

Blueprint for beginners Part I by KEN WILLARD

RADIO

DECEMBER 1963

50 CENTS

60¢ FOREIGN

CONTROL *modeler*



Meade Hallock's contest winning NOVA

THE TORERO twin-tailed multi by Willie Smith

R/C modeler

VOLUME 1, NUMBER 3

DECEMBER, 1963



PAUL RUNGE

(Editor's Note: This month we are privileged to have as our guest editorialist, Paul Runge, Publisher of Grid Leaks Magazine, one of the finest magazines dedicated exclusively to radio control. We feel that Paul's message is of utmost importance to all RC'ers, and urge every radio control hobbyist to take an active part in supporting the program outlined below.)

At the outset, let us say that we very much appreciate the invitation extended by RCM to do a guest editorial. This is indicative of the excellent cooperative attitude that exists in most phases of our grand mutual hobby of radio control.

It is time for all modelers to stand up and be counted, especially if they hope to continue in radio control as a hobby. With a new Form 505 due about the time that these lines are in print (this one even simpler than the previous 505's), this will be your last chance to get registered for an FCC license for radio control without having to pay a fee. If your license should expire during this year of 1963, you also ought to get your renewal in, since a renewal in '64 will cost you \$8.00. Not only is it good economics to apply for a license now if you do not yet have one, but it will help us all because it will make the FCC more aware of the total number of radio modelers.

This has become increasingly important with the AMA having recently appointed an FCC Committee. Ed Lorenz is chairman, with Vernon McNabb, Dr. Walter Good, John Phelps, and Paul Runge as members.

Earlier this year, at a meeting of this committee, it was felt that a competent communications attorney would need to be retained to represent the AMA RC'er before the FCC in all matters relating to radio control. This, the committee felt, was necessary because it would help prevent others from usurping our spots, as they seemed ready and willing to do, and might possibly provide us with the opportunity for filing other petitions for additional spots and frequencies away from the increasing interference problems of the Citizens Band.

FEATURES

- 8 THE NOVA
by Meade Hallock
- 12 BLUEPRINT FOR BEGINNERS
by Ken Willard
- 14 THE TORERO
by Willie Smith
- 17 SPACE CONTROL MODIFICATIONS
by D. D. Foss
- 34 INTERNATS DATA SHEETS
Preface by Harry Brooks

DEPARTMENTS

- 4 EDITOR'S MEMO
- 5 DEAR RCM
- 6 A.M.A.
- 7 BENCH BITS
- 19 RCM INTERVIEW
- 20 FLY-IN
- 22 SHOWCASE '63
- 27 SOLO
- 28 TACH TALK
- 42 CLASSIFIED
- 43 READER SERVICE

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DEAR RCM:

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FIRST REVIEWS

I have just been looking over the advance copy of R/C Modeler, and I am sure you will be receiving dozens of letters like this which will say "Congratulations." I think that you are off to a flying start and that as time goes on this magazine will become one of the "most wanted" publications.

Dave Berg
Norquist Products, Inc.
Magna-Jig Division
Jamestown, New York

I have just completed the reading of your first issue. My congratulations on a job well done. Enclosed is my subscription for two years. With the growth of our wonderful hobby, it is most fitting that we should have a magazine devoted exclusively to radio control. Perhaps your greatest contribution can be in the field of aircraft construction articles such as the Stagger-Bi. Keep the technical topics coming, and also some plain old RC gab sessions. In short, keep up the good work, and good luck.

Gerald F. Cole
Norwich, New York

I just had to drop you a note to tell you how much I enjoyed my first copy of your new magazine. The radio control model industry badly needed a publication devoted solely to RC. I have been building and flying gas models ever since the Brown Jr. engine and Henry Struck's "New Ruler" Class C free flight, and have only recently tried my first rudder-only radio control.

An entirely new pleasure is open to me and I'm jumping in with both feet. Keep up the good work. You have my whole-hearted support.

Robert P. Ehas

I picked up Vol. 1, No. 1 in a local hobby shop and have enjoyed reading the various articles and features very much. I've been reading model airplane magazines off and on for over 25 years and can recognize one that's put together with enthusiasm and genuine interest. Your first issue certainly exhibited such qualities.

Henry A. Sparks, M.D.
Bethesda, Maryland

What can we say, except thanks? And that we'll do our best to bring each issue of RCM up to your expectations.

SOME SUGGESTIONS

I am more or less of a beginner in radio control and was impressed by the article on escapements—no wonder I've had trouble!

Naturally you must have technical articles for advanced fliers, but *please* remember us poor beginners who don't know an ohm from a volt. I think you would help thousands of us and have our undying gratitude if you ran a whole series of basic articles like the one on escapements. I have read many so-called "beginners articles" in other magazines that have been over my head because the author assumed that everyone knows what a "hyperparabolic sassafras" is. Let's face it—a lot of us don't even know how to solder correctly, let alone know how to hook up a potentiometer in series. Such a series will make many of us indebted to you for life and will make many loyal and devoted fans for your magazine.

W. W. Cook
Huntington, New York

I picked up the first issue of RCM in a hobby shop on a trip east this week—you hit my "hot button." As a true novice, I have read all I can find on RC, purchased all needed equipment, and in spite of this my radio is still only partly installed. As a chemical salesman, I am only home on weekends. I know of no nearby radio control clubs. Therefore when I attempt to install a receiver and find five lugs on the escapement to which I can solder three wires from the receiver, I am stopped cold. I hesitate to experiment for fear of destroying the equipment. May I suggest that you run a series of articles for us rank beginners just as were once run for children making their first R.O.G. Show us the "missing links" for *specific* hook-ups so written that we can translate the information from schematics to our planes. In a specialized mag of your type you can make yourself great to us and to the hobby; industry by filling this gap.

Allen Trask
Hudson, Ohio

See Ken Willard's Blueprint for Beginners in this issue. We are all beginners once, and with the ever-changing developments in RC, can still be placed

(Continued on page 42)

AMA

● In keeping with the very important message from Paul Runge in the editorial section of this issue of R/C Modeler, concerning the support of the AMA-FCC Committee, we are reprinting a letter from the B.I.R.D. Club of Long Beach, California, to the A.M.A.

Gentlemen:

The BIRD Club of Long Beach, California, is making application to the Academy as a chapter club. Our membership now numbers in excess of 100. Obviously we are long overdue for affiliation.

We have been tremendously impressed with an article by George Wells in Grid Leaks Magazine in which he points out the tremendous need for more radio control frequencies and the almost monumental task of trying to get them. He remarks that one of the few courses open to us would be for the AMA to retain a qualified communications attorney who carry the word of our need to the right people at the right time and in the right manner. This is, admittedly, a long range project, and most certainly an expensive one. Because we, as a club, feel that some sort of action must immediately be taken to protect the future of our hobby, we have taken the following action:

The BIRD Club has begun a special fund of \$100 to be placed at the disposal of the AMA for the express purpose of retaining an attorney of their choice specializing in the field of communications.

A hundred dollars is not a lot of money except when it represents a gathering of nickels and dimes from a lot of people with the same ideal in mind. It is our hope that publicizing this action will attract the attention of other such groups and will bring about similar fund raising activities on their part.

We do not look for miracles. We understand that we are working for the good of future flyers and we are still apt to get "screwed into the ground" for a lot of flights to come, but we're willing if you—and the thousands of RC flyers in the country are.

In the interest of a better hobby for everyone, I remain,

Sincerely yours,
Andy Foster, President
Birds Club

(Continued on page 42)

● In response to the many requests we have received for construction notes and circuitry on RC test equipment, we are presenting several items this month which we feel you will be able to put to good use.

First, from Charles Fondecaro, Monterey Park, California, comes a very useful servo checker. It seems that Chuck "bends" his airplanes and equipment periodically and finally got tired of having to untangle the mess of spaghetti in order to check his servos for damage. The schematic for this unit is shown in Fig. 1. It is a standard servo hook-up—the only difference being that a SPDT switch is substituted for the reed bank.

When we tested this unit at RCM, we went a step further and included a reed switch in series with the switch shown. This is illustrated by the dotted line portion of the schematic. Although this feature is not necessary in order to obtain useful information from the servo checker, it does more closely simulate the actual operating conditions of the servo being used. For example, without the reed switch, a servo with open filter capacitors would still work okay on the checker, since it is D.C. which is applied instead of pulsating D.C. such as the servo gets from the reed bank in the receiver. You may not feel the extra expense is necessary, so pay your money and take your choice. Reed switches are available from Ace Radio Control, Higginsville, Missouri. We used a coil from a 110V A.C. relay and drove it directly off the power line. This gives a 120 cps switch rate, as the reed switch activates on both the positive and negative portions of the cps power. This is considerably less than the lowest frequency used on your reed bank, so if the servo works from this frequency input, you can rest assured that it will work from your reed bank.

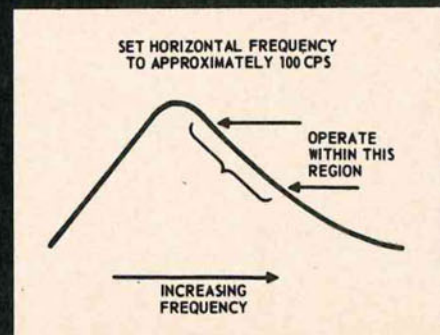
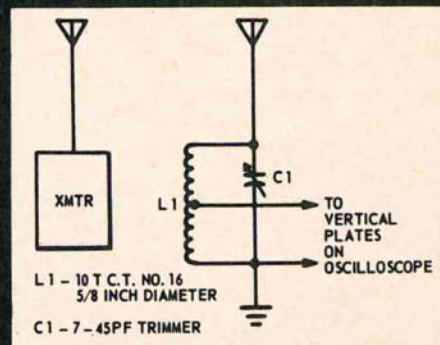
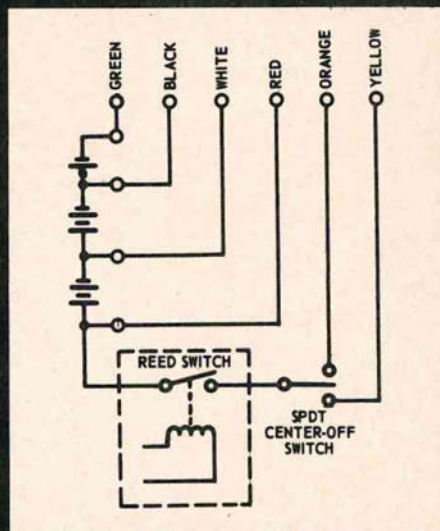
One of the frequent causes of burned-out glow plugs is excess voltage from a lead-acid cell used as a starter battery. While these cells are available at very reasonable prices and are easily rechargable, thus lending themselves to use as ignition batteries, a device must be employed to drop the terminal voltage to some safe value. Normally, a resistor of about .2 of an Ohm would be sufficient, but with the many different types of glow plugs currently in use, varying loads are presented to the starting battery, and the current drawn from the battery may differ by as much as one ampere! These changing currents cause a changing voltage drop across the series resistor. If a silicon diode (10-20 ampere) is substituted for the series resistor, the voltage drop across it will be about .5 to .7 volts, which value remains fairly constant throughout a wide range of load current. This will drop the 2.2 volts to about 1.5 to 1.7 volts at the glow plug, which is just about right.

(Continued on page 32)

BENCH BITS



HANK GIUNTA
Technical Editor





VELMA AND MEADE HALLOCK

The NOVA

● No matter what phase of our hobby a modeler pursues, he will, at times, come to a standstill in his activity, reflecting upon the things he would most desire in the "perfect" model. From his own experience, he will sort out the bad ideas and characteristics and retain the ones he knows are desirable for this particular model. Then he will begin to design that ship which he feels will provide the top performance for a certain job to be done. Out of these efforts may come many failures, but persistence will usually lead to success.

In effect, the foregoing thinking led to the development of the Nova design. Too many times wings came apart, nose gears caved in, fuselages split apart, rudder movements weren't adequate to keep control, engines broke out, ad nauseum, in the usual commercial kits. It was finally decided that, just as a better mouse trap could be built, so could a better radio control plane!

Thinking back through many years of modeling, we decided to set down the points we felt were needed in an ideal RC model. The following are the characteristics we felt every modeler wants in an RC plane:

1. Easy and economical to build and operate.
2. An easy, stable flier with built-in recovery tendencies, yet outstanding in contest performance.
3. Rugged and dependable — built to take punishment, but without excessive weight.
4. Maintenance free — leaving more time for flying instead of repairing!

These are the main reasons behind the Nova design — but we were also thinking about a versatile design — one that could be built and flown by beginner or expert alike, yet would be able to perform exactly the way the flier desired. It would also have to be adaptable to any number of channels or to any type of radio gear. Sound impossible?

It was felt that, in order to accomplish all of these prerequisites with one model, a design was needed that would fly well on rudder-only equipment, yet with the area and room to accommodate the addition of any number of control surfaces and extra equipment necessary for their operation.

In order to determine if the first characteristics (easy to build) would meet the test, it was decided to let another person build the first model from the original plans. For this we wanted a person with very little modeling experience, and decided upon my wife, Velma, as a good choice for the test. She had built only one RC model prior

to this attempt and had required considerable help in order to get it built and flying.

With only the plans and materials for the Nova before her, she began the task, and in short weekend had the plane ready for painting. One more day, and she proudly produced the completed model for approval — it was a beauty! All red, trimmed with white and black, and as professional looking as might be expected of a far more experienced modeler. A couple of days later we installed the radio equipment and prepared the model for the first test flights.

Now satisfied that the first requirement had been met, we went on to test the second. (Is it stable? Does it have built-in recovery tendencies?) We loaded the plane and flying gear into the car and headed for our club field, northwest of Fresno, California.

After getting the plane ready and checking the prevailing wind direction (about 12 to 15 mph — really too much for a first flight), we started the motor and checked the controls. Velma released the model and the test began. The big question in my mind at that moment was, "Would it be stable enough to control in such a breeze?", but it was too late to worry about that as the plane roared straight down the runway into that small gale! It lifted off the ground and continued to climb straight out into the wind with only a slight turn, noticeable about 200 feet after lift-off. It continued to climb steadily, even down wind. After throttling back to cruising speed, we made a couple of turns around the field and then entered into the approach pattern for a landing. It set down smoothly and with ease. After adjusting the clevis on the rudder horn to stop the slight right turn tendency, we filled up the tank, revved up the motor, and took off again — this time to find out just what the Nova could do maneuver-wise.

We found the Nova to be highly maneuverable in the stunts as well as very smooth and easy to handle in the procedure turns. Above all, we noticed three outstanding characteristics that most rudder only jobs lack:

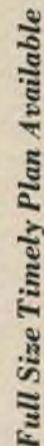
1. On turns it continues to groove gently until a tap of opposite rudder was used to straighten it out.
2. The nose does not drop in sharp turns but remains high enough to keep the plane at the same altitude — and with just a little more motor speed, it will continue to turn and climb gently upward at the

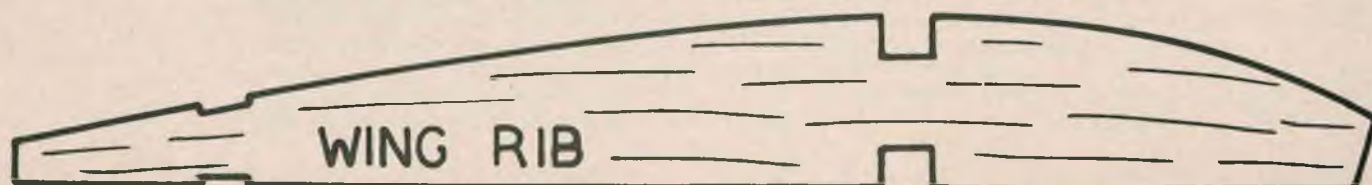
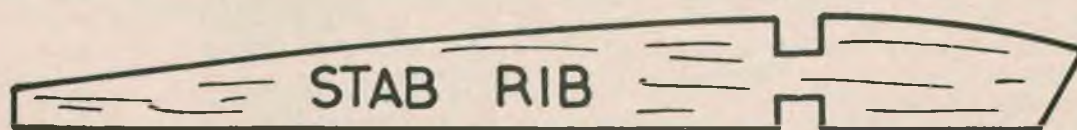
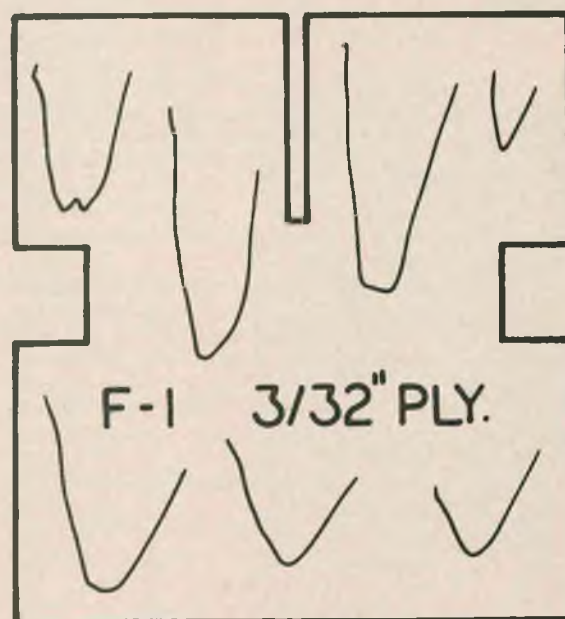
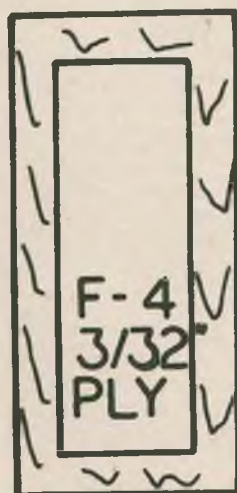
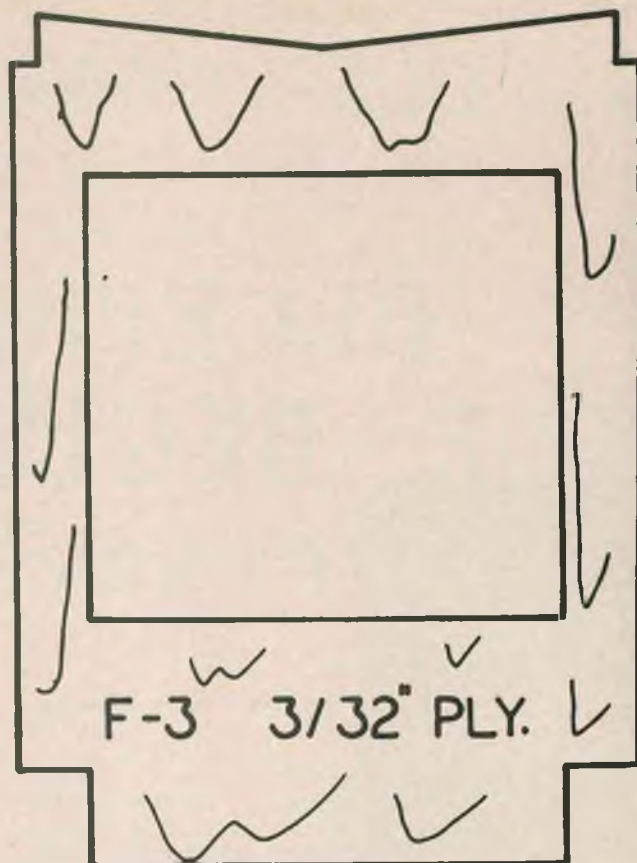
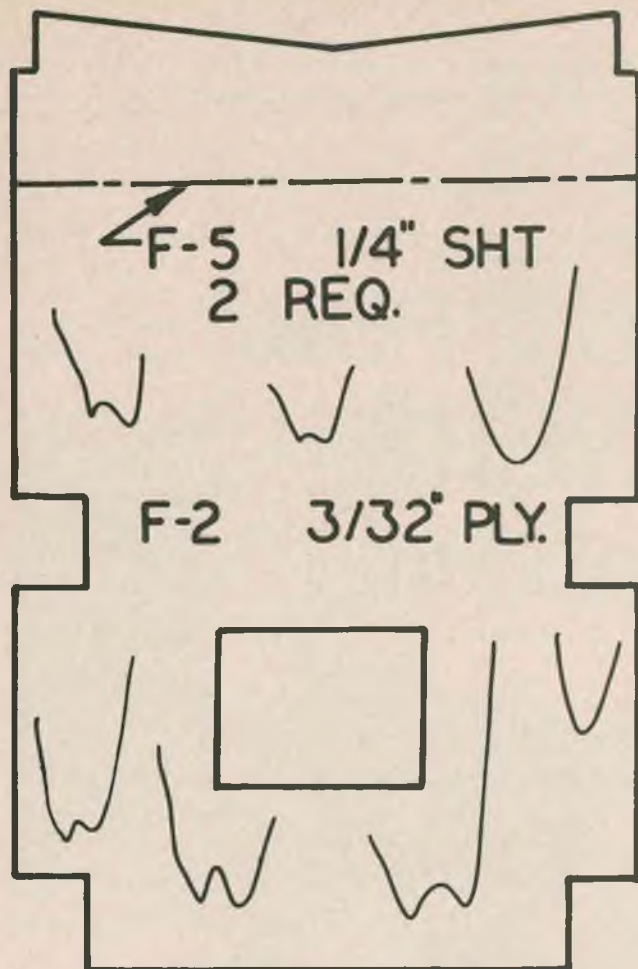
(Continued on page 29)

THE NOVA

SPECIFICATIONS

SPAN:	58"
AREA:	456 SQ. IN.
LENGTH:	34"
CHANNELS:	1 to 8
CONTROLS:	RM REM REMT
CLASS:	I, II
ENGINE:	.15 — .23
THRUST	2° DOWN 2° RIGHT
INCIDENCE:	
STAB	0°
WING	+3°





NOVA FULL SIZE

Starting this month, a three-part series for beginners, written exclusively for RCM by Ken Willard—one of the world's best-known and widely respected authorities on radio control.

BLUEPRINT FOR BEGINNERS

BY KEN WILLARD

● There's one thing certain about advice to beginners in radio control — there's no shortage of it! The beginner's real problem is to figure out what advice to follow — big plane, little plane, multi or single channel, escapements or servos, proportional or reeds, etc. Every system has its disciples. In fact, if you are a beginner, the terms I've just used are largely unintelligible gibberish, except that you may have overheard them in use at a flying session where you, as a spectator, decided to try this fascinating sport.

However, it is important right at the start to identify the type of beginner, since RC model airplanes attract such widely dissimilar types of enthusiasts.

The prime source for RC beginners is the model airplane hobby itself, since many free flight modelers and control line modelers switch over to RC. But these modelers have one big advantage — they are beginners only insofar as RC is concerned. They know how to build, cover, and finish a model. In addition, they have a knowledge of balancing and trimming models for flight.

Another source for newcomers is the radio ham. He knows the electronic aspects, but has to learn the techniques of model construction and flying.

Finally, there is the true newcomer. Oh, perhaps many years ago, as a kid, you built a couple of free flight models, but for all intents and purposes you have forgotten most of what you learned. But, now that you have seen what is being done in RC, you're interested in starting up, and wondering what is the best way to go about it. You ask ten people and get ten answers: "Start with rudder only." "Get a big airplane kit — big airplanes are easier to fly than those little ones." "Get multi-channel equipment and use as many channels as you need. Then you won't



have a useless single channel rig on hand when you go into multi flying." "Escapements are crude — use servos." "Pulse is best." And so on.

Now let's analyze the true beginner's dilemma. We'll bear in mind you're not a free flight or control line convert, and assume you know little or nothing about electronics. One thing is certain — you're going to bust up your airplane sooner or later. The less painful it is — both to your enthusiasm and

C & S Electronics Falcon transmitter and Pulsi-Tran proportional pulser.



C & S Electronics CS-505A dual output receiver with "sensimatic" circuitry.

your pocketbook, the more likely you will recover from this disappointment and go on with the hobby. Therefore, the first airplane should be relatively rugged — and easily repaired. It also should be inexpensive and easy to build. And, of course, it must be easy to fly. We'll consider the airplane in more detail later on.

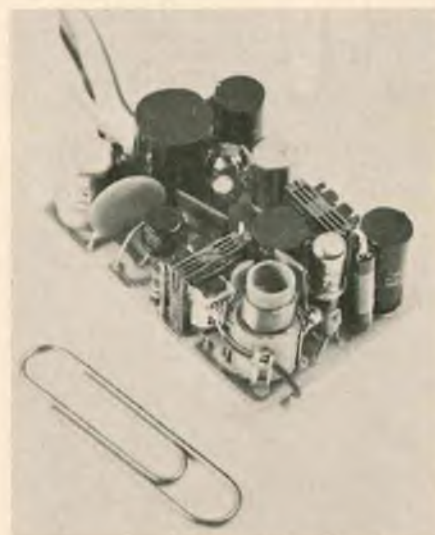
Right now, let's discuss the pros and cons of various types of radio equipment for beginners. Before narrowing down to any single recommendations, though, this qualifying observation is in order: If you are fortunate enough to be able to afford the more sophisticated equipment with ten or twelve channels, or simultaneous proportional, and can get experienced help in building the model, installing and checking out the equipment, and then be given dual instruction until you are ready to solo, there is no reason why you shouldn't go this route. But this is the exception rather than the rule. The simplest possible rig which can be bought and installed — that's best. And that is "single channel."

So what is single channel equipment? If I tried to give you an accurate technical definition, every electronic genius this side of the Iron Curtain would dispute me — and rightly so. Therefore, here's a non-technical definition: single channel radio has a transmitter which sends out a signal when you press the button. It can only send out one signal, and when this signal is received by the receiver in the airplane, it "closes a switch" between the batteries and an "actuator" (the latter being either an "escapement" or a "servo"), then operates the control surface to which it is linked — usually the rudder.

An escapement is similar to the escapement movement on a clock, hence the name. It is powered by a rubber loop instead of a clock spring. Basically, when the radio signal closes the circuit between the escapement and its batteries, the coil of wire in the escapement makes the inside core of the coil into a magnet which "pulls in" the metal rocker type device called an armature. This in turn permits the mechanism to "escape" from its normal neutral position, and the rubber band "spring" makes the escapement turn to the first stop, where it will remain until the radio signal goes off. Then the escapement returns to neutral. Now, some escapements, called "simple," or "bang-bang," have two neutral positions. One is followed by right rudder when the signal actuates the escapement; when the signal goes off, the escapement progresses to the second neutral position, and this in turn is followed by left rudder. With this type of escapement you must remember

(Continued on page 31)

Otarion Electronics Ot-31 all-transistor transmitter.



Otarion 0-22 single channel receiver.

TORERO

SPECIFICATIONS

SPAN:	70"
AREA:	914 SQ. IN.
LENGTH:	48"
WEIGHT:	7 LBS.
CHANNELS:	8 — 10
CONTROLS:	REMT REMAT
CLASS:	II, III
ENGINE:	.45 — .56
THRUST	0° DOWN 0° RIGHT
INCIDENCE:	
STAB	0°
WING	0°

BY WILLIE SMITH

Full Size Timely Plan Available

● When a man bites a dog — that's news! When I try to write something, that's new! In other words, writing for me is a chore and somehow beyond my mental capacity. (Ed's note: You too, Willie?).

Almost as bad as choosing a name for your favorite "toy" — which is even worse than choosing a name for your kids. At least with the kids you have a wife to say no! After devoting considerable time and thought to a name, I finally turned to serious research and grabbed the first one I heard mentioned. By the time I had convinced myself it was original, lo-and-behold, I saw the same name on a new ship in a hobby magazine. The only alternative left was to use the second name I heard, and that is how we came up with the name "Torero," which means "the bull fighter." Since fighting bulls is, in my opinion, almost as stupid as flying radio airplanes, I just couldn't let it pass by!

I'm not an expert with models, and don't pretend to be (unless you ask me), but nevertheless, will comment on a few of the models I have flown. Each had many good features to recommend them, but also lacked a few traits I personally desired in a model. I rumbled through many kits trying to find what I wanted, but there were none that had seven and a half pounds total weight printed on the box! Once I did build a kit that weighed less than seven and a half pounds — it was designed by some big handsome Eastern fellow who I later heard was some sort of champion. This one was just too fast for me — the ship seemed to be at least half a maneuver ahead—but could it outside loop! During this period there was all kinds of talk about how silly the West Coast boys were building ships with thin wings. I can only guess that this big handsome fellow wanted to find out once and for all whether the Western boys knew what they were talking about or not, so he tried a thick wing. But 19%! Oh well, I heard he was an even bigger champion with that one — think what he could do with a 50% section!

After being an omniscient observer (?) for some time, and begging to fly different ships, a brilliant idea struck home. Why not combine the things I liked about these other ships and see if I could make one fly. First of all, I knew I had to have something that would fly at seven pounds. Since I can't normally make anything come out less than seven and a half, I was obviously shooting for a light one! I guessed I

should have a larger wing, and this posed a serious problem — should it be longer or wider? (To me, a chord is some kind of obsolete musical expression.) Knowing nothing about wings, I tried a little of each. The best way to get a wing 13" wide is to stretch a 12" wing an inch. Which is exactly what I did. That took care of the wing. (See how easy it is? All you need is a good set of plans to alter!)

Clarence Lee once told me that my engine wouldn't idle because my fuel tank was too high. I just had to design the proper level, so with extreme mathematical precision, asked Clarence how high it should be. The nose of the Torero was then drawn around the fuel tank. (This design work is a snap, if you ask me!).

Another design requirement was to have a ship that would take most any kind of radio and battery pack, so this meant a large fuselage. (You never know from one minute to the other what kind of second hand equipment you might have a chance to buy!). The air scoop under the nose makes for more battery room and also makes an excellent oil drain. It was surprising to find out that even a little air came through, with the updraft helping to keep the oil out of the fuel requirement.

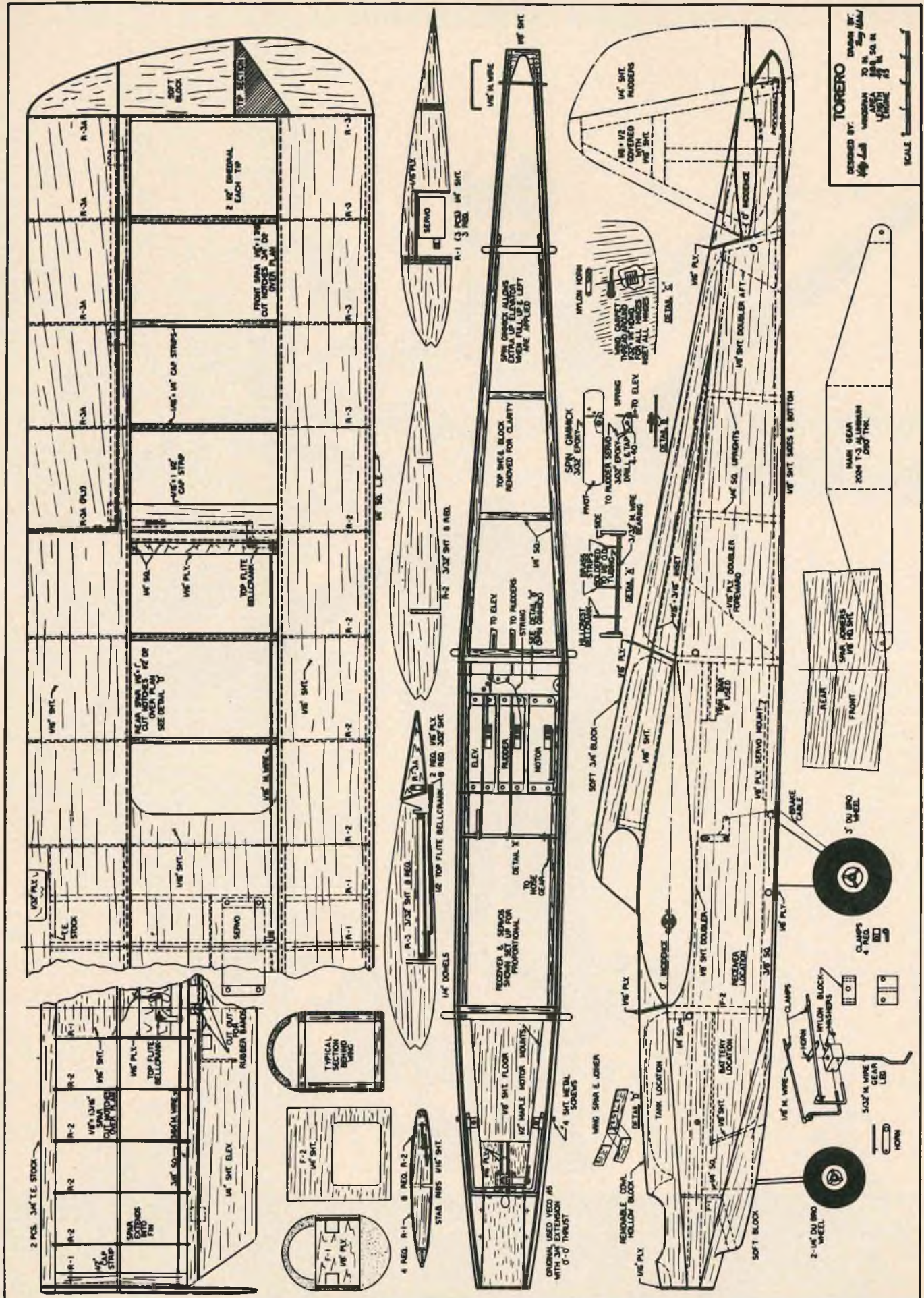
A further pre-requisite was a ship with no loss of control at very low speeds, and with no tendency to snap roll. I wasn't sure just where to copy these ideas so was forced by necessity to try some ideas of my own. (What a revolting development that was!). A real scientific approach was used to cope with this aerodynamic problem. I guessed. Boy! Did I make out! I flew at a contest in Fresno that had a snap roll in their pattern, and try as a might I couldn't do one! And about that slow speed control — I have witnesses to prove that Jack Byers stopped his Torero in mid-air and took off again, needless to say, with no loss of control. For spot landings you simply throttle down to a stop over the spot, then settle down on it like a helicopter . . .

About this time a few of the boys were flying the new proportional gear, and I was really envious of their smooth elevator action. Not being able to stand it any longer, I decided to do something about it. Not knowing how to design a stab and elevator to give the desired results, I figured to alter some existing stab. Having heard at some time or another that tip plates

(Continued on page 39)



WILLIE SMITH





by D. D. FOSS

SPACE CONTROL MODIFICATION

● Do you find your Space Control receiver too large and prone to damage? Here is a modification which reduces the length from $7\frac{5}{8}$ inches to 5 inches, the width from $3\frac{1}{4}$ inches to 3 inches, and the overall volume including servos by more than 18 cubic inches. The overall height and weight remain the same, and the servos are mounted on $\frac{1}{8}$ inch thick hard aluminum, which affords excellent protection for the circuit board and forms the top and ends of the case. The main advantage is that it is now virtually impossible to damage the circuit board—which was so vulnerable to cracking when the servos were thrown forward in a crash. It also removes the possibility of the aluminum shafts of the servos being bent in a crash, as the receiver is packed in styrofoam. From a weight standpoint, it allows much more of the receiver to be placed ahead of the CG of the aircraft. All wiring is inside the case—however, the servos and circuitry can be completely removed for servicing in a matter of seconds. Finally, the whole operation can be accomplished by the average modeler

—who needs to know nothing about electronics.

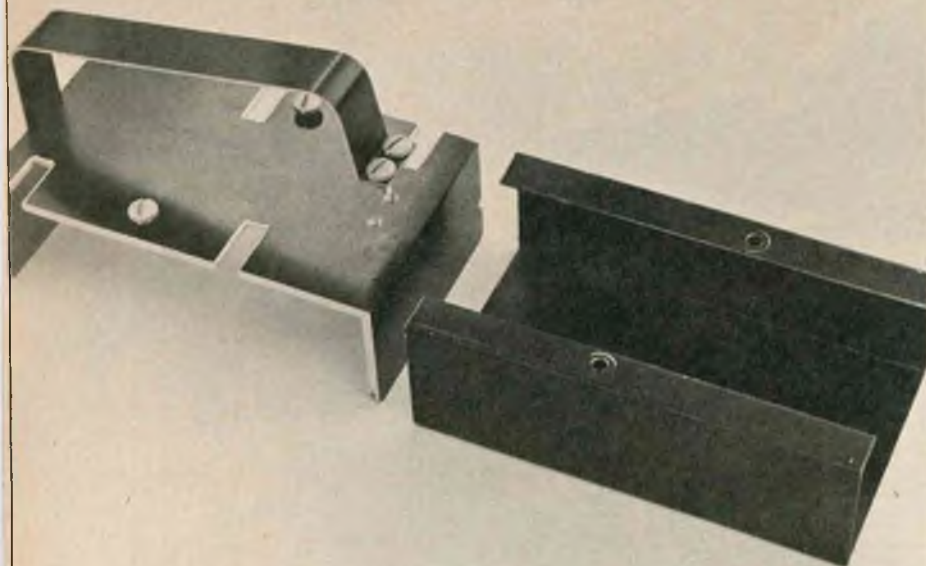
As far as construction is concerned, it is suggested that the case be made first. The materials are very easy to obtain from almost any aluminum fabricator's shop. The case is $2\frac{7}{8}$ inches wide and is cut from a piece of 5 inch by $1\frac{3}{4}$ inch standard 50 S aluminum rectangular tubing, with $\frac{1}{8}$ inch wall thickness. The top is then cut off this piece, leaving a channel whose outside dimensions are $1\frac{1}{2}$ inches high by 5 inches long and $2\frac{7}{8}$ inches wide. It is a simple matter to cut the slots in from the edge of the case. (See sketch).

The edges of these slots should be well rounded so they will not cut into the wires to the servos. The cover of the case is made from No. 3 anodizing quality 18 gauge aluminum sheet. The cover slides on over the end of the case and is held in place by $\frac{1}{2}$ inch flanges, which also cover the slots, so that the wires to the servos are barely visible. Two screws were put through these flanges into the case to prevent the cover from sliding. (See photo). One would

have been enough, and its position is immaterial.

Now form the $\frac{3}{4}$ inch wide aluminum strap over the servos, using the same sheet material as for the cover. It was found the best way was to sand a block of wood to the same contour as the three servos, in their correct positions. Then after forming a right angle bend in the strap, $\frac{3}{8}$ inches from one end and starting from this end, bend the strap over the top of the wooden block. The strap can then be riveted to the end of the case, taking care to leave about $\frac{1}{8}$ inch clearance, so that it can be tightened down onto the servos with two screws. (See photo). This completes the case except for drilling and tapping the holes for the strap tightening screws. These are not shown on our sketch, as their position will vary slightly from one assembly to another, and must be positioned at the time of construction.

At this stage, a new terminal board must be prepared. (See sketch). This terminal board replaces the wiring which will be cut off when the existing board is trimmed. As a double check, it is



suggested you study your own circuit board and cross check it with that portion of the circuit board shown in the sketch. These should be the same. Take printed circuit board stock and cut the terminal board $4\frac{3}{8}$ inches long by $1\frac{1}{2}$ inches wide. Make nine straight terminals on it, equally spaced, each $\frac{1}{8}$ inch wide, to which the wires from the servos, power pack, and receiver can be joined at the appropriate spots. It might be found easier to cut the "lands" with a sharp knife, instead of etching. Before soldering these wires to the terminal board, drill holes in the board and bring the wires in from the back. This will give more strength to each joint and will greatly facilitate your holding the wires in place while soldering.

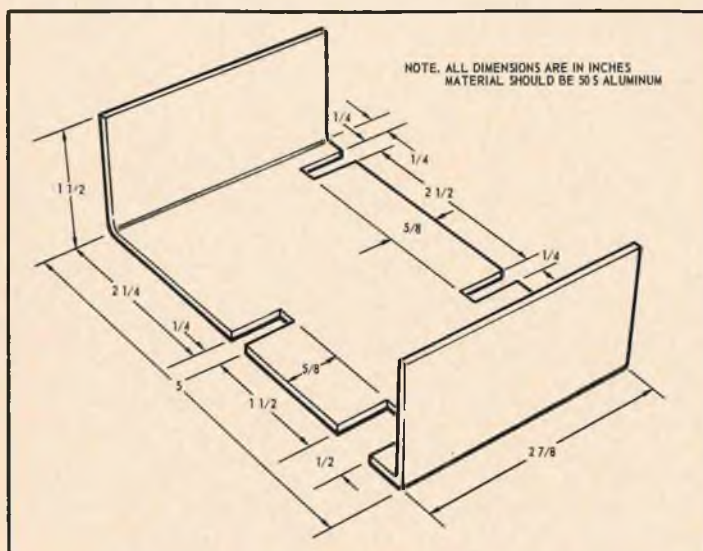
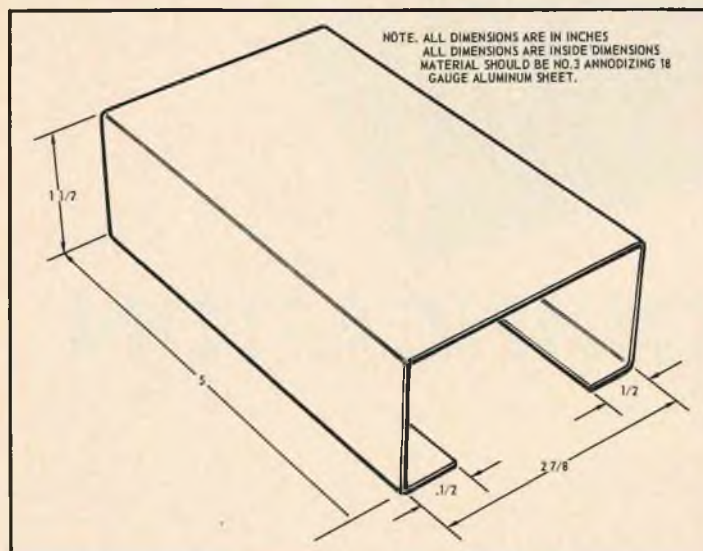
The wires and plugs for the aileron-servo and power pack can now be cut from the existing circuit board and soldered to the new terminal board. Note that the purple wire from the power pack is soldered to the red wire terminal. Care should be taken to make the wires from the servos exactly the right length—that is, long enough to allow the servos to be removed from the case, and short enough so that the wires do not have to fold inside the case. To do this, place the servos in position on the case and bend the lead-in wires through their respective slots in the case, up under the terminal board and through the correct holes ready for soldering in position. Before soldering, however, recheck that these wires are just long enough to allow the servos to be removed; then solder. The seven wires to go to the receiver should be kept in their corresponding colors, that is, one blue for each of the four servos, and one red, one orange, and one green. They can now be soldered to the terminal board. (See sketch).

At the rudder-servo end of the receiver circuit board, note that the wires coming out of two large capacitors on the back of the board will be cut when the board is cut, unless they are moved. Both these wires must be unsoldered and resoldered to the same "land" nearer the center of the board. (See Diagram). Holes will have to be drilled to do this.

The circuit board can now be cut. (See sketch). Care must be taken to make the saw cuts to the outer sides of the dotted lines, so that they can be trimmed right down to the lines with sand paper.

Care must also be taken when these cuts are being made, as the circuit board cannot be secured in a vice. It must therefore be hand-held very securely, preferably by another person.

(Continued on page 41)





RCM INTERVIEW: HARRY SAMPEY

EDITOR'S NOTE: *This month's interview is with 33-year old Harry Sampey, RC modeler, manufacturer, and amateur radio operator. In less than a year as a manufacturer, "the man from Florida" has seen his 404 proportional equipment set a new world's altitude record and win the coveted 1963 Nationals.*

Q. Harry, we'll start with the usual question—how long have you been a modeler?

A. Like everybody else, Don, I have been a modeler for most of my life—starting back about twenty years ago with some rubber powered jobs that were sold during the war years. Later, I ran into someone who flew model airplanes on wires, so I did the same up and down the East Coast for several years. Somehow or other, I just couldn't cope with the idea of wires—winning a few meets and losing most!

Q. Your proportional equipment has established some enviable records—what is your own background in radio and electronics?

A. I guess my own biggest interest has always been in the field of radio. My father owned a big automotive garage in those days, and being the oldest boy, I was presented with an old Ford spark

coil. After the first hundred electrical shocks I was jolted from then on into electronics, obtaining my ham ticket during high school. The war was still with us when I went into the Air Force in 1947. I had always wanted to fly, or perhaps I just wanted to show the home folks that I was old enough to smoke! For three years I advanced my studies in electronics and aviation. Right after my discharge someone in Korea said "war," so back I went with the reserves. Following the Korean bit, and toward the end of 1953, I gave up modeling and full-scale aviation and headed straight into electronics full blast. I was in and out of schools like a yo-yo, and finally in my own business of television communications. I filed my first electronics patent in 1955, followed by several others, and as the years went by my education and experience increased until I went with the rocket industry. That was back during the days of the Viking and Vanguard birds.

Q. It would seem, Harry, that the field of missile engineering and radio controlled model aircraft are somewhat distant cousins. How did you get into RC?

A. A little over three years ago, while working at Cape Canaveral as an engi-

neer in charge of tracking, I found a need for a small DC motor which couldn't be located. Deciding one day to look in a local hobby shop, I became involved in a conversation with some local radio control boys. Before the night was over they sort of clued me in as to what was what in RC. At first it seemed these fellows were way outdated flying reeds in comparison to the remote control methods used at the Cape. It I knew then what I know now I probably would have stayed away from modeling, for the next two years of my life were spent in trying to design a remote control system for model airplanes with the same caliber of operation as used in missile guidance! For weeks and months the lights didn't go out until after midnight, and then came the day! The design was complete. It worked on the bench so it would have to work in the air! Besides that, the best test equipment in the world has checked it out, so into the airplane it went—full house proportional control!

Q. So don't leave us in suspense—what happened?

A. Needless to say I had never flown a remote controlled airplane before! The engine was started and away it went.

(Continued on page 26)



FLYIN

'BIG BREATHLESS' AT SMITHSONIAN

Just recently received from the Smithsonian were the photographs of **Ken Willard's** presentation of his world record holding model to the Institute. Ken's six-foot, three-and-a-half pound (seven pounds with fuel) 'Big Breathless', held the world endurance mark of five hours and twenty-nine minutes from April 1958 to December 1962, and was presented to the Washington Institute during the DCRC Symposium last summer. An interesting footnote is that Ken brought the plane down after the five hour twenty-nine minute mark for fear of exceeding the battery limitations. It was discovered, that the model (and batteries) might well have lasted well beyond this mark!

GIZMICKS

Several months ago we were able to obtain a few lengths of cedar arrow stock which, we found, were far better suited for pushrod and torque rod construction than any other material we had used previously. These arrow shafts are not only light weight, but are perfectly straight and true and extremely strong. **Al Thompson**, RCM Mechanical Editor, located a source of supply for this material—an archery company that will mail six or more 31½", lengths of cedar arrow stock anywhere in the United States. These shafts are available in diameters of 9/32", 11/32", and 5/16". Price is two dollars a dozen plus postage. We suggest you write Kittredge Archery Company, 1421 Mission Street, South Pasadena, California.

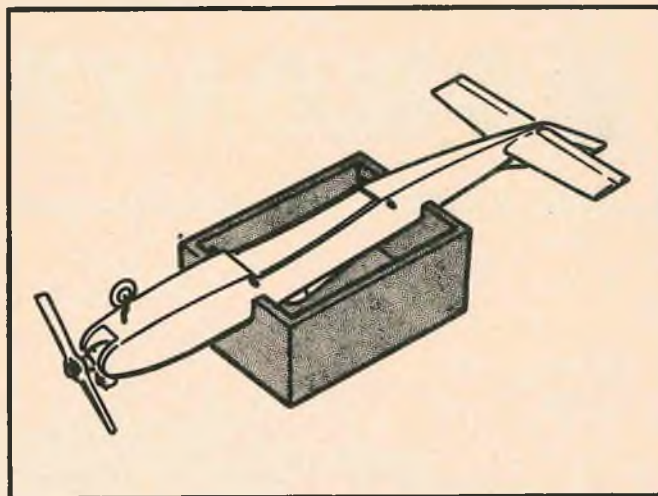


GIZMICKS
CONTEST DATA
CLUB NEWS



Upper left: Beautiful scale twin from British Nationals. Left: Scale Macchi 202. K & B .45, F & M 10 channel. 7 pounds.

Above: Ken Willard and Big Breathless. Photo by Smithsonian Institute.



Above: Great Britain's Geff Franklin and Pylon Duster. Aileron and elevator. Cox .15. Below, right: Geff's Astro Bipe.



A clever way to dress up a model around the walls of the motor mounts, as well as keeping fuel from weakening the glue joints, was submitted by Russell Whiting of Rochester, Minnesota. Russ obtains used offset lithography plates from a local printer and cuts pieces from the light weight aluminum plates to fit the specific areas. We contacted an offset printer and discovered these plates come in various thicknesses from foil to light plate, and are usually discarded after use. Since they are extremely light and glue well with normal model or contact cements, some enterprising experimentation might produce an all-metal rudder only ship in the quarter-A size!

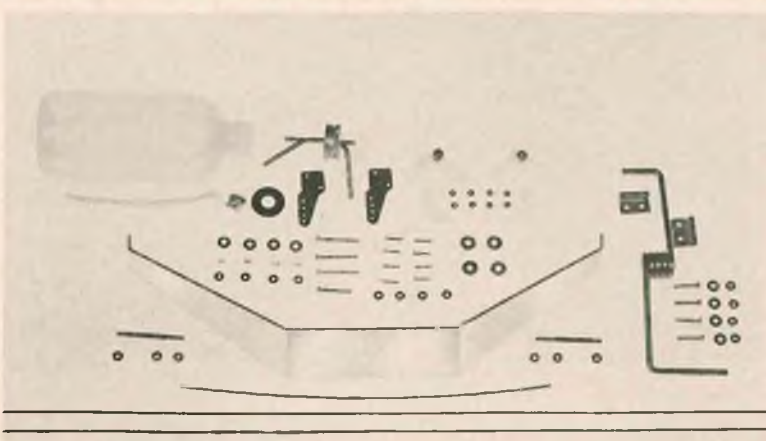
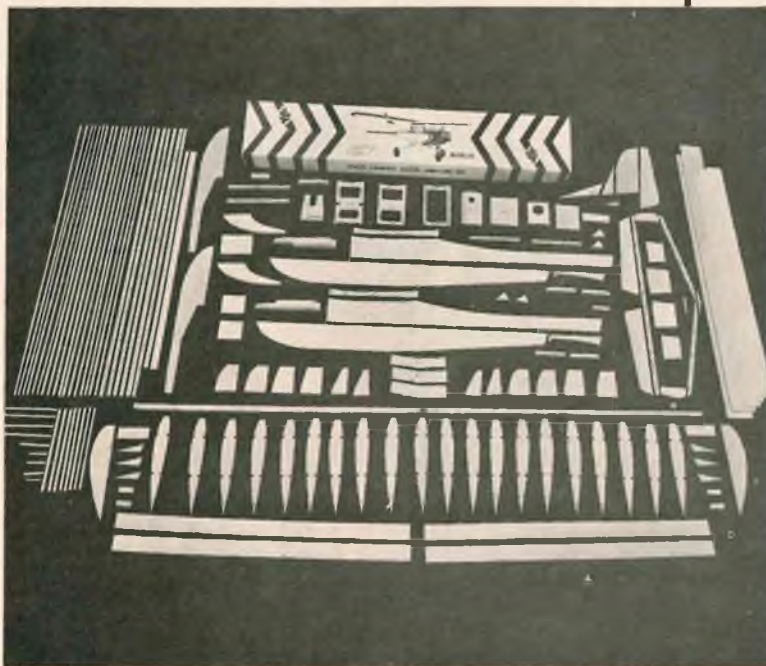
For safe transportation of models and easy access to the radio compartment of low wing multi's, **Dan Stevens**, Charlotte, N.C., suggests the method shown in Fig. 2. An inexpensive (\$1 to \$2) styrofoam ice chest, available at most variety and department stores, provides the answer. The styrofoam is soft and the ends can be cut to a custom fit for your particular model. In addition, some of the larger chests can double as a field box, with ample room for transmitter,

(Continued on page 37)

UPPER ORDINATE				LOWER ORDINATE			
Station	2415	2418	2421	Station	2415	2418	22421
0	-----	-----	-----	0	-----	-----	-----
1.25	2.71	3.28	3.87	1.25	2.06	2.45	2.82
2.50	3.71	4.45	5.21	2.50	2.86	3.44	4.02
5.00	5.07	6.03	7.00	5.00	3.84	4.68	5.51
7.50	6.06	7.17	8.29	7.50	4.47	5.48	6.48
10.00	6.83	8.05	9.28	10.00	4.90	6.03	7.18
15.00	7.97	9.34	10.70	15.00	5.42	6.74	8.05
20.00	8.70	10.15	11.59	20.00	5.66	7.09	8.52
25.00	9.17	10.65	12.15	25.00	5.70	7.18	8.67
30.00	9.38	10.88	12.38	30.00	5.62	7.12	8.62
40.00	9.25	10.71	12.16	40.00	5.25	6.71	8.16
50.00	8.57	9.89	11.22	50.00	4.67	5.99	7.31
60.00	7.50	8.65	9.79	60.00	3.90	5.04	6.17
70.00	6.10	7.02	7.94	70.00	3.05	3.97	4.87
80.00	4.41	5.08	5.74	80.00	2.15	2.80	3.44
90.00	2.45	2.81	3.18	90.00	1.17	1.53	1.88
95.00	1.34	1.55	1.76	95.00	0.68	0.87	1.06
100.00	(0.16)	(0.19)	(0.22)	100.00	(0.16)	(0.19)	(0.22)
2415 Leading Edge Radius.....	2.48	Slope of R. thru L.E.....		0.10			
2418 Leading Edge Radius.....	3.56	Slope of R. thru L.E.....		0.10			
2421 Leading Edge Radius.....	4.85	Slope of R. thru L.E.....		0.10			

SHOWCASE '63

An exciting
display of new products
for your 1963
Christmas Gift Selection.



● For some reason, this has turned out to be the month for new kits with quite a few RC ships making their debut. In answer to the many requests for information concerning a **Flat-Top Stormer** kit, we are pleased to announce that **R & D Model Products**, Camarillo, Calif., is kitting this model with an exceptionally well made fiberglass fuselage. All formers are in place and motor mounts are pre-installed to specifications for your individual motor. All parts for wing, stab, and fin are included and pre-cut to shape from top grade balsa. Price is \$29.95. R & D is also fabricating a **fiberglass Taurus fuselage** for use with your Taurus wing or a Top Flite Taurus wing kit. Fuselage and plans only, \$19.95. RCM has examined both kits and find them to be excellent. For information on either item, **circle #1 on Reader Service Card.**

One of the newest innovations in the kit field is the R/C Pylon **Duck Hawk**

One of five new top-quality kits from Royal Products, the Regulus is an excellent multi trainer. Circle #16 on Reader Service Card.



Exceptional battery value from Polk's Hobbies.



A must for scale enthusiasts From Timely Plans

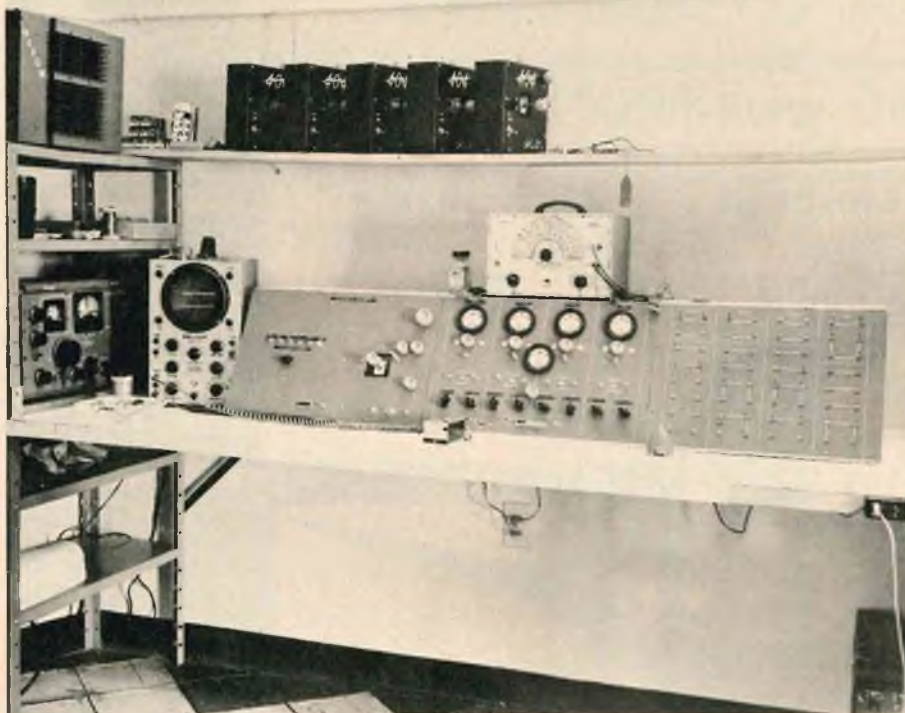


from **Williams Brothers**, Bell, California. After seeing the prototype at the '63 Nationals, we've been waiting for this one! The complete (and we mean complete!) kit includes sixteen high impact plastic wing ribs plus tips, high impact plastic engine mounts, formers, nose shells and turtle back, plus all necessary nylon bellcranks and accessories, nylon parabolic spinner, 2 1/4" smooth contour wheels, formed metal landing gear, formed canopy, plastic racing pilot, and selected balsa wood. Designed for 4-6 channels, the Duck Hawk has a 54" span and 576 square inches of area, 40" length, and takes a .15 to .19 mill. To the best of our knowledge, this is the first such combination of wood and high impact plastic, and seems to be the answer to quick assembly plus a strength factor heretofore unknown in the conventional all wood models. Price, \$27.95. For free brochure on the Williams Brothers line of quality products, **circle #2 on Reader Service Card.**

In the form of a pre-announcement is **Len Purdy's Jubilee**, available on or about January 15th. The Jubilee is complete when purchased, ready to fly except for gear installation, and constructed entirely of Air-O-Sheet, an entirely new concept in model material. The Jubilee may well be the answer to a ready-to-fly contest caliber multi ship. When available, RCM will present an exclusive review of this new model. In the meantime, for further information, **circle #3 on the Reader Service Card.**

(Continued on page 40)

Williams Brothers Duck Hawk. Pylon Racer for .15-.19 mills.



A special discriminator test console for alignment of Harry's 404 receivers. Reduces time from four hours to fifteen minutes.

RCM INTERVIEW

(Continued from page 19)

Up, left, and down. Thirty seconds later the flight was over and no airplane. Three months later we were ready to go again. Only *this* time and old TTPW pilot would test fly it. She flew fine until the Florida sun got to it. For the next year we redesigned, modified, and flew continuously. By this time, half a dozen other systems were flying successfully. It was during this period that Don Steeb was called into the game to supply a reliable servo system that would work with our servo amplifier. After several months of sending servos back and forth we came up with an excellent proportional servo. To this day I have never met Don Steeb although I feel I have known him for years.

Q. When did you actually start to manufacture the Sampey 404 system?

A. After investigating the hobby market to determine just what could be required in manufacturing such a system, we entered business in October 1st of 1962 with the 404. It didn't take long to learn that many of the RC modelers were a little shy of new manufacturers. Every effort was made to equal a precedent that had been established by other concerns. It was also evident that our company needed some type of recognition, and with the help and good old football spirit of our employees we

were successful in building the business to its present state. There were times, however...

With suggestions from many, many customers such as Jim Kirkland and Maynard Hill, the whole effort became a team effort.

Q. Just where did the name "404" come from, Harry?

A. Many people have asked that question. Ron Chidgey said it was the profit we made from each sale! Actually, it was our fourth completely redesigned system, and needing a name we just chose 404.

Q. One last question, Harry, and a hard one—what do you see for the future of radio control?

A. This would be difficult for me to define, since the sky is the limit. I can tell you some of the things we are currently developing. First, we must solve one of the biggest problems of proportional control, and that is re-educating the old modelers about this new type of control system. Truthfully, a properly produced proportional system is much more reliable than reed type systems. In addition, many proportional systems will lend themselves well to many, many additions of extra controls and functions. For example, pre-programming conditions can be manually placed into the operation, such as flaps, landing gear operation, pre-set control surface positions, etc. One of the biggest advantages

is that with the continuing development of transistors it will not be long before autopilot accessories can be added. We have about ready for prototype production a program guidance system that can be attached to our present model 404 transmitter that will permit the modeler to actually press a button and automatically acquire many of his maneuvers—completely true in performance! As a follow-up to this system we are working on a completely closed-loop type of guidance that will provide true axial performance from the aircraft. Extensive testing is also being done on servo systems that operate on totally different principles than those currently used.

There is no limit to man's imagination, Don, and to what he can do as a result of it. If a need exists, man will find the answer.



Marti—and how lucky can you get, Harry?

● Our first column produced a letter that, to say the least, demands an answer. It will not be our practice to reprint letters from readers within the individual departments, but this one will be an exception. We have obtained permission to reprint it in its entirety:

Dear Mr. Justin:

I've just read your column, Solo, in the first issue of R/C Modeler. I am impressed by your logical thinking regarding the novice RC'er, and I'm wondering if you'd help me; I'm a rank novice to radio control. In fact, I'm trying to get started! But my circumstances are a little different than most, and I'm having more than a little trouble.

To begin with, I belong to no RC club, so have no access to the "expert advice" everyone tells me to seek—thus I come to you. I've read model magazines until I'm blue in the face—one contradicts the other! I've asked acquaintances from hobby shops for advice, and found that the primary interest is profit, not help to the sucker! For instance, one man whom I thought of almost as a close friend, told me during a discussion while buying a U-control to build for my son, that when I went into R/C, and as long as I was starting from scratch and didn't have any money invested in equipment, to get "proportional" equipment right off—it would be cheaper in the long run. He said that reeds would be around for some years yet, but it would be like buying a horse for transportation when the automobile was here to stay!

I agree—and from your article I get the idea that you think so, too. But when I got enough money to start and went back to get more information on this type of rig, the story had changed completely! It was expensive—too expensive for anyone who didn't know beans about R/C—I should get reeds, 10 channel transmitter and receiver, multi servos, plugs, etc.—the works! I reminded him of the previous info he'd given me, but he "conveniently" didn't remember—no, the right thing was reeds. So I started buying servos and now have three. Last week I found out that he flies proportional himself, but buys ten channel kits, builds them, then sells them for factory assembled price!

I've heard much about the experienced RC'er always wanting to help the amateur get started, but it would seem that the only help he can expect is to get "taken." Another man tried to sell me single channel and all the trimmings—said that later I could get 6 channel, then 10 channel. Start with small engines, then get intermediate sizes, then large. Nuts! I made that mistake when

we got started in U-control some 8 or 9 years ago—Now, I believe, we have seven ukie engines and only use one! And an equal number of fuel tanks of all sizes and types!

Through these years, my son and I flew ukies, and had many an enjoyable hour together, for which I'm grateful now, regardless of cost. But I could still work then, and while errors are costly, I was making money enough to go back and do it over better on the second try. Now my son is in the Navy, and I've become completely disabled, due to an incurable disease, and couldn't fly a ukie if I wanted to! Finishing the "last one", a Cougar, for my boy to fly when he's home on liberty—he still loves 'em! But radio control I *could* still handle. I love flying, too—was a pilot for a time when I was younger—hence the interest in radio control.

I recently met an Air Force pilot who flies radio control on his own time. (Like the bus driver who rides the bus on his day off!). I'm retired Army, and we got to joshing about the service, and eventually to talking about RC. He, too, flies proportional, and told me I was throwing my money away on reeds—get proportional right off—that by the time I got all the stuff it would cost just as much as proportional, and all I'd have would be a "dead horse!" His reasoning was that a proportional rig was complete for the price, whereas reed stuff was all bought separately—receiver, servos, batteries, charger, etc., plus the obvious advantage of having fully proportional control. This follows the line of reasoning of the first man with the first story, and I must admit makes the most sense to me, too! The Air Force flier says all the wiring is completed—no chance for amateur error—just hook up the control surfaces and take off—no individual servos and plugs to solder, no servo board to set up, just a "gold brick" to batten down at the C.G.

You say in your article that the Taurus is a good airplane for a good flier, and yet one of the best for a novice. I wanted a Taurus, but the hobby boys insisted on a high wing monoplane, then maybe later a Taurus — more doubling! They *know* that TIME is a factor with me—dying by inches. The doctors can't cure it, they can only stretch it out as long as possible. But that almighty buck is what seems to count most! If I sound a little bitter, it's because I'm beginning to look with a jaundiced eye at the altruism of the "experienced R/C'ers willingness to help the newcomer." But I see now that I've only been able to contact the fellow

(Continued on page 44)

SOLO

by Frank Justin

TACH TALK

COX .049

● The recent introduction of the Cox precision throttle control for their Medallion series engines (.049, .09, .15), filled a definite void in reliable motor positioning for the smaller size mills. Since their original debut in the modeling field, the Cox Tee Dee and Medallion engines have set unqualified records of excellence in quality, workmanship, and performance. The new throttle control unit is no exception.

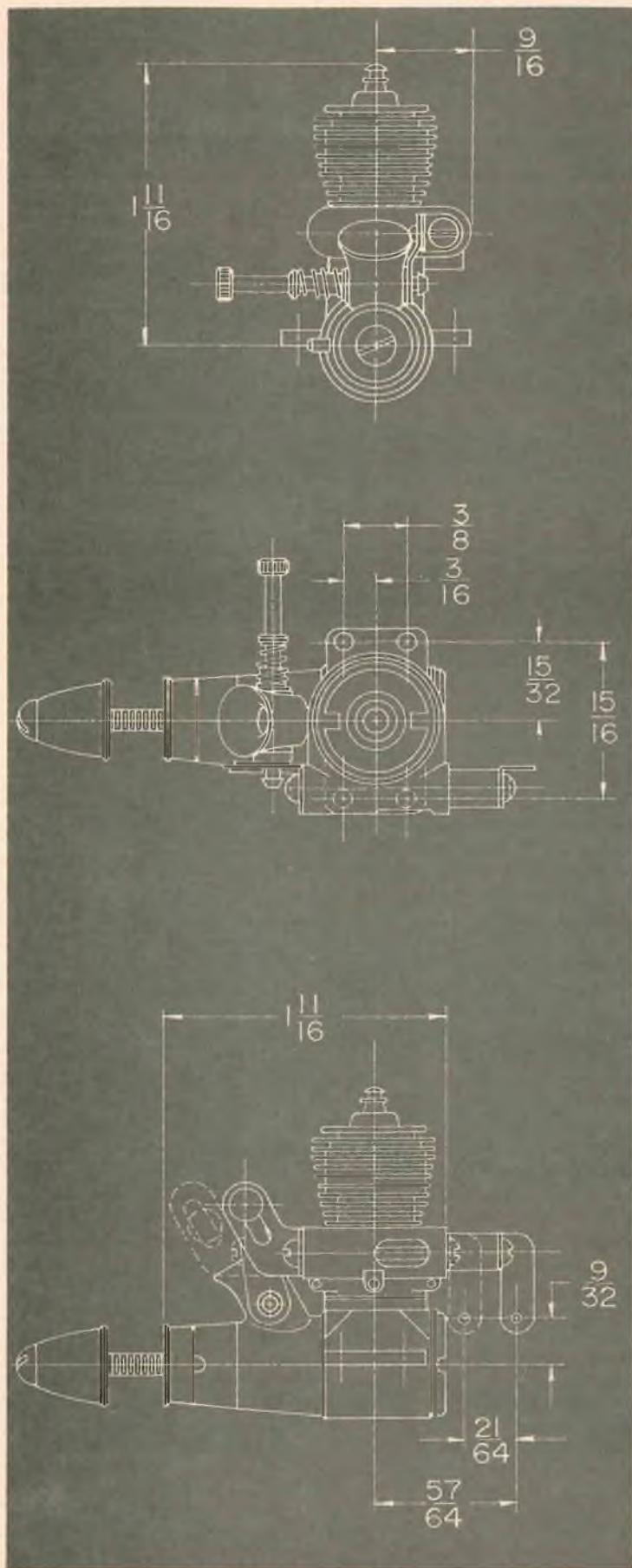
For our tests, we obtained throttle control units for all three sizes from local hobby shop shelves, and all units have met or exceeded manufacturer's specifications. This test, however, is confined to the Medallion .049 R/C unit.

Throttle control unit #2450, designed for the Medallion .049 was assembled and installed in less than ten minutes. Very compact in size, the total weight of the engine with throttle was 1.7 ounces. The feature most immediately noticeable was the linear motion, coupled exhaust and intake linkage, which was completely friction free, allowing it to be operated by either servo or escapement. After operating the linkage a few times, the engine could be tilted forward with a resulting forward movement of the throttle linkage. This friction-free movement is of immense value when operating a throttle from an escapement in single channel installations.

The Cox Medallion was tested with and without throttle, using a 6/3 prop and Cox 'Red Can' fuel. There was no noticeable difference in top RPM with throttle installed. Peak RPM was 13,300 with an idle RPM of 1700. The engine two cycled throughout the entire range from low to peak, with instantaneous response to throttle positioning and absolutely no tendency to load up after prolonged periods of idling.

Three .010 washers are provided with the throttle system to adjust for optimum idle, and in our particular mill, one washer was required.

The Cox Medallion .049 lists for \$6.98 and the Throttle Control Unit for \$3.98. Displacement of the Medallion is 0.0499 cu. in., bore is 0.406 in., stroke 0.386 in. Manufactured by L. M. Cox Mfg. Co., Cox Center, Santa Ana, California.



THE NOVA

(Continued from page 9)

same time.

3. And, we found it had a very fast penetration rate into the wind, even on high motor, which is not found in most rudder only jobs.

Now the time had come to find out if a less experienced flyer could handle it as well. Again, Velma was chosen for this test. Having flown only a few times, she was a bit skeptical about trying out a new plane in such a breeze. But, this was the only way to find out if "anybody" could fly it! (Ed's note: That will get you in trouble, Meade!) We started the engine, and when she was ready, released the plane. Following a nice take-off, Velma executed the few basic maneuvers she knew, then brought the plane in for a smooth landing. She was excited and jubilant over the ease with which it could be flown. We packed the gear into the car and headed for home. We both felt we had a potential winner!

And so we did! That same weekend we entered the Nova in its first contest. Velma entered the "Buddy Event," (in which beginners are helped by an experienced flier), and I entered Open Rudder Only. All went well on Saturday, but on Sunday morning Velma informed me that since she had done well in the Buddy Event the day before she had also decided to enter the Open Rudder Only event! (Of course she was only doing this to beat me — then she would have something to hang over my head!) Anyway, this made three events the Nova was entered in that day. With both of us flying the same plane in two different categories, and with only ten minutes between flights, we found barely enough time to change an occasional broken prop, wipe off the excess grease, and fuel up the tank! In both days of competitive flying, the only damage was a few broken props and one blown tire! All this flying and very little damage pointed out that the Nova really was rugged and maintenance free!

That contest came to a happy close for both of us—not only had we proven that the plane could meet the remaining tests of an "ideal" model, but we walked off with three wins; Velma placing 2nd in the Buddy Event and typing for 3rd in Open Class I, and my own attempts rewarded with 1st place in Open Class I. We truly had a winner!

Since that first contest, the Nova has

placed 2nd in the Fresno Radio Modelers June Open, and two more wins in the West Coast Championships at Turlock during the last weekend in August. All this represents less than a year of contest workout for the same Nova, as well as many hours of weekend sport flying. At last we know we had a design that was built to take it, and one that was able to compete with the best of them!

Shown on the plans is an optional, hotter version with a clipped wing and stab. We used a Supre Tigre .23 and two servos in this version, but the plane flies equally well in its original size using any engine and equipment combination as shown on the plans. For Class I contest work we recommend the smaller, hotter version with either a .19 or .23 engine. The Nova has also been flown six channels — it is like flying rudder only, but when you want elevator for some of those more difficult maneuvers — there it is! It would also be a simple manner to add an additional servo for trim—there is ample room in the fuselage.

Enough said about what the plane will do for you. Now, let's sharpen the X-Acto's and get down to the easy task of building a dream of an RC plane . . .

Construction

Wing and Stabilizer

First, carefully select matched, medium grade balsa. Then, carefully make templates of the wing and stab rib patterns. Trace these on to 1/16" sheet as many times as required for the number of ribs needed, plus an additional two wing ribs of 1/4" stock. Be careful in cutting out the ribs and sanding will not be necessary. Pre-cut all leading and trailing edges, and spruce and balsa spars to the correct length. Select the sheeting material and cut to length. With this step completed, construction can begin.

The wing can be built in two ways: (1) in one piece on a Magna-Jig, adjusted to the correct dihedral, or (2) each wing panel built separately on a flat work surface. In either case the wing is built from the board up by the following method:

Pin the bottom sheeting in place on the plans, then glue the spruce and balsa spars directly to the sheeting at the correct locations. After the spars have dried enough to remain in place, continue by checking the spar positions in relation to the ribs. Place a rib at each end and one in the middle of each wing directly on to the spars, but do not glue these ribs in place. Re-pin the

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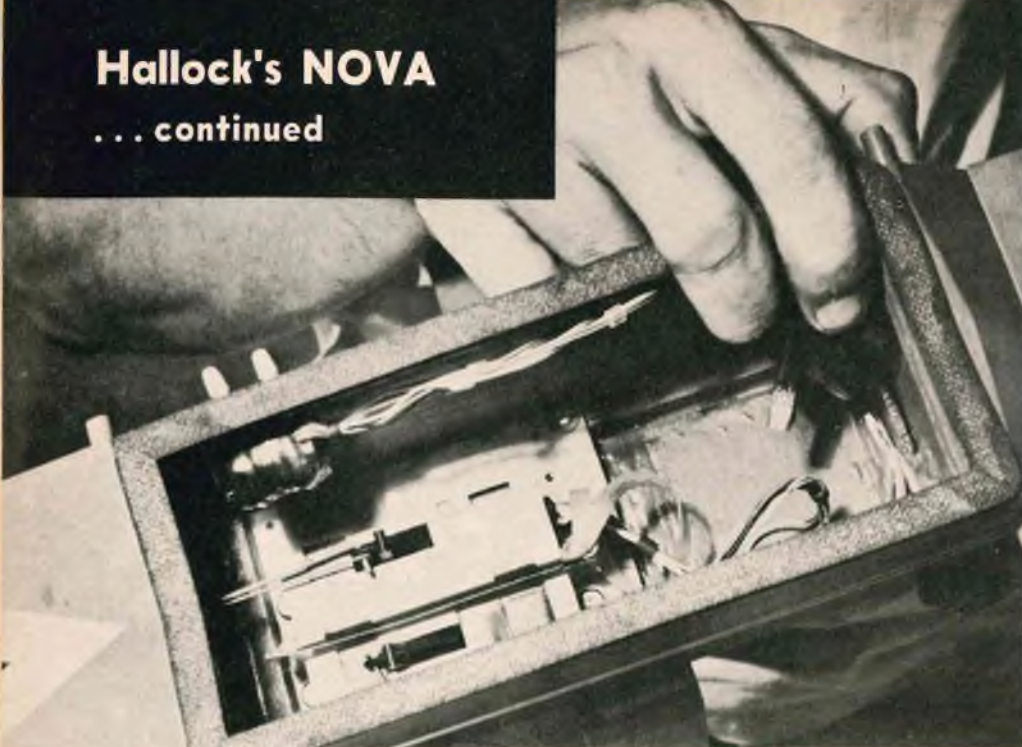
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sheeting after alignment and proceed to glue in all cap strips between the sheeting and at the rib locations. Place center sheeting in correct position at center of wing. Follow by gluing in all ribs, making sure to glue one of the 1/4" ribs at the correct location on each panel. Then glue on leading and trailing edges.

Next, glue the spruce and balsa spars together before placing them into the notches on top of the ribs. Allow this much of the construction to dry thoroughly. Re-glue all joints which will be covered by the sheeting.

Cut the 1/16" sheet for the number of pieces needed for webbing the spars. Make sure the grain of the wood used for webbing runs vertical to the spars. Glue in webbing between all ribs. Then glue on front and back top sheeting and complete the sheeting at the center of the wing. Finally, glue on cap strips. Shape wing tips and glue top into place. Then, after entire assembly is dry, remove from the board and sand structure to final contour.

If wing panels were built separately, the correct angle for the dihedral joint is cut by passing each wing panel through a table saw and carefully sawing a slight angle on each of the 1/4" thick ribs. For first cut, set the saw blade at about a 2 degree angle. Check for correct dihedral angle, and if not enough, repeat until the correct angle for 6" dihedral under one tip is obtained. Then coat each side of the joint with white glue, allow to dry slightly,

then re-coat. Pin one wing down flat on the building board, press the joint firmly together and prop the other wing up to the correct dihedral. Pin the joint together and allow to dry. Then, remove from board and sand, as above.

After the wing is sanded, place a 3" strip of Celastic or fiberglass over the center joint, both top and bottom. Now silk the entire structure. If you wish to use a hidden antenna, this can be placed inside the wing before silking.

At this point, give the wing two coats of clear dope mixed with talcum powder. Next, construct the stabilizer using the same procedure as you did with the wing. Silk, and give two coats of the dope-talc mixture. Set wing and stabilizer aside and go on to the fuselage construction.

Fuselage

Motor mounts, parts 6 and 7, wing mount stiffeners, all 3/16" square bracing, and tail section doublers, as well as servo rails, are glued directly to the sides of the fuselage. Then formers 1 and 2, along with keel plate 8 are glued into both sides for alignment of the nose section. Allow to dry thoroughly. Next, glue in former 3, tail block, and former number 4, in that order. Glue on landing gear plates. Sheet the top and bottom of the fuselage, with the wood grain going crosswise to the fuselage. Glue on fin and rudder. Silk entire structure and give two coats of clear dope and talcum mixed together. Then give entire model — wing, stab, and fuselage, three coats of color and final

trim as desired. Wing and stab tie down dowels are not cemented in place, but are only snug fit through the body for easy replacement in case of breakage.

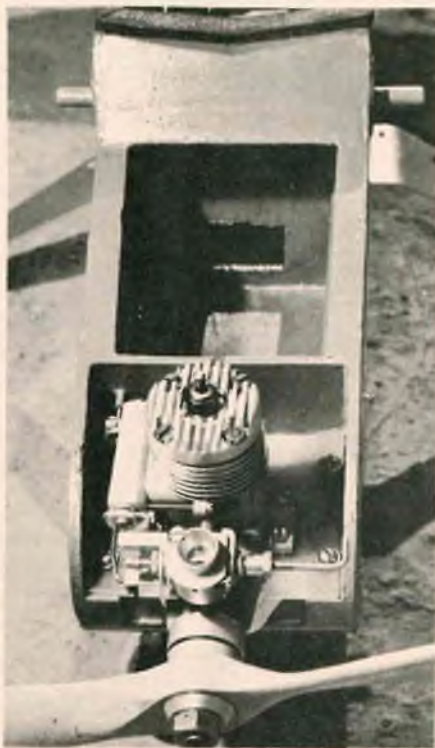
Landing Gear

The free-swiveling, caster action nose gear as used on the original Nova was turned from aluminum bar stock. If you do not have access to a lathe, it can easily be made to square dimensions and the corners rounded with a rasp. A straight-bent wire for the nose gear is as functional as the coil-bent type, and some may find it easier to fabricate. Also, if a steerable gear is desired, this can be accomplished by either extending the wire into the fuselage and placing the control horn inside, or a control horn can be mounted below the aluminum strut.

The main gear is of dural aluminum (DeBolt RC-6 blank), and it, along with the servo board, is held to the fuselage by two 4-40 bolts.

Through all this I am certain that you will agree it is much more difficult to put these instructions down than it is to actually build the Nova. Once you've finished yours and have flown the paint off it, the Nova will still appear to be a "bright and shining star" against the deep blue sky.

Write us c/o R/C Modeler and let us know of your experiences with the Nova!



BLUEPRINT FOR BEGINNERS

(Continued from page 13)

what position is coming up — and this isn't easy when you're excited!

The "compound" escapement, on the other hand, has only one neutral position, eliminating the need to remember what control position is coming next. With the compound escapement, the torque rod linkage to the rudder is usually arranged so that one signal yields right rudder, two left. For advanced flying, elevator linkages can be added. But for now, let's stay with rudder only.

Although there are electrical "servos" available for single channel operation, they are heavier, slower, and require separate batteries in most cases. It is my opinion, that for the beginner, the escapement results in the most economical, simplest, and lightest installation.

There may be an exception to this, if you leave out "most economical." A fairly recent development in single channel transistorized receivers is the "double ended" type. Bill Blick and I published the first circuitry on this a couple of years ago, and since then it has been added to two commercial receivers as standard equipment. The Otation O-22 and the C & S "Finch" provide this feature. What it does is this: When the receiver is turned on, one circuit is immediately closed, and current flows from the batteries to the actuator, which in this case is a form of "servo," which when energized by one current, moves in the opposite direction. Thus, when the receiver is turned on, the current moves the actuator all the way over in one direction. This movement, linked to the rudder, means the rudder goes hard over. Now, when you press the transmitter button and send out a "tone" signal, this does two things to the receiver — it opens the circuit which closed when the receiver was turned on, and closes a second circuit which energizes the actuator in the opposite direction — and the rudder flops hard over to the opposite side.

So, if you press the button rapidly, or "pulse" it, the rudder will flop back and forth — and if you go fast enough, the rudder doesn't have time to flop all the way over before it is forced in the opposite direction. Thus it winds up with a sort of nervous twitching movement. And, by controlling the amount of on-off time, you can make

the rudder twitch more to the right or left, as desired. Since it isn't practical to do this manually, "pulsers" which do it for you, have been developed.

The double-ended receiver, with an appropriate servo, makes a very simple installation. However, it requires a pulser for the transmitter—thus the whole system is more expensive, plus the added requirement for wiring the pulser to the transmitter. (It's easy, yes — but just one more possible pitfall for a beginner.). So, at least for the present, I'm inclined to recommend the combination of a single channel transmitter and receiver with escapement.

There are several good single channel transmitters and receivers on the market. They're something like cars, if you know what I mean — they all work, some perhaps better than other — and each has some little feature of its own, so its pretty much a "pay your money and take your choice"

NEXT MONTH PART II BLUEPRINT FOR BEGINNERS FEATURING AN ALL-NEW WILLARD DESIGN

proposition. Again, though, for the real beginner, I think the all-transistorized receivers now available will give you the least trouble — no relay points to get dirty or fouled by sparking — and they're light, rugged, and reliable. A couple of them have some unusual feature, too. The Otation, for instance, has a small light in the circuit which flashes when the receiver gets a signal. This shows it's working, and can also be used as an aid in tuning. Another new development — and a very significant one, especially for newcomers — is C & S's "sensimatic" circuit which eliminates "swamping" of the receiver when the transmitter aerial is too close. Swamping has baffled many modelers when they encountered it for the first time. You'll recognize it — if you have a "swamper" — by either a chattering of the escapement as the receiver gets the radiation from the transmitter aerial, or in some cases the receiver will "lock in" and hold the

rudder in full right or left. With this type of receiver you either have to have a friend launch your plane far enough away from the transmitter to eliminate the swamping, or else launch with the receiver on and the transmitter off, then, when airborne, turn the transmitter on. Another alternative is to buy a transmitter, such as the Otation, which sends both a carrier wave and tone when you press the button, but has a separate switch for carrier that can be turned on after the plane is away from you. In any case, the C & S receiver circuit eliminates the whole problem of swamping, and this is a very desirable feature.

Perhaps this is a good time to say a word or two about interference. The little receivers available are, for the most part, of the "super-regenerative" circuit type. Operating in the "Citizens Band" frequencies from 26.995 mc to 27.255 mc, they have such a wide band of reception that they pick up any signal in that band if the signal is fairly strong. In other words, your set may be turned to 26.995, yet some trucking firm may be operating in the area on 27.255, and every time a nearby driver calls the dispatcher he also calls your plane — usually right down to the ground! Also, some cities control their traffic signals by radio transmission on 27.255 — Chicago, Los Angeles, and the Long Island Turnpike are examples of cities or control areas which have employed this type of control. Don't try to fly when they're changing the lights! Perhaps by the time you read this they're changed to a different frequency, a move which has been requested by both the cities and other users of Citizens Band equipment, since it is a nuisance.

For a little more expense, plus a little additional weight and complexity, you can get a superheterodyne, or "superhet" receiver. These have very sharp tuning and won't receive a signal unless it is right on the receiver frequency. In fact, a matching transmitter, carefully tuned with the receiver, is strongly recommended. This minimizes interference unless, of course, someone is operating right on or very near your frequency, and this you can usually spot right away.

All things considered though, you can operate safely most of the time throughout the major part of the United States with superregen equipment, so let's stay with it for now.

One last word of caution. Obtain your Citizen's Band license from the Federal Communications Commission before you operate your radio transmitter! There's a stiff penalty for transmitting illegally!

Now let's talk about escapements. As with the receivers, they're all good, they all have some small shortcomings, and you'll have to learn the character-

(Continued from page 31)

istics of the one you buy, since even those of the same type have individual "personalities."

The Citizenship is the smallest of the compound type (and that's the type you want), and is fine for small models where you can use 1/8" rubber to power the escapement. It operates quite rapidly when wound up tightly, which sometimes poses a problem for the beginner equipped with a slow thumb! Also, if overwound, it won't release from neutral.

The Bonner VariCamp is excellent. It's biggest drawback is its size, which limits its use to larger models.

Fairly new to the U.S., the British Elmic escapement has proven to be a reliable operator. The disconnect feature for the torque rod is useful during installation and removal.

Ecktronics makes a good compound escapement, and have recently developed an integral motor control feature. However, for the absolute beginner, motor control can be confusing. I'd leave it until you're ready to build Number Two Plane.

Of all the escapements currently available, my personal preference happens to be the Babcock. Perhaps it's because I've used them for years and know how to troubleshoot them. And no matter what escapement you use, sooner or later you will have to adjust it — probably as the result of a clob-

ber job! But, I think the main reason I like the Babcock is that, properly adjusted, it operates reliably with rubber from 1/8" flat to 1/4" flat — in fact, in 1959 during the Nationals, I used four strands of 3/16"! The instructions tell how to adjust the rocker on the star wheel so you can make it operate faster or slower depending on your own "thumb timing."

Finally, no matter which escapement you buy, you should set it up on a board in your shop, with the rubber wound, and connect batteries — or even better, hook up your receiver with its batteries — then learn to operate it at the same time you are checking reliability. With 3/16" rubber, the escapement should operate reliably on 2.1 volts (the manufacturer says 2.2).

This, incidentally, brings up the question of batteries. Most of the old timers have shifted to nickel cadmium cells — "NiCads." However, at the start, I would recommend "alkaline energizers" in the pen cell size, such as the Eveready E91's. They have good life under the conditions of the transistorized receiver and escapement combination, and you can tape two of them together and solder them in series, thus eliminating any danger of intermittent current due to vibration, even though small. If you prefer, battery boxes are available for them — just make sure the contacts are solid.

Later on, after you've gained a little more experience, you'll probably change to the nicad battery packs and get yourself a charger. All in good time.

Start simple.

So far we've talked about types of receivers, escapements, and batteries. One more item and we'll call it quits for this month and I'll give you an assignment to keep you busy until the next issue of R/C Modeler. Get a good combination voltmeter, ammeter and ohmmeter. You don't need an expensive one — the Aristocraft unit is fine for RC. It's reasonable and covers the necessary range.

Next month we're going to talk about the plane I think most suitable, and designed for, the absolute beginner in RC. For now, let me say this — if you have a flat worktable (doesn't everybody?) and can glue two pieces of balsa together, you can build this plane.

In the meantime, go to your hobby shop or write your mail order house and buy a single channel transmitter and all-transistorized receiver — preferably matched, like the C & S, Otation, F & M, or other first line brands. Also purchase an escapement — I recommend the Babcock super compound because of its flexibility and reliability (the others are also satisfactory). Get a meter and some batteries, too. Now go home, read the manufacturer's instructions and hook up your receiver and escapement in a test rig, turn it on, and practice operating it with the transmitter until you can get the first position on the escapement with "one press and hold" and the second position with "two presses and hold" and can do it every time.

Okay? See you next month.

BENCH BITS

Motorola has a line of silicon diodes which are very reasonably priced. A Motorola MR-24 is a 15 amp, 150 PRU unit, and is available for \$1.20. Be sure to observe polarity when wiring in the diode—if you put it in backwards, Clyde, the glow plug ain't gonna glow!

During the past two years of RC equipment repair and service, it has been my personal experience that many cases of poor equipment performance and malfunction has been due to improperly tuned transmitters. It may be stated here that the only satisfactory way to tune an RC transmitter and to know that it is tuned properly involves

the use of an oscilloscope. This is not to imply that it is impossible to tune a transmitter without a scope, as this is not the case. In general, those transmitters employing a vacuum tube as a modulator have sufficient audio power available to make tuning feasible with the simplest of equipment. The following applies mostly to those transmitters employing transistor modulators, which normally do not have much reserve power, and in some cases, barely enough. This does not mean that transistor modulators are unreliable, but only that some care must be taken to insure adequate modulation.

The point of maximum RF output is not necessarily the point of optimum tuning. The point of maximum modulation without exceeding 100% (in the downward direction) is the optimum tuning point. A tone receiver does not "see" the carrier as bearing any information of its own, but it responds to the modulation envelope. Why peak the RF at the expense of modulation? This practice leads to those frustrating days at the field when the range is short, yet the output is strong as indicated on

the FSM. A kilowatt of RF carrier doesn't give you one microvolt of audio at the receiver, and without audio, you have no rudder either. The whole idea is to give the receiver the greatest possible audio signal on which to work.

Control grid modulation used on virtually all of the tube type transmitters is by nature one of the most difficult of amplitude modulation systems to adjust properly. It is used because it requires relatively little audio power, and thereby reduces component numbers and battery drain. Since we are stuck with it you ask, how do we go about making the system work?

Since the audio power is fixed, the only adjustment we can make is in the RF drive to the amplifier. It can be seen that if the oscillator is lowered slightly, the audio power being constant, the net result is a higher percentage of modulation accompanied by slightly lowered RF output. In practice, this is precisely what is done. We must match the RF power from the oscillator to give us the modulation we need. Actually, modulation percentages of greater than 85% cannot normally be

obtained with control grid modulation without some distortion and non-linearity of the modulation characteristic; however, some distortion is tolerable—insufficient range is not!

We assume that everyone is familiar with the restrictions imposed by Part 19 of the FCC regulations—therefore, the following tuning procedure is presented for information only. Equipment required is an oscilloscope, a field strength meter, and a proper tuning wand—no Allen wrenches, can openers, corkscrews, etc!

The purpose of the external tuned circuit (FSM) is to enable us to couple some of the RF energy being radiated from the antenna into our test circuit for observation. The standard practice of inserting a pickup link inside the transmitter tank coil or in the vicinity of the coil is fine for rigs with more power output, but doing the test in the manner prescribed does not alter the loading of the final amplifier in the transmitter.

Hook-up the equipment according to the sketch. Then, starting at the low frequency end of the oscillator coil adjustment, (for ferrite slug-tuned circuits, the slug is turned into the form for lower frequencies; capacitors are set to maximum capacity) turn the slug or capacitor until the oscillator starts. This will be indicated by a wide pattern on the oscilloscope screen. Make this adjustment quickly, because the tubes draw heavy plate current. Further turning of the slug or capacitor when the oscillator is not operating, or in the same direction will cause the height of the pattern to decrease. This is the effect we want. Now, key the audio and adjust the tuning slug or capacitor until the troughs in the waveform barely touch each other. Over-modulation will result if you go any further. Key the audio on and off,

and check the setting for stability. Also turn the transmitter on and off, and ascertain that it starts every time.

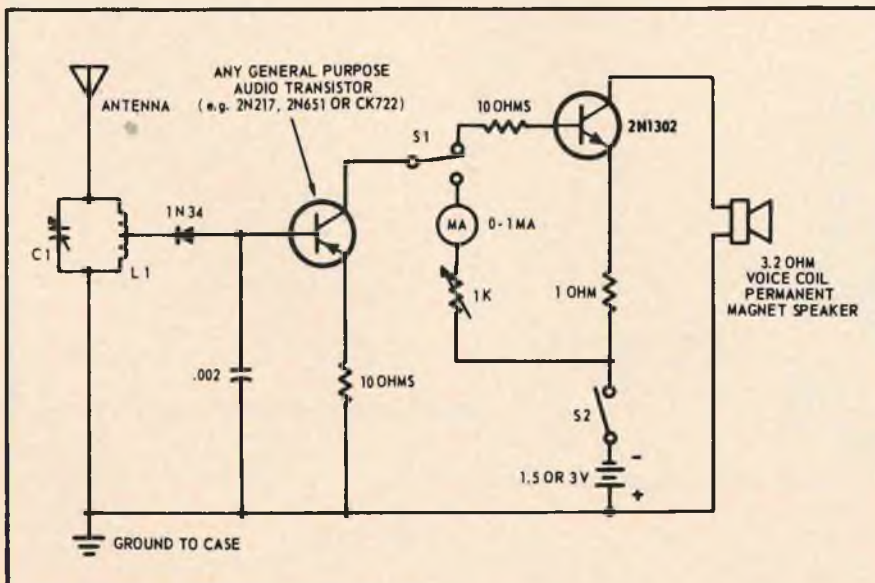
It will be noticed that the oscillator starts abruptly and then decreases in output more slowly as the circuit is tuned to higher frequency. Be sure that all adjustments are terminated on the high frequency side of the crystal oscillator curve, as instability will surely result if the tuning is done on the steeper low-frequency side. As a final precaution, make a ground range check.

In conjunction with the preceding discussion on the effects of transmitter tuning on modulation, the following notes cover the construction of a Field Strength Meter—a very useful piece of equipment, both at home and at the field—giving a relative indication of proper transmitter operation.

This particular circuit is far from being the ultimate in FSM's, but for our purposes it is more than adequate. Mine has been in use for five years and still perks right along. (Changed the batteries once!).

Starting at the antenna, the operation is as follows: some of the radiated power from the transmitter is picked up by the antenna and impressed on the tuned circuit formed by L1 and C1. L1 and C1 are chosen to form a parallel resonant circuit at the transmitter frequency. Making C1 a variable capacitor allows the circuit to be tuned over a range sufficient to cover all the assigned RC frequencies. L1 is tapped to provide a closer match to the low impedance input of TR1. The diode D rectifies the RF carrier, and due to its connection, presents a negative DC voltage to the base of TR1. C2 is a filter for the rectified carrier. TR1

(Continued on page 36)



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Circle No. 107 on Reader Service Page

1963 Internats Data

● **EDITOR'S NOTE:** *We are pleased to present the following Internats Data Sheet as a supplement to our November coverage of the 3rd World Control Championships at Genk, Belgium. The following preface is in the form of a few random notes from Harry Brooks in Great Britain.*

The 3rd World Radio Control Championships proved to be a disappointment for Great Britain. Frank Van den Berg was the only one to complete the required three flights. Chris Olsen crashed both models in practice, repaired one and flew the second flight, then crashed on the third. On my own first flight the only control response from up elevator, causing the model to fly out of control and prang about 150 yards away. My second model was called but the reed bank top plate had warped, lifting the reed screws from the comb. This was corrected, and the model flew well the same evening. On the second flight of the following day my motor cut in the stall turn. My very shaky third flight made 1500 points, but was minus the spin and the stall turn. With out gear operating perfectly both before and after the session, the whys and wherefores of

our difficulties are still points of contention.

Despite our problems, the standard of flying at the Internats was way up on anything we had seen before. Some of the surprises of the meet included P. Louis of Belgium, ending up only 31 points away from "Kaz," the beautifully smooth flying by Culverwell of South Africa and Chris Teuwen of Belgium, and the phenomenal rise from last place at Kenley to twelfth position this year by Stephansen of Norway. Monty Malherbe would have placed better, but on two flights lost control, regaining it each time to continue a shaky pattern. His first flight did a tour of the city of Genk, and when nearly out of sight, turned and came back to the field. Monty's comment: "How's that for trimming!"

The great talking point was proportional versus reeds. The facts are that the two systems tied for first place. I was, however, fortunate enough to put in a flight later in the week on Ralph Brooke's winning plane. My impression is that with this new gear a smoother flight is possible without the effort and skill needed for reed flying. Frank Van den Berg commented that we will have

to learn the finer points of radio control flying all over again. My feeling is that if you can fly reeds, you most certainly can fly proportional.

Another impressionable piece of gear was the new Super Tigre 56 Ball Race Motor which was used by Fritz Bosch and most of the continental flyers. It's tick-over (slow speed) with the new carburetor was slow and smooth, and along with the constant power provided through the pattern, was without doubt one of the contributing factors of Bosch's win. Those using this motor state that 5% petrol in the fuel really helps at the slow speed range.

Another interesting point was the development of model designs. Kazmirski's thick wing principle was being used by Bosch, Brook, and Van den Berg, but for constant speed and maneuvers, plenty of power is absolutely essential — especially in the wind! Bosch's plane weighed nearly nine pounds, yet it went through the maneuvers without any trouble at all. I firmly believe that a 20% wing and a seven pound model powered by a ST 56, or similar, will be a winning combination in the coming year.

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- Receiver used Superhet R.F. with toroid tone filters. Separate cables are provided for each servo and are terminated with a connector. Uses ESP-6 pack for power. Receiver size: $2\frac{1}{2}'' \times 2\frac{1}{2}'' \times 2\frac{1}{2}''$, weight 7 Oz. Temperature compensated from 0° to 140° F.
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NAME COUNTRY	PLANE	SPAN AREA	WEIGHT LB./OZ.	AIRFOIL SECTION	TRANSMITTER	RECEIVER	CONTROL SYSTEM	ENGINE PROP	REMARKS
R. Brooke U.S.A.	Original Amanusa	72 720	6/8	NACA 0018 18%	Orbit Proportional	Orbit Proportional	REMA Orbit	Veco 45 11/6	Fibreglass fuselage.
F. Bosch Germany	Original	67.5 1070	9/0	Symmetrical 20%	Telecont 9	Telecont 9	REMAT Bonner servos	ST 56 BB 12/6	Fibreglass fuselage. Poly wing.
E. Kazmirski U.S.A.	Taurus	69 720	5/12	NACA 2419 19%	Orbit 10	Orbit 10	REMAT Bonner servos	Veco 45 11/6	Mechanical kick-up elevator for spin.
P. Louis Belgium	Taurus	69 720	6/8	NACA 2419 19%	Orbit 10	Orbit 10	REMAT Bonner servos	Veco 45 11/6	Override elevator for spin.
G. Nelson U.S.A.	Original Cumulus	70 865	6/4	Symmetrical 17%	Orbit Proportional	Orbit Proportional	REMA Orbit	Veco 45 11/6	
C. Culverwell South Africa	Taurus	69 720	5.4	NACA 2419 19%	Kraft 10	Kraft 10	REMAT Bonner servos	Veco 45 11/6	Tail moment increased 1 1/2"
F. Venderbergh Great Britain	Original Skydancer	67	6/12	Symmetrical 15-20%	Orbit 10	Orbit 10	REMAT Bonner servos	Merco 49	Mechanical kick-up elevator for spin.
Ch. Teuwen Belgium	Taurus	69 720	6/4	NACA 2419 19%	Orbit 12	Orbit 12	REMAT Bonner servos	Veco 45 12/6	
P. Marot France	Taurus	69 720	6/8	NACA 2419 19%	Radio Pilot	Radio Pilot	REMAT Bonner servos	Veco 45 11/6	Oversize rudder for stability.
H. Tom Canada	Taurus	69 720	5/12	NACA 2419 19%	Kraft 10	Kraft 10	REMAT Bonner servos	Veco 45 11/6	
J. P. Gobeaux Belgium	Taurus	69 720	6/4	NACA 2419 19%	Orbit 10	Orbit 10	REMAT Bonner servos	Veco 45 12/6	Override elevator for spin.
P. Stephansen Norway	Original	65 780	7/4	Semi-Symet. 18%	Quadruplex Proportional	Quadruplex Proportional	REMAT	Merco 49 12/6	Mass balanced rudder & elevator.
M. Chercover Canada	Taurus	69 720	5/12	NACA 2419 19%	Orbit 12	Orbit 12	REMAT Bonner servos	Veco 45 11/6	Override elevator for spin.
J. Connacher South Africa	Taurus	69 720	5/8	NACA 2419 19%	Kraft 10	Kraft 10	REMAT Bonner servos	Veco 45 11/6	Mechanical kick-up elevator for spin.
H. Schumacher Germany	Original Vat 69		8/4	NACA 2415	Bellaphon 10	Polyton 10	REMA Bellamatic	ST 56 BB 12/6	Pegasus fuselage.
M. Malherbe South Africa	Sultan	66 810	5/8	Symmetrical 14%	Orbit 10	Orbit 10	REMAT Bonner servos	Veco 45 11/6	Elec. switched elevator override for spin.
W. Hitchcock Canada	Taurus	69 720	6/8	NACA 2419 19%	Min-X 12	Min-X 12	REMAT Bonner servos	Veco 45 11/6	Elec. elevator override for spin.
P. Bignon Caravelle		70.5 660	6/0	Semi-Symet. 17%	Orbit 10	Orbit 10	REMAT Bonner servos	Veco 45 11/6	Kit model.
E. Corghi Italy	Original X-16	74 820	6/4	Semi-Symet.	Controlaire 10	Controlaire 10	REMAT Bonner servos	ST 56 12/6	
F. Plessier France	Original Filocher	68 690	5/8	NACA 2415 15%	Grundig 8	Grundig 8	EMAT Bellamatic	KB 45 12/6	No rudder used.
R. Dilot Sweden	Taurus	69 680	6/8	NACA 2419 19%	Bramco 10	Bramco 10	REMAT Bonner servos	Merco 49 11/6	Elevator override for spin connected to low motor.
P. Eliasson Sweden	Original Mustfire	68 700	10/12	Semi-Symet. 15%	Kraft 10	Kraft 10	REMAT Bonner servos	Merco 49 12/5	
V. Tonneson Norway	Original Hugin	66 720	6/0	Semi-Symet. 16%	Orbit 10	Orbit 10	REMAT Own Servos	Merco 49 12/5	
T. Van Vliet Holland	Taurus	69 720	5/8	NACA 2419 19%	Orbit 10	Orbit 10	REMAT Bonner servos	Veco 45 11/6	Elec. kick-up elevator for spin.
N. Kramer Holland	Taurus	69 680	6/0	NACA 2419 19%	Kraft 10	Kraft 10	REMAT Bonner servos	Max 49 11/6	Elec. kick-up elevator for spin.
O. Mantelli Italy	Flat-Top Stormer	64 720	9/8	Semi-Symet. 15%	Ecktronics 10	Ecktronics 10	REMAT Bonner servos	ST 56 12/5	
A. Gast Germany	Original	68 690	7/12	NACA 2415 15%	Telecont 9	Telecont 9	REMAT Ancco servos	ST 56 11/6	9th channel switches engine control to trim function.
H. Brooks Great Britain	Original Soraco	68 700	6/12	Symmetrical 16%	FM 10	FM 10	REMAT Bonner servos	Veco 45 12/6	
C. Southier Switzerland	Original			NACA 2411 11%	FM 10	FM 10	REMAT Bonner servos	KB 45 11/6	
C. Olsen Great Britain	Uproar	66 780	6/0	Symmetrical 18%	REP 10	REP 10	REMAT Climax servos	Merco 49 11/6	
G. Horman Austria	Original	74 810	6/8	Semi-Symet. 18%	OMU 10	OMU 10	REMAT OMU servos	ST 40 11/4	Balance elevators.
R. Aebi Switzerland	Nimbus 2	60 640	7/4	Semi-Symet. 15%	Own Proportional	Own Proportional	REMA	ST 56 12/6	Two proportional channels, two non-proportional channels—2 receivers.
J. Levanstam Sweden	Livewire Viscount	64 720	6/8	Symmetrical	Kraft 10	Kraft 10	REMAT Bonner servos	Merco 49 12/6	
W. de Hulder Holland	Taurus	69 680	6/4	NACA 2419 19%	Controlaire 10	Controlaire 10	REMAT Bonner servos	Veco 45 11/6	Elec. kick-up elevator for spin.
P. E. Reinas Finland	Uproar	66 740	7/12	NACA 0018 18%	Orbit 12	Orbit 12	REMAT Bonner servos	KB 45 11/6	
F. Mortensen Denmark	Taurus	69 720	6/0	NACA 2419 19%	Kraft 12	Kraft 12	REMAT Bonner servos	Max 49 11/6	
A. Matthey Switzerland	Taurus	69 720	6/8	NACA 2419 19%	FM 10	FM 10	REMAT Bonner servos	Merco 49 12/6	
V. Milani Italy	Taurus	69 720	6/0	NACA 2419 19%	Orbit 10	Orbit 10	REMAT Bonner servos	KB 45 11/6	
J. Sederholm Finland	Uproar	66 740	8/0	NACA 0018 18%	FM 10	FM 10	REMAT Bonner servos	Merco 49 12/6	Stormer fin.

BEWARE OF THE R-C BUG!

This "bug" lurks in your workshop and in the flying field. If you have ever attended a flying session or an RC contest you may have been bitten by its' deadly sting!

HOW TO COMBAT THE R-C BUG!

The surest way to ward off this affliction is to try to compete in RC without the BEST equipment available and without the means to purchase a really good RC rig. In other words, if money is holding you back from your full share of RC fun, you have the perfect cure.

WHAT IF YOU ARE "INCURABLE"?

If you do have that surge in your blood, and yearn to fly with the best of them, with equipment of which you can be proud, we may be of help to you — we have been to thousands of others over the past four years. AERO-TROL Engineering was founded by modelers, to solve modelers problems! Dealing in RC items exclusively, we are the originators of the famous "Fly Now Pay Later" plan, and feature all major RC makers.

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BENCH BITS

(Continued from page 33)

is a PNP transistor, and a negative voltage on its base forms a forward bias, causing the transistor to conduct. The current flowing in the base circuit is amplified by the transistor, and the collector current is approximately equal to the base current times Beta, which may vary from 20 to 100 in inexpensive transistors. All this means is that we can use a more rugged and less sensitive meter for M1. (Less expensive, too!). R2 is a variable resistor which is used to adjust the sensitivity of the FSM. R1 increases the input impedance to TR1 slightly and gives some measure of temperature stability. (Not very much, but apparently enough). The series combination of R1 and R2 affords some protection to the meter in the event that TR1 develops an emitter to collector short. (Depending on where R2 is set, the meter may still end up by being ruined, but it doesn't smoke quite as much!).

For those who do not need or want to listen to the audio output from their transmitter, the FSM is complete. By eliminating S1 and forgetting the remainder of the circuit, the unit can be constructed very compactly and may be easily carried to the field. This is a practical application because we all know the transmitter always works on the bench! Practical failures generally occur where such failures will cause the most possible damage—on takeoff, while in a steep dive, when inverted 50 feet of the deck, etc. This is when the transmitter usually fails, if it fails at all!

Getting back to the FSM, if S1 is switched to its other contact, the meter is disconnected from the circuit and TR2 and the speaker are subsequently connected. When the transmitter tone is keyed, you will be able to hear it from the speaker. TR2 is an NPN transistor which further amplifies the signal from TR1 and energizes the speaker. There is adequate volume obtainable, but don't expect high fidelity!

Total cost for the unit will range from a couple of dollars to about twelve dollars, depending on how well your junk box is stocked. S2 is not really necessary, especially if TR1 is a low-leakage unit.

Typical component values are:

L1 = 10T #16½" dia. (For 6 meters 5T) Both coils center tapped.

C1 = 7-45 pf (for 6 meters, 3-12 pf)

D = 1N34

S1 = SPDT toggle, lever, or rotary switch

C2 = .001 uf

R1 = 22 ohms ½ or ¼ watt 10%

R2 = 1K pot

R3 = 10 ohms ½ watt 10%

R4 = 3.3 ohms 1 watt (can be omitted)

Speaker = any 4 or 8 ohm permanent magnet speaker from 3" to 8"

(the larger speakers offer more volume)

TR1 = any general purpose audio transistor (CK 722, 2N224, 2N-461, 2N217, 2N651). PNP's.

TR2 = 2N1302, or almost any NPN transistor rated at 150 ma or greater collector current.

Meter = 0-1 ma or 0-5 ma (a 0-10 ma may be used at reduced sensitivity)

Antenna: 20"-30" (the longer the better)

If you have more than one PNP transistor available, use the one which has the lowest leakage. This is indicated by the lowest meter reading with no RF signal coming in. My CK722 leakage is low enough so that there is no discernible meter indication with no RF.

Since the FSM does not indicate an absolute value of RF output, some hints on the use of the instrument are in order. To determine if the output of your transmitter has increased or decreased since the last reading, the FSM must always be placed the same distance away from the transmitter. Only then will the readings have any real value to you. For example, if the FSM gave a half-scale reading at a distance of 3 feet from the transmitter when the latter was properly tuned, using the FSM at a distance of 3 feet in subsequent tests will enable you to determine if the RF output is less, equal to, or greater than the original.

Normally, a field strength meter should be placed at least one or two wavelengths away from the RF source. In the 27mc band this amounts to about 37 feet. And at the 37 feet the meter looks like a gnat's eye, and even if you could see it well enough to read, it is doubtful that it would even twitch when the transmitter was turned on!

One other thing which may be of interest is that this meter is not a logarithmic device but is almost linear. Consequently, small improvements in transmitter tuning will cause the FSM to exaggerate the increase in RF power in terms of range. That is, a 100% increase in the FSM reading will not double the range of a particular transmitter-receiver combination. In order to double the range, the RF power at the transmitter must be 2 or 4 times the original power; to triple, the RF power must be 3 or 9 times the original power. Don't expect fantastic increases in range if the FSM shows a little more output from your transmitter.

And don't forget to send in your schematics, gimmicks, and what-have-you for next month's Tech Topics!

FLY-IN

(Continued from page 21)

fuel, starting batteries, and the usual miscellany.

While airfoil outlines are easily found, ordinates are sometimes difficult to track down. **Don Neil** of the Lincoln Sky Knights searched out the ordinates of some popular airfoils, and these are shown in Fig. 3 as reprinted from the *Clanking Armor*.

CONTEST DATA

We'll kick off this month's contest data with the Aeromodeler Trophy Meet held at the Barkstone Lincolnshire Aerodrome in England. Although plagued by rain and gale force winds during the entire event, **S. Foster** and his *Nimbus II* won the Multi event. F & M 10 channel equipment and a ST 56 R/C were used. Second place winner **P. Waters** flew an ever-popular *Taurus* with Merco 49 mill and Min-X gear. Third place was taken by **Ed Johnson** with a Merco 61 powered *Taurus* and Orbit 10-channel radio. It is reported that this new Merco from **Denis Allen** gives that extra bit of power needed in the severe English weather conditions. According to our correspondent, **Maurice Franklin**, this mill idles even better than the popular Merco 49, using the standard 49 throttle arrangement. Another interesting feature is that the new Merco is the same size as the 49—making a very compact installation but with that extra amount of power sometimes necessary. Maurice, by the way, heads up the new Orbit Service Center in Leicester, England, and informs us that this installation is now open and in full swing.

From **Norma Kelly's** Mile-Hi RC Club Newsletter, details of an interesting three day fly-in held at Oklahoma City. One event we couldn't find in the AMA rule book was the 'Las Vegas Le Mans!' Flyers in this category had to roll a seven with a pair of styrofoam dice, run to the starting line, start their engine and fly out 500 feet, then land and park in the hangar. This was followed by a mad scramble back to the desk to roll an eleven! Shortest elapsed time was good for fifteen bucks!

Sunday's competition found **Dale Nutter** winning Pylon with a new world's record time of 1:7:6. Dale's model was an original delta design with



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The scale event was won by **Maxey Hester** with **Loren Tregalles** taking second place honors. Loren also captured the Multi event with **C. Smith** and **Bud Atkinson** edging out in Class I and II, respectively. All-in-all, an excellent meet, topped off with a steak dinner for the Mile-Hi crowd at the Ramada Motel. Might have been hamburger except for the fact the Kelly's and **Ron Murray** split a \$50 driving distance award!

A recent fly-in held by the Pioneer RC Club, Inc., of Menlo Park, Calif., saw **Jim Gettman** (Pioneers), **Bob Heise** (EBRC), and **Jim Stevens** (EBRC), take the first three places in Class III. Both Gettman and Stevens were flying the very popular Apollo, a forthcoming RCM construction feature by Jim Stevens. **Lou Guerrieri** and his Stormer took first in Class II, and **Charles Gilbreth** (LERA Star Modelers) captured top honors in Class I.

With fifty-five entrants competing in six separate events, the 10th Annual New England RC meet was an outstanding success, hampered only by gusty East Coast winds. **Hal deBolt**, **Ron Chapman**, and **Ed Izzo** were the winning trio out of fifteen entries in Class III. **E. Rogers** topped the group in Class II, with **A. Shpack** winning Class I. **P. Reed** won the Pylon event and **H. Bentley** the Scale competition. Although the Parachute event drew nine entries, there were poor distances recorded due to the high wind condition—**John Schroeder** winning this event. **Harrison Morgan** was the CD, with **Harvey Thomasian**, **Lou Andrews**, **Lee Renault**, **Ed McCary**, **Ted Lewis**, **Mel Mosher**, and **Bill Keen** as judges. Over \$750 in prizes and trophies were presented at the con-

clusion of the meet.

The Uniontown Flying Electrons, Uniontown, Pa., held an all-day meet preceded by five days of radio spot announcements provided by a local radio station. In addition, the Uniontown newspaper gave front page coverage to the event. Multi winners were **Merel Mansell**, **Nick Costea**, and **Fred Collins**. The rudder only event was won by **George Gordon**, with runners-up **M. C. Reed** and **Al Signorono**. An interesting side note was that with continuous flying from 10 a.m. until 5 p.m., there wasn't a single crack-up!

The Harbor Slope Soaring Society held a rudder-only pylon race—for gliders! Rules specified that the ship must be contestant-built, and would be timed for five laps around pylons spaced 528 feet apart. **Dale Willoughby** won first place with an Aviomodelli Pelican and a speed of 14.1 m.p.h., **Ted Trevor** was second with a Sinbad clocking 10.8 m.p.h.; and **Pete Jones** took third with a Thermic 50 at 10 m.p.h.

We couldn't resist this one! The highlight of a recent family picnic and fly-together, sponsored by the Lincoln Sky Knights, was the flight of **Don Neill's** Spitfire. The concrete ramp provided for takeoffs was too short for an ROG of this big ship, so the Spit was **hand launched** by Don! The secret to the successful hand-launching of an airplane of this size and weight seemed to lie in the fact that Don was riding in a convertible going thirty, thirty-five miles per hour at the time of the launch! Don, Spit, and car would roar by while member **Bill Phinney** handled the transmitter from a safe (?) distance! We do not have the outcome of this "assisted hand-launch"—perhaps it's better that way!

(Continued on page 38)

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CLUB NEWS

One of the most important, and difficult, tasks facing every RC club, is that of promoting and maintaining good public relations. Whereas the general public has almost no conception of the functions and techniques of radio controlled model aircraft, they are sometimes very suddenly aware of their existence when adverse newspaper headlines call attention to a rare, but unfortunate, bodily injury or property damage accident involving an RC model. It has long been our contention that each RC club is in a position both of privilege and responsibility in promoting good public relations by the dissemination of information to the general public concerning our hobby. This can best be accomplished by electing a Public Relations officer in each club, often the club editor or Field Safety Officer, whose duties would be to provide the local press, TV stations, etc., with news and general information concerning the radio control activities in their area. More often than not, local newspapers and TV stations will provide on-the-spot coverage of contests and activities of general public interest. Properly presented, this form of publicity will go a long way in promoting public support and recognition of our activities in radio control. And we need that support!

One RC club, which has established themselves as a leader in this field of public relations, is the **Greater Pittsburgh ARCS**. As an example, on September 15th and 16th, the ARCS, under the direction of the Variety Club of Pittsburgh, assisted in putting on an air show for the benefit of handicapped and underprivileged children. As a part of this program, TV star Don Riggs, gave both the ARCS, and the entire RC fraternity, a big boost with his television public.

R/C Modeler magazine offers its congratulations to the Greater Pittsburgh ARCS, for its outstanding efforts and resultant successes. It is sincerely hoped that this will become a precedent for radio control clubs, both large and small, throughout the country.

Congratulations, too, to the **Fresno Radio Modelers** and Editors Meade Hallock for resuming publication of their club bulletin, *Watts New*. This periodical is a six page, 7" x 9½" format, commercially printed and complete with photographs.

While on the subject of club publications, we noted that the **MARS** plan to distribute ten copies of the *Pulse* to the local hobby shops to be given out to newcomers to RC. An additional membership idea on the part of the Montreal RC'ers is to have cards printed

for local hobby shops offering assistance to new RC'ers by MARS members, these cards to be included with each new RC kit sold. They also plan to construct a single channel trainer from contributed parts and labor for the use of new and prospective members.

EDITOR'S MEMO

(Continued from page 4)

We feel it should be pointed out that, even if the attorney is retained almost immediately, effective action may take time. It takes considerable detail to prepare petitions, and then it takes constant follow-up to assure action on these petitions. We know that *RC Modeler Magazine* would welcome your suggestions and comments, and we appreciate the fact of having the opportunity to make you aware that the AMA is acting in your behalf.

Now, as never before, the RC'er should feel a closer kin with the AMA, and do everything in his power to cooperate. Every effort should be made by individuals and clubs to make sure that every member and prospective member and potential RC'er is registered on Form 505 with FCC *now*—before the fee starts! Next, every effort and device should be used to make sure that all RC operations are done legally so that our attorney will have as strong a case as possible.

With the Federal Aviation Authority observing at the Nationals this year, and with the indication that, for reasons of safety, they are interested in seeing that our planes do not get shot down by interference, we have another potent weapon for our attorney.

Your AMA-FCC committee needs your help in getting *documented* evidence of interference problems caused by *any* interfering factor. This *must* be documented and should include the *date*, the *time*, the *place*, the *frequency* being used, the interference *source* if it can be spotted. (Tape recordings might prove valuable if they are validated).

This is your fight, and your assistance to the AMA-FCC committee will be welcomed. They assure you they will do all within their power to improve the present situation, and hope to give you reports on progress as time goes on. In the meantime, send your comments and suggestions to *R/C Modeler Magazine* and to *Grid Leaks Magazine*.

THE TORERO

(Continued from page 14)

make a wing more effective, I thought, quite logically, that it might work on a stab as well. As long as we were thinking along the lines of tip plates, we might as well just put a fin and rudder on each end of the stab. Since the stab would, in effect, be larger, an equal size elevator would give a smoother response. Could it be just possible that win rudders would tend to slice through the air instead of twisting, giving more axial roll? Why not! Having gone this far, what could I lose? You might also think about what happens when the rudders and fins are out of the way of the prop blast, too.

One item I believe was original — if you will notice, the thrust line runs from fore to aft. I mean, the thrust line follows the motor mounts and comes up quite high on the fins. Since everything is set zero degrees in relation to the thrust line, the ship flies with the tail in a lower attitude than that which you are accustomed to seeing. This give a better fuel level for taxing, and permits the fuselage to sit level in relation to the ground. Not only does it look better, but it still has effective negative incidence when rolling on its gear. That is supposed to make the ship easier to land without bouncing.

All kidding aside, the Torero handles like a baby at both low speed and at full bore. The ground handling is excellent even in the wind, and the ship leaves little to be desired in its ability to go through a winning contest pattern. In the hands of proficient flyers, it has proved its worth in many contests. If you can land fairly well, you can fly the Torero with no trouble at all. With a 60" wing, you have to skip no maneuvers in Class II, and no reversal of rudder control is required when inverted.

Construction of this model is not too different from current practices. I can tell you a little bit about my own methods, but don't be afraid to deviate a little and adapt your own building procedures. You will do a better job if you do things in a manner to which you are accustomed.

It's difficult for a person to build his first model from plans unless he had highly detailed plans and instructions. Since the Torero is a ship that should not be built and flown by a modeler without a little previous multi-experience, neither the plans or the construction data are highly detailed.

The front and rear spars of the wing and stab are full depth, and notched to accept the ribs. I cut and notch the ribs and spars first. Lay the front and

rear wing spars on top of each other and glue the balsa doublers in the center. I use one 1/4" rib in the center of the wing. I prefer to use 1/16" sheeting and cap strips on the wing, although you may try 3/32" sheeting if you prefer, and if you can manage the extra weight. Build the wing first, then mark and saw out the ailerons with a razor saw after the sheeting is in place. The only plywood used in the wing is the servo platform and the section of rib to which the aileron horn is fastened with sheet metal screws. The appearance of the wing tips shown on the plans is good, and flies equally as well, but in order to save weight a silk-covered frame with equal angle from top to bottom of wing can be used for the tips, if desired. Different tips will not affect the flight enough to matter.

Since the original plans were drawn, I have found that the plywood doublers on the fuselage are of little value, so I recommend using 3/32" sheeting for the sides and doublers. This seems to be just as strong in a crash and has the additional advantage of saving some weight. If you build as I do, all these little things which will save weight will make the difference between a seven and an eight pound airplane!

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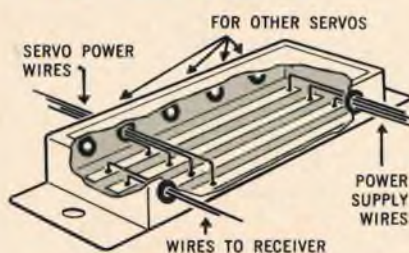
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SHOWCASE '63

(Continued from page 23)

With a current upswing in single channel activities, and a corresponding trend toward small, transistorized transmitters, **Lee's Hobby Industries** announces the addition of **Lee's Lightning Transmitter** to their continually expanding program of radio products. Manufacturer's specifications are as follows: crystal controlled on 27.045 mc; three VHF transistors in an MOPA circuit with 100% collector modulation for maximum efficiency; out-put tone 600-700 cycles; temperature stabilized for 20 to 120 degrees F. The antenna used with the Lightning transmitter is a two-piece, center loaded unit, tuned for the operating frequency, and giving maximum field strength for the power input. The complete power source is a single 9V hearing aid type battery.

An interesting feature of this product is the accessory provision for the installation of a 'quick blip-timer' which will permit a signal to be transmitted at 1/100 second, eliminating the difficulty of pulsing quick blip motor control with the thumb. Price of the transmitter and antenna, less battery, is \$23.95. With the built-in quick-blip feature, only \$32.00. **Circle #4 on the Reader Service Card.**

Also from **Lee's Hobby Industries** is a fully transistorized monitor for 27 mc or 6 meters. In addition to audibly detecting interference on the frequency you are using, it will indicate when your transmitter is emitting a carrier wave and will audibly indicate the tone and clarity being produced by your transmitter. Small enough to fit in your shirt pocket, this new monitor can easily pay for itself by spotting Citizens Band interference. \$19.95 for 27 mc, \$24.95 for 6 meters, freight free. Both units are custom built and fully guaranteed. **Circle #5 on the Reader Service Card.**

A miniature precision-built **junction box** for multi installations has been announced by **Lindwood Accessories**, Long Beach, Calif. Designed to practically eliminate wire breakage caused by vibration, this 1/2 ounce unit consists of a printed circuit board completely enclosed in a miniature high impact plastic case. With all necessary provisions for servo power, power supply, and

receiver wires, this compact unit greatly simplifies multi wiring and eliminates the cost of individual connector plugs. Price: \$2.25. Available at your local hobby shop, or **circle #6 on the Reader Service Card.**

The second item from Lindwood is a **leakproof fuel tank** available in 4 ounce, 6 ounce, and 8 ounce sizes. By eliminating the threaded cap and gasket usually found on transparent clunk tanks, the new Lindwood units weigh less and require less space, in addition to eliminating leakage. Four ounce size is \$1.55, 6 ounce \$1.65, 8 ounce \$1.75. Check your local hobby dealer—if not available, **circle #7 on the Reader Service Card.**

Many requests have been received for information* on the Nationals winning Class II proportional system from **Airborne Control Laboratories**. In addition to winning the intermediate event, the **ACL Mark II** scored a fourth place in Scale for Ralph Jackson and his beautiful B-24. This is a dual proportional-trim engine, superhet system, which is sold complete for \$299.95. For ACL's eleven page brochure covering the Mark II, enclose twenty-five cents and **circle #8 on the Reader Service Card.**

Non-spillable **Power-Mite batteries** are being offered by **Polk's Hobbies**, New York. Manufactured by skilled U.S. battery technicians they are fully guaranteed against defects in materials and workmanship. Two lightweight models are available: the P65 with 2 ampere hour life at \$6.95, and the P69 with 6 ampere hour life at \$8.95. **Circle #9 on the Reader Service Card.**

Requests from the field have made a **basic NiCad charger** package available from **Ace Radio Control**, Higginsville, Mo. This package consists of a 9V new surplus transformer for complete isolation from the AC line, UL approved line cord, and 500 ma 400 PIV silicon rectifier. Included are complete instructions and schematic for charging 1 to 6 NiCads at a 2.2 ma or a 5 ma trickle rate, or 22 ma or 50 ma 14 hour rate. Charger may be housed in a case of your choice, and resistances are given so that a fixed resistance may be used for a one type battery box charge set-up. Price of the entire parts package is less than the price of the transformer if you were to purchase it separately. First come, first served basis, as supply is definitely limited. **Circle #10 on Reader Service Card.**

One of the finest single channel escape-ments made is the English **Elmic Commander**. This light weight compound escapement features nylon pawls, quick blip motor control contacts, counter

balanced governor, and 200 ma drain. With a wide range of operating voltages from 1.5V to 6V, the Commander will operate with 1/8", 3/16", or 1/4" rubber. An outstanding feature of this actuator is a snap-out torque rod, eliminating the usual soldered linkage. \$11.95 from **International Model Products**, New York. **Circle #11 on the Reader Service Card.**

For scale fans, we recommend a subscription to **HisAirDec News**, published bi-monthly by the **Historical Aircraft Decalcomanias Co.**, Minneapolis, Minn. Although devoted primarily to miniature solid scale models, this magazine is full of scale material in an infinite detail that we have not seen before. For further information, **Circle #12 on the Reader Service Card.**

While on the subject of publications, **Timely Plans** has started a program of expansion to include selected hobby and aviation books. One of the most popular book releases is the 'U.S. Army and Air Force Fighters 1916-1961.' This is a complete history and description of outstanding aircraft from the S-3 to the Convair F-106A. Seventy drawings, 250 photos, and 256 pages. \$9.75. A complete catalog and listing of books and model plans is available from Timely. Enclose twenty-five cents to cover handling and **circle #13 on Reader Service Card.**

An excellent Christmas gift for the air-minded would be a new book entitled **Turbine-Engined Airliners Of The World**, by F. G. Swanborough. This important new volume illustrates and describes every jet-type aircraft that has gone into airline service since 1952 when the De Havilland Comet made the world's first jet passenger flight, plus types still under development. Information about airliners of all countries, including Russia, are included in this excellent work from **Aero Publishers, Inc.**, Los Angeles. The text is supported by more than 300 photographs, plus some outstanding scale drawings. We have reviewed this book and find it to contain a wealth of information. We recommend it for general reading, and as a must for RC scale enthusiasts planning a multi engine liner. \$5.00. **Circle #14 on the Reader Service Card.**

Superscale of Arlington, Texas has announced that the very popular book "Outstanding Military Aircraft of WW II" has been reduced from \$4.95 to \$2.95. This publication, written especially for historians is one of the finest reference works published for the serious scale enthusiast. Supply is limited. **Circle #15 on the Reader Service Card.**



SPACE CONTROL

(Continued from page 18)

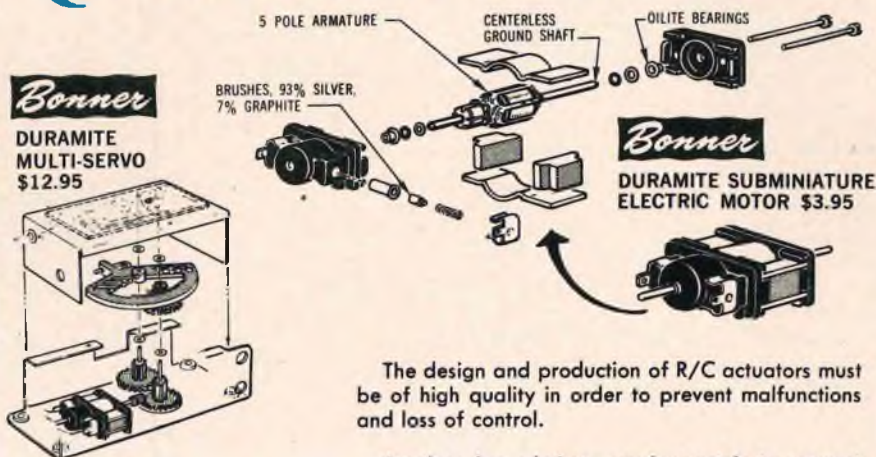
A hack saw will probably be found best to make the cuts. After the ends have been cut and trimmed, the sides can be trimmed in the same manner, leaving the new board $4\frac{3}{4}$ inches long by $2\frac{7}{8}$ inches wide.

All that remains now is to solder the receiver wires from the terminal board to the receiver circuit board. Here again it is suggested that holes be drilled through the board for strength and to facilitate soldering. It is shown in the sketch where each hole was placed in the circuit board—however, the position on the "land" is relatively unimportant. What is important is to ensure that the wires go to the correct "lands" on the receiver circuit board. (See diagram.) Also note that when the motor servo end of the receiver circuit board was cut off, the green wire "land" was cut; this must therefore be rejoined (see diagram), with a green wire.

The modification is now finished, and the unit should operate the same as it did previously. The set illustrated had absolutely no interaction, and operated perfectly, as it had before the modification was attempted. Before installing it in the new case, however, the back of the receiver circuit board and the top of the terminal board should be insulated with tape. The terminal board is mounted right up against the $\frac{1}{8}$ inch thick aluminum case. The receiver circuit board is immediately under this; mounted with the circuit board itself next to the terminal board, with the components under the circuit board pointing toward the cover of the receiver. A piece of 1 inch foam rubber between the components of the circuit board and the cover holds everything in place. Note that one corner of the circuit board was cut out to make room for the knots tied in the aileron and power-pack leads

(Continued on page 45)

QUALITY YOU CAN DEPEND ON

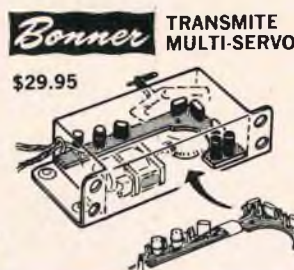


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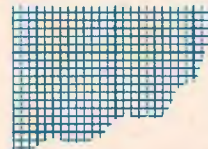
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SINGLE channel equipment. 2 F&M transmitters and receivers (1 super-regen, 1 superhet); 2 Bonner vari-comps, 3 Bonner SN escapements, battery boxes, rubber winder & misc. items. Make offer. Dick Bertolin, 2953 E. Robinson, Fresno, Calif.

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CITIZENSHIP 3VTRA receiver, CTX transmitter, Lil Esquire, Babcock MKV escapement, Tri Pacer, Enya 29 RC. Don Wiggley, 4906 Queen Mary Rd., Apt. 15, Montreal, Canada.

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R/C MODELER MAGAZINE

P.O. BOX 487
SIERRA MADRE, CALIFORNIA

DEAR RCM:

(Continued from page 6)

in this category! This three-part series, and others to follow, will start at the "grass roots" for those just beginning in this hobby. If you have questions, let us know—we'll always try to answer them.

RCM AT SEA

I received your first issue today—we only receive mail aboard ship about twice a week—if we are lucky! Model airplanes are my number one hobby and I really enjoy it. Only one big drawback—I am aboard ship from March til December and am only able to fly during the winter months. We fly from Lake Superior when it is frozen, with skis. Engines are almost impossible to start below 20 degrees.

How about doing a flying and reliability test in the magazine similar to the Tom McCahill reports in PM? The high price tags on the new proportional rigs mean a big investment—too big to risk without a guide to go by.

Don Wojcieszak
S.S. A. M. Anderson
Soo, Michigan

They're coming, Don—and no punches pulled!

A.M.A.

(Continued from page 6)

We feel that this letter epitomizes the spirit of modelers in general, and RC modelers in particular, and that it represents the beginning of an excellent future for our hobby of radio control. We urge every individual RC'er, and every club to lend their full support to this program. The Academy of Model Aeronautics, as well as this magazine, welcomes your suggestions and comments on this program.

Glue sniffing—the intentional inhalation of solvents for the purpose of becoming intoxicated—is an unhealthy misuse of desirable and beneficial substances which have values for good far exceeding their dangers.

Practically every American boy builds a model airplane at some in his life. Many pursue this hobby to highly advanced technical levels. The AMA represents over 20,000 model airplane builders who enjoy this hobby in its most sophisticated form, as a creative and scientific endeavor which contributes substantially to the technical competence of our aerospace effort. Furthermore, the AMA's membership outstandingly represents a large segment of our nation's youth which has not been involved in problems of juvenile delinquency. The basic binder in this activity is a chemical ingredient—glue!

Model builders do not believe that limiting the sale of model airplane type cement is a good approach to solving the problem of solvent sniffing for the following reasons:

A. Such legislation must be largely ineffective because:

1. The intoxicating solvents are widely available in many other common products including household cements, nail polish and nail polish remover, lacquer and paint thinners, cleaning fluids, motor fuels and may even be purchased readily in pure form.

2. Even discounting the wide availability of other sources of intoxicants, the enforcement of a law limiting the sale of model airplane cements would be ineffective so long as there is any means of purchase; probably to the extent of promoting the illicit sale of cements in the same manner as is practiced with narcotics.

B. Such legislative is offensive, inasmuch as it punishes many more innocent than guilty youths.

C. Further, such legislation is detrimental to many very constructive and creative activities, which in themselves tend to curb juvenile delinquency, and which have proved to be valuable educational and career building influences.

D. Better and more effective legislation can be passed, or may in fact already be available in existing statutes which need only application to solvent sniffing cases.

As President of the Academy of Model Aeronautics, it is my recommendation that the most effective ways of discouraging solvent sniffing lie in two areas:

1. The enforcement of laws which make it an offense to inhale solvents or chemicals for the purpose of intoxication. Such legislation has already proved to be effective in localities where it has been applied.

(Continued on page 46)

Citizen-Ship

HIGH POWER—HIGH QUALITY TRANSISTORIZED TRANSMITTERS AND RECEIVERS



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Ten Channel Multi Simultaneous Selective Superhet Relayless Receiver

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- Newly designed reed bank with stiffer reeds on higher frequencies prevents false commands from vibration.
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- Uses inexpensive 9 volt hearing aid battery available even in drug stores.
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- Weight 4 oz. • Size 2 1/8 x 3 1/4 x 1-1/16.



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High Power "Compactized" Multi Simultaneous All Transistorized transmitter for 10 channel high reed operation

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- Output equivalent to tube transmitter because of high power silicon output transistor used.
- Tones stabilized to 140° F.
- Uses one 9 volt battery (no expensive power pack needed.)
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Single Channel Relayless Tone Receiver

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- Smaller than a postage stamp.
- Module type construction gives maximum performance in minimum space.
- Ultra miniaturization accomplished with standard size reliable components.
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All Transistorized Tone Transmitter

- Same high output as tube transmitter.
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SE-2-M ESCAPEMENT

NEW! With Transistorized Circuitry.

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To secure motor control from single channel relayless receivers. (may also be used with relay receivers.) Operates auxiliary PSN-2 on momentary pulse (quick blip) from Transmitter.

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SOLO

(Continued from page 27)

"with an axe to grind"—the guy who could make money off me, and who didn't know or care about me as a person.

That's what brings me to you, Mr. Justin. You're an expert in this field, and you don't have any axe to grind at my expense. I'm not so far along with it that I can't get rid of the three new servos, and even the Fox .40 engine that I picked up at a bargain, brand new. You say in another spot, "When you put that first multi together, don't skimp on the radio installation." Although I don't have a lot of money, I've found by experience that it pays to buy a good pair of shoes rather than two or three cheap pairs—and easier on the feet, too! Wouldn't I have a better chance of NOT cracking up the first ten feet off the ground, or on the first landing, with proportional rather than reed equipment?

Knowing how to fly an airplane, do you think I might try a Taurus with proportional equipment? If so, after it was built I'd fly it out at Lowry Air Force Base—they must have a club out there, I'd think. Perhaps one of their club experts would check it out and give me pointers—he wouldn't be "in the business" either, so maybe I'd have a chance of getting straight dope!

Thanks for wading through this, even if you probably do think I'm a nut by this time. Try to see it a little from my point—I want to fly, and I don't have all the time in the world! I'm not asking for sympathy, but the facts may influence your conclusions. I told you my circumstances were a bit different than most.

Thanks again for your patience, Mr. Justin. I will be looking forward anything you can tell me that will help me along.

Respectfully,
C. H. "Marty" Martens
1437 Clayton Street
Denver, Colorado

I think our readers will be pleased to know that C & S Electronics has sent a Taurus kit to Mr. Martens. Due to the long delay in delivery time in most proportional rigs, and since time is a crucial factor here, this magazine has contacted Harry Sampey of Sampey and Company who agreed to fill Mr. Marten's order

as soon as received. On behalf of the industry let me say that this is being done not out of pity for Mr. Marten's condition, nor as an attempt to ease our conscience because an individual RC'er received what he considered to be poor advice from an industry representative. Rather, it is done out of a feeling of compassion for a fellow modeler who, because of circumstances beyond his control, need help now. I want Mr. Martens to know that modelers in general, and RC modelers in particular, are as outgoing and helpful a bunch as I have ever met in any walk of life.

Mr. Marten's letter brings the proportional versus reeds controversy to the point of needing an answer. I'd like very much to say that the two are not competitive and write "finis" to the question, but such is not the case. In the hands of an experienced flyer, the proportional rig is smoother. However, in order to achieve this, the proportional rig is more complex with three times the number of components in the receiver. It will, at this time, mean a higher ratio of equipment failures, but as the art advances, proportional will, perhaps, become even more reliable than reed equipment as we know it now. The thing that impresses me is that if I would trade my twelve channel reed rig in for proportional equipment, I would spend a good amount to smooth up my flying, and I'm not sure this would be important except in competition. However, if I was a newcomer how could I justify reeds when a proportional rig would give me a ready-to-install system? What I'm saying is that if you're flying reeds you haven't been left behind, and if you're a newcomer there is a new and impressive development ready to consider.

Don't forget that we are talking about the top end of the line—there is a heavy percentage of fliers that are perfectly content to move one surface, with all its inherent challenges, and couldn't care less if the rest of us use reeds, proportional, or sun powered butterflies! (These people will be glad to know that at least one manufacturer is working on a truly miniature superhet single channel system, on which we will give a complete report in the near future.

Perhaps this "answer" will give Mr. Martens enough to form a conclusion as to what is best for him. Perhaps, too, those RC'ers in the Denver area might like to contact him and offer their assistance. We hope so. There's an old proverb that says something about when you help a fellow traveler up a mountain side, you get nearer to the top yourself.

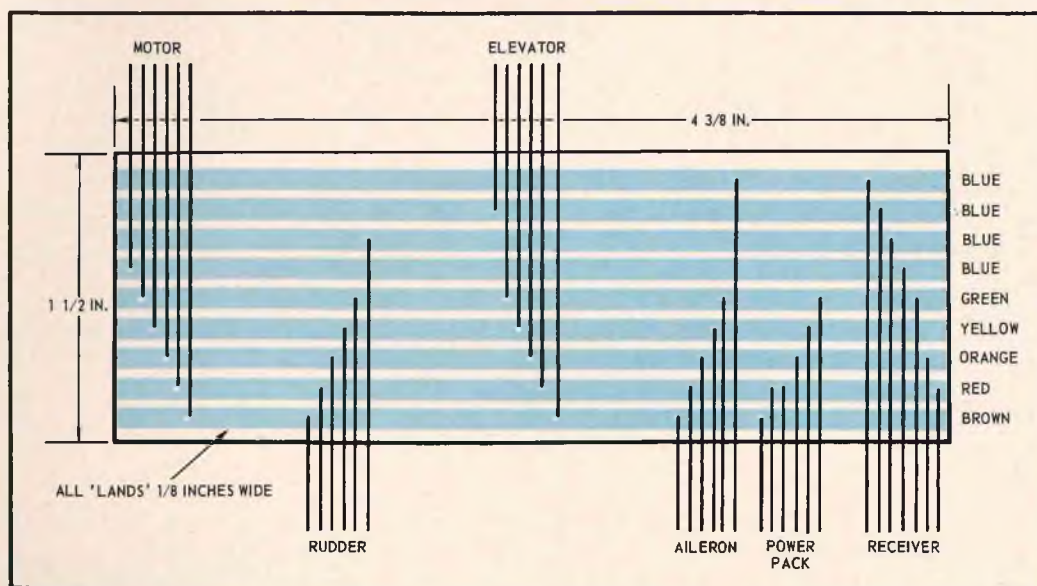
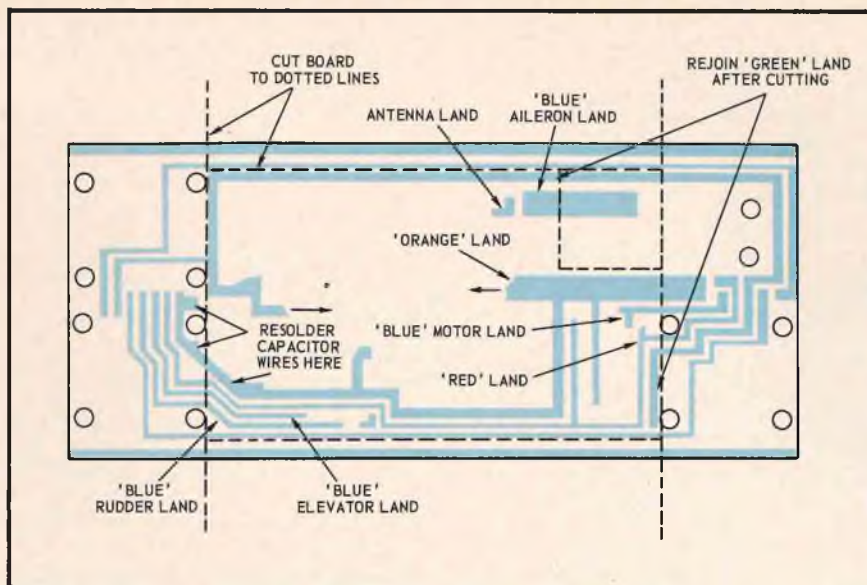
And good flying, Mr. Martens.

SPACE CONTROL

(Continued from page 41)

so that they would not pull through the case and out of the terminal board in a crash. This portion of the board had nothing on it except the serial number.

Some Space Control owners may not wish to have their servos mounted in this manner, and it is therefore pointed out that Orbit connectors could easily be put on each servo and the strap over the servos deleted, so that the servos could be mounted individually. In this case, it might be better to bring the servo wires out of one end of the case.



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A.M.A.

(Continued from page 42)

2. The use of publicity stressing the point that it is most difficult, if not impossible to get intoxicated through solvent inhalation; that deaths attributed to glue sniffing have more than likely been due to strangulation or lack of air. In other words, breathing a strong concentration of fumes is ineffective and efforts to induce stimulation in this manner have required the victim to completely exclude oxygen by such devices as putting his head completely into a bag containing the solvent—any deaths resulting can be blamed on lack of air as much as the effect of the solvent.

It should be recalled that several similar situations have been resolved in recent years, largely through educational promotions aimed at pointing out dangers in the careless use of home products. The laundering industry went through a panic of threatened legislation to ban the use of plastic bags which had caused deaths due to strangulation. Likewise, hair sprays survived ban attempts resulting from fatal fires caused by spraying while smoking. In all such cases, the answer has been education rather than restriction. Otherwise, why not ban the greatest killer of all—the automobile?!!

The AMA urges, therefore, that mature good judgement be used in matters pertaining to this subject. This applies to all: governmental agencies at all levels; hobby manufacturers, distributors, and retailers; to general news media and specialized publications in the hobby field; to all individuals concerned with the future of aeromodeling and with the well-being of American youth.

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ten channel
installation

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The Justin Micro-Tie is a high quality printed circuit board designed to simplify the installation of multi-channel equipment. The use of the Micro-Tie eliminates up to 6 connectors and 44 solder joints in the average ten channel installation. It provides hook up for 5 Bonner Servos, power to the receiver and servos and hook up for the reeds. The Micro-Tie uses a mil spec edge connector to supply the receiver with all requirements except the antenna lead. The connector has gold contact and supplies a maximum wipe area to the circuit board and is able to withstand extreme shock and vibration. The Micro-Tie comes complete with all necessary hardware for mounting to the back of a Bonner Servo, although it can be mounted in any convenient spot that allows servo leads to reach the unit. Lacing cord and insulation tubing is also supplied.

ELECTRONICS PRODUCTS DIVISION
justin, inc.
BOX 135, SAN GABRIEL, CALIFORNIA