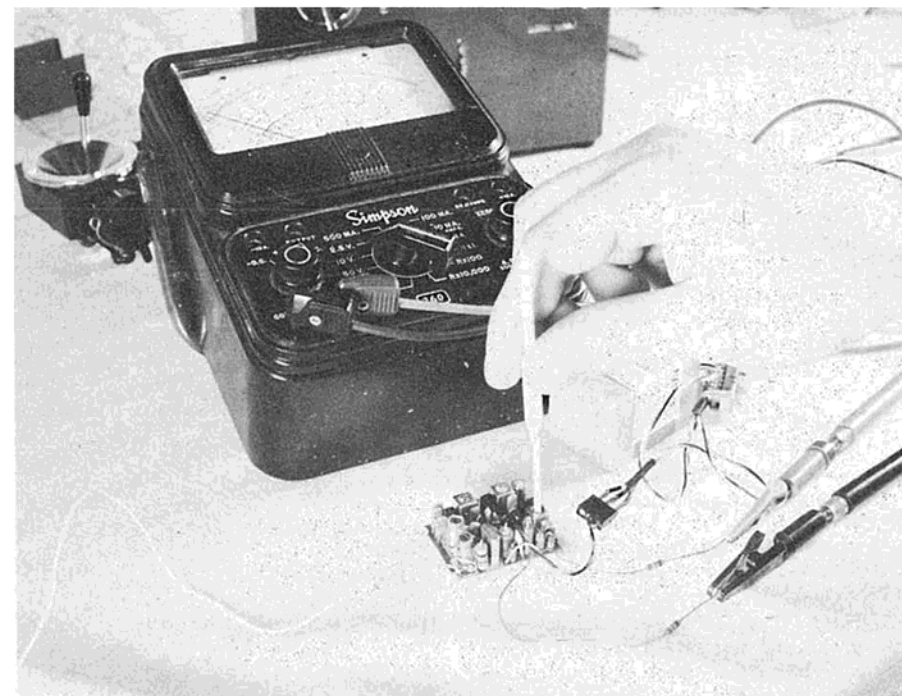
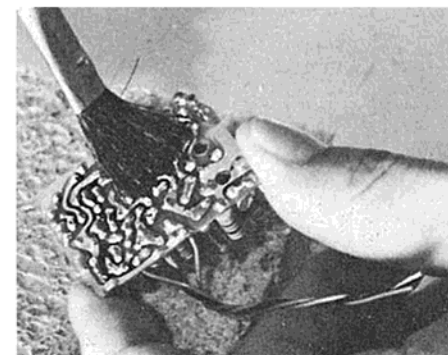


Above: The completed receiver P.C. board. Right: Ed Thompson checks the voltages: Note the 1K resistor in series with both meter leads at probes.



Above: P.C. board placement in case. Below: Cleaning the rosin from the P.C. board. Inspect carefully for any solder bridges or cold solder joints. The best components and overall design are only as good as your construction techniques.

Below: Turning the receiver. Be sure to use a good quality test meter. Use a plastic tuning wand or wooden dowel with chisel tip.



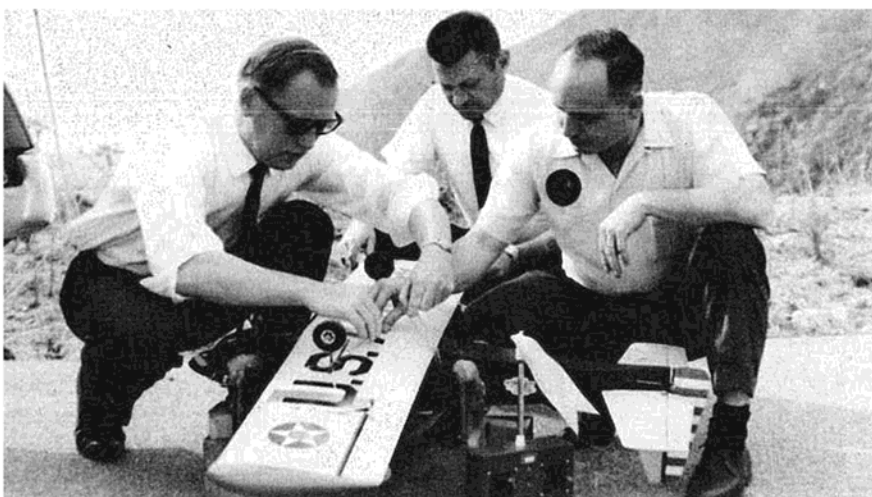
terminal of the battery pack.

- ( ) Measure the receiver voltages as shown on the schematic. All voltages should be within  $\pm 20\%$ . Use a 1K resistor in series with both meter leads at the probes.

#### Tuning the Receiver

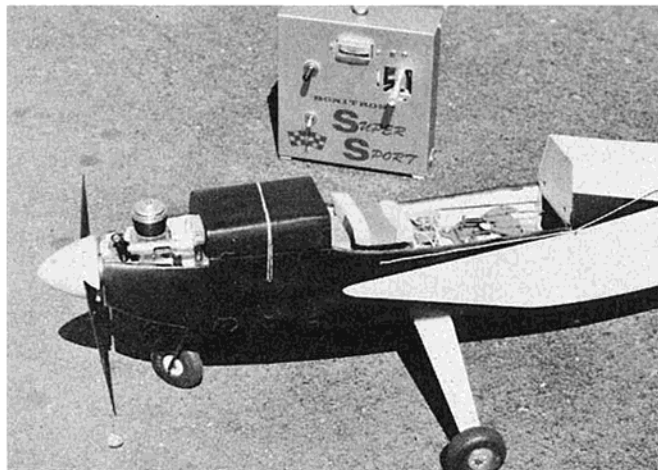
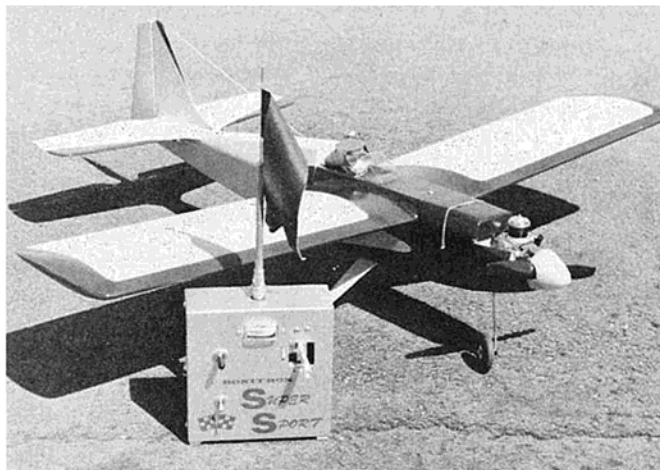
The receiver should be tuned using the transmitter with which it will be flown. The transmitter should be completed, ready to fly, and properly tuned. The battery packs for both the transmitter and receiver should be fully charged.

- ( ) Lay out the receiver antenna its full length, on a non-metallic surface, as far as possible from household power wiring. If the work surface is high enough from the floor the antenna can be dropped over the edge and let hang.
  - ( ) Temporarily solder two 1K resistors to the tuning points, as shown on the schematic. These test points are the blue signal lead and the positive ground lead.
  - ( ) Place the multimeter function selector to the lowest A.C. range and connect the meter leads to the two 1K resistors. Place the meter leads out of proximity with the receiver antenna. The meter should have 5,000 ohm/volt or higher sensitivity on A.C. measurements.
  - ( ) With the antenna collapsed, turn on the transmitter and place it a few feet from the receiver.
  - ( ) Apply power to the receiver and tune the three I.F. can cores for maximum deflection. Use an insulated tuning tool. Move the transmitter further away as the meter reading increases to maintain a peak reading of less than  $\frac{1}{2}$  volt.
  - ( ) Remove the antenna from the transmitter and tune L1 and L2 for peak meter reading.
  - ( ) Finally, repeat T1, T2, T3, L1 and L2 while maintaining transmitter spacing for less than  $\frac{1}{2}$  V peak reading.
  - ( ) Disconnect test equipment and battery pack.
  - ( ) Secure the cores of T1, T2 and T3 with a drop of Plibond cement.
  - ( ) Tie a single knot in the antenna wire  $\frac{1}{2}$ " from the P.C. board for strain relief.
  - ( ) Install the antenna grommet in the receiver case.
  - ( ) Place the receiver in the case and pass the antenna wire through its grommet.
  - ( ) Check for clearance between lug #3 of L1 and the case. If clearance is needed, remove excess with a fine file.
  - ( ) Make one final check of the P.C. board for foreign material and possibility of component lead "shorts." If desired, use 'silicon rubber' sparingly to prevent component shifting. The receiver construction is now complete.
- Note: The receiver characteristic graph and test set-up drawing shown may be used to check or trouble-shoot your receiver's performance.



#### PARTS LIST RECEIVER

Item	Description	Part No.	Mfg. or Source
Capacitors			
C1,2	47 PF Disc Ceramic	20% CV15GC47PF	Mepco
C3,4,5,6,7,8,10,11,13	.1 MFD Ceramic	+80 —20% C330BA/R100K	Amperex
C9	47 PF Disc Ceramic	10% CV15GC47PF	Mepco
C12,19	50 MFD @ 6V Elec.	+80 —20% C426AR/C50	Amperex
C14	2 PF Disc Ceramic	10% CM2.1 NPO	RMC
C15	16 PF Disc Ceramic	10% CM16 NPO	RMC
C16,18	6.4 MFD Tantalum	20% C426 AS/C6.4	Amperex
C17	.047 Disc Ceramic	+80 —20% CO52B100E473Z	Sprague
Diodes			
D1,2	Silicon, Signal	1N4148	1TT
D3	Germanium, Signal	Amperex	1N34
Coil (Forms) RFC			
L1	Handwound (see text)	2173-2-3	CTC
L2	Handwound (see text)	2173-2-3	CTC
RFC	12 uhy	3640-47-2	CTC
Resistors			
R1,3,5	2.2K	1/4 W 10%	IRC
R2,8	1.0K	1/4 W 10%	IRC
R4,6	470 ohms	1/4 W 10%	IRC
R7,15	4.7K	1/4 W 10%	IRC
R9	27K	1/4 W 10%	IRC
R10	39K	1/4 W 10%	IRC
R11	1.5K	1/4 W 10%	IRC
R12,14	100K	1/4 W 10%	IRC
R13	47K	1/4 W 10%	IRC
R16	220 ohms	1/4 W 10%	IRC
Transistors			
Q1	PNP Mixer (Ge)	TIXM15	Texas Inst.
Q2,3	PNP IF Amp (Ge)	TIXM17	Texas Inst.
Q4,5	NPN High Gain (Si)	M400 or 2N4124	R.E. or Motorola
Transformers			
T1	Mixer, 455 KC (yel. core)	MIX S10	Mitsumi/R.E.
T2	1st IF, 455 KC (whte. core)	1st IF S10	Mitsumi/R.E.
T3	2nd IF, 455 KC (blk. core)	2nd IF S10	Mitsumi/R.E.
Item	Description	Mfg. or Source	
Miscellaneous			
Crystal	3rd Overtone Fund. Freq—455 KC	R.E.	
P.C. Board	1/32"	R.E.	
Hook-up Wire	#26 Stranded	R.E., Bonner or R.C. Craft	
Insulator	1/64" Sheet 1-19/32"x1 1/4"	R.E.	
Mounting Screw	#2 Self-Tapping (Sh. Metal)	R.E.	
Grommet (1 ea.)	1/4" Rubber	R.E.	
Grommet (2 ea.)	5/16" Rubber	R.E.	
Coil Wire 30"	#24 En. Copper (solderable)	R.E.	
Test Res. ( 2ea.)	1K 1/4 W 10%	IRC	
Case, 2 piece	.032 Aluminum	R.E.	
Insulated Tubing, for Component Leads	2" #22 Plastic Tubing	R.E.	



The Author's Bonitron equipped test model, an original shoulder wing sport design with 41" span and Cox .15 engine. Rand Dual Pak installation with the Bonitron receiver up front, wrapped in foam.

## RCM PRODUCT REPORT:

# BONITRON SUPER SPORT

By GEORGE P. HARRIS

Recipe for a barrel of fun: One Bonitron Super Sport transmitter and receiver, Rand Dual Pak, and airplane. Mix well and fly.

For a reasonable price, pulse proportional provides a degree of control approaching that of full house gear, and is just about as reliable now. At high pulse rates there is almost no wiggle, and better still, with dual actuators and a decoder, there is no lurch when throttle is used.

The Bonitron Super Sport outfit has some unique features which make it quite versatile. The transmitter is packed in a small, easy-to-hold case finished in light gold, and has a fairly long stick with a recessed knurled end, so you can grip it with thumb or fist. The Trims are of wheel operated, electrical type and do not change the stick position. They have a good range of travel but do not have any markings to indicate neutral (on my unit at least), which is the only criticism we have of the unit. A toggle switch is used for throttle control, and a horizontal scale meter indicates output. When the back of the transmitter is removed the unique features are displayed in a group on the PC board. There is a slide switch for selecting tone or pulse output, the tone being operated by using the throttle toggle at high position. Another slide switch selects high or low pulse rate, giving a choice of three modes of operation. Along the bottom of the PC board is a row of trimmers for individual adjustment of range and centering for rudder and elevator, which we feel is a very useful feature. The instruction book for the transmitter contains comprehensive instructions for setting up and adjusting each mode, the pulse operation being explained fully by numerous diagrams showing the control actions.

The Bonitron receiver is built on a rugged PC board and is completely coated with a clear rubbery material, which protects against shorts and vibration. A 7 inch antenna stub is provided with the suggestion to use a 24 inch whip antenna. However, in our years of flying GG we have never had any trouble with a wire antenna trailing back to the tail, so we carefully ignored this recommendation.

The Rand Dual Pak uses two of their tried and true actuators with all kinds of little transistors and things hidden inside to sort out the signals! A mounting frame, now available from Rand, holds the two actuators with one slightly higher than the other to provide clearance between the moving parts and allowing the assembled unit to fit into a narrow space. The battery pack has a full amp hour capacity and will operate the system for an hour, continuously, which should be ample for a day of intermittent flying. The System was completely wired with coded plugs and required only charging of the airborne pack and a 9 volt battery in the transmitter to become operable.

The model used for testing was an original shoulder wing sport model of 41 inch span, powered by a Cox Medallion 15 and proved to be fast and responsive. With the model parked in the pits a range check showed solid response at over 50 yards with the antenna collapsed, which is more than adequate. With the transmitter antenna held close to the receiver antenna there was no sign of swamping. The control surfaces quiver almost imperceptibly at neutral and move smoothly in response to stick action.

On take-off, a slight turn to the right was corrected by trim, and from then on it was all fun! There was no detectable

interaction of controls and no deviation of the model when throttle was used, which is especially nice for touch-and-go's. The lack of flapping surfaces really reduces drag and results in an increase in speed, which is most noticeable in the glide. Control response is positive, even at small stick deflections. Several other models were in the air at the same time but no adverse effects or glitches were apparent.

On the following weekend the model was held in a straight climb-out longer than usual (about 200 yards) and, due to the tail end view of the antenna, it ran out of range and fail safed. It responded to the full tone signal for high throttle but fail safed again when released, so it finally settled to earth in neutral with no more damage than a dirty engine. Now paying heed to the manufacturers instructions, a whip antenna was installed and there were no more range problems! Subsequent flights were great except when we tried to knock down a barbed wire fence about 50 feet short of the runway. This was rough on the model but had no effect on the equipment.

The slow pulse rate was bench checked in an unfinished model with a single actuator Rand G-G Pak and the response was still good at small stick deflections. No trim adjustment was necessary when switching pulse rates.

This is a very satisfactory set of equipment and will shortly be installed in some small scale models, with aileron control and possibly coupled rudder, since the Rand actuators have ample connections for multiple surfaces.

Tested, Approved, and recommended by RCM.



By LEO LICHTBLAU

RCM's Editor in CZECHOSLOVAKIA



Preparing two 'Polysterix' gliders for flight. This popular Czech glider designed by RCM's Czechoslovakian Editor.

## RCM VISITS CZECHOSLOVAKIA

Nobody will doubt that aeromodelling is a very useful hobby, providing fun and active rest after working hours. But it is not only the fun, but also a certain compensation in bringing one's own ideas into reality, which is so often impossible at work and business. Building and flying R/C models is one of the most wonderful parts of this hobby and it is little wonder that worldwide interest in this activity is increasing. The average American modeller may not be aware of his advantages with respect to his R/C activities which are supported by a highly developed technical and commercial industry. The following lines should show conditions under which modellers in many other countries follow their hobby. So, let's tell you something about R/C activities in Czechoslovakia.

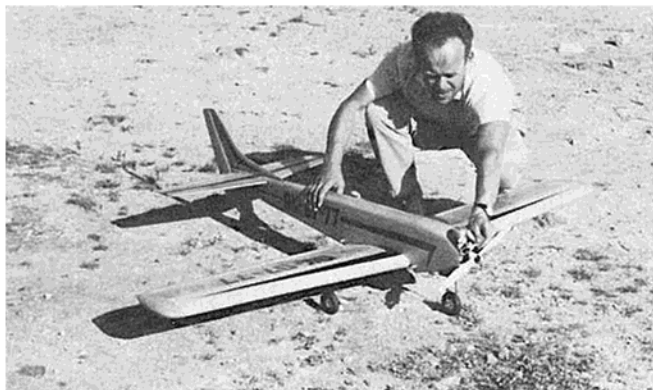
### Brief History

First signs of R/C flying in Czechoslovakia can be found in the years 1952-1953. The first sets used super-regen valve receivers and carrier wave transmitters with-

out modulation. Home-made relays, magnetic actuators, and big planes to carry the heavy receiver and HT battery were a common sign of this time, and lasted until 1958 without significant changes. In 1958 the first transistors appeared, very expensive items in those times, but strong natures did not mind quality nor prices, and started with transistorized LF amplifiers, combined with super-regen valve HF stages. Magnetic actuators and rubber driven, home-made actuators were still the only rudder driving devices. In 1960 and '61 there appeared the first HF transistors, and although not yet available in shops in these times, R/C fans found their own ways to obtain secondhand and third-hand OC 170's and were soon experimenting with transistor-super-regen stages in receivers. Transmitters were already tone-modulated, but of course, with valves and without crystals. When the availability of low power HF transistors increased, the number of fully transistorized super-regen receivers grew, but everything was still

single channel. The first home-made single-channel servos with electric motor drive made their appearance, but a drawback of these was the only available East German electric motor, which often failed to start, or remained stuck in the full signal position with all the attendant unpleasant consequences!

In 1962-64 R/C fans tried their hands at multi channel equipment. There were no reed relays available and no multi servos. The only way to go was the German system of L/C filters. Several home-made sets made their appearance, and were more or less successful, the main stumbling blocks again being the servos coupled with insufficient temperature stability of the tuned filter circuits. There was a certain improvement in the availability of miniature resistors and condensers, although electrolytics were still of unacceptable size. Transistors improved in characteristics, but there were still available only the germanium p-n-p and n-p-n types and no power HF units for trans-



Left: The author with his Taurus-like multi. Above: A family of Polystyrene gliders and a WWII car, used by modelers.



Left: Fritz Bosch at the Czech International event at Karlovy Vary. Above: Mirko Musil landing his glider.

mitters.

Another step forward was in 1964 with the production of the first commercial set in Czechoslovakia, the single channel "GAMA." This set with valve transmitter and relayless receiver increased the R/C team considerably. There were more than 200 people from the whole country who flew and took part at different competitions, but only 10 of them flew multi four to eight channels. In 1965 the manufacturer ceased production of the "GAMA" and in 1966 there appeared another commercial set, the 4-6 channel "TONOX." This set was built on the lines of L/C tuned circuits and comprised a transistor transmitter with crystal.

This situation is almost unchanged in 1968; the average R/C fan still flies single channel, very few of them having gone to multi "reeds." Two of our pilots, Michalovic and Vostry, participants at the last World Championship at Corsica, have flown Orbit reed outfits since 1963, the only American commercial sets ever imported. For last year's championship they were equipped with two Simprop proportionals, imported by our Central Committee of Aeromodelling.

For a better understanding of the above, it may be wise to explain a little of the common organization of our modelling activities.

#### Organization of Clubs and Competitions

Modellers in Czechoslovakia are organized in approximately 300 clubs, which contain all kinds of model activities, aero-

modelling, model boats, model railroads and model cars. Model flying clubs usually contain free-flight, U-control and R/C modelers. There are no pure R/C clubs, as yet.

These clubs are directed by a Central Aeromodelling Committee, which is part of a central organization called "Svazarm." This organization advises aeroclubs, parachute clubs, motoring clubs, amateur-radio clubs, etc., and partially finances their activities. Modelling clubs receive a yearly amount of basic materials like plywood, glue, paper and similar items, the amount depending mainly on how many youngsters are educated in courses, led by club members, on aeromodelling. Club members get a small amount of balsa yearly depending on points gained at competitions. This is an agreeable policy with respect to free flight and U-control, as in these categories the Czechoslovak teams have really good results as can be noticed from earlier championships and last year's F/F World Championship, held in Czechoslovakia.

But back to R/C. There is quite a number of competitions each year, attended by many single channel enthusiasts, but by only very few entries flying multi. Categories flown at competitions are as follows: single channel glider; multi glider; aerobatics; single channel slope soaring; multi slope soaring; single channel motor models; and multi motor models. The latter are flown to the FAI schedule, the rest to our national schedules. For each cate-

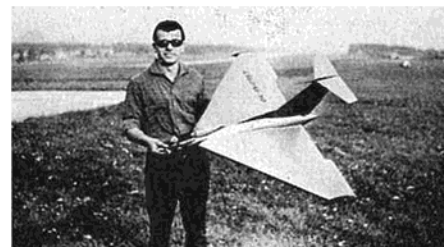
gory there are three yearly championships, the winner of each becoming national champion of the year in his category.

Every other year there is an international multi event at Karlovy Vary, which is attended by R/C pilots from Western Germany, East Germany, Hungary, Yugoslavia and Poland. For Czech modellers this event is usually only a kind of "show," where they are able to see a bit of real flying. Last year we were lucky enough to see the flying of Bosch, Schmitz and Bauerheim, and this was our first opportunity to see flying with full house proportional of outstanding quality. This also was the reason why our Central Committee decided to purchase two Simprop outfits for two of our top pilots for their start at Corsica, but the lot of really keen chaps cannot afford a foreign proportional set, since these items are not imported.

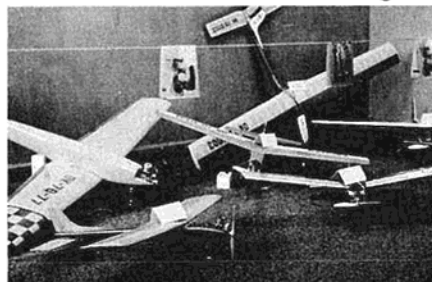
#### The "Do-It-Yourself" Man

From the onset, it is necessary to understand one important point—although poor in equipment and commercial availability, the average Czech R/C enthusiast knows quite a bit about the radio, itself, and is usually the "do-it-yourself" type in every respect. A few examples may illustrate this fact.

To start with, small things that you are used to buying such as hinges, control horns, ready made landing gears, clunk tanks, and other kinds of hardware, we must fabricate ourselves. You would not think of making your styro-foam wings by yourself, or at least you do not have to,



Left: The multi glider, 'Vampire', by Heyer, described in text. Center: The author tuning his old 'Live Wire'. Right: The Delta man, Urban, with his single channel model mentioned in article.



Left: A display of Czech R/C Models. Center: Another glider by Mirko Musil. Right: Two cute and efficient single channel gliders called 'Dart'.

but we always cut them with hot wire at home and do the sheeting with low grade balsa and thinned epoxy cement. Few of our modellers may make their fiberglass fuselages by themselves, because there is a wide variety of types commercially available in your country. We make these fuselages ourselves, starting with the wooden model, preparing negative plaster die halves, and commencing with the production of positive fuselage halves and then joining them. Another item worth mentioning is balsa: We get our ration in bars which we must hand cut into sheets. Selection of hard, medium or soft balsa is hardly possible, since we are lucky enough to get any at all.

It is also necessary to mention the radio problem. We build our receivers and transmitters from scratch, the etching of printed circuits and preparation of all the hardware is also a part of our business. As already mentioned before, availability of parts restricts our modellers to single channel or to multi bang-bang, but there are still very few of us flying multi today. This situation may change with higher production of the six-channel commercial set, "TONOX."

The problem of proportional flying bothers Czech R/C fans very much and at hangar doors one hears talk about digital and analog circuits and feedback servos. Actually there have been few attempts for home-made propo-sets (analog, of course) but the available germanium transistors with wide spread characteristics, their low temperature stability, and homemade feedback servos, have sentenced these efforts to experiments only. But a big advantage of these experiments have been that the average R/C modeller has gained a certain knowledge of the stuff and usually understands how things work. There is one more thing worth mentioning when comparing our R/C activities with yours. To my thinking, flying represents the larger part of our hobby and your modellers certainly restrict their work-shop hours to the necessary minimum. If a crash occurs, and a commercial set is damaged, your modeller sends it in for a fast

and thorough factory service and looks after his model. This enables him to be in the air again very soon, and thus he has plenty of time for practicing and improving the art of flying. The Czech R/C fan, if he experiences a bad crash, is grounded for long laborious weeks and months, before he gets his badly shattered equipment and plane into the air once again. And this means a lot of bench-work and a minimum of flying. In turn, if he finally gets airborne again, the probable consequences of another crash make his hands and nerves somewhat shaky!

But enough of it, we fly, anyhow, and American modellers should be taught by these examples to think highly of their R/C equipment and the commercial help they receive. It is really worth the money they spend for it.

#### The "Tough" Team

Despite his difficulties, the Czech R/C fan is really keen and tough, knowing enough to get the best out of his equipment and model. Let's, for instance, have a look at R/C glider activities. This is widespread in this country and competitions are really crowded. The original single and multi channel glider schedule flying is slowly losing popularity and a great part of R/C glider pilots have become devoted slope soarsers. There are competitions held at the hilly site of Nove Mesto in Moravia with outstanding soaring conditions. High mountain slope soaring is held also at Krkonose mountains on the so-called "Zlate navrsi" or 'Golden top.' In the accompanying pictures you will find people and models around this business. Models are of very good quality, as for instance the multi glider of Ing. Heyer, shown in pictures, equipped with a homemade 9 channel receiver with elevator, elevator trim, rudder, ailerons and spoiler-flaps control. These give the model outstanding maneuverability and performance. The model is of orthodox balsa construction with a wingspan of 61", a wing area of 713 sq. in., and a weight of 4.2 lbs. The wing profile is a NACA 64 A 512. In other pictures you will find other Czech

gliders, showing clean lines and good performance characteristics.

Single channel motor models are of orthodox construction, sometimes equipped with styro-foam wings and glass-fibre fuselages. These models are designed for good wind penetrating characteristics and are equipped with diesel or glow engines ranging from .06 cu. in. to .35 cu. in. capacity. These engines are either original Czech made or diesels imported from East Germany. This category is the second most crowded category, attended by young people and newcomers to R/C. Only a few models of this category are equipped with throttle control since the landing approach is done with cut engine. Last year there appeared some designs out-of-the-rut of orthodox single channels, as for instance the deltas of Miroslav Urban from Prague, who flies these darned things, believe it or not, with magnetic actuators! Another interesting model is the pusher-engine model of J. Bily from Melnik, who is also one of our multi pilots. There is not much more to say about this category, except that it enables the average Czech R/C enthusiast to become a member of the "tough" team.

R/C multis are, as already mentioned, very rare. Michalovic and Vostry of Prague are our top performers in this category and they placed 29th and 36th at the 1967 World Championships at Corsica. This is certainly a success, when compared with the 1965 Championships, where Michaelovic ended last. The remaining few multi pilots from Brno, Melnik or Koprivnice, with their homemade bang-bang multi's, will have to wait for better equipment.

Coming to the end, the author would like to stress that it was not his intention to complain about everything, but only to show that it is possible to build and fly R/C models under conditions very different from yours. But there remains one thing that is common to R/C fans in the whole world—we like our R/C hobby as much as you do and we would never give it up, despite all difficulties.



# The RCM Flight Training Course



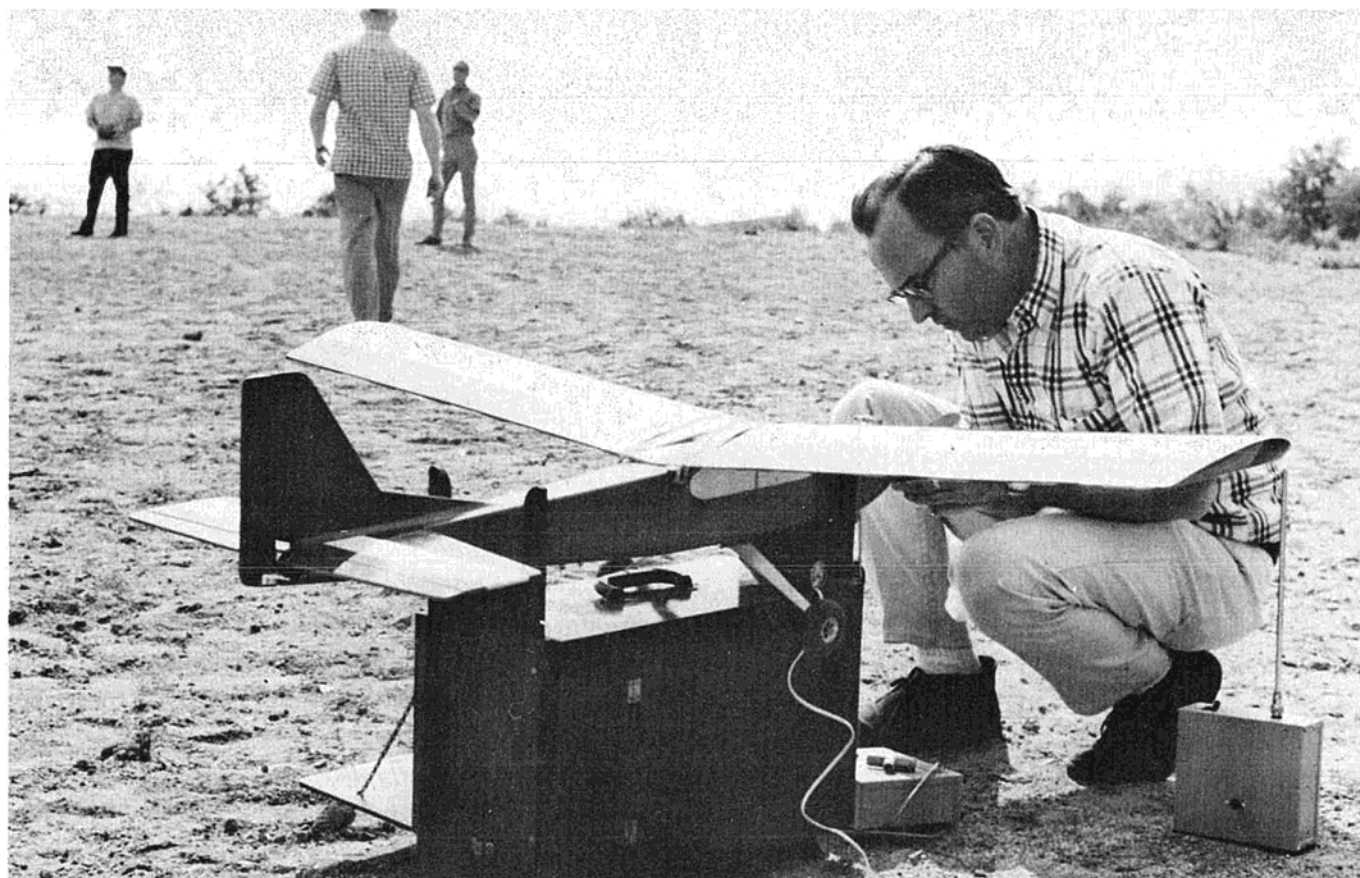
## PART II: THE RCM BASIC TRAINER

*This RCM Flight Training course is a unique program devised by the RCM staff for the many newcomers to R/C who have never, as yet, soloed, as well as for those countless others who are experiencing difficulty in learning to fly. The objective is to teach you to fly, with RCM as your instructor. You will be given a thoroughly field tested aircraft on which to learn. You will be shown a professional way to learn to fly with proportional control, using the assistance of one of the more advanced fliers in your local area. As you gain confidence and proficiency, you will be shown how to upgrade your training aircraft to keep pace with your abilities. In short, you will learn how to fly radio control.*

*This series has been prepared for presentation by RCM by Don Dewey, Herman Stroup, Kathleen Acton, Chuck Cunningham, Dick Kidd, Dick Sonheim, and Bill O'Brien.*

The phenomenal growth of radio control over the past few years has brought with it its own complex of problems. One of these is the unprecedented influx of newcomers to our hobby and sport. While this is beneficial to the present and future growth of the hobby in general, it has created a situation of an industry that was, and still is, to some degree, unprepared for the novice adult R/C'er with little or no modeling background. This is evidenced by the many magazine construction articles that contain the phrase, "This is not a beginners project," as well as the majority of kits on the market which assume a vast modeling background on the part of the modeler.

This leads us to another problem — the endless array of construction articles, kits, and radio equipment available to the new R/C'er. He is expected to make a choice, and if his choice is wrong, he will encounter a great deal of disappointment and frustration, rather than success, in his attempts to get started in the sport of his choice. This quandary in which the novice finds himself, is evidenced in the hundreds of letters we receive from beginners each month. These letters literally plead for specific recommendations as to a choice of first airplane, engine, and radio equipment. And, although we have made general recommendations in the Shop & Field section in the past, it is apparent that more specific recommendations be made. This, is the second installment in a Shop & Field series of articles presenting a tested and proven program that will literally guarantee you, the newcomer, a relatively high degree of success in building your first aircraft and, subsequently, learning to fly that aircraft. This is, certainly, not the *only* way to learn to fly — but one that is based upon the combined years of experience of a great many people, as well as one which eliminates as many pitfalls as possible.



RCM's Art Editor, Dick Kidd, prepares the RCM Trainer for flight. Note Deans Proportional System with student "buddy box."

# THE RCM BASIC TRAINER

Designed By H. L. STROUP

Last month, in the first installment of our Flight Training Course, we discussed some of the aspects of getting started in R/C. In this issue, we'll get down to the actual building of the Basic RCM Trainer, designed by Herm Stroup of the Memphis R/C Club. We hope you will follow this program through, step-by-step.

## Construction Notes

Construction details will be fairly complete since the RCM Trainer is designed for individuals with limited flying and building experience. The length of these construction notes may give the impression that the model is time consuming and difficult to build. It isn't! During December I built two in three weeks—including six coats of dope. (I have a full time job, too.) K. K. McClure of the Memphis R/C Club recently cut out and assembled a completed fuselage in three hours.

Some of the building techniques and wood sizes used are rather arbitrary. So far I have built three and no two are exactly alike. Several of my fellow Memphis R/C Club members have built the Trainer and no two of them are exactly alike. Use

your own favorite building devices and experiment but don't distort the basic aerodynamics. All balsa used should be medium grade except for soft blocks for the wing tips.

## Wing

The prototype was built with a conventional "built up" balsa wing but all subsequent models have used foam wing cores, no dihedral braces, and no spars, but with the center section glass clothed and epoxied. These wings are true, easy, cheap and require the use of dope only on the tip plates. Warner Industries, whose advertisement appears in this magazine, has both the Basic and Advanced RCM Trainer wings in stock.

After cutting the two wing halves, use the foam cutter to make the 45-degree angle at the tips. Contact cement a 3/16" sheet to each tip. Contact cement the Bristol plate to each wing half. The board will straighten some warps in the foam but avoid the warps in cutting, if possible. Match the two halves for proper dihedral angle and fit together. Epoxy the two halves together (use long pins to hold in

position) and let dry overnight. Spread a 4" wide coat of epoxy (or resin) across the center, lay on a 4" wide strip of glass cloth, then smooth another layer of epoxy on top. Seal the trailing edge and the tip plate with epoxy. The forefinger is the best tool for this. After the whole mess is dry, fine sand where the epoxy is used, then dope, Hobbypoxy, spray enamel, cover with Monokote, or cover with shelf paper.

If you insist on building a balsa wing—O.K. It will be a little lighter. The 1/16" ribs may be cut from the scrap stock left over from the wing and stab sheeting. Make a plywood or posterboard template. After cutting out all the ribs, stack and sand to exact shape. (A little care here will save building and flying problems later.) The two center ribs (one each side) should be cut from 3/16" stock . . . the scrap left over from the fin and rudder.

Pin the 1/2" x 1/4" leading edge to the plan. (Don't forget to lay waxed paper on the plans first.) Cement the bottom leading edge sheeting (1/16" x 3" x 26") to leading edge. Pin the trailing edge sheeting (1/16" x 1 1/2" x 26") to plan. Pin

the  $\frac{1}{4}$ " square bottom spar to plan. Glue all ribs in place on 2-inch centers. This close rib spacing gives the wing strength and avoids fabric sagging between the ribs without a measureable increase in weight. Glue the two  $\frac{3}{16}$ " center ribs at a slight angle (for dihedral). Glue the top spar in place. Glue the top leading and trailing edge sheeting in place. Cut and sand the  $\frac{1}{2}$ " x  $\frac{1}{4}$ " leading edge to airfoil shape. Add tip blocks, carve and sand. The 45-degree tip angle may be cut flat after the top of the block is cut and sanded to airfoil shape. Sand the two center ribs (use a flat sanding block) to correct dihedral angle. You may use a dihedral brace between the spars but it is not necessary. But glue the two halves together, one flat, the other blocked up to correct dihedral angle. After it is completely dry, glue in the top and bottom  $\frac{1}{16}$ " x  $\frac{1}{4}$ " cap strips. Cut these strips from scrap or purchase strips this size from your hobby shop. If the top strips resist bending over the airfoil shape—wet the top of them. Glue the center sheeting ( $\frac{1}{16}$ ") from the center to the top of the third rib of each wing panel and wrap the entire center section with a 4 inch strip of glass cloth impregnated and coated with resin or epoxy.

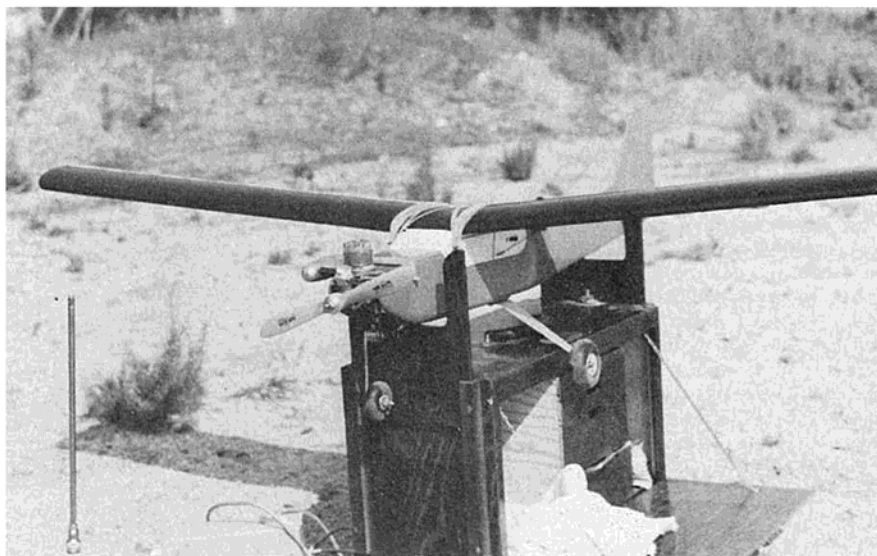
Punch a small hole in each wing rib to avoid the expanding and contracting of trapped air with temperature changes. Sand the entire wing frame with particular attention to the center section for smoothness. Apply two coats of clear dope to all the wood you can reach with a brush, fine sand again, then apply Scotch Tape to the top of all cap strips. This will preclude the possibility of the covering material sticking to the cap strips when dope is applied.

#### Stabilizer

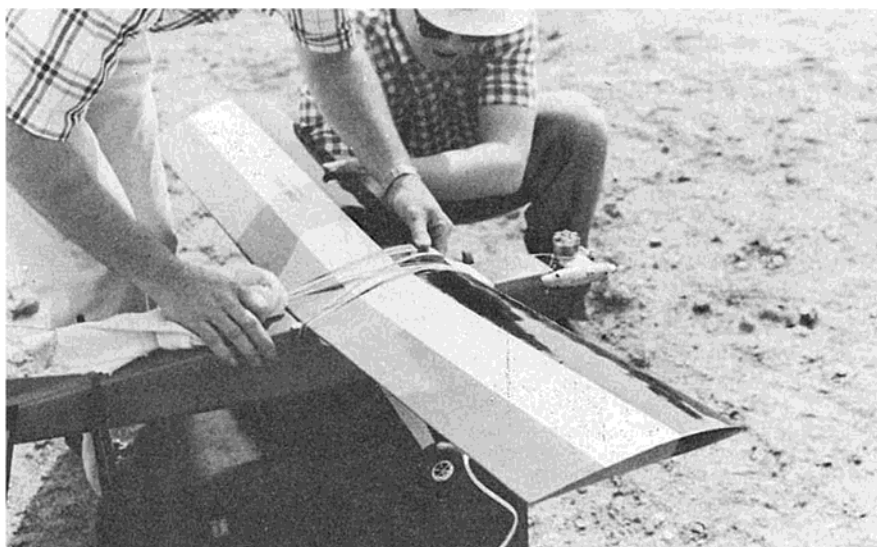
This is a basic sandwich of  $\frac{1}{16}$ " sheet over  $\frac{1}{8}$ " x  $\frac{1}{4}$ " framing. If you use 6-inch width  $\frac{1}{16}$ " balsa for the top and bottom, the job will be easier and neater. If you can't find  $\frac{1}{16}$ " balsa in 6" widths, glue two 3" pieces as closely fitted as possible with epoxy while holding the two pieces together with Scotch Tape. Weight the glued pieces on a flat surface and allow to dry thoroughly. Mark a center line (from leading edge to trailing edge) then cut the top and bottom sheeting to the shape shown on the plans. Pin the bottom sheet to the plans, glue in the outside framework, then the inside. If hard use is expected, you may add more framing than is shown in the plans. Before the framing is dry spread a layer of glue on top of the entire framework and all the top sheeting. Weight it down on a flat surface and allow to dry overnight. Round all edges except the flat section of the leading edge that joins the fuselage top.

The elevator may be cut to shape from  $\frac{3}{16}$ " sheet and reinforced in the narrow center section with glue and fabric. If heavy stresses are expected, glue music wire across the center, as used with many elevators. For Galloping Ghost flying use trailing edge stock  $\frac{3}{4}$ " wide. Round the leading edge of the elevator. The tapered trailing edge stock will keep the elevator out of the air stream while it is pulsing in neutral.

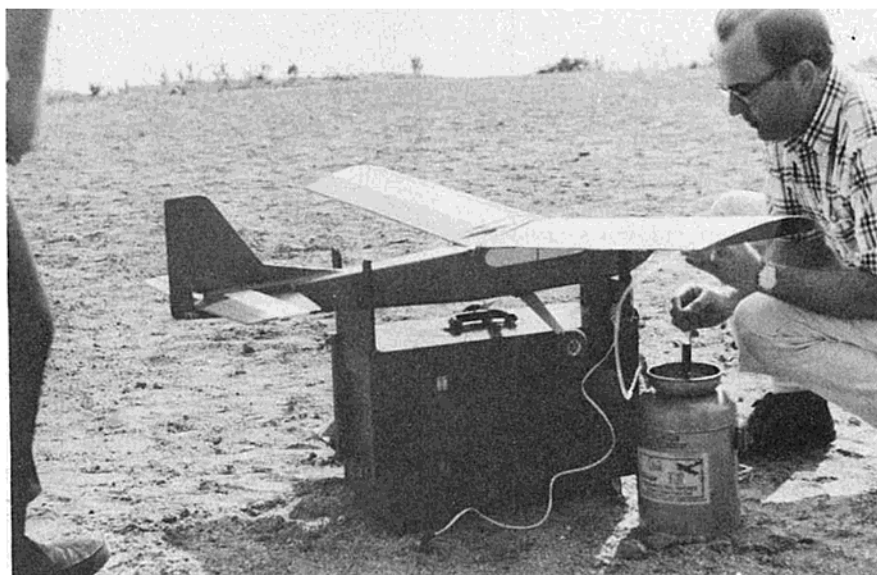
The fin should be butt-glued (same



The RCM Trainer cradled in the G & K Flight Box. Merco .49 muffler used on Enya .29 allows muffler to clear fuselage.



Above: Checking the wing position and the hold down bands after each flight is a must. Below: Satisfied that the entire aircraft is okay for flight Dick fuels the Trainer with the Argyle Model Products Quik Fill pressurized fuel tank. Starting battery is a 2 amp hour nickel cadmium cell with a Kavan glow plug quick clip.





technique as the stab top and bottom), weighted on a flat surface, and allowed to dry before cutting to shape.

#### Fuselage

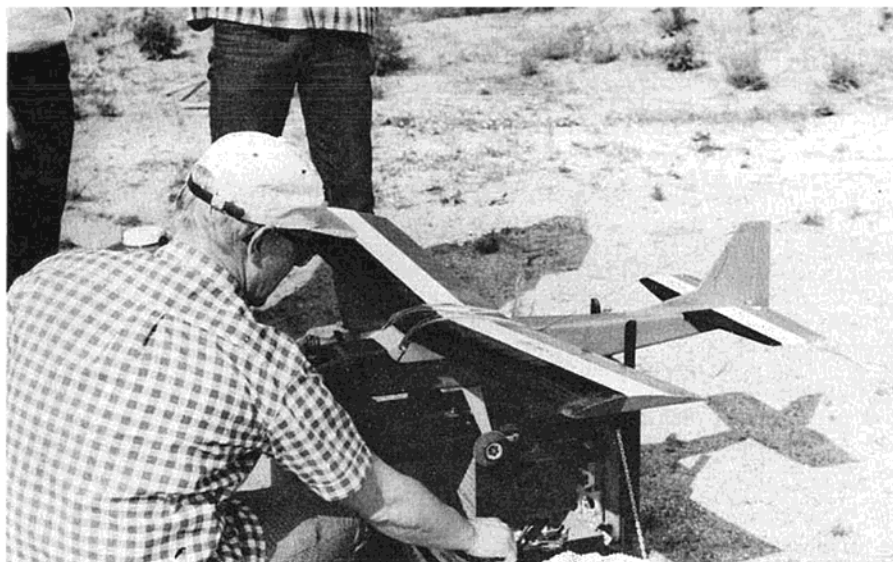
This is strictly "box construction" with corner longerons. These corners may be carved and sanded after the assembly is completed for a rounded fuselage contour. Two RCM Trainers were built with  $\frac{1}{4}$ " corner longerons, then cut and sanded to an extremely rounded shape.

Cut the full length fuselage sides from  $\frac{1}{8}$ " x 4" x 36" balsa. Both the wing rest and the fuselage bottom are left the full 4-inch width, and straight, in order to have two references with which to check incidence. (It allows more cabin space, too.) Make sure these sides are cut accurately, then pin them together and lightly sand any differences. Do not sand the wing and stabilizer rests. If these don't match, lay each side on the plans again and correct. Draw two lines (at right angles to fuselage bottom and cabin top)  $\frac{1}{8}$ " apart for F2 and F3. Draw a line  $\frac{5}{16}$ " from the bottom of the fuselage, then contact cement  $\frac{1}{16}$ " sheet doublers from the top of the cabin to this line. The doublers should extend from the back line drawn for F2 to the forward line drawn for F3. If properly installed on both fuselage sides, these doublers act as guides for proper placement of the two bulkheads (F2 and F3). Contact cement the  $\frac{1}{8}$ " balsa doublers from the nose to the front line drawn for F2. Contact cement the  $\frac{1}{16}$ " plywood doubler on top of the  $\frac{1}{8}$ " balsa doubler. Contact cement the  $\frac{1}{16}$ " balsa doubler below the stab cutout. (End this doubler  $\frac{1}{8}$ " from fuselage end.) Measure  $\frac{5}{16}$ " down from the top of the fuselage, aft of the cabin, and draw a line. These lines should be drawn on the inside of each fuselage side. Measure  $\frac{5}{16}$  inches from the bottom and draw a line. This line extends all the way to F2. Glue in the fuselage diagonal side stiffeners ( $\frac{3}{16}$ " sq.) to these lines beginning at the bottom just behind F3. Contact cement the  $\frac{1}{16}$ " plywood brace in back of the line drawn for F3 as a support for the hold down dowels. Again, match the two sides to make sure they are identical. While pinned together, drill holes through both sides for the wing and landing gear dowels.

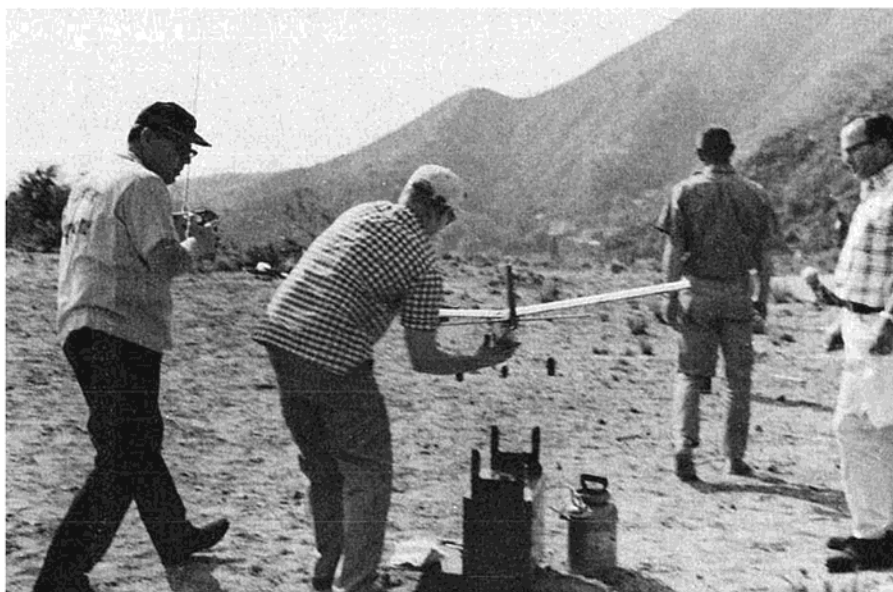
If hardwood motor mounts are to be used, epoxy them in place from the nose to the back of F1. At this point, you should locate the position of F1 (the  $\frac{1}{4}$ " firewall) by measuring  $4\frac{1}{2}$ " from F2 and drawing a vertical line at right angles. The motor mounts may be  $\frac{3}{8}$ " square or  $\frac{3}{8}$ " x  $\frac{1}{2}$ ". If this type of mount is used it will be necessary to construct a mounting plate. I very much prefer to use a bulkhead mounted, combination motor mount and nose gear. Tatone mounts are excellent with either fixed or steerable nose gears.

Cut out F2 and F3 from  $\frac{1}{8}$ " ply and glue in place. Mount the fuselage side on a flat surface and check both bulkheads for exact right angle placement. Allow to dry before any further assembly.

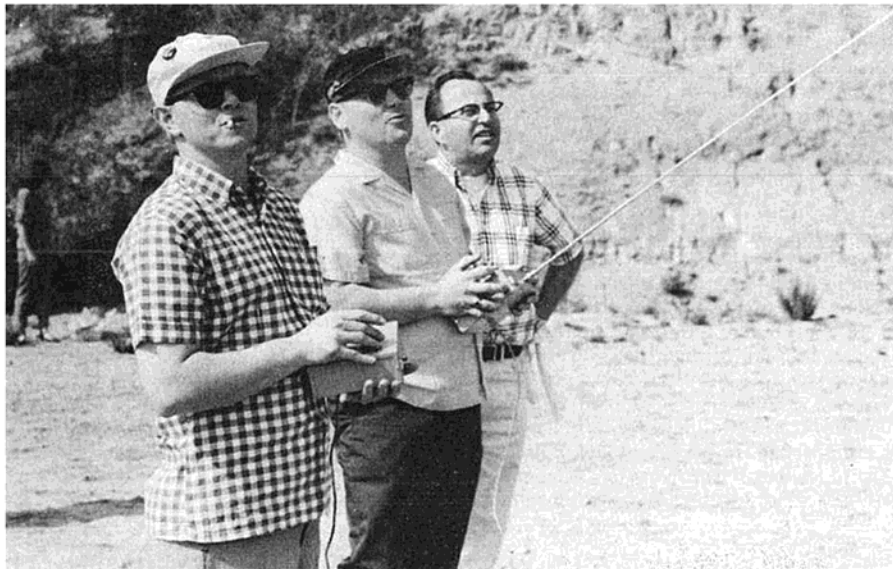
Cut the fuselage top to the length shown on the plans from  $\frac{1}{8}$ " x 3" balsa. Draw a light line down the exact center, then cut to shape. (All fuselage lines are



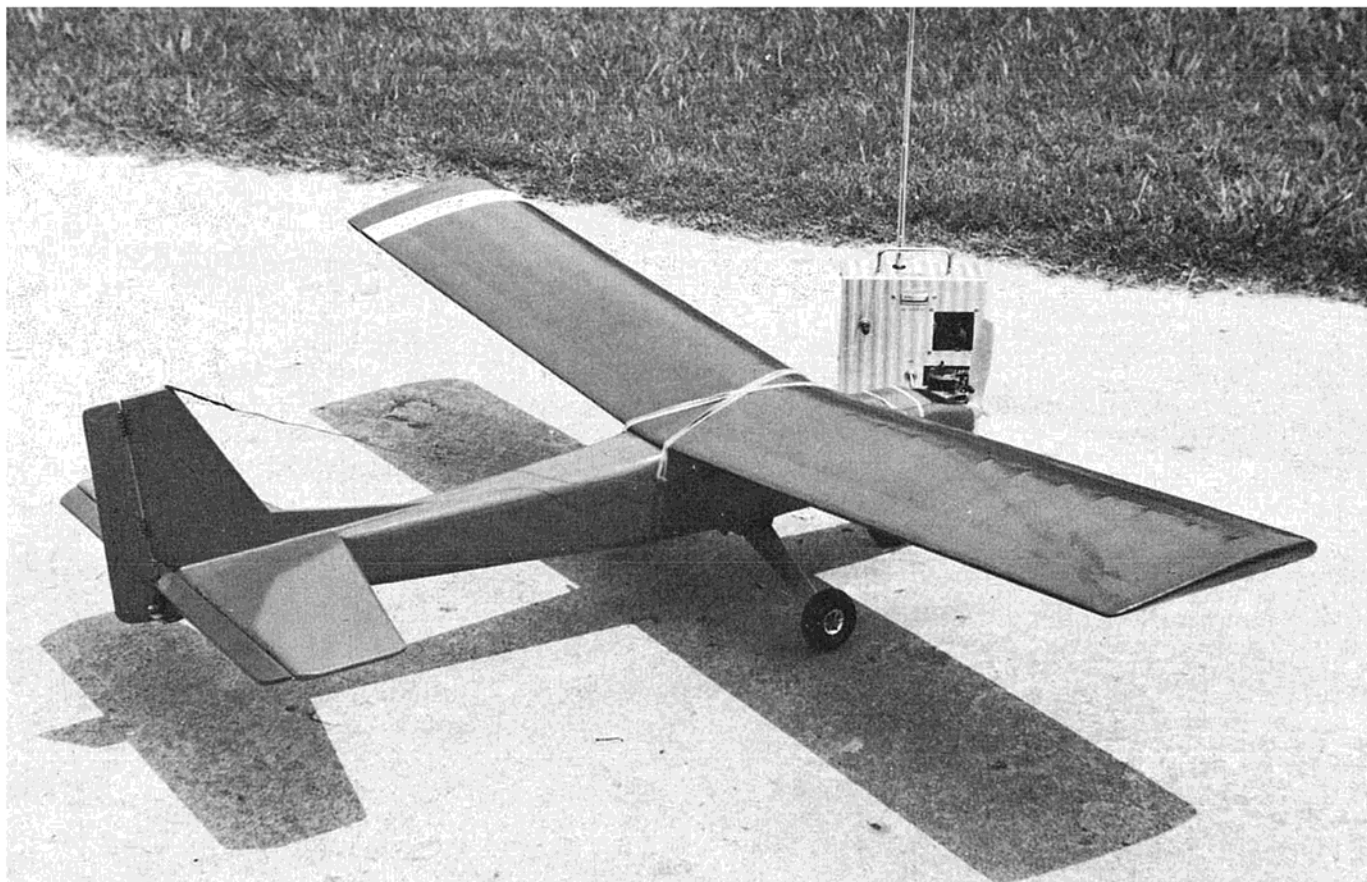
A thorough ground check before each flight can save your aircraft!



Above: Chuck Cunningham checks control response as Don Dewey prepares to launch. Below: Don flies the Trainer from the "buddy box" as Chuck watches for any necessary corrections. Cunningham's forefinger depresses the switch on the Deans transmitter that allows the student to control the plane. A spring release on the switch allows instantaneous take-over by the instructor.







The author's original prototype now has in excess of 400 flights, Rand L.R.3, Controlaire Galloping Ghost.

straight except for the rounded nose.) After cutting, measure opposite sides at various points along the length to make sure they are equidistant from the center line. The top should be absolutely symmetrical. Glue the corner longerons and cross braces in place and pin to a flat surface.

Cut and assemble the fuselage bottom in the same manner as the top. Make sure the longerons end  $\frac{1}{8}$ " from the rear of the bottom piece. Notch the longerons to accept F3, and use a razor saw to cut across the  $\frac{1}{8}$ " bottom (at the point shown on plans). Saw a notch in the longerons above the bottom saw break. This will allow a sharper bend in the fuselage bottom. The cuts may be filled with glue after assembly.

Glue the other fuselage side to F2 and F3. Apply glue and insert the top and bottom between the fuselage sides. Pin and hold with rubber bands until dry. Epoxy the firewall (F1) in place. Glue the  $\frac{1}{8}$ " plywood main gear rest in place. Make sure this piece extends to the outside of each fuselage side. Glue  $\frac{3}{16}$ " sheet on the bottom from the gear rest to the bottom of the firewall. Glue the  $\frac{3}{16}$ " sheet cabin front (windshield) in place. Cut a piece of  $\frac{1}{8}$ " balsa to exactly fit in the tank compartment opening. Glue another larger piece of  $\frac{1}{8}$ " sheet on top of the first piece. In this way the top piece overlaps the firewall top and may be carved to shape when the fuselage nose section is later shaped to streamlined contours.

Fit and glue the  $\frac{1}{8}$ " tail piece between the sides flush with the end. Install the  $\frac{3}{4}$ " x  $\frac{3}{4}$ " tail block (made from leading

edge stock or carve to shape from soft block left over from wing tips). Cut the top of the block diagonally to permit free elevator movement. Contact  $\frac{1}{16}$ " ply sheet to the cabin floor and to the floor of the battery compartment. **Do not** round the fuselage corners until the stab and fin are installed. Several methods of fuel hatch hold downs may be used . . . screw, dowels, etc. I prefer to use a heavy rubber band around the whole nose.

Mount the stabilizer by aligning its center line with the center line drawn the length of the fuselage top. Since the top and bottom of the fuselage are left flat it is easy to check vertical as well as horizontal alignment. Cement the fin using the center line on the fuselage and stabilizer for alignment. If the ship is to be flown with heavy equipment, glue in fillets of  $\frac{1}{4}$ " triangular balsa on each side of the fin and below the stab.

After everything has dried "round off" the corners of the fuselage by carving and sanding. The nose may be rounded and tapered on the bottom, top, and sides. The hatch cover should be held in place while the nose is being sanded in order to mate perfectly. Install the wing and main gear hold down dowels.

Next month Part III of RCM's Flight Training Course will go into the covering and finishing of your RCM Trainer.

#### Material Sizes

##### Fuselage

- 2 sides— $\frac{1}{8}$  x 36 x 4
- 1 top— $\frac{1}{8}$  x 3
- 1 bottom— $\frac{1}{8}$  x 3

- All "hold down" dowels  $\frac{1}{4}$  inch
- Cabin doublers (sides)  $\frac{1}{16}$  x 3 (scrap from stab sheeting)
- Nose doublers  $\frac{1}{8}$  balsa
- Inside nose doublers  $\frac{1}{16}$  ply
- Firewall  $\frac{1}{4}$  ply (or laminate 2  $\frac{1}{8}$  ply with epoxy)
- 2 bulkheads  $\frac{1}{8}$  ply
- Cabin floor  $\frac{1}{16}$  ply
- Corner spars, braces and framing  $\frac{3}{16}$  sq.

- Main gear doubler  $\frac{1}{8}$  ply
- Nose bottom  $\frac{3}{16}$  balsa, taper and round to main gear doubler

**Hatch**—2 pieces  $\frac{1}{8}$  Balsa (one inside to fit opening, the other glued to it, placed on top and shaped to fuselage contours)

- Front of cabin  $\frac{3}{16}$  balsa
- Fuse doubler below stab  $\frac{1}{16}$  balsa
- Tail block  $\frac{3}{4}$  leading edge stock or  $\frac{3}{4}$  block shaped to triangle

##### Wing (Built up version)

- Ribs  $\frac{1}{16}$  sheet (2 center ribs  $\frac{3}{16}$ )
- Leading edge— $\frac{1}{4}$  x  $\frac{1}{2}$  (shaped after sheeting)

- Leading edge sheeting  $\frac{1}{16}$  x 3 balsa
- Spars 1 Top—1 Bottom  $\frac{1}{4}$  inch square
- Trailing edge sheeting  $\frac{1}{16}$  x  $1\frac{1}{2}$  balsa
- Trailing edge  $\frac{1}{4}$  sq.

- Top block 1 x 2 soft balsa
- Fin and Rudder— $\frac{3}{16}$  sheet.

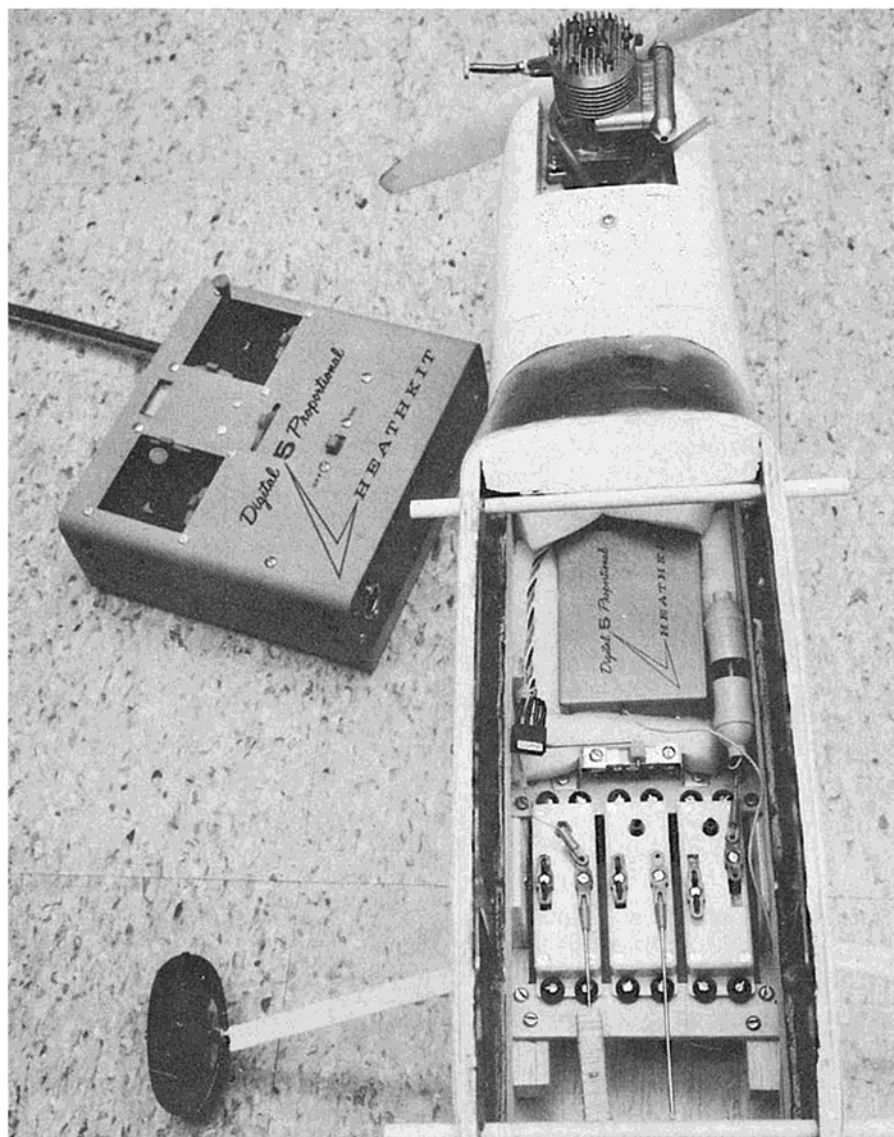
##### Stab

- Top and Bottom sheeting  $\frac{1}{16}$
- Framing (Leading, trailing edges and tips)  $\frac{1}{8}$  x  $\frac{1}{4}$
- Inside framing  $\frac{1}{8}$  sq.

##### Elevator $\frac{3}{16}$ sheet.

- (For GG use  $\frac{3}{4}$  inch cord trailing edge stock.)





Heathkit Digital 5 installation in CG Skylane 62. Photo taken after test flights.

## RCM PRODUCT REPORT: PART II

# HEATHKIT DIGITAL 5

By Bernie Murphy / Don Dewey

Construction of the Heathkit Proportional System is more of a pleasure than a challenge, and within the capabilities of the 'average' RC'er.

In the past, it has generally been our policy to "live" with a system for several months before attempting a report. In the case of the Heathkit Digital 5, this time has been shortened to one brief month. The reasons are simple and basic. First, the system is primarily a kit version of the popular Kraft system. Second, through construction, we have "met" each component. Third, because of the endless queries from RCM readers. Add to these the

reputation of the Heath Co. for producing excellent electronic kits.

Previous endeavors with Heath kits have included such seemingly complex items as their 23-inch color television and their AR 15 stereo system. Results with both of these were truly unbelievable, and compare with the best commercially wired sets. We have yet to see a color TV that will render a comparable picture! What does this have to do with R/C? Simply

that the same techniques, know now and explicit instructions that were used in these sets has been applied to their R/C system.

Construction of the Heathkit Digital 5 is simple and easy IF you follow instructions CAREFULLY. Each step is described in detail with a check off block to mark upon completion. A check off is provided for each component. Diagrams, photos and pictorials follow you every step of the way. We have found that an accurate method involves reading a step, performing the operation, rereading the step, checking your work, and finally marking off the block. In this way each step is checked for error before proceeding. An error is far easier to spot at this stage than after completion!

Our kit was supplied with an extra capacitor. Checking of the components against the parts list disclosed this packing error at an early stage. Be sure to make the initial parts checks before beginning actual construction, as left over parts can be somewhat unnerving.

During construction of our rig, the manual was followed exactly. Our system worked perfectly upon completion, in spite of the fact that some of the construction was done by a novice with NO electronic experience.

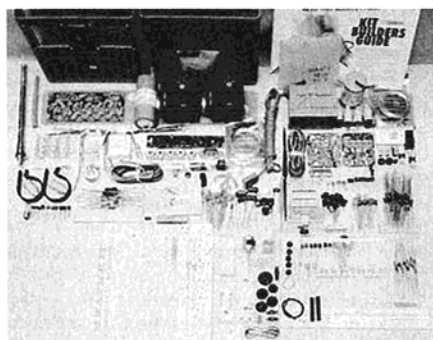
To date, two systems have been checked out completely and test flown with total success. A third set, built by an RC'er who didn't previously own a soldering iron, met with only minor difficulty. In the case of the third set, it was assumed that all transistors of a given shape were identical, resulting in damage to two of them. In this case, adherence to the manual and a little extra care could have prevented the error, as each transistor is called for by part number. The Heathkit instruction manual covers circuit operation and descriptions as well as trouble shooting charts and complete schematics, as an aid to repair or maintenance. In addition, service is available direct from the Heath Co. or any of its branch stores at reasonable rates.

The system consists of a five channel digital transmitter, five channel digital receiver, four servos, rechargeable nickel cadmium batteries for both transmitter and receiver, and a battery charger (built into the transmitter). The airborne system weight is about 20 ounces, with an average flying (operational) time of four hours.

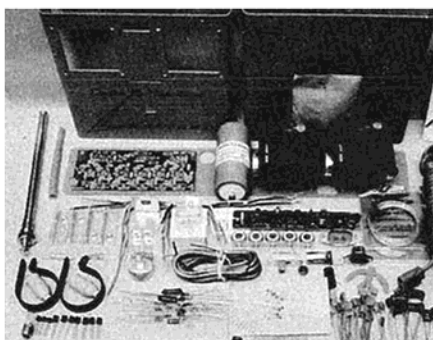
The Heathkit Digital 5 Proportional is an excellent R/C system, comparable with systems costing considerably more. Our two test units met or exceeded published specifications in every case. The pre-assembled and tuned RF section of the transmitter was precisely peaked.

With the aid of the comprehensive, clearly written manual, construction becomes more of a pleasure, and less of a challenge. This is one of the finest R/C kits ever manufactured, and in our opinion, is within the capabilities of the "average" RC'er.

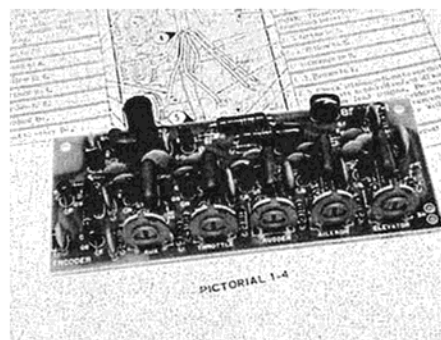
The second transmitter prototype failed to modulate properly, and upon using an oscilloscope to trace the problem, a faulty transistor was discovered. This was replaced and the unit passed all tuning stages and is now flying quite successfully.



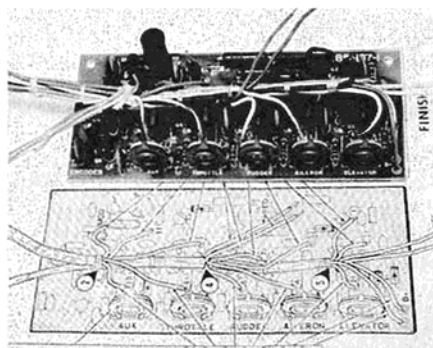
Heathkit Digital 5 parts as they come from the package. Only on servo shown.



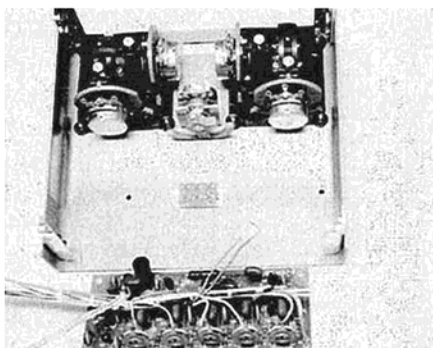
Transmitter components sorted and we're ready to begin.



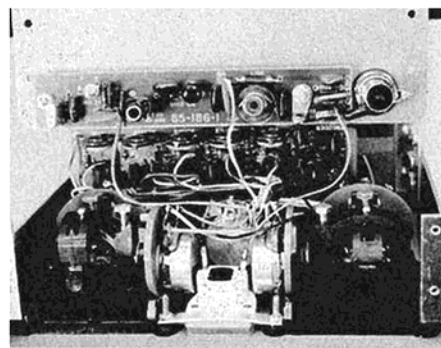
First step: Installing components on encoder PC board. Note parts identification printed on board.



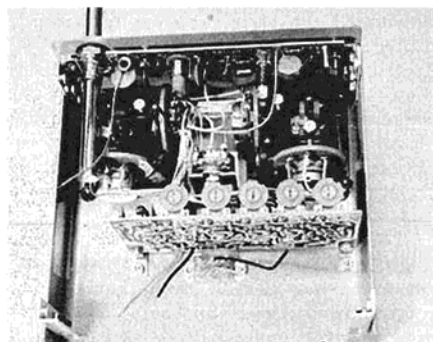
Addition of pre-wired cable completes encoder board wiring.



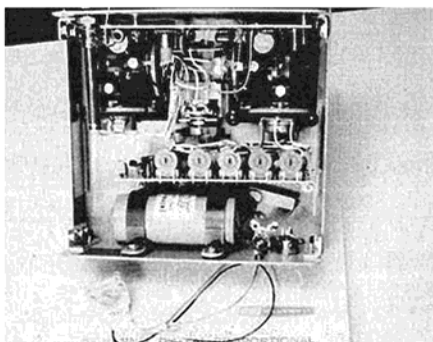
Mechanical assembly of cabinet front ready to receive completed encoder board.



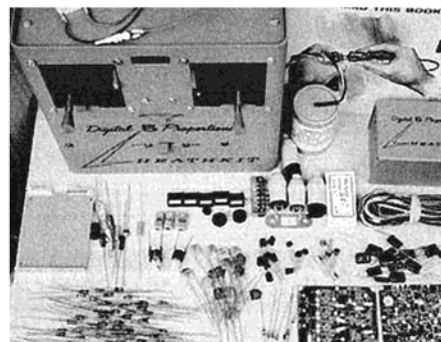
Factory assembled RF board and antenna mounted. Encoder board in place and wired.



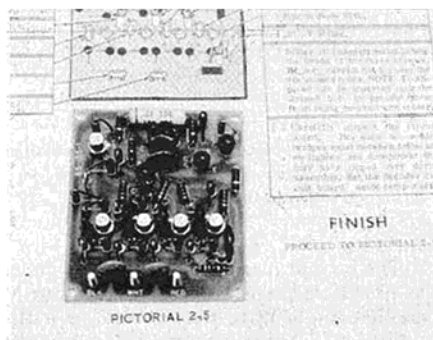
Case top with RF section in place.



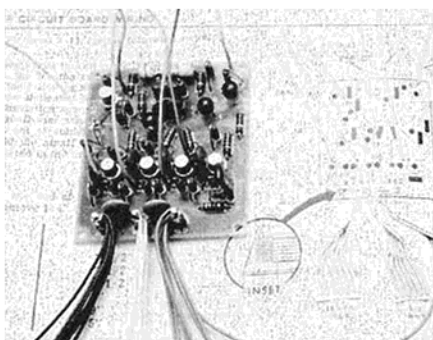
Case bottom; battery & charger. Completed basic Tx assembly. Meter used during checkout.



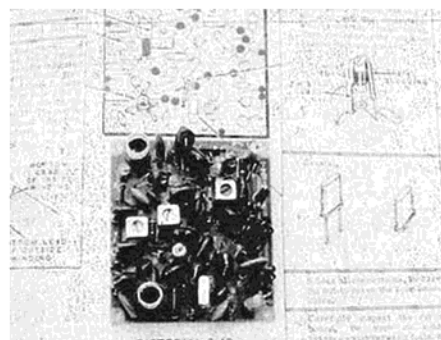
Completed Tx (less meter) and receiver-decoder components sorted to aid assembly.



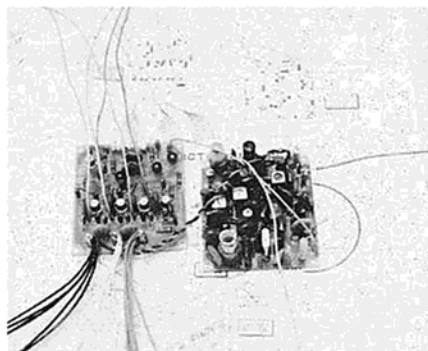
Components installed on decoder board.



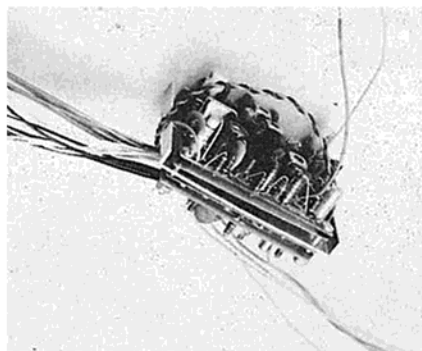
Decoder circuit board wiring added.



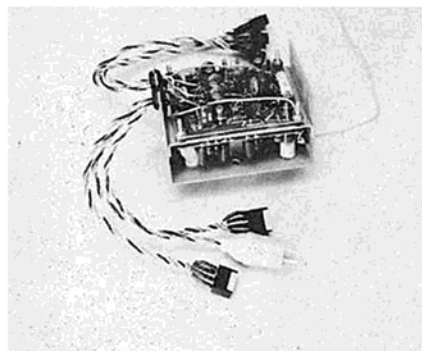
Components installed on receiver board.



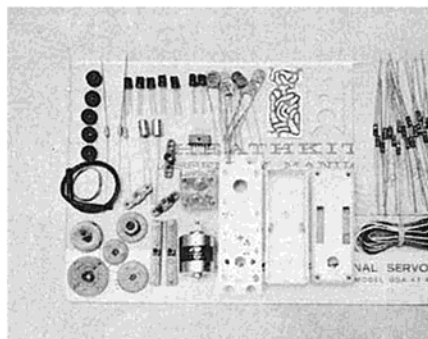
Interwiring of receiver and decoder.



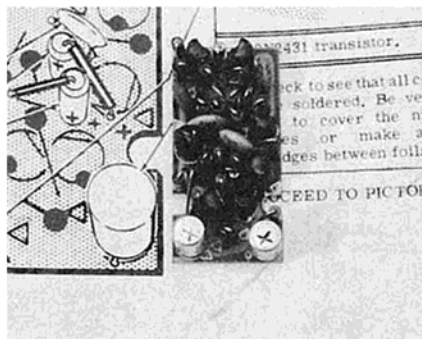
Wired receiver and decoder in position on PC shield. Note spacers and insulators between shield and circuitry.



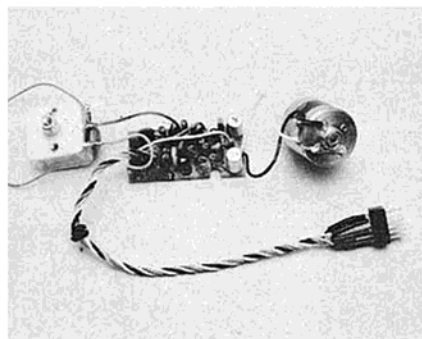
Connector wiring completed and installed in case bottom. Rx-decoder ready for checkout.



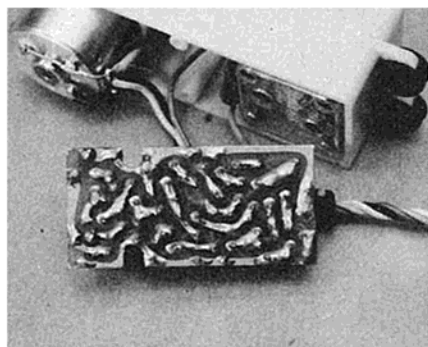
Servo components — assembly much easier if parts are not sorted on top of manual!



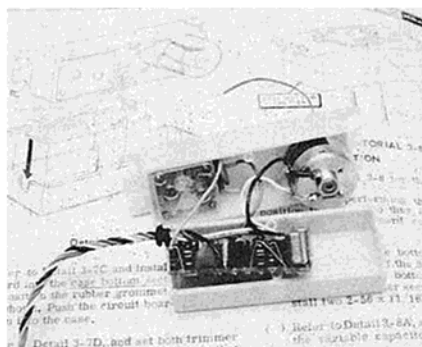
Servo board with components installed. Quite tight, requiring extra care in soldering.



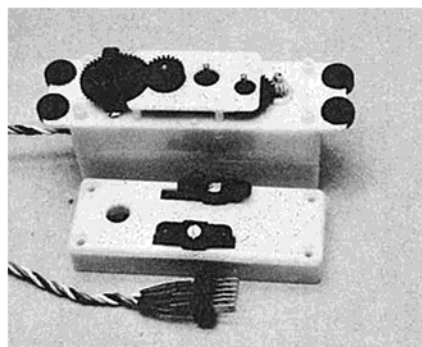
Feedback capacitor, motor and connector complete servo wiring.



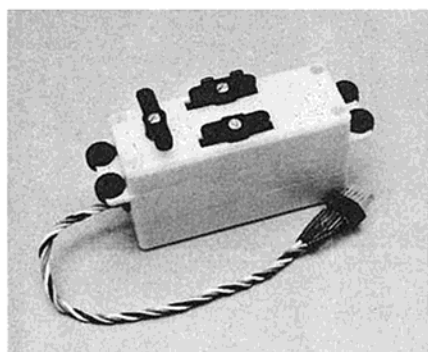
Feedback capacitor and motor installed in servo case center section. Note: clean soldering of leads a must!



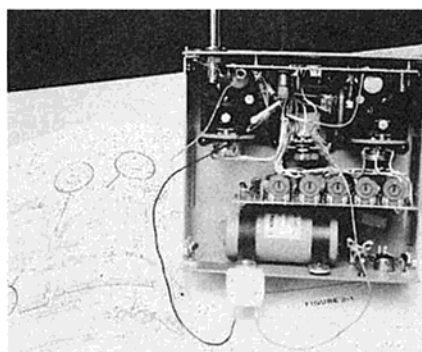
Servo board mounts into case bottom section.



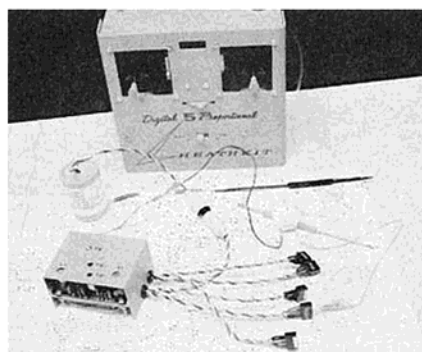
Drive gears added, ready for final assembly of case top.



Completed servo — three more to go!



Transmitter output meter being used to adjust Tx.



Tx output meter and transmitter used to align and peak receiver.





Left: What a day to have your feet on the ground and your head in the clouds! Roodepoort Club with mine dumps in the distance. Hal Snow performing with 'Ugly Stick' for movie feature.

THE FUN-FLYING Contest, arranged by the Lombardy East Radio Fliers of Johannesburg on March 3rd, naturally coincided with the first spell of bad weather for two months! With the rain still pouring down at 11 AM the "fly-day" was officially cancelled, yet when the skies miraculously cleared at noon, enough stalwarts remained to entertain the large afternoon spectator group.

There were enough fliers too, to check out the fun value of a few of the planned events. Now, fly-days must be held frequently all over the world, but when it comes to planning one, there is very little detail to be gleaned from the model press. Therefore, it may be of interest to mention the general principles and a few details which we believe necessary in organizing a successful fly-for-fun contest.

The first thing to ensure is good weather—even in sunny South Africa we boo-boomed on this, and would appreciate suggestions on how to fit it for next time! However, we did try and allow for different wind directions in our layout of spectator and model areas, to minimize any flying over either. Also, most events of this type involve paper tape and we found that half-inch crepe paper strips joined with masking tape were adequate for moderate winds. Wider tape breaks more readily as wind resistance increases faster than breaking strain. For strong winds, adding-machine paper rolls backed with a continuous strip of narrow masking tape seem adequate, but of course the lighter tapes are less prone to "throwing" a model when struck by the wing-tip.

The next factor in order of importance is safety. Frame your rules to keep flying and static models away from people and vice versa—designate a specific line for all low passes. Someone is bound to break the rules—ground him immediately with zero score until the next event and it will probably be the last transgression of the day!

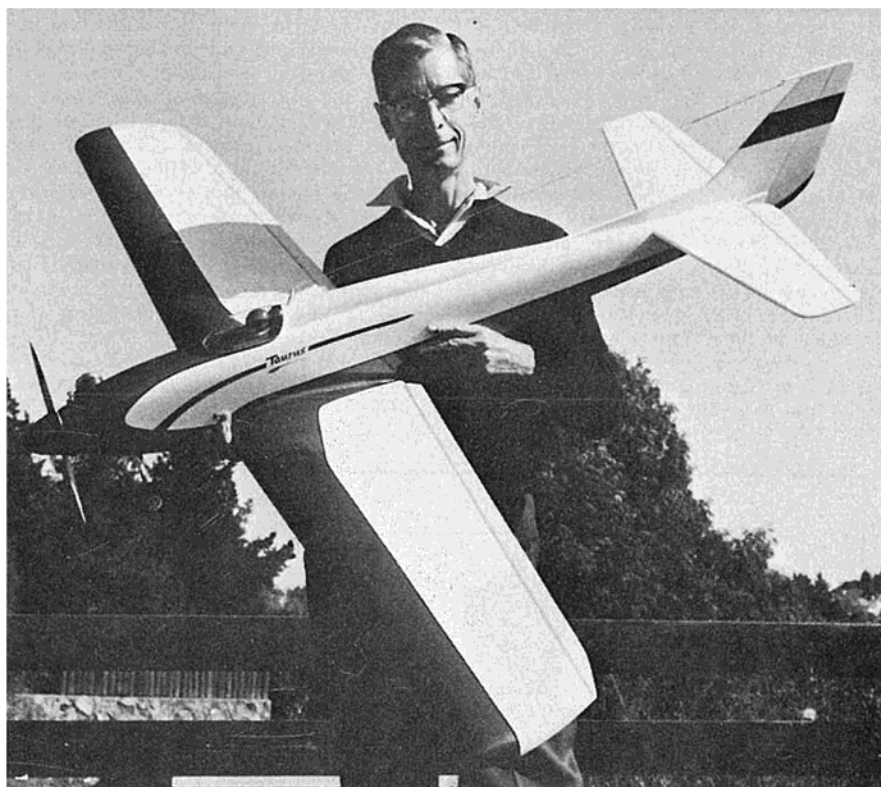
Plan the events to get as many planes in the air for as long as possible with safety. This means plenty of helpers, a pit marshall for "ready boxes," a short and ruthless engine starting time, and an "instant" frequency sorting-out system. We devised a simple arrangement of colored cards and clothes pins which helps to overcome the baching-up of "popular" frequencies. The dullest time for all is the "getting ready" before take-off, so if you can keep models airborne between events, there will be a continuity of interest and a faster pace generally. For instance, instead of ending our first timed event with a landing, we "clocked" the model on flying under a highish tape (9 ft.). The pilots flew around for a few seconds while the time was recorded, and then flew under the tape again (we call it a "fly-by") to be timed for the next event. This way, unnecessary ground "fussing" was eliminated, with more to watch and more flying for contestants.



Jack Holmes, on final, with own design Bipe. Lovely grass field at Roodepoort Club, just west of Johannesburg.

## SOUTH AFRICAN 'FLY-DAY'

Jack Immanuel reports from Johannesburg on the 'How-to's' for a successful Fly-For-Fun Contest.



Take one faithful Taurus kit, build up the nose to hide the Enya 60, give the pilot a headrest and the tail a tweak — it stays as gentle as ever. Jack Immanuel with tweaked Taurus.

Avoid a formal "lunch-hour." We had a "scale" event planned as a substitute, a separate affair from the contest scoring events, using pilots and helpers not much occupied otherwise. Many scale builders are not the contest "types" but enjoy having their always-interesting scale (or even partly scale in this kind of "do") seen and briefly flown. We think this gives a wider interest to the day as a whole.

Try a little real "pattern" for the experts. Only a few of the more difficult maneuvers can be selected, requiring skillful integration to be done in the allotted (say) 3 minutes. Have engines ticking over in the "ready box" for the next flight. Perhaps throw in a low-score nominated maneuver for interest, and for that little extra bonus to pick the winner. But have proper judging to reward the serious flier!

Try and get a little prize for most everybody. Big prizes too, if you can! Our most valuable prize was not for the day's top scorer, though, but for the most consistent flier. So if "Thumbs Boobman" comes tenth, but in every event—well he deserves the big prize! And try to stop the official business in good time to hand out the hardware to those distant enthusiasts with a four-hour trip home.

End up with the most exciting (damaging?) events like a pylon race, as a suitable climax to the day. If you are short on Goodyear racers, throw in Kwik-Fli's, Taurus' and what-have-you. When it is all over, keep the frequency-check system in force while the locals display their prowess—it's a pity to end an almost crashless day with a write-off, as we discovered too late!

The final principle of the many remaining aspects might refer to publicity. Get the news out early—months before if possible. Circulate to the public as well as to the modellers, because both are necessary, in force, for a really gratifying day. And give would-be contestants details of some of the events in the hope that a little practice will make the events run a lot more smoothly. Define the procedures as far as possible. For instance, what is a "take-off". Does it start, for purposes of timing, with the taxi to runway, or when the model swings into wind and off down the runway, or when it leaves the ground for the first time? The pilot and his time-keeper must know when to start the "clock," so better sort it out before they get to the field. In fact, there are a dozen such definitions to be established before-



Hal Snow tries out new Kraft in the rain while helper shelters model. Everything worked fine but who likes washed eye-balls? Another scene at Grand Central.

hand if the contest is to be fast on action and slow on argument, and they must have been thrashed out a thousand times before all over the world. Perhaps our own "fly-day" glossary will one day be developed into a standard form to suit most fliers and organizers.

Why don't you try out a few of these fun maneuvers? Place two 9 ft. poles about 50 ft. apart and link their tops with paper tape. This is a "fly-by." One observer with stop-watch "clocks" from take-off (let's say from when the wheels first leave the ground) and calls out after 3 minutes. A second observer counts the number of times the intrepid pilot flies under the tape. Counting stops if tape is cut or when three minutes expires. (Take-off under tape is not scored.) Called "Immelimbo" after the writer, this event is designed to eliminate some of the normal "limbo" hazards and complications while retaining the fun. With a minimum of equipment and fuss, the Immelimbo can be set up at any field in the world, and the flying scores compared. Our best score under contest conditions was 12 completed passes by smooth-flying Rene Trogolo. Let's see what others can do! And hats off to the first guy to try the fastest-scoring method of

all—a succession of loops!

Another simple event, named after our chief "spinner," Hal Snow, is the "Snow-Spin." "Clock" the time from take-off to do ten true spins and touch down. Spin entry by snap roll permitted, but "zero count" to start only when a proper slow-throttle spin condition is stabilized. A real test of judgment, this. Subtract the time in seconds from 180 and see if you beat our score of 132!

There are many other fun maneuvers like cut-the-tow-tape which provide much excitement for fliers and spectators. It would be nice to exchange ideas with others on this subject, because the scope is endless.

Perhaps more clubs can be encouraged to try arranging a "fly-day." It does not have to be highly organized unless a big turnout is encouraged, but it must be planned sufficiently to keep moving. One of the many requirements not yet mentioned is, of course, a Public Address system, but these notes are more intended to describe the "happenings" than the arrangements.

Maybe some guy will write a comprehensive article on "1001 ideas for a Fly-Day," and save us all a lot of trouble!





# SUNDAY FLIER

KEN WILLARD

Oops! Goofed again. Or, at least, for now, so it seems. Only time will tell—but let's go back a bit. A couple of issues ago, the statement appeared in the Sunday Flier column that balsa prices were going



to go up about 45% in 1968—and then I mentioned that I'd discuss some ways of reducing the impact of the increased cost.

Well, shortly after that item appeared, I got a couple of pretty irate letters from balsa dealers saying it wasn't so, and they quoted their own prices as proof, and suggested a retraction.

So here's the retraction. As of the time of this writing, it would appear that the cost of balsa to you, the modeler, will go up in 1968—but not by 45%. The amount will vary, according to the source, as I understand it, and is not firmly established, but won't be as much as 45% in any case.

Now I'd like to give you a little background. I obtained the figure from a dealer, then from a distributor, and then discussed it with a manufacturer before I wrote it into the column. Even so, Don Dewey checked it and found that the figure was questionable—so, in editing the column he reduced it to 15%. But, as luck would have it, somehow or other the original figure of 45% got back into the copy and the printers printed it that way! Some days you can't win for losing! Then, to confuse the issue, I went into the local hobby shop and found a piece of balsa, priced at 70 cents, and in the same bin, and the same size, another piece, priced at 1.10! Now that's about 57%—so, to say the least, the picture is confusing.

In any event, I've always maintained that this column tries to be completely fair, and equal time, as the TV people put it, is available to both sides of any question. I've offered it, and the offer still stands, to any balsa dealer or manufac-

turer who would like to state their views. Meanwhile, as I said when the item first appeared, there are several ways you can minimize the impact of increasing prices, and here are some of them.

First off, one of the best ways is to buy balsa! But, buy it in a kit. Kit manufacturers go to a great deal of trouble to achieve maximum utilization of the balsa which they use, and by careful arrangement of the die cutting, they get a lot more value out of a piece of balsa than the average modeler can achieve. Thus, there is less waste. Combine this with the fact that the material is diecut to fit, which saves a lot of time, and the modeler is well ahead of the game when he buys a kit. It is true that there was a time when the balsa in kits wasn't satisfactory to the discriminating modeler, but now, except for a few isolated instances, the balsa in kits is graded for the purpose for which it is intended. So, if you buy your balsa in a kit, you're saving time and money.

Next, there is the increasing use of materials other than balsa, plus the availability of those materials in preformed wings and stabs which gives the modeler the chance to do some original designing without the usual attendant use of various sizes of balsa to fit all elements of the design. One of the most evident examples is the Midwest foam wing and stab kit. They, for example, have created several designs using the same basic wing and stab combination—and later on this year I'm planning to publish a couple of designs around the same combination. When you do that, the amount of balsa involved

is limited to the fuselage, and the cost is reduced accordingly. Plus the fact that you have a ready made, and truly aligned, wing and stab.

For those of you who like the large models, Lanier sells wing and stab combinations which you can adapt to your own personal design preference.

Then there are the foam wing cores. True, sheet balsa is the favorite material for covering them, but experiments are constantly in process for using other materials—paper, fiberboard, plywood. The competition is bound to get even stronger as time passes. The monopoly of balsa as a prime construction material for models is under serious threat, and there's nothing like competition to keep the industry on its toes. The first issue of R/C Ltd. has a complete article on making your own foam wing cores along with cost-cutting methods of skinning them. Don't miss reading it.

So, that's enough of the fuss about balsa. Let's get back to flying.

I don't know about you, but I'm still on the slope soaring kick. After my first venture, which I told you about, I've been doing a lot more, and all I can say is, if you haven't tried it yet, find yourself a hill!

Last month I decided to give my new slope soaring design, the Slopemaster, a chance to test its wings against some of the big boys. The San Francisco Vultures had persuaded the Pacifica Moose Lodge to sponsor their first annual slope soaring contest, and they had some very intriguing events lined up—spot landing, touch-and-go, and limbo. If you'll take a close look

at the picture of me launching the Slope-master you can see what appears to be a fishing pole just behind my head, and a line stretching from it, with streamers attached, over to another pole about twenty feet away. This was the limbo target—you had to go between the poles and under the line. Mighty tricky, because it was right on top of the hill, and you had to come into it from behind. The wind currents were erratic, and, of course, there wasn't any lift behind the hill, so you had to plan the approach very carefully.

I decided to try it. After a couple of aborts, I found that by coming downwind about one hundred feet to the side of the limbo, and in a shallow dive to pick up excess speed, you could make a turn into a "base" leg at right angles to the limbo and then, if you did it just right, and a gust of wind didn't throw you off, you could turn in and under the limbo and sail out over the hill to go up and make another try.

Well, it was pretty rough, but great sport. I got through a couple of times in practice—but that didn't count—and I did manage to get through a couple of times on official flights. However, on the third attempt, a gust caught just as the Slope-master was going through and flipped the model over on its back—and I was a spectator from then on. However, it didn't take long to repair the damage, and now I'm eagerly looking forward to the Santa Cruz R/C Bees slope soaring pylon races on April 29.

It's really great what the slope soaring experts have been able to figure out for fun contests on the hills, and for sheer



beauty of motion you can't touch the slope soars. Jerry Nelson, who took the shot of me launching the Slope-master, had the back luck to have his twelve footer break a wing when it hit a spectator, but if I were a big airplane man, I'd sure go for one of Jerry's big jobs. And I hear he's getting all set to kit them, too.

Even though I happen to be hooked on slopesoaring, I haven't quit power flight, and last weekend I went out with Scott Christensen, my old Shearwater sidekick, to run some test flights on his latest model—a Headmaster, with a Rand GG Pak for control, and an Enya .15 up front. I was particularly interested in this setup, because he had modified the tail surfaces slightly—a little wider rudder, and a little narrower elevator, like the GG experts say you should do in order to get good solid rudder and elevator control with a minimum of gallop.

Needless to say, the combo worked perfectly. Unfortunately the next day Scott was out, and after a flight of about five



minutes, a spurious signal of some sort got through and caused the model to spiral in, wiping out the nose of the fuselage. But it's repairable, and worth it, as you can see from the picture.

Speaking of galloping ghost, I got a letter from Mr. GG Pak himself, Herb Abrams, and he's still busy coming up with new items. Also, he's hired Peter Waters, former British National Champion, to help Rand come up with some new gadgets. That's Pete, proudly displaying his Goodyear racer, on a sunny, snowy day in Detroit. Welcome to the club, Pete—and it isn't always cold, as you will have found out by the time this column appears.

There's a new, real go-go club down Florida way. They call themselves the Pensacola Reromodelers, and their news letter, which they call the Trim Tab, had a very interesting comment in the latest issue. It's well worth passing on, so here it is.

#### "THE TRIM TAB TECHNICAL FEATURE OF THE MONTH

by Lt. Julian Hass

"Just like the advertisements say, we don't want to skimp on the stuff that holds our models together. However, you can use a pound of the wrong type of glue in the wrong place and still not have a serviceable joint. Before I go any further with the types of glues that I have found to work best, let me state a few basic rules that I try to follow in order to insure good strong bonds.

1. Both surfaces must be clean and free from foreign matter.

2. Hard surfaces should be roughed to give more bonding area and better adhesion. If there is enough material, you can even drill holes in the surfaces, i.e., the edges of firewalls, bulkheads, etc.

Type	Brand Name	Use
EPOXY	Hobby Pox	General high stress areas, firewalls, etc., wing hold-down dowels, attaching stabs and fins. Use with glass cloth for foam wing center sections.
CONTACT CEMENT	Goo, Weldwood, Pliobond	Weldwood . . . plywood to balsa doublers. Goo, Pliobond . . . small metal parts to wood.
FILLER EPOXY	CONAP, HYSOL Epoxylite	Forming internal fillets around high stress areas.
FOAM CONTACT CEMENTS	Quickstick, Coregrip, 3M Contact Spray	Balsa skin to wing cores.
SILICON ADHESIVE	GE Clearseal	Potting material for electrical connectors, switches, etc.
WOOD GLUE	Titebond	General low stress construction, also good for joining foam wing sheeting.

3. In the case of resins . . . follow the directions of the manufacturer to the letter. When using epoxy, I try to keep the temperature of the epoxy above the minimum specified temperature, and for the duration of the entire cure period.

"Here is a brief table of the brand names (something very few articles in the magazines seem to be willing to do), the type of glue, and the best uses that I have found for them."



And there you are Julian, thanks for the ideas, and we're always willing to pass on good ideas.

Incidentally, I'd like to add a comment. I use Titebond as a general construction adhesive and not necessarily in low stress areas, but I did find out one thing—it's not a good idea to use it in flying boats. I attached the engine pylon to the wing of my latest flying boat design, the Lakebird, which uses a Midwest Foam wing and stab. And was I embarrassed when the pylon came off in my hand following one flight—luckily it had held until the model landed. But it seems that Titebond, even though thoroughly dry, will gradually—very gradually—dissolve when in contact with water, and of course that's normal when you're flying seaplanes. So

now I use epoxy, or model airplane glue like Ambroid or Testocs. That's another thing I noticed in Julian's listing—he didn't mention the old standbys which have been under fire because of "glue-sniffing" but they're still very good adhesives.

Here's a real puzzler. Calvin Deyton, of Bamberg, South Carolina, writes:

"Dear Ken: I am sending a picture of my Buzzard 144 that I built to take movies with. The engine is a Supertigre .46. No side thrust but some upthrust is used. The center of the gas tank is over the C.G. I am using strip ailerons coupled with the rudder. This is my problem—the ship under full power will turn real nice to the right with full aileron, but full aileron to the left will only stall the bird. If I use very little left aileron then it will turn some. When I cut the power to land it will still turn to the right but will not turn to the left no matter what. Could you tell me what is wrong?"

What would you tell Cal, if you were me? Here's what I said:

Dear Cal:

One of the peculiar things I've noticed in R/C models where the engine is pylon mounted above the wing is that the vortex from the propeller tends to make the model turn to the right rather than to the left. I've even used left thrust to counteract it. Another thing that may seem strange is that even though the engine is above the wing, and this would tend to give a diving moment, it seems that the increase in speed under power, which causes models to nose up if they have any decalage, has more effect than the diving moment. As a result, in several models with a configuration similar to yours I've used downthrust rather than upthrust.

I couldn't say for sure what makes your model behave the way it does, but if I see it correctly, you have a flat bottom wing. So try this—take out the upthrust, add a little weight in the nose to move the CG forward slightly so the glide will be just a trifle faster, and see if that helps. Then if you need a little more action to the left, crank in a slight amount of left thrust, and readjust your rudder slightly to the right if necessary. Finally, adjust the coupling between the rudder and the ailerons so you get more rudder action and less aileron action. With all that dihedral, the rudder should be able to do most of the work anyway. And let me know if any of these ideas cure the problem. Regards.

Ken

When I hear from Cal I'll let the rest of you know whether the prescription was any good.

## EDITORS MEMO

### From page 6

them get it through the proper channels and things will get done. Quite honestly, I'll admit there have been letters come to me that I have ignored because frankly I'm not going to go down and step on other people's toes to get something done for a friend of mine or some guy I may not even know. I get a little bit sick and tired of this type of approach. In the American Modeler Magazine, in the model aviation section, there are lists of the officers in the Academy. These are people you're supposed to go to. Fine, go to them if you have a squawk. They will see that something gets done. They will give it to the rest of the board, or to me, or to headquarters where it should go.

Now we talk about the R/C section splitting away from the Academy of Model Aeronautics. Well, maybe you've got a good idea and maybe you haven't. I can remember I went to a few meetings of R/C'ers that were going to break away from the Academy and boy I was all hot for it at the time, but then I stopped and thought. What does it take to run this organization? If you will all recall, at the Chicago Nats in 1962, an organization was formed for R/C. How long did it last? You never heard anything more about it. Wasn't that a pretty good lesson? I sure thought so. Another thing, the Academy of Model Aeronautics is the F.A.I. representatives in the United States. If you steer away from the Academy you are not going to have an F.A.I. representative. Now what are you going to do? The United States couldn't possibly field a good team under these conditions. Forming a separate R/C section within the Academy—this might be a good idea. Maybe that's the approach we should use. I don't have time to do it. There are people out there within this activity that could do it. But get them to do it. There's a horse of another color, now. But if you are going to do something like this, do it right, don't go half way. Get something well thought out and then approach other people with your ideas. Another thing, the Navy entered into the game. They want younger people in this activity. We all know that the average age of the R/C'er is somewhere around about thirty-six. That's not young people. The Navy wants them. OK, the next thing I hear is "we'll bail out and get away from the Navy." This is easier said than done. Granted the Air Force is looking at this thing. There has been paperwork going back and forth between the Air Force and the Academy of Model Aeronautics. Maybe it will come to going with the Air Force, but let's not just leap around like a bunch of rabbits. You have to investigate these things. The Air Force has to know what we require to hold the Nationals. We have to know what the Air Force requires for this thing. Like I said, it's being investigated, seriously investigated. Give us a little time. Maybe we can come up with something.

And now, to finalize this, let me read a little bit of what was in this Editor's memo. What it appears to boil down to is that the Washington officialdom spends

a great deal of their time and our money preparing supplemental bulletins of abso-lution for official A.M.A. action while the council of elders (I resent that), "sorts out their personal interests and convinces one another that they are, after all, really in the best interest of the majority. If this is truly the democratic form of government described by Mr. Winter, one wonders wherein lies the enfranchisement of power. In a democracy it lies with the people, the majority of the people. And like the man said "Ain't nobody asked me nothin' of late." There is my point. Does the Academy have to ask you people what you want? No, quite honestly, you should let the Academy know what you want.

Well, so much for that. I have spoken my piece. To those of you who disagree, I'm sorry. To those of you who do agree, again,

Thank you.





## SHOP & FIELD PRODUCT NEWS

Commercial items for test and evaluation should be addressed to Product Editor, R/C Modeler Magazine, P.O. Box 487, Sierra Madre, Calif. 91024.

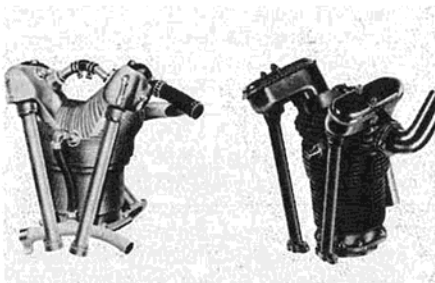
Ace R/C Inc., 203 W. 19th St., Higginsville, Mo. 64037, has announced that the More-Craft Co. is now a part of Ace R/C Inc. and located in Higginsville, Mo. The More-Craft line of Goodies has expanded and are listed in a new Ace catalog sheet. The Goodie line has been considerably expanded and is, essentially, a marriage of some of Ace's Classic products. Ace has discontinued the More-Craft wood items for the time being, although there are some ideas along these lines for the future.

Lanier Industries, Inc., Briarwood Rd., Oakwood, Ga. 30566, has released their new



semi-scale P-51 ready-to-fly R/C aircraft. This model is designed in the classic tradition of Lanier Ind., Inc., and is designed to fly with 10 channels, or proportional rudder, motor, elevator, trim, and aileron control. The wing span is 65" with an overall area of 630 sq. inches. The P-51 utilizes a symmetrical 17% airfoil, and is designed for .45 to .60 engines. The P-51 flies a complete AMA pattern. For further information write Lanier Industries, Inc.

Williams Brothers, 6719 Salt Lake, Bell, Calif. 90201, has released their radial Engine Cylinders. The desire for mock-up model planes to look like the famous radial engines of the 1920's and 1930's is now fulfilled. Available for the first time are authentic looking Wright J-5 "Whirlwind" and Pratt and Whitney "Wasp Junior" cylinders. These are the cylinders that were used in engines by most of the aircraft manufacturers of the 1920's and 1930's. These cylinders are manufactured by Williams Brothers, well known for their quality model accessories. Molded of durable high impact styrene, the cylinders are available in 1", 1½", and 2" scale, and sell for sixty-five cents, eighty-five cents, and ninety-eight cents respectively. They are minutely detailed and easy to assemble.



Packed one to a card in a plastic bag, the point of sale card includes instructions for assembly plus a detailed drawing for making a mock-up of the crankcase to house the cylinders. These brand new cylinders by Williams Brothers are available now at hobby dealers.

Finishing Touch Decals, 9944 Debbie Drive, El Paso, Texas 79925, announces their newest offering — Nickel Numbers. What Finishing Touch has done is to take their AMA sheets, cut them up and box them so the modeler may now buy the numbers individually to fit his needs. Large size numbers, 2¾" high, are a nickel each, and the smaller size numbers, 2" high, figure out at two for a nickel, although these are available only in number strips of 1 to 0. The center color section of the AMA sheet, together with the 1" numbers, and miscellaneous items such as instrument dials, "experimental," etc., are packaged separately and sell for ninety-eight cents. Along with his Showcase release from Finishing Touch, was a notation concerning the occasional problems with getting Finishing Touch Decals to stick to plastic planes of the Lanier and Dee Bee types. The best



way to insure good adhesion is to spray the surfaces first with Krylon Crystal Clear Spray which seals the plastic and stops the microscopic amounts of oil that fresh plastic emits. The decals are then applied, and will stick permanently. Then, if desired the model can be sprayed, not brushed, with clear dope, since the Krylon has sealed off the plastic and gives the dope something to "hold on to."

Dumas Boats, a Division of Dumas Products, Inc., Tucson, Arizona, has announced the recent introduction of the SKDaddle Junior to their complete line of hot racing boat models. This rounds out the Dumas model "SK" boat line, bringing the total to four models all designed for radio control, straight away or multiple boat racing with gas engines from .60 down to .049. The new SKDaddle Junior, a little edition of the famed Hallett SK boat, is 18" long with a 7¾" beam — making it ideal for swimming pool racing with electric motor. The kit is complete with mahogany frames and deck, birch plywood bottom and sides, and is easily adaptable for single channel radio control using an .049 engine or electric model. The SKL Daddle Junior is priced

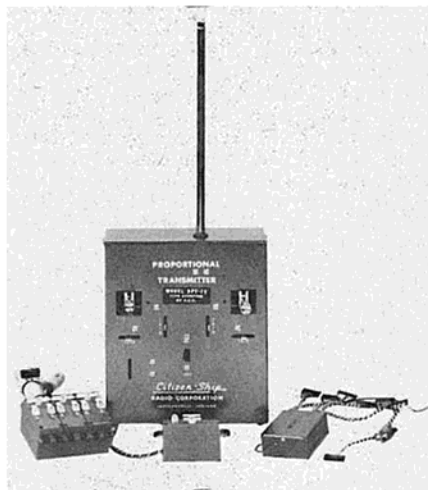


at \$6.95. The complete running hardware kit for .049 engines sell for \$4.50.

Marcon Engineering & Manufacturing Company, Inc., 21 Santa Fe Drive, St. Louis 19, Mo., manufactures the Marco-Tac, a self-contained solid state audio tachometer used to measure engine RPM, over a range of from 5,000 to 30,000 RPM. Because the sounds produced are similar to an actual engine, measurements can be made easily. With a Marco-Tac you can measure the RPM of any engine you can hear, be it on the bench, on the water, or in the air. The Marco-Tac also enables you to set up your engine to operate at the manufacturer's recommended RPM, giving you maximum horsepower. Any improvements in engine performance can be easily checked. Operating from one inexpensive 9 volt battery, the Marco-Tac is available from Marcon for \$18.95.

R/C Engineering, 4901 E. Holly, Phoenix, Arizona 85008, manufacturers of the now widely used G-Pad, announces a new formula for this product. This new type of G-Pad is lighter in weight, 4 to 6 pounds per cubic foot density, and is completely odorless. Also formulated out of the same material is the new ¼" thick G-Pad. Price of either the ½" or ¼" thickness will be the same — \$1.35 per package. The ¼" thick material, however, will be packaged with twice the area, that is ¼" x 8" x 24". Tested, approved, and recommended by RCM.

Citizen-Ship Radio Corp., 810 East 64th Street, Indianapolis, Indiana 46220, has announced their new lighter, smaller, simpler, stronger four channel Digital Proportional System. The Citizen-Ship DP-4 System features four completely independent proportional simultaneous channels. Designed and manufactured to conform to FCC requirements for type acceptance, the new system utilizes proven digital techniques that have been field tested and consumer approved, according to the manufacturer. The new DMS Servo furnished with all digital systems, incorporates a completely new design and includes all new features. Available on either 27mc or 72mc frequencies, the suggested list price is \$374.95 with an additional \$25.00 for 72mc frequencies.

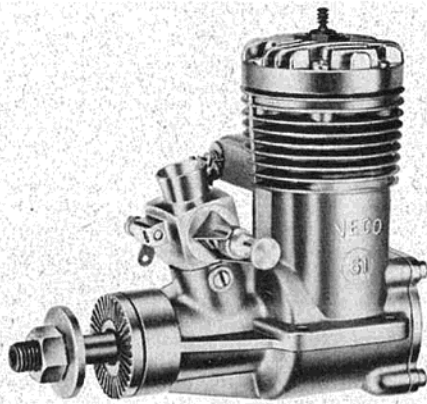


Performance Aero Products, Inc., Box 6064 Shirlington Station, Arlington, Virginia 22206, Distributors for the Austrian HP engines announces that the manufacturer will be producing a .15 and a .40 engine in addition to their high performance RC .60. According to reports from Austria, the prototype .40 engine produces 1.25 horsepower using the RC .60 carburetor and 1.5 horsepower on the racing carburetor

using 5% nitro-methane in the fuel. PAP Inc., is hoping for production by June but this has not been confirmed by the manufacturer. The .40 engine will be the next to be produced, followed shortly by the .15.

**K & B Manufacturing, 12152 Woodruff Ave., Downey, Calif. 90241**, announces that the Veco .61 RC now is back in full production, along with other Veco engines, after being taken over by K & B Mfg. With the acquisition of the Veco line, the .61 RC is the largest engine produced by K & B. This engine now includes an exclusive no-tension, single ring and low expansion aluminum piston. Additional features include linear control carburetion from idle to maximum RPM; heat treated steel shaft; a one piece, die-cast aluminum alloy case, hard chrome-plated cylinder sleeve; and two Fafnir precision ball bearings. The Veco .61 will soon be available at all hobby dealers priced at \$55.95.

**Fliteglas Laminates Inc., 1211 Thompson Avenue, Santa Cruz, Calif. 95060**, announces that they will have in production by June 1, 1968 a scale Curtiss P-40 Warhawk in



addition to their fabulous P-51 Mustang. The new P-40 Warhawk kit will feature a molded fiberglass fuselage, an engine cowl, scale spinner, vacuum formed wheel fairing blisters, exhaust stacks, canopy, completely pre-cut foam wing and stab, formed leading edges, hardware and metal parts for the landing gear. The Fliteglas P-40 Warhawk will span 59" with a total wing area of 603 sq. inches. The fuselage length will be 47". Power requirements will be from .45 to .71. The price of the kit will be \$69.50. You are advised to order early since the initial production will be 25 planes per week. Pre-paid orders shipped first starting June 1, 1968 in the order received.

**Rand Mfg. Co., Inc., 8909 Hubbell Ave., Detroit, Michigan 48228**, announces that their relayless GG Switcher is available in assembled or kit form. These have been adapted for use with any Rand actuator. Complete components and detailed modification instructions are included with these switchers. You need only one battery to power both the receiver and Rand actuator. The Switcher Kit is priced at \$9.95. The complete Switcher Assembly, which includes switch and wiring harness, is priced at \$14.95. This grouping offers the rate decoder for those who wish to have the advantages of the high rate, non-interaction Dual Pak System. The decoder uses an integrated circuit and 6 transistors in a switcher network for single battery flying. Also new from Rand is some further improvements on the Rand Hinges. The manufacturer has changed the material from Delrin to nylon and has also made the webs thinner. They are designed to fit an X-Acto knife slot without swelling the wood. There are four styles to suit every need including  $\frac{5}{32}$ " wide neutral axis hinge;  $\frac{1}{4}$ " wide neutral axis hinge;  $\frac{1}{4}$ " top edge hinge; and a  $\frac{5}{32}$ " wide double flange hinge.

**Trombly Woodworking Co., 2064 Lomita Blvd., Lomita, Calif. 90717**, is currently producing a custom kit of Joe Bridi's Sun-Fli IV. Priced at \$42.50 this kit is completely prefabricated with hand machined parts and all hardware. This kit can literally be assembled in your lap, since all parts are machine cut to interlock and fit firmly in place. Total construction time from beginning to final sanding is 13 hours or less. Designer approved by Joe Bridi, this is one of the finest kits we have ever seen at RCM. A Shop & Field review will be forthcoming. Tested, approved, and recommended by RCM.

**Silvertone Electronics, 727 Princes Highway, Tempe, N.S.W. Australia**, is producing the Silvertone Expandable Digital System, a modern fully transistorized unit capable of being expanded from 2 to 5 channels. Three distinct models are in current production — the twin stick 5 channel version, and the single stick 2 and 3 channels sets, both of which may be expanded to 5 channels when required. All three models use the same 5 channel receiver, thus no further expansion is required in this unit when converting from 2 to 5 channels. The receiver is a twin deck, miniature unit measuring  $2\frac{1}{4}$ " x  $1\frac{1}{2}$ " x  $1\frac{1}{4}$ ". Orbit servo mechanics are used exclusively. These are considered the world's best and feature a hot molded carbon track feedback element, which in over 1500 flights to date, have given absolutely trouble free service. An 11 transistor amplifier is housed in the base of the servo. The accuracy of this servo is beyond reproach, and will give a center variation of less than  $\frac{1}{16}$ " on a 3" wide control surface. Flying weight of the 5 channel set with 4 servos is 19 ozs. with 500mah batteries which give three hours flight time. A unique feature of this set is the use of the new Silvertone Interlock System which is a lock-out system rejecting all signals below the minimum useable signal-to-noise ratio. This has the desirable results of switching the servos off abruptly at extreme range leaving the control in the last position of transmission, meaning a rock solid control until all signal is lost. Hence, if a weak signal area is encountered while flying, the model will fly through it without the slightest sign of disturbance, until the normal signal level is once again present. In addition, inter-band interference is completely eliminated. The 5 channel system complete with transmitter, receiver, 4 servos, batteries and charger, ready wired with switches, is priced at \$490.00. Also available with your choice of three, two, or five servos. Also available from Silvertone is a 2 channel single stick proportional system with transmitter, receiver, 2 servos, batteries and charger. Ideal for boat enthusiasts, this can be expanded to 5 channels. Price with one servo is \$299.00 or \$349.00 with 2 servos.



**Dé-Koch's Custom Woodcrafts, Rt. 4, Appleton, Wisconsin 54911** has produced their Big Bender, a wire bending jig designed for bending  $\frac{5}{32}$ " piano wire, and smaller, with ease. Hardened steel dowels are used to eliminate marring and wear. These dowels are pressed in and can be easily removed by tapping out from the backside.

An extra hole in the bender is designed for moving closer to the pivot point so that you can shorten the distance between bends. The removable dowels are easily placed in this hole. The Big Bender can be mounted to the side or top of any work bench with two  $\frac{1}{4}$ " wood screws. This unit was designed and then tested in the manufacturer's workshop for 1½ years prior to production. It was found to be rugged and dependable and is sold with a money back guarantee if the modeler is not entirely satisfied and if it is returned post paid. Although the manufacturer specifies  $\frac{5}{32}$ " piano wire or smaller, we have tested it with  $\frac{3}{16}$ " piano wire and found that it did bend without any breakdown of the unit. This is the highest quality wire bender we have found in the model industry and is a good buy at \$6.95. The Big Bender has been tested, approved, and recommended by RCM.

**Hobby Lobby International, 2604 Franklin Rd., Nashville, Tenn. 37204** has a new item in their Rigging Cable, a special 15 lb. test nylon coated steel cable for mechanical brakes and scale type control surface cables. This cable has absolutely no "stretch" or "give". This feature makes Hobby Lobby Rigging Cable far superior to plastic or fabric type mechanical brake strings. The 15 lb. test feature is designed to be strong enough for any control or brake application, but still be a low enough breaking test so that, in a crash, the cable will break and not destroy the servo mechanism to which it is attached. The unique feature of this cable is that the steel cable core is encased in nylon. The nylon fuses when heat is applied. This allows the modeler to make finished loops at his cable ends by twisting the cable upon itself and then heating the joint with the flame from a match or the heat of a soldering iron. The finished loop has a higher break test than the cable. Packaged in 10' lengths, the Rigging Cable is available for sixty cents direct from Hobby Lobby or your local dealer.

**G. Meinel, 8000 Munchen 23, Post Office 1064, Germany**, sent us a test sample of their EK-VZR6 rudder servo. The EK-VZR6 is a spring neutralized 2 channel rudder servo for use with reed systems. An essential part of this servo is a swinging lever clutch which functions as follows: a small lever is excited to swinging motion by the rotation of the motor shaft. The generated inertia forces are transferred to the pinion which drives the servo. This system works independent of position. As the transferred torque depends on the mass of the swinging lever, it is defined precisely. In addition, the torque is proportional to the square of the speed, providing an unloaded start of the servo motor. The return movement is dampened by the swinging lever clutch so that the rudder does not swing over neutral position. Furthermore, this damping motion makes possible a soft proportional control by means of pulsed operation. Particular care was taken with the construction of the servo motor to make it immune to vibration and, generally speaking, the ZR6 servo can be mounted rigidly in the model. Operating off of two reeds in a reed system, and a standard 4.8 to 6.0 volt source, the ZR6 servo has been found to meet the manufacturer's specifications and has been tested, approved, and is recommended for those purposes specified.



M. B. McBrae's 'Skybat' with Micronic 6 radio and Merco .61. 6 pounds. MonoKote covered balsa fuselage and foam wing. Kavan throttle and exhaust.

## C-VUES

By Jack Capehart and Ben Herman

RCM Contributing Editors

Now that the AMA pattern rules and judges guides have finally arrived (this is being written in the early part of February) and most of us have had a chance to digest them, perhaps it is time to talk a little about them.

First of all, how about overall impressions. We definitely are of the opinion that the old, archaic pattern was definitely in need of revision and "toughening up" in order to revive interest in this event. And from what we gather, a revival of interest in this event was, and is needed. We have heard rumors which have managed to diffuse "eastward" to the effect that pattern is dead, and the only thing now is Goodyear. While this may certainly be true in certain areas of the country, we do not feel it holds true for the majority of contest minded RC'ers. We base this statement on the fact that our observations indicate that, with the possible exception of those few areas mentioned above, contests draw far more entries in the pattern, and also fun events, than in the Goodyear event. This is not meant to imply that we are not in favor of the Goodyear event, but on the contrary, we think it is a very exciting and challenging event that had done much for our sport, both from a competitive and a spectator viewpoint. It also has the added advantage that the winners are determined by objective methods. However, we feel that pattern flying is still the mainstay of this sport and when all is said and done, makes the greatest demands on the pilot's skill. The new Class C, with its inherently more difficult maneuvers, places even greater demands upon the pilot's skill, and if our experiences (flubbed maneuvers by the score) are any indication, should continue to do so in years to come. This is not meant to imply that we don't have some gripes about the new pattern, but we'll get to that later.

In so far as the elimination of Classes I & II by, perhaps, somewhat questionable tactics, we feel that the new Classes A and B will actually, in the long run, prove beneficial. We say this because,

while in retrospect the old Class III pattern may have seemed ridiculously easy to some of the old pros, to many it was impossibly hard. This, we believe, was a prize reason that many of the better than average Sunday Fliers would not enter a contest. What we actually had under the old rules was too great a gap for the Sunday "multi" flier who didn't wish to fly rudder only with his "full house" equipment. The jump from Sunday flying to Class III competition was simply too great. This gap has been considerably narrowed by the appearance of the new classes A & B. While these new classes will not, we believe, encourage any more participation on the part of the single channel escapement or galloping ghost type of fliers, it will bring out a larger number of the "full house" Sunday fliers. This increased contest interest on behalf of those fliers has already been seen, locally at least, at the time of this writing (they may chicken out yet).

The above is not meant to construe that we fully endorse all aspects of the new pattern. One thing that we feel is that there is still too large a gap between Classes B and C, or conversely, too small a gap between Classes A and B. Simply put, Class B should be made more difficult. As it stands now, a winner in Class B is by no means obviously ready to move up to the Class C wars, even as a novice. Most of the present Class B maneuvers are currently routinely done by the average Sunday flier, and should accordingly, present little difficulty. We feel that the insertion of a few of the more difficult maneuvers such as a 4 point roll, stall turn, and possibly one or two others would at least force him to learn something new before passing on to Class B Novice.

While on this subject we recently had the opportunity to talk with several of the fliers competing in the Southwest Regionals held at Buckeye, Arizona on February 17-18. We were particularly interested in gathering opinions concerning the new pattern rules at this meet as it was the first large meet in which the new

rules were used. Also, it may be noted that the turnout for this annual affair was as large as ever despite the absence of Goodyear this year. This event was omitted because the Phoenix ARCS felt that they couldn't do justice to pattern and Goodyear at a two day meet. This seems true enough as the 50-60 competition managed only four flights despite 3 circles running almost continuously. As is traditional the ARCS did an outstanding job in conducting this meet. We might also add that the Saturday night banquet at the Buckeye American Legion Hall was also outstanding.

We managed to corner Cliff (pattern takes too much practice) Weirick on the flight line (we think Cliff is right but if it takes too much practice for him, wow!) and threw a few quick questions at him. The first thing we asked Cliff was concerning the rumor we had heard that pattern flying, particularly on the west coast, was in its last throes. To this our congenial AMA prexy answered, that, although he had lost a considerable amount of interest in this event, he didn't think the majority of fliers around the country felt this way. Apparently Cliff's main objection was the lengthy and monotonous practice sessions required to maintain a high level of proficiency. He contrasted this to Goodyear racing, where one or two occasional zips around the course keeps you in the pink and you are then free to pursue the more enjoyable aspects of this hobby. If this, translated has anything to do with the PCS goal, Cliff is dead right. On a more serious note, Cliff stated that the objective of the new pattern, Classes A & B, was to stimulate more Sunday fliers to compete. If Buckeye is any indication, we think that this goal will be accomplished. While the entries in Classes A & B did not overwhelm the ARCS, these classes enjoyed greater participation than we ever before witnessed at this meet in the old Classes 1 and 2. When one stops to consider that this was the first contest in this region under the new rules, so that a great many Sunday fliers were still somewhat hesitant about entering, it appears that we'll see a lot more competitors in Classes A & B during this current contest season. This should be particularly true for Class B. This class, though we feel it is somewhat on the easy side as mentioned earlier, seems to have great appeal to the competent, but heretofore non-competitive flier. We think that this popularity is due to the fact that the competent Sunday flier is familiar with all the maneuvers that he will be required to do, and has therefore ample confidence in his ability. This confidence, coupled with the fact that he is competing against other Sunday fliers of comparable ability now gives him a fighting chance to win. Compare this to the old Class I and II with their highly specialized machines and techniques, the design of which was generated solely by the rules, and which were uninteresting enough to the typical flier that he simply did not bother with them. As such, it would be impossible for "Joe Average" to compete with those few serious Class I & II competitors, so that the vast majority of Sunday fliers just never bothered. The new Classes A & B however, will just be





Ted White and El Gringo at recent Southwestern Regionals. Photo by Art Gyles.

another Sunday flying session for most, but with the added thrill of competition. Of course, if one wins too much, he will be thrown to the dogs in the cold, cruel world of Class C, but that's the price you have to pay for success.

So much for that. While at Buckeye we also had the opportunity to talk to the young man from Albuquerque who, in our opinion, is certainly one of the best fliers in the country today, if not the best. Of course we are referring to Ted White, whose smiling face you see next to his favorite design, the El Gringo, on the accompanying picture. We hope the great white Navy fathers who sponsor our Nats won't object to Ted's headgear, but it was hot in Buckeye, particularly for February (has the snow melted in Delaware yet, Bill Northrop?). Incidentally, Ted won first in Class C Expert at Buckeye with his latest, modified El Gringo. We asked Ted what he thought about the new pattern and he replied that while he thought it was a step in the right direction, and this may come as a shock to some of you (and us), the new Class C pattern is still too simple. Ted seems to favor more combination maneuvers, at least for Class C Expert. He then proceeded to demonstrate what he meant by giving an exhibition performance over the lunch break. This exhibition performance by Ted is getting to be a standard part of the southwest regionals, and is probably the high point of the meet. In his "performance" this year, Ted pulled off inverted tail slides, loops with double snap rolls, square loops with full rolls on each leg, Cuban eights with snap rolls, climbing and diving 4 point rolls, plus many more. The point of all this is that these various combination maneuvers are possible with our aircraft, and we feel that more of them should be included in the optional maneuvers for Class C. This is not meant to criticize the contest board, as the chairman, Jerry Nelson, has already indicated that the list of optional maneuvers will be expanded in the not too distant future.

While at Buckeye, we had the opportunity to observe again the very marked contrast in style between Ted and Phil Kraft. Incidentally, Phil, flying his new Kwik-Fli III, came in second in Class C Expert but won the grand champion trophy in the flyoff between himself, Ted White, and Cliff Weirick, who came in 3rd in the meet proper. It appeared to us that both Ted and Phil were several notches above the rest of the Class C Expert field. If anything, the new pattern has widened the gap here. Getting back to the style contrast, it isn't clear as to how much of the differences are due to personal preferences on the part of the fliers, and how much is due to the differences in their respective aircraft. Phil Kraft's design philosophy has been adequately covered in his construction article on the Kwik-Fli III in M.A.N. Basically, he favors a light aircraft with plenty of drag to keep the speed nearly constant through the entire flight. Ted, on the other hand, favors a heavy, well streamlined fast airplane, complete with fillets and retractable gear. For most of the maneuvers, Ted dives from considerable altitude to gain even more speed prior to entry of the maneuver. Phil, on the other hand, makes no effort to pick up speed prior to any maneuver, trusting, to the lightness of his airframe and the adequacy of his power plant to pull him through. Thus, while Ted's style of flying is more spectacular from a spectator's point of view, from a judge's point of view, there is very little difference. However, in our opinion, with the new, freer maneuvers, we think that Ted's style of flying should give him an extra edge and that he'll be seen even more frequently in the winner's circle.

We also got a few details from Ted on his latest modifications to the El Gringo. Ted's original plane incorporated an NACA 0015 airfoil, but this with a tapered planform, gave tip-stalling problems on landings. Someone advised him to try a progressive airfoil, 15% at the root and 18% at the tip. This really didn't solve the tip stalling problem and in addition, slowed the roll rate down excessively. Ted is now employing a straight 15% tapered planform wing again, but with washout in both tips. This seems to have adequately cured both problems. Also, we might add, the taper on the current wing is closer to the ideal, as we have previously discussed. Another point which Ted stressed to us is that he keeps his models slightly nose heavy, balancing them at 25-30%, with 25% preferred.

He claims the models are groovier this way, with added stability. Of course, here we give up something in the way of rapid pitch control. This has not seriously effected the design, however. Another point that Ted brought out was that he likes to set his planes up to fly with a little down elevator trim. Ted prefers this set up for two reasons. Firstly (and those of you who have seen Ted fly, will know what we mean) Ted likes to precede entry on many maneuvers by a dive in order to pick up speed (tremendous speed, we might add), and the down trim prevents the plane from ballooning in such a dive. Secondly, it also prevents the plane from ballooning upon exiting from those

The continuation of the article, absent from the scanning.

# Top Out

The beginning of article absent from scanning.

tion . . . Perhaps when this comes to pass, then it could be said that we would really be ready for Olathe!

(Who was it said, "To be able to sit down at the bargaining table, you've got to be able to stand up for sound principles?")

Modeling mainstays — how unfortunate a community is without having one of those individuals who is looked to for advice, guidance, and help in general with things to do with modeling. Or, to put it positively; how fortunate an area is that has an individual that may be depended upon to lead, inspire, work and promote modeling, with a constancy and spirit that draws confidence and trust. Such is the case with Syracuse and Pompey, New York and its senior modeler, Bill Kenyon Sr., who with his wife and family, serves his community and modeling with an uncommon constancy.

Currently an RC'er with the Aero Radio Club of Syracuse (ARCS), big Bill's first rubber-powered plane lifted into the air in 1922 and the hobby has been within the core of his life ever since. The history of modeling development has been Bill's pattern of modeling action. Not necessarily an innovator, Bill has followed the course of practical flying and organizing modeling meets; flying and teaching control line flying, helping to start the Plymouth Aero League (PAL), and making two trips to the Detroit International in Stunt. Fond memory: Outfitting his son (13) for PAL meet in Detroit with planes and engines, only to see him return with a medal won with a hand launched glider made in the station wagon on the trip to Detroit!

Currently, the Syracuse ARCS only have a \$5 a year dues and no field fee due to the annual Hobo meet helping to cover other club expenses. However, there's been a considerable history of modeling behind this present operation that made much of it possible. The original club started in the late '30's, followed by the PAL organization, then the Syracuse Sky Knights, and finally — 10 years ago — the ARCS came into being as RC found a toe hold and grew. Those RC beginnings came during the 1950 Hobo meet where Ralph Jackson of Endicott successfully battled Art Simmons and Harold "Pappy" deBolt for the "best" flight of the day. A \$2 prize kitty was the top award for getting up and down again with the least damage! Ralph is remem-

Joe Guidry likes his triked Champ. El Paso pilots headed by Daryl Cooley, Ken Walton, Harry Pearson, and Chuck Wenzel, who sent in outstanding color pics.



Ted White & PT-17, were top winners at El Paso Fly-In. Won Limbo, (16" high plane under 30" wire) Touch & Go, Crap Shoot. Cool weather fly-fest was Phoenix warm-up for Ted and Galaxy.

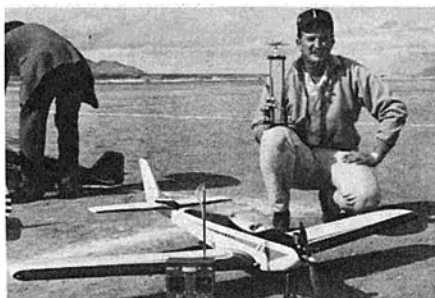
bered for having the largest ground-based transmitter in the area, Art for his Rudderbug on 52 Mc, while deBolt was beginning that RC tradition affectionately known as the Live Wire and hand-launching it into 465 Mc radiations. Art, incidentally, is the present president of the ARCS, and is abetted by another RC luminary, Ed Izzo, who is the sec-treasurer . . .

Bill Kenyon, after seeing these stirrings, couldn't resist RC either, and succumbed to its siren beckonings in the form of a Super Brigadier (trike geared) and carrying an E.D. diesel, a Loenz 2-tube receiver, and an SN escapement — all teased with an Aerotrol transmitter. The ship lasted two years — cost for the whole outfit, \$30 . . . But Bill enjoyed organized flying get-togethers, and after turning the reins of the ARCS regular AMA contests over to Ed Izzo after an 8 year stewardship, continued the Hobo meet tradition where well-worn clothes, a picnic feed, and easy-paced flying events were the order of things for a leisure weekend. It's still a yearly treat where the ladies, under the initiative of Bill's wife, serve a fulsome meal topped by a special cake artistically done by the Kenyon daughters. As an added "flavor" the 1967 cake masterpiece had a lucky number in it, resulted in a happy contestant carrying home a prized CG Skylane 62 kit!

Bill likes to reminisce about his past RC planes: the original 1950 effort was followed by one of the first Live Wire Seniors then a Smog Hog fitted with an early version of galloping ghost pulse. Chuck Hollinger's 1955 J-3 Cub was a favorite and was stuffed with the faithful Lorenz 2-lunger working a compound escapement this time. The J-3's Fox 25 engine was

Bob Brown — El Paso RC Club Limbo Champ. Also Fly-In Bomb Drop winner, guards his neat serviceable fleet.





Al Casey and top Workmanship Award for El Paso Fly-In. Taurus, well done, with Enya 60. El Paso January meet becoming popular.

eventually fitted with one of Dick Bramter's (Bramco) early throttles, making touch and go landing patterns an RC reality. The old J-3 lasted for 1000 flights, ended in the 1960 fire that swept Bill's house that also destroyed his extensive picture history of N.Y. modeling. A pioneering biplane was a 1954 effort along with a low wing racer that didn't fair too well on rudder-only. Bill's dream ship project is to create a Stinson Reliant so as to re-live the thrill of his first plane ride when he was 12. His collection of plans and parts is almost complete now for the 90" replica this project calls for.

All this, Bill Kenyon (Box 63, Pompey, N. Y.) sums up thusly: "I have met some of the finest folks in the world through flying model planes. I hope to live to 105, but if I have to go tomorrow, my only regret is the 6 hours a day I had to waste sleeping." The fun I had flying is enough reward. No special credit is due me—all the old members had a hand in the club's history."

We might add, Bill Kenyon has the helpingest hand of all...

#### THE MAIL BAGGE

**Oklahoma.** S/Sgt. Dan Santich of Tinker AFB writes concerning recent CB and rules actions;

"I grant you, the Contest Board acted hastily and seemingly without forethought. Where do the juniors and seniors fit in? Class C novice? I think not. There are many solutions (it would have been nice if the CB would have found one. Ed) —here are a few of my ideas:

1. Class A — a Jr. event with a few free-style maneuvers, no equipment restriction.

2. Class B — a Sr. event with added time for a few more maneuvers.

3. Class C — an open event, novice and expert, with present ABC pattern except that bonus points would be given

El Paso RC Club flight line — neat spacious layout. Crystal air obvious...



Mr. "Hobo" himself... Bill Kenyon Sr., of Pompey N.Y. and Syracuse ARCS, in his 'lectronic lair. All the comforts... while turning out Digi-trios. A long history of devotion to modeling.

for scale and semi-scale aircraft.

"These ideas are two-fold — to get the youngsters back on the field, and also to get some interest back in pattern, as Bob Clemens said in your April column. Added interest could certainly be achieved by flying scale type aircraft in Pattern. The effect of scale planes was described quite well in Frank Baker's P-51 article in September's R/CM. And I'm sure you remember Lou Proctor's flight at the 1967 Nats... who could forget that?"

"Enclosed are a couple pics. One is of my modified Upset (R/CM—Nov. '67) using an Enya 60 and a new Kraft KP4B. It's finished with Sherwin Williams Acrylic white, MonoKote for trim, and coated with Flecto Varathane, which is a quick-drying clear plastic. It's used to coat roller skate rink floors, so it's TOUGH, and doesn't crack, chip, or peel, and gives a beautiful lasting shine. (Well said, Dan. Just like in the commercials... Varathane does sound good although we haven't tested it yet. Ed.) The other picture is of Randy McGee about to test fly his Aeromaster. The top wing is held by nylon screws and on this flight one of them vibrated out and the top wing departed at about 200 feet in a power drive! McGee, unshaken, simply fed in full up trim and landed unscratched while the top wing floated merrily across the countryside!"

**Washington.** George Hickson (Totem RC Products) of the Seattle RAMS who sponsor the yearly Northwest Conference, writes about RCing and the conference:

"There are 4 clubs in the area; the RAMS (Radio Airplane Modelers of

Ralph Miller's J-3 Cub. Hobo veteran helped Bill Kenyon re-start in RC when fire wiped out Bill's fleet. J-3 sports ancient Johnson 35.



Seattle), SRAC (Seattle Radio Aero Club — the oldest in Seattle), Lake Sammamish RC 'Nauts, and the Mt. Ranier RC Society in Tacoma. The RAMS originated the Northwest Conference and each year it has been growing. This year we started late and so there were less commercial displays than could have been. However, this is an up and coming RC territory so this part of the Conference will grow when the word gets out... The sign-up book showed well over 200 signatures which indicates a total attendance figure that could probably reach 450. We drew a contingent of Canadians, also from Spokane. Oregon, of course, was well represented from as far south as Eugene, home of the Aeronauts. Even a Texas family registered although I'm sure they didn't come just for our shindig. One thing noticed this year was the rise of proficiency in building. The judges had a tough job picking winners in each category you'll find later in this rundown. A Bonner 4RS was raffled and helped cover expenses. The Saturday night banquet was enjoyed by all, with live music for the dancing which followed Phil Kraft's slide talk about the Internats. The party continued late... On Sunday the flying was at nearby Olympia Airport, but I'm afraid it got a little out of hand. It was the first sunshine for quite a spell and everyone was trying to get in the air. I think safety factors were overlooked somewhat. All one can do is pray nothing disastrous occurs that might mar our image in the public eye...

"Pete Bowers flew his full-size Fly Baby and Jerry Leake had an RC version of the same ship they planned to fly at the same time. The idea was to fly the two side by side while photographing the event from a car moving down the runway. Things went awry when Jerry dove the model to pick up speed and the wing broke at the dihedral joint! It was a basket case... This model had been built for single-channel gear and wasn't beefed for the multi weight and big engine. Next year the conference is to be held February 1st and 2nd... Here's a list of this year's winners:

- Best of show — Clyde King, Portland SkyKnights P-47
- Best Finish — Mike Ogilvie, Lake Sammamish RC 'Nauts
- Best Scale — Jerry Leake, Clyde King, Gordon Jensen
- Best Display — Mike Ogilvie, Jerry Gordon
- Best Kit Mod. — Dave Katagiri, Don Anderson, Don Dolin
- Best Idea — Bill Eldridge, Marty Dietrich
- Class I & II — Dennis Sivak, Steve Brooke
- Class III — Paul Good, Bill Kempton, Ralph Brooke
- Most Originals — Jerry Leake, Bill Eldridge, Tom Stom, Jr.

"Thomas Strom, Sr. is president of the RAMS this year and I'm sending some pictures I took of his epic 1914 Taube. It's scale and had several free-flight predecessors which convinced Tom it was a good RC subject. Construction is of the balsa stringer and former method with dyed silk covering, clear doped. The ship weighs 5 lbs. and has a 78" span of the wings using under-cambered built-up ribs and



a wire trailing edge like the original! The OS 30 engine is covered by a scale engine of balsa. Most interesting, is the warping system like the prototype. Currently, the elevator is operated that way with the ailerons ready for later flights. An Orbit analog propo handles the RC function . . . Well, Jerry, it's time to close — hope readers will find these ramblings interesting . . ."

**New York.** From Ouquaga, a few well chosen thoughts from Ed Abram:

"I just finished reading the February AMA mailing . . . that the Executive Council set the pattern (FAI Finals), overruling the apparent wishes of the RC Contest Board. This seems to indicate a lack of faith in the CB's action, at least. Altogether, it points to a mish-mash at the higher levels . . . I have the feeling that some good can come of this. It would seem it is an opportune time to come up with a workable and equitable system of contest flying that would be more in keeping with the basic tenets of the AMA, and at the same time garner the blessing of the Navy. I don't know the full answer, but I know that something involving more kids, looking less professional, and staying more closely to the stated aims of the AMA would be a step in the right direction. If one of the more prolific designers came up with a simple ship for GG or some other simple control system, this could be useful for a multiple-event plane in pattern, speed, carrier landing, or other such competition. Then draw up either sensible restrictions, or come up with an equitable handicap system, and I think we'd see a lot more activity at the contests—at least in an area where we NEED activity, and where we presently don't have much. As far as the rest of us are concerned, I think we'd get just as much activity if we announced a contest with a \$2 entry fee that went to buy beer and soft drinks, and then just flew to see who got the best score. Prizes are nice, but actually don't mean much to pilots like deBolt, or Kraft. I'd rather see the prizes go to the kids, who appreciate them more and get better mileage out of them . . . I'm enclosing one of our club newsletters (The AIRFOIL). I now have about 25 kids ranging from 5th to 12th grade; they're really enthusiastic."

**Illinois.** From Chicago and the RC Club of Chicago (RC3) Jim Della Rocco, Jr. — its president — sends details of the 47-member organization and its operation and make-up. Ed Kazmirski was a former member until a blossoming business attracted Ed from active RC'ing. Sid Peterson, who managed RC at the 1966 Nats, is another club luminary. Jim compiled statistics on the club with these illuminating results:

- 5% fly in contests — average 4 contests a year
- 100% Class III — 80% Novices
- 30% have won trophies in RC contests
- Logictrol, Orbit, MicroAvionics; are favored in this order.
- Supertigre, VECO, Merco, Enya, are engine preferences.
- Most pilots design their ships ("but somehow, all look like Tauruses).
- 27 Mc. is still most used frequency with 4 using 6 meters.
- Other club officers are VP Al Szymkowski, Treas. Bob Choronzuk, Sec'y Everett

Kelly. The club also has a Corresponding Secretary who is Tom Maier. A club newsletter, RC-3, is edited by Tom Drury, with Jim Della Rocco and Dan Laughlin helping out. Kickapoo Forest Preserve — 144th & Halsted — is the location of the flying field of the club, which belongs to the Association of Greater Chicago RC Clubs. Their sanctioned contest, with Sid Peterson and Casey Ziemba as CD's, is set for May 25-26. Our best wishes to them all . . .

**Texas.** El Paso's Chuck Wenzel sends results of the SPRC's contest:

- Single Channel — Don (Lucky) Gibson, Mike Peck
- Balloon Burst — Jack Albrecht
- Crap Shoot — Ted White, Harry Pearson, Earl Bazell
- Limbo — Ted White, Sam Hand, Bob Brown
- Touch & Go — Ted White, Bob Jarrell, Sam Hand
- Spins — Jack Albrecht, Lucky Gibson, Moon Mulling
- Bomb drop — Bob Brown, Al Casey, Earl Bazell
- Workmanship — Al Casey
- Hardluck — Lucky (who else) Gibson (Antic and Thunderball)

Chuck reports further on the RC adventures of Lucky: "In the April R/CM was a picture of a plane with a limbo pole through the wing. At a recent club contest, Lucky Gibson flew his Thunder-



AF S/Sgt. Dan Santich and modified Upset. Finish is unusual, uses clear plastic Varathane coat.

ball through a 1 x 2 limbo pole and only had a small dent in the wing. The plane continued flying as if it had gone under the pole instead of hitting . . ."

**New Zealand.** From Nae Nae (that's right . . .) Bill Aldridge trims us in on his RC doings:

"Thought you'd like to see the enclosed photos. One is of myself and R/CM's Das Flugenhoster modified aft and scaled up to 56" and sporting an OS 40 with Digitrio-4 radio. It goes quite well and looks impressive in the air. Changed the name bit too . . . the name on the cowl reads "Das Poochengraber." I'll nail that dog yet! The other pic if of a biplane that was first published in Flying Models (Jan. '65) as the PT-16½ control-liner. I jacked the size up to 48" on the upper and 44" for the lower wings using an M6 rib section. This M6, I've found to be excellent for RC bipes. It has extremely good high and low speed characteristics, and being rather thin, gets rid of that bulky winged look that in my opinion ruins most RC bipes. This airplane is the most pleasant to fly that I've yet encountered and the takeoffs and landings are something to see! It floats in at low speed and the ailerons are effective right down to the final touchdown. Engine is an OS 40 with my Digitrio-4. The machine is fully aerobatic and spins are something to behold . . . it flicks in, and spins rather slowly and immediately flicks out when controls are neutralized."

#### CON-TRAILS

Contest competition — despite the Nats drag — will be spirited and fun-filled on local levels. Sponsors and contest directors are swiftly moving to take advantage of the surging upswing in RC interest and flying brought about the new unsurpassed equipment, and planes that are sprouting

Randy McGee, TORKS anchor man, readies Aeromaster for test hop. Nylon screws fastening top wing departed in flight. Ship landed safely, wing retrieved!





Business end of Tom Strom's 1914 Taube. RAMS president's epic RC plane has scale engine masking an OS 30. Undercambered wings, Orbit analog propo. Riggering wires functional.

everywhere in unprecedented numbers. In addition to traditional meets, newcomer contests, junior events, and fun affairs are included in the 1968 line-up. Of the many contests listed, here are a few that have special appeal:

**\*Tri-Valley RC Club** of South Bend, Ind. will hold its 5th annual meet at their flying field located 1/2 mile east of the Indiana Toll Road on Cleveland Road. Class A and C (N&E) will be flown. Dates, 8-9 June. Trophies and merchandise prizes will be awarded in all events.

Contest contact: Al Morse — RR #6, Box 360, Elkhart, Ind. 46517, Phone (219) 264-7834.

**\*FIESTA OF 5 FLAGS.** June 15 & 16 are the dates of the Pensacola Aeromodelers' annual contest which will feature all pattern events, Scale, and Goodyear this year. A special "Carrier Event" will also be flown and Ron Chidgey, the CD, says hooks for this event will be available at the contest site. This contest is specially recommended for all the family since it's held in conjunction with the Fiesta of 5 Flags Festival that runs from 10 June through the 16th. It's just right for a family vacation since Pensacola is also an outstanding swimming and boating area. The Pensacola RC'ers really extend themselves staging their annual shindig, and this promises to be their best. A club barbecue will also take place during the meet. An air show, complete with the Navy's Blue Angels, is another scheduled attraction that will interest all who come to enjoy Pensacola's natural attractions. Plenty of hardware and prizes are promised. Contest contact: Capt. Russ Verbael — 219 N. Madison, Pensacola, Fla.

**\*Wright Bros. Memorial.** The WORKS

Tom Strom Sr. (Seattle RAMS) prepares his scale 1914 Taube for first flight at Portland Starduster meet. Note warping (on purpose) elevator, wire trailing edges. Bird-like, attacked twice by hawks! (Geo. Hickson Photo)

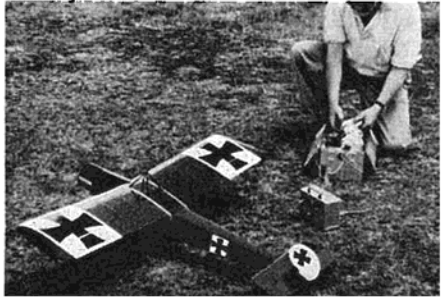


The RC Club of Chicago — at least 25 of the 47 — and part of their plane pack. Jim Della Rocco, their president, behind the camera. Lotsa contest fliers . . .

are all set with their 6th RC Championships to be held this year at Wright Field in Dayton, Ohio again this year on June 22-23. Held each year with the cooperation of the U.S. Air Force, the WBM is easily the number one RC contest in the country and the 1968 meet promises to exceed last year's outstanding affair when 96 contestants came to share in the flying and valuable prizes. Events for 1968 are: Class A, B, C (N&E), with A having a Jr.-Sr. category as well as an Open Category. Scale and Goodyear will also be held at the spacious flying site, along with 2 special events; Open Pylon and Combat (ala the McDonnell system). Prizes of the usual high quality will go to 5 or more places (all proceeds are used to obtain prizes) along with the Wright Bros. Desk Set Trophies valued at \$100 each! A Grand Champion will also be selected to receive the perpetual Wright Bros. Memorial Trophy. Four flight lines will be flown and AMA rules will be followed exclusively. This is also to be an FAI semi-finals contest. Wake-up coffee and donuts will be served early contestants each day . . . Motels — the Sheridan and the Sheridan-Gateway — are conveniently within a 1/4 mile of the flight line! Contest contact: Don Lowe CD — 5936 Clair-Von Drive, Dayton, Ohio 45430, Phone (513) 426-0635.

**\*GENTLEMEN, START YOUR ENGINES!** The Mile-Hi Club of Denver, along with the Englewood Eagles and the Jeffco Aeromodelers, are cranking up the top cash prize contest of the season. A top prize of \$300 is being offered for 1st place in C Expert and the contest set for 29-30 June. Cash will also be awarded 2nd and 3rd in CX, as it will in all 3 top places in C Novice also. All-in-all, at least \$650 will go to winning pilots in Class C. Class A & B events will be flown along with Scale with these events having trophies for the

New Zealand "Poochengrabbler" . . . Bill Aldridge upped Flugenghoster to 56", used OS 40 and Digitrio for fine fun flyer.



PT-16 1/2, gone RC . . . New Zealander, Bill Aldridge took 1965 ukie design, stretch span, used M6 rib section to create outstanding aerobatic bird. Flying site near Nae Nae.

winners. Open Pylon will be flown, with the winners splitting the entry fee for this event. For entertainment — Denver style — a Saturday night banquet is planned. Good flying facilities are assured since Lowry AFB is the contest site. An exciting FAI semi-final competition is anticipated . . . Contest contact: Norma Kelly, c/o Tom Thumb Hobby Center, 7020 E. Colfax, Denver, Colo. 80220.

**\*SPIRITS OF ST. LOUIS.** Another FAI semi-final contest, this is the 2nd sanctioned contest for the St. Louis area enterprising and energetic club. Bob Williams is CD for the meet which will have Pattern and Scale events on 29-30 June. Members of the club will not fly in the contest and since a well run show is firmly promised along with "the most fair judging possible," it's assumed just about all members will be helping to achieve these objectives and wouldn't have time to be "host" and "guest" at the same time. Plenty of flying for all, is their motto . . . Contest contact: Bob Williams CD — 4060 Bondurante Rd., Bridgeton, Mo. 63042.

#### THE NEWSLETTER ROUTE

— SQUAWK SHEET (Port Arthur, Tex. Oily Birds — Bob Talley)

From Texas, a bit of spring poetry:

Spring has sprung, the mud has roze—  
Over our shoes 'n 'tween our toes.  
We slosh and fly with box in hand,  
to music of the mosquito band.

They land on eyeballs and control  
stick fingers,  
Lick off "OFF" and insert their  
stingers.

Oh, Oily Boids, 'Twould be great to  
fly,

If we could keep our minds on that  
plane in the sky!

(So grit your teeth and be of cheer —

Bensen type gyrocopter RC model.  
Max 50 and Digimite 4. Untested, by  
G. Boivin.





Don Lowe, WORKS CD, taxis Ray Nugen's Sperry Messenger for Cincy demonstration flight at last invitational. 4th Cincinnati meet is due September 7-8. Queen City RC Club and World Engines will co-host RC Industry fun-fest flying meet.

then go relax, and crack a beer . . . Ed.)  
—WRAM (Westchester Radio Aero Modelers — Art Byers)

RC comes of age — clever caricature, with a vengeance, on the ploya and foibles of RC publications:

FROM MODEL AIRCRAFT TIMES: P.A.N. At Work — "Just returned from a flying visit to the Headhunters Model Club of New Zealand — was having a wonderful time but decided to leave when I heard one member say he'd like to have me for dinner. Next week I'm off to a trade show in Calcutta, India held by the Indian Free Flight Society, and the week after that I'm flying to — just don't remember where, but it will be someplace. Gave my son, Dutch, the new kit of the Blodget 8 proportional as my fumble fingers just were not up to it. Dutch assembled it in two evenings and put it into the new Creamsville Special kit given to me for a test by Crash Products and Dutch has about 100 successful flights on it. He would have put in more, but I have him building the new Scale Gotha Bomber put out by Miniature Models and the new kit of the Carl Goldfinch Big Bird. In fact, Dutch has been doing so much of my work lately that there is a rumor they are about to fire me and put my son in the job . . ."

FROM THE R/C MEDDLER: Editor's Memo by Don Hooey — "Let's go into the foul ethics of the competing model magazines who are busy printing advertisements by manufacturers who won't advertise in our magazine. After all, who else had underwear ads in an airplane magazine; and why don't they think we are the best self-appointed judges of who should do what, where, and when we want them to; and why shouldn't we be able to tell others what to do and print. Furthermore . . ."

FROM DYING MODELS: An article by Zick Niroli — "This month I present

our almost Halberstadt to go with our new series of nearly Eindecker and almost Saulnier, not quite Fokker D-7 and very possibly SE-5 which I have turned out, finished, flown, drawn final plans, and had printed in the last 3 days. Next month we present my positively 4 motor B-29 and the moth after, my very likely Sabre Jet!"

AMERICAN AIRPLANE MODELS: Presented a radio controlled dragon fly by Dave Robell — with sub-miniature pulse system and powered by a .0001 engine of Dave's own design, for the asimpleton system. This uses a REAL DRAGON FLY, and can be flown in a small bathroom. . . .

BRITISH MODELL AIRCRAFT: Presented several escapement designs and report rumours that Reeds may soon be replaced by a new type of radio system called "proportional." (—for all who were missed by Art's sharp pen, take heart. We have a feeling he's just warming up . . .)

—FLY PAPER (Pittsburgh Area RC Society — Phil Catanzaro) Speaking of Toledo, I'll give you some statistics on the trip to help out with the planning of next year's trip. We had 33 men go up with us and 32 came back (the other flew back). We had 7 six packs of soft drinks, 4 cases of beer, and 100 sandwiches. This used up 4 loaves of white bread, 6 loaves of rye, 9 lbs. of baked ham, and 3 lbs. of chipped ham. We also took along a jar of mayonnaise, mustard, pickles, 2 large cans of potato chips and 2 of pretzels. After all was said and done, we had used up the soft drinks quite early, the sandwiches were just about right, we had 2 cases of beer left over, no one touched the chips or pretzels, mayonnaise, mustard, or pickles. It seems the next time we should make more rye sandwiches though.

Oily Boids, are you taking notes for your bus trips? The rye sandwich comment is a good thought, after all, those 2 cases of beer do need to be soaked up, and . . .

—GLITCH (Soo Modellers Radio Control Club — Dr. Nino Campana)

A Note of Interest. Twenty percent of the SoMoRaCC's membership is composed of Yankees. The MAAC will not accept them as regular members, insisting that they must join AMA, their own country's parent model aviation body. How about that? From "Over There." Recently I bothered Radio Control Models and Electronics with a letter full of questions. One of the questions asked was: When will the modelers who helped build models for the film "The Battle of Britain" last year publish details on producing the authentic battered and war-scarred finish (that was on models)? The answer, in effect, was, "not likely for a long while." The film was cancelled after the first successful RC models were built, but, as Tony Dowdeswell — RCM&E Editor — took time to write, the film is now on again. Inasmuch as the techniques used in mass-producing these very realistic models were evolved by the special effects staff at Pinewood Studio, the tricks remain the property of the studio, and cannot be revealed. Thanks, Pinewood Studios! I'll go see the picture anyway, just to see those marvelous flying models in action.

—BREEZE (St. Joseph & Benton Harbor,



Marilyn Reeves holds Piper Comanche 250 by Cliff Corvette Sr., of Savannah, Ga., pres. of Cloudbusters. Kraft KP-5B, ST 60 (Kavan carb.) Lakin nose gear, and flaps. Outstanding scale.

Michigan Whirlwinds — Hannah Lukaszewski)

Had a chance to visit with the Northern Indiana Model Aeronautics Association at their January 8 meeting, thanks to an invitation from President Kemp Bunting, and Activities Chairman Bob Kendall. Bob's the guy who had the article on foam wing bi-planes in R/CM. The Northern Indiana MAA is located in Hobart, Indiana — now there's a swinging club. They hold their meetings at the Pheasant Valley Country Club near Hobart. This is an honest injun country club complete with golf course, cocktail bar, and restaurant. Meetings are held in the carpeted and draped bar room — complete with service. Seems members of NIMAA have automatic membership in the country club. There's more—the owner of Pheasant Valley CC has bestowed upon the RC club a flying site which he maintains for them. All this in exchange for use of the club name and charter for the country club. Some of these guys are glider buffs and believe in roughing it. They fly gliders from the patio of the club house overlooking a horse-shoe shaped ravine which is near perfect for the purpose. Of course, a long day of flying those gliders in wind and hot sun is extremely fatiguing, especially from the patio of a club house where one has but snap the fingers for another tall, cool one. Tough duty, guys.

Always knew something like this was around somewhere. Sounds, though, as if the club owner is just a good guy who likes to have modelers around.

—AERO-NUTS (R/C Club of Rochester, N.Y. — Jake Schaible)

The 9th annual New York State Radio Championships that are to be held June

Wayne Moore, Ricky Witt — Junior RC competition at Houston meet. SportsMANship prevailed throughout.







Oily Boid hi-jinks. RC bonfire staged by lively Port Arthur, Texas mosquito feeders. End-o-season idea, or last resort to get Anopholes relief.

8-9 at Salmon Creek Park near Brockport will be handled by Tony Mangos. He was appointed to the job as contest coordinator by Bob Kesel. Tony is asking for people who want to work during the contest, as well as set it up. This will be held at the corner of Coby and Swedne Walker Roads.

Tony will need extra help now that the Rochester meet will be an FAI semi-finals contest.

—TAILSPINS (Cordova Model Masters — Phil Heller)

Now here's a topper. About 6 weeks ago I managed to crash the Aristocat under rather odd circumstances — it was in a panel delivery van at the time, and the ship was airborne! I had taken the van home with a plan for using it Sunday morning. It was big enough to hold the Cat completely assembled and I had it sitting in the rear with the rest of the flight gear. The plan was to drop the kids off at Sunday school and then hot foot it out to the field for a good hour and half of flying with a minimum of lost motion. On the way to Sunday school I unfortunately happened to arrive at a crossroads at almost precise moment another vehicle did. Luckily the Dodge has excellent brakes, but unfortunately they were not connected to the 'cat, and it continued on its way at what must have been its flying speed because I had just about time to see it bash into the engine compartment about a foot off the deck. Result: a broken tail section and no flying that Sunday, and a few choice words the kids wouldn't hear in Sunday school!

Don't have any figures, but a 6 to 8 lb. bird hurtling through a truck or station wagon must be carrying potential like going through the air at the flying

Art Snyder floats his Pacemaker old-timer in Lake Elsinor. Ship won 1937 California Championship in Free Flight. K & B, 1968 powerplant. (RCM plans.)



RC going to the dogs? Bryce Peterson's wife thinks so. The poodle wonders too, in Bryce's Fokker Triplane.

field. Tie 'em down guys, that gets the brakes working for the model, too. Tool boxes also need securing. The National Safety Council will tell you a high percentage of serious injuries occur from near auto accidents when tool boxes and other heavy objects take to the air inside a de-accelerating auto.

—LIDSLETTER (The Long Island Drone Society, Inc. — Oscar Weingart)

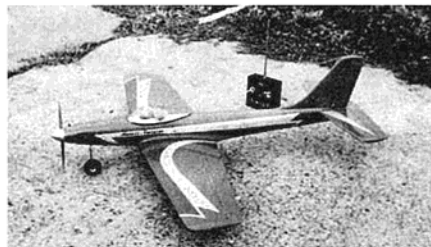
Not to be outdone, your Secretary will bring down (to the club meeting) his latest invention. Would you believe a scale machine gun that actually fires? If you think I'm kidding, come to the meeting — and be mowed down! The idea was triggered (pardon the pun) by that Rhinebeck WWI meet last year. Extra bonus points were offered for simulating machine gun fire, although no one did it. The mock combat event would also have been more realistic with such a gadget. I'm going to mount it in my Big John which I'm going to disguise as Snoopy's Sopwith Camel. Red Baron, LOOK OUT!

Seems as if something like this was said before — sometime in the 1920's. I can hear it now: "OK, guys, I want you to come to the garage on Clark St. on St. Valentine's Day. I wanna show you my new scale model..."

—FEEDBACK (Northern Virginia RC, Inc. — Jim Deckert)

I've found one of the most time consuming installation problems to be servo mounting, in particular, the Logictrol, MicroAvionics, Orbit type. Facing a recent last minute installation job in my airplane, compounded by its minuscule inside dimensions, I contact cemented 3 servos to the inside top of the fuselage.

Eugene, Ore. Aeronauts Narrow Needle, Rober Breedlove and modified Jester. University of Oregon, Autzen Stadium parking lot is flying field. Roger editor of AERONAUT N/L.



From Pisa, Italy, Graziano Pagni's Twister, uses ST 60 SR with new carb, Orbit 6-12 propo. A Spreng fan, Graziano also flies a Thunderstorm.

The airplane was then flown with this for 3 weekends. In an attempt to, pardon the expression, improve the system, I did some experimenting with G.E.'s Clear Seal/Metal Seal, which, by the way, is available at Sears-Roebuck. Applying a 1/4 inch layer of Clear Seal to the servo bottom, it was then applied to balsa block, pushing down until the Clear Seal was compressed to 1/8 inch thickness. After drying for 1 hour, it was sufficiently firm to allow normal installation work. After 12 hours, the servo was subjected to a 25 pound push/pull test which failed to affect the joint in any way. In addition, there was more resiliency than provided by the usual grommet system. Obviously, a flat mounting surface is required, however lacking this, the servos could be fastened to a mounting plate which could then be installed with mounting screws. For you doubting Thomas types, I'm not through yet. Pending receipt of a secret glue formula from a strip teaser friend of mine, I plan to develop a method of gluing in engines!

STRAY SIGNALS. According to Art Gyles, Bill Watson is lining his refrigerator with G-Pad (Ref. R/CM April '68) to keep his eggs from breaking. NOISE will expect a full report from Bill on the effectiveness of this product for use under Tech Topics in future issues.

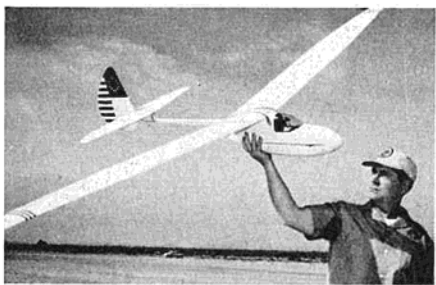
See, Ray, lotsa help.

—FEEDBACK (Houston RC Club — A. K. Carter)

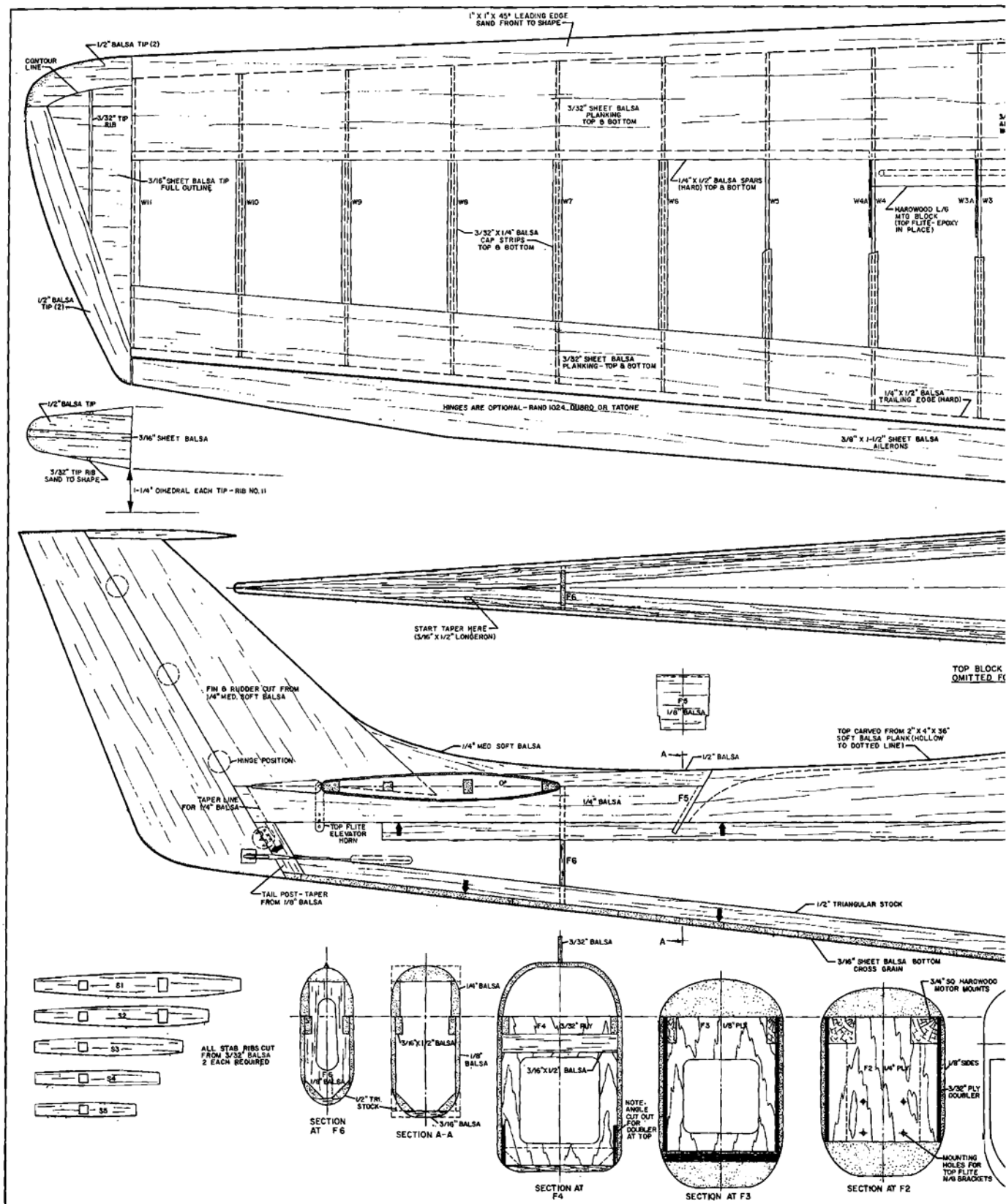
"Doc" Martin, of jet model renown, has been busy putting in a lot of work toward education of our judges for the upcoming sanctioned contest on June 8-9. He has set up the new AMA patterns with plastic airplanes on wire flight paths showing all attitudes of each maneuver.

Leave it to "Doc."

Al Cox, of Santa Monica, eyes his 108" Bowles scale glider. The Valley Flyer's beauty uses a Bonner 4RS, grosses 3 lbs. A nice slope soarer, it loops well.



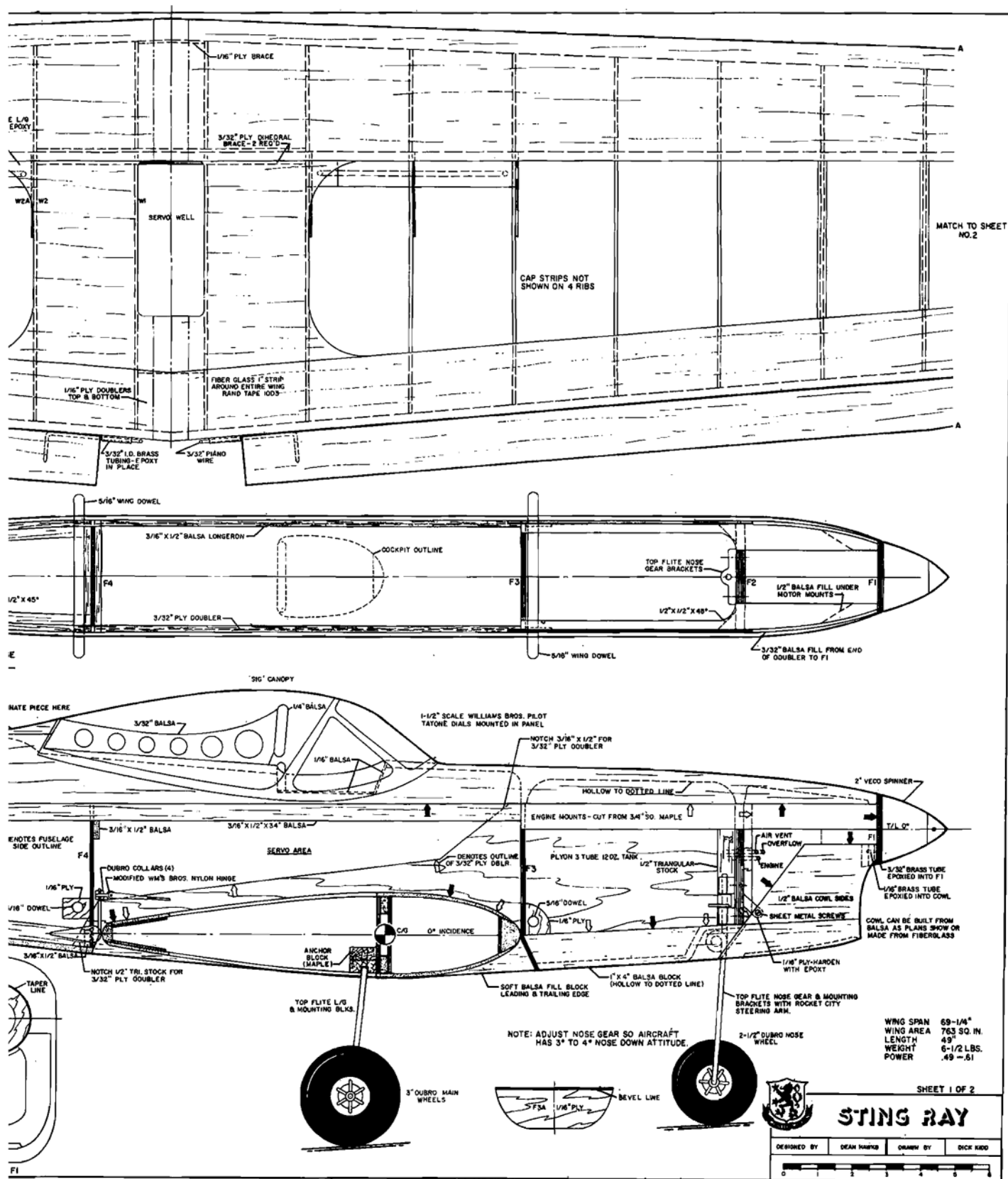
# STING RAY





AN RCM CONSTRUCTION FEATURE

# BY DEAN HAWKS







**F**IRST of all, I am not going to sit here and write—"I spent ten years in the development of the Sting Ray"—and insult your intelligence! Actually, I simply didn't care for what I saw on the flying fields so I decided to do something about it. Being a former ukie stunt flier, I wanted to see beauty and grace in my aircraft.

R/C Class III designs are in a drastic rut insofar as being conventional is concerned. I feel that, for me at least, the Sting Ray is a step in the right direction. A lot of fliers will scoff at the cowed inverted engine, but they can stay in their rut. You and I will step forward and, at least, try to improve, beautify, and put realism into our aircraft. After all, that is why we fly radio control.

The first prototype of the Sting Ray flew 'right off the drawing board.' The only modification I had to make was to the landing gear, which was too far apart. I recommend a twenty-four inch wheel width for this particular design. The Top Flite "Taurus" nose gear tiller arm proved to be too sensitive, and I subsequently found that a tiller one inch in length was quite satisfactory.

Insofar as the general acceptance of the Sting Ray is concerned, it has been overwhelming. The very fact that well known R/C'ers have shown a definite interest in this ship has confirmed my own idea that R/C'ers, in general, are looking for more modern and realistic designs.

Okay, so much for the sales pitch. You guys who will be spending your money to build the Sting Ray (or stealing your wife's grocery loot) will want to know how she performs. In one word—beauti-

fully! I use a Super Tigre .56 and a Rev-Up 12/5 prop. With this combination she is a sweet, docile aircraft. With an 11/8 1/4", she becomes a hot contest stunt ship. If a bumble thumb like me can fly this airplane, anyone can fly it. Even a beginner!

Insofar as the construction of the Sting Ray is concerned, it is quite simple, and anyone with a moderate amount of building knowhow will find little difficulty in putting this bird together. If you should have a problem, or a question, drop me a line c/o Dean Hawks, 2950 West Lynrose Drive, Apt. R2, Anaheim, California.

#### Construction

I normally begin construction with the fuselage. Take a sheet of 1/8" x 4" x 48" medium soft balsa and mark the location and dimension points of bulkheads, wing centerline, and engine mount bearer, on the wood itself. Then, with a ball point pen, draw the fuselage outline on a balsa.

Cut out the fuselage side, then trace this on a similar sheet of matched wood for the other side. Make absolutely certain your wing cradle will give you a 0 degree incidence and is absolutely true to the airfoil curve.

Next, cut your spinner bulkhead, firewall, and next two bulkheads. The firewall is cut from 1/4" plywood. Now cut two 3/32" plywood doublers and glue them in place with Titebond or epoxy. While these are drying, mark the holes in the firewall for the nosegear mount, throttle control linkage, and fuel draw and air vent tubing. Drill these accurately. Now epoxy the firewall in place, following up immediately with the next bulkhead. Cut

a large lightening hole in this one, leaving a half inch width from the outside of the bulkhead itself, to the perimeter of the lightening hole.

Flip the fuselage upside down and line up the two bulkheads and sides over the plans. Let the epoxy completely cure before you handle it again.

While this assembly is drying, you can cut out the fin and rudder. Sand the rudder to a symmetrical shape. Next, prepare the mounting pieces that go under the stabilizer. Again, make certain that you maintain a 0 degree incidence. Place a 1/16" balsa doubler (grain vertical) inside the fuselage, reinforcing the seam where the stab mount butts against the fuselage sides. This balsa doubler should run from the tail post up to the bulkhead that connects to the fuselage top. Glue in place with Titebond. Now join the sides together at the tail, leaving the entire fuselage assembly on the plans to assure a true shape without any misalignment.

Now you can drill and mount the blind nuts for the engine. Next, tack glue the soft balsa top decking in place. This can be laminated from 1" x 4" x 36". I used an X-Acto wood plane to carve the top and also to blend it into the fuselage contour. After carving and sanding to the desired shape, build the cockpit. Take your time—this sort of detail really sets off one ship from another. Now, pop off the top of the fuselage and put in the cockpit floor and instrument panel.

After this step, you can start hollowing out the fuselage to a 1/8" thickness. Do a good job here, making sure to sand carefully when you have finished.

Lay the fuselage upside down and sheet the bottom. Use a square or a 30/60-45/90 degree triangle to make sure the sides are vertical, then glue the top on, again using Titebond.

Now build the stabilizer and elevator as shown on the plans. The stab is sheeted with  $\frac{1}{16}$ " medium soft sheet and silkspan covered.

The cowling on this ship is very easy to build, but you have to be careful in carving the outside shape. The first step is to mount the engine, removing the exhaust baffle before so doing. Use  $\frac{1}{2}$ " thick sheet blocks for the sides; a  $1\frac{1}{2}$ " block for the bottom; and a  $1\frac{1}{2}$ " x 1" block to join the sides. Cut a glow plug access hole before glueing the bottom to the sides.

Lay the sides against the head of the engine. Now rough carve the shape of the cowling. Now pop off the cowling, replace the exhaust baffle, and carefully carve the inside of the cowling to clear the exhaust and carburetor. Now epoxy a  $\frac{1}{16}$ " plywood plate to the cowling where it butts up against the plywood spinner plate. An opening has to be cut for the nose gear—this also serve as a hot air outlet, so carve accordingly.

A  $\frac{1}{16}$ " plywood plate is epoxied to the rear of the cowling nose gear opening. A 4-40 or 6-32 blind nut is epoxied into the balsa block behind the cowling to serve as a hold-down.

At last we come to the wing. Believe it or not, it's a snap to build. Simply trace the full size ribs on to very thin tracing paper. Now cut the paper into rectangles, then glue them to  $\frac{3}{32}$ " sheet balsa. (I prefer to dope these patterns on to the wood—your choice.) Now cut out the ribs and peel off the paper templates.

Mount the  $\frac{1}{4}$ " x  $\frac{1}{2}$ " spars in place but do not glue as yet. Pin the leading and trailing edges in position. Now find the exact center of the L. E. and T. E. Block with scrap and pin firmly. Go ahead and start glueing the spars, leading and trailing edges, in place. Sheet the trailing edge with  $\frac{3}{32}$ " sheet. The wing gets  $1\frac{1}{2}$ " dihedral—don't give it any more than that!

The spars are joined together in matrimony with  $\frac{1}{16}$ " plywood, both front and rear. The sheeted trailing edge centers are supported by  $\frac{1}{16}$ " plywood and epoxied. The wingtips are made up with two pieces of  $\frac{3}{16}$ " soft balsa and four pieces of  $\frac{1}{2}$ " soft balsa. The  $\frac{3}{16}$ " balsa pieces are the center plates, built up with  $\frac{1}{2}$ " rims. The landing gear ribs are beefed up with  $\frac{1}{16}$ " plywood, ala Taurus.

Well, you guys, that's about all I can think of to pass along to you regarding the construction of the Sting Ray. With the exception that wing fillets and dummy exhaust pipes can really set it off. Fillets improve the aerodynamics of an aircraft as well.

Since every construction article seems to imply that the prototype was retired intact, I'll mention that I cracked mine up. Damn it, it broke my heart, too! It hit so hard that the fuselage virtually exploded. The wing and tail group remained intact, however, making it rebuildable. It wasn't radio or aircraft failure, by the way—just plain, dumb pilot error.

So, go ahead and build the Sting Ray. It's a sweetheart, and you'll be the envy of your R/C flying buddies.

