

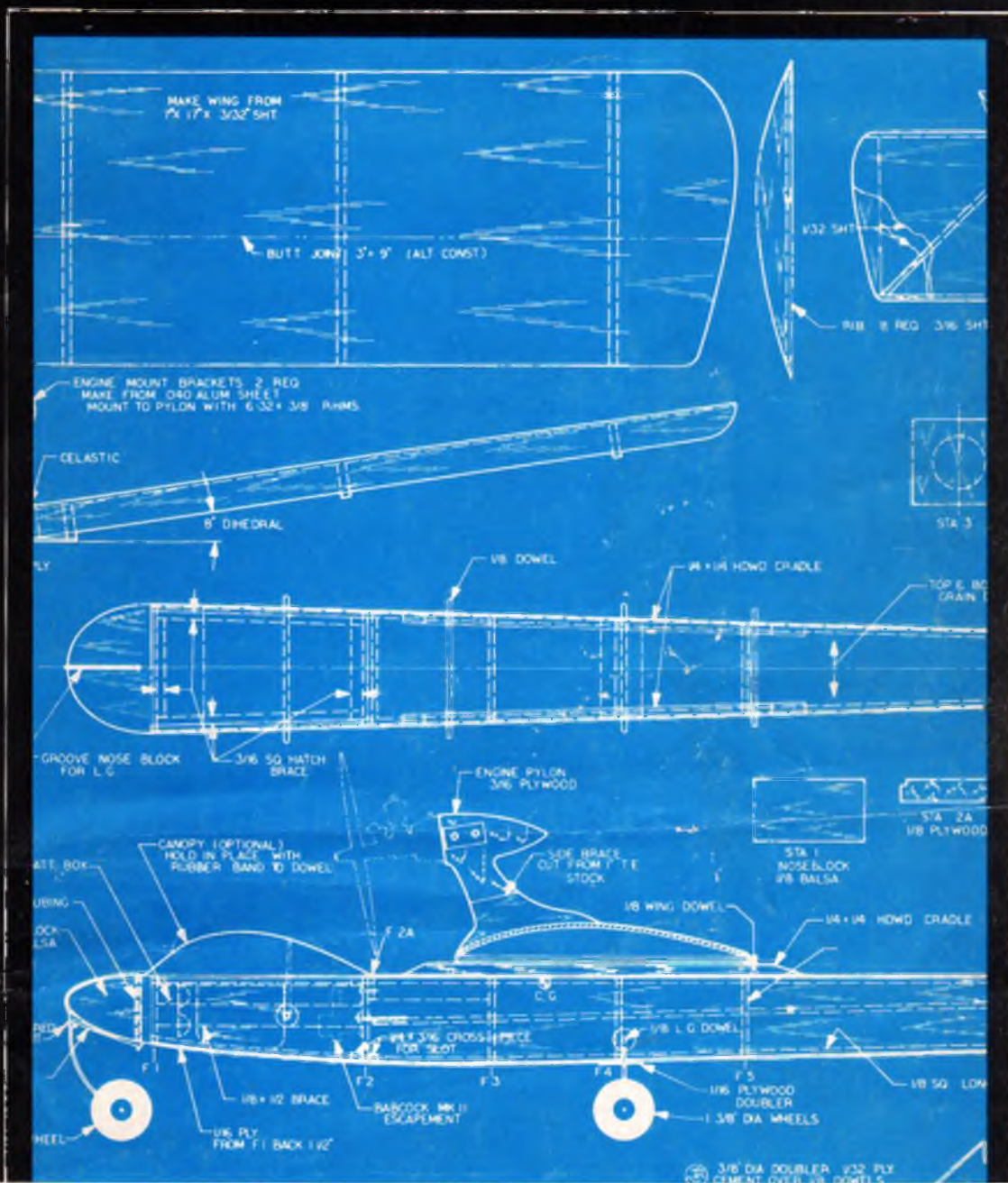
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JANUARY 1964

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Blueprint for Beginners

KEN WILLARD

THE F-9 a new look in multi's by Darryl Usher

R/c *modeler*

VOLUME 1, NUMBER 4

JANUARY, 1964

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EDITOR'S



MEMO

This has been some month! First, Chuck comes down with the flu — recovers, and is back down a few days later with pleurisy. This puts us behind schedule. Then, yours truly comes down with pleurisy, or pneumonia, or something — and we're behind another few days. When you live with deadlines that require a routine twelve to fifteen hour working day, seven days a week, in a normal month and you get behind — brother, you're behind!

Somehow we managed, with Kathleen holding down the fort and supporting Chuck all the way through the Orbit tour, while your editor, at home in bed with heating pad and thermometer, pounded the typewriter keys. Everything was on the plus side of the ledger until the better half of the Dewey family came down with the flu. And, as if this weren't enough, her contender for the 1976 Nats broke out with the measles!

In spite of it all, we made it. We even got a chance to sneak down to the flying field with Phil Kraft. Phil's Flat-Top Stormer really tore up the sky, his new proportional rig making each maneuver look like it was right out of the judge's manual! Phil was a little bent out of shape over a recent issue of RCM that mislabeled his sports car a Triumph — in reality, it's an Isetta.

While we're in the retraction department, castor oil will not replace nitro in fuel — just in case you didn't know! We attributed this classic statement to Clarence Lee, who in his usual quiet manner, asked us (among other things), why we didn't suggest soy bean oil and Thunderbird wine as a home brew! Like we said, it's been a bad month.

Next one will be better, though — we're going to present our favorite multi design from one of our favorite people — the Norseman by Ron Chapman. Ron is a gentleman, and one of the finest flyers we have ever known. In this writers

(Continued on page 62)

DEAR RCM:

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

Just wanted to drop a line to let you know that your magazine is great!

How about some construction articles on some of the most popular multi-kits? I have just finished my first one, a Taurus, built from the Top Flite kit. Believe me, I could have used some professional advice! Most of the trouble was in trying for a "Kazmirski finish," so maybe an article on custom finishing and painting. Living in a small town there is no one to turn to—I'm sure there are other modelers with the same problem.

Keep up the good work and thanks for a great magazine.

Tom Wilson
Barbourville, Ky.

Good ideas, Tom—we're going to start with a step-by-step photo and text construction article on a single and six-channel version of the new Schoolmaster kit in the February issue.

We have just received the first issues of R/C Modeler, and all of us here think it's great, and wish you the best of luck. One small point—will you please put the scale of the drawings on the construction plans; i.e., the Stagger-Bi? I'm a real biplane fan—in fact the gang says I even see two wings on an Orion or Taurus! To me there is nothing like twin wings!

Once again, all the best!

E. S. Scott Foister
Nottingham, England

We goofed on the scale! They're usually one-fourth or one-fifth full size. And if you liked the Stagger-Bi, wait until you see the bipes (plural) that are forthcoming!

I have recently purchased a Midwest Esquire kit and would appreciate your suggestion as to a good transmitter and receiver. I am a beginner at radio control and still don't know what equipment is best to choose. What I need is a single channel rig, and any information you can give me will be greatly appreciated.

Marshall Bissonnette
St Meinrad, Indiana

With interference problems always on the increase, we would suggest a superhet receiver and matched transmitter, if finances permit. A good investment is one of the "convertible" single channel superhets that permit the substitution of a ten or twelve channel reed bank for the single channel relay when you are ready to go into multi. Initially, it's more expensive, but in the long run will more than pay for itself. There are several such rigs available, and among them are the C&S "Oriole" and "Cardinal"; the Kraft Custom Convertible; Controlaire, etc.

Let me start off with a compliment for your magazine. It's great. It is just the thing for a semi-technical minded person like myself. I hope the mag lives a long life.

I would like to take advantage of your offer to answer technical problems. I have an F & M Vanguard superhet single channel receiver. It has been performing for me very well, however, I would like to convert it to ten channel operation using the New Haven reed bank, if it is feasible. Could you advise me on this, and supply me with the necessary circuit changes if it can be done.

Robert M. Livin, O.D.
Cedar Rapids, Iowa

Although it is theoretically possible, it would be highly impractical to attempt a conversion of the F&M Vanguard—too many changes would be needed in the audio section. With regard to the New Haven reed bank—we have experienced some difficulty with this unit in excessive reed vibration. Although this can sometimes be cured by interleaving thread between the reeds, it is certainly not good practice. We highly recommend the Medco reed bank to home constructors.

Just finished reading your latest issue and wish to send in my congratulations to you and your team for a fine presentation. I've taken all the usual mags (United Kingdom and USA) regularly since 1947. There are some mighty fine publications from both sides of the

(Continued on page 59)



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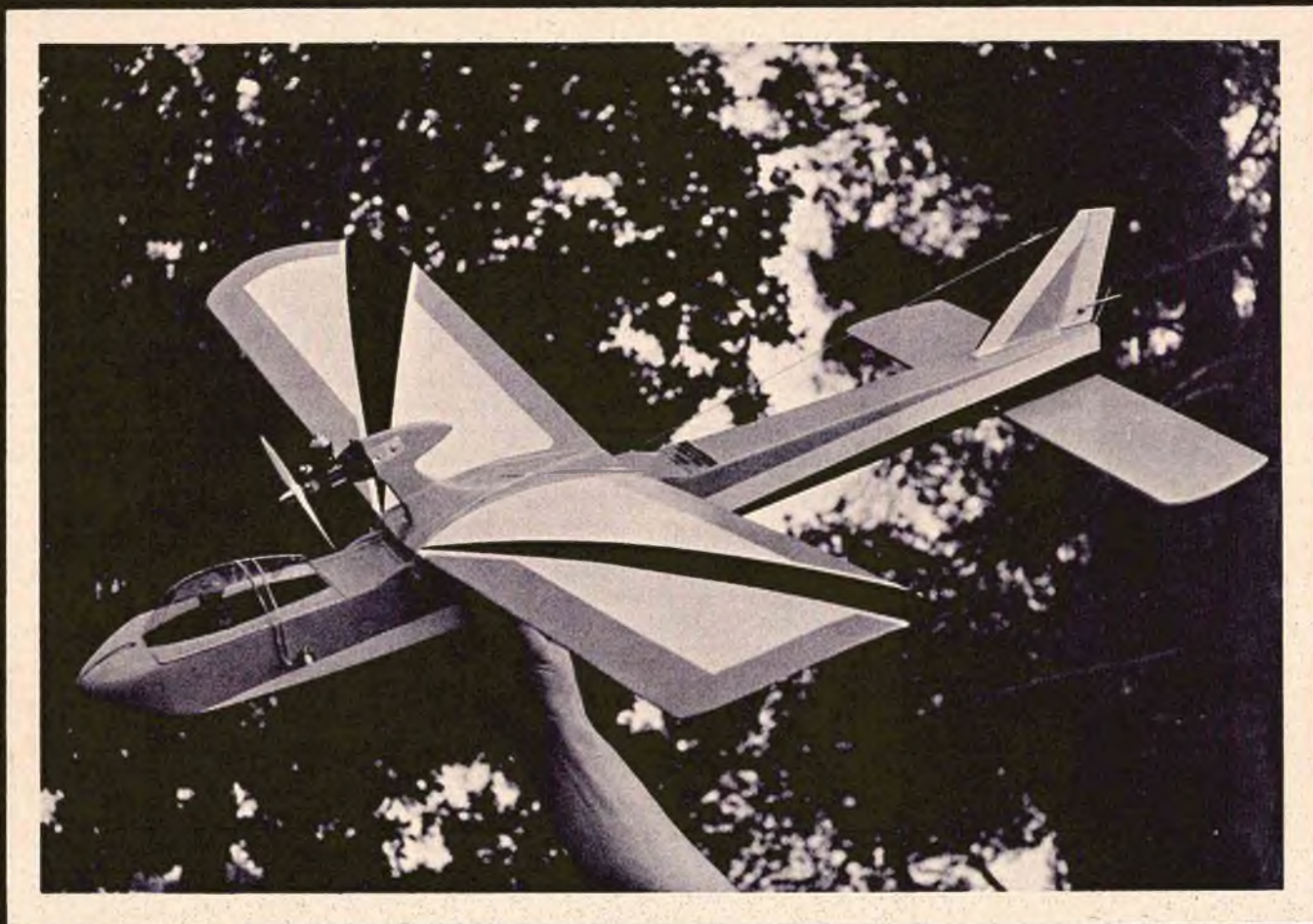


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the virus

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. by KEN WILLARD

STEP-BY-STEP INSTRUCTIONS FOR THE IDEAL BEGINNERS SHIP

Full Size Timely Plan Available

● Last month we talked about the radio equipment for beginners in R/C model flying—transmitters, receivers, and actuators. Having covered that phase, our next concern is the model in which to install the equipment. And here again, you'll find as many opinions as there are modelers. If, however, we keep uppermost in our minds that the beginner I'm trying to help is neither a free flight or control line convert, nor is he a radio ham, certain basic facts can be listed for use in selecting a design.

Let's digress for a moment, though, and mention some good kit designs for modeler converts from free flight and control line. For free flight converts, accustomed as they are to polyhedral, paper covering, single box fuselage—typical free flight construction—the Nomad makes a good beginners R/C trainer. For the sport free fliers—modelers who like to fly Veco Dakota's, Midwest Sniffers, and similar sport models, there are many good kits, both large and small. The Schoolboy, Lightning Bug, Lil Esquire are good small jobs; the Esquire, DeBolt Champion, and other similar models are good in the larger size.

For the control line converts, it's hard to beat DeBolt's Champion—the construction is similar, and when built true and properly balanced, first flights are usually completely successful—unless the modeler gets too nervous and goofs on the controls!

But back to you, the absolute beginner. Let's list all the things that are most likely to cause you trouble:

1. Covering. Your first covering job is likely to be pretty sad. Sure, some of you will do great, but for most beginners, this is a real chore, with no assurance that even with care you'll have a smooth job. The solution? Eliminate the chore. Make the entire model of balsa.

2. Glueing. "Laying a bead of glue" is standard practice, but at first try it's hard to keep the flow from the glue container smooth and regular as you apply the glue. So, the answer is to make the areas to be glued together big enough so that the pieces can be pressed together and the excess glue wiped away without losing all of the cohesion.

3. Warping. The variation in balsa weight, strength and stiffness, are very likely to cause warps when two dissimilar pieces are bent to a shape. So—do a

minimum of bending, and when necessary, do it so that the pieces are firmly fixed in place on your flat workbench until dry.

4. Installing the equipment. Most beginners tend to be a little "hamfisted." To overcome this, the equipment should be easily accessible with no need to get your hands deep inside the fuselage. Solution—make the escapement, radio and batteries easily reached through a removable hatch in the top of fuselage. All wiring right at the top, too.

5. Engine operation. The engine has to be easy to start. Fortunately, most of today's engines meet that requirement, particularly if the manufacturer's instructions are followed. The engine should also be kept clean—and this isn't always easy. However, it's possible to reduce the frequency with which dirt gets into the engine by putting the motor on a pylon above the wing. Then, in addition to its being readily accessible, it isn't always nosing into the ground on rough landings. Sure, the fuel drips down on the model, but it's easier to wipe off a model than to clean a dirty engine.

6. "Finishing" the model. This really is minor, if you go the all-balsa route. "Finish" can be either glass smooth, through the use of balsa filler coat and careful sanding before applying the final coatings, or it can be smooth, but with the balsa grain showing, if you simply apply the dope directly to the sanded wood, then sand smooth and add more coats until the surface is well sealed.

Dope comes in two kinds—nitrate and butyrate. Nitrate is cheaper but does not have the fuel-resisting qualities of butyrate. All dopes have a characteristic of shrinking, and if your balsa structure does not have uniform strength, the shrinkage can cause warping. A new material, called HobbyPox, solves not only the shrinkage problem, but in addition, is absolutely fuel proof. True, it's a little more tedious to use than dope, but for a simple beginner's airplane, all balsa in construction, two good coats of HobbyPox applied directly to the smooth sanded balsa, serve to seal, strengthen, and fuel proof the model without introducing warps. Later on you can decorate the model for appearance, following the manufacturer's instructions. I'd advise a couple of practice coats on scrap balsa first.

7. Adjusting. Here you get into a real meaty area which we'll discuss later in more detail. For now, let's just look at the logical design approach to minimize the adjustment problem. The design must inherently be very close to the final requirement with respect to the angular setting of the wing, tail, and motor; then it should provide an easy means to make minor adjustments in order to achieve the desired flight. Finally, the design should be capable of flying, even though badly out of adjustment, so you don't bust it up before the final trim is achieved.

8. Flying. Obviously, for a beginner, the model should be reasonably slow, so it doesn't "get ahead" of the modeler. Its response to a radio command should be both gentle and firm, and the model should be stable enough that if you get confused you just leave it alone for a few seconds and it returns to level flight all by itself. Small models have the reputation of being a little tricky to fly. Large models, on the other hand, have a more stately flight, but when they crash, it's much more catastrophic. So, ideally, we should try to come up with a relatively small model, which is easily built and repaired (and less susceptible to damage), yet which flies like a big job. The compromise is hard to achieve, particularly when you keep in mind all the other things we've talked about thus far!

Okay—there are all the major problems with ideas for their solutions. Put all the ideas together and what comes out? An all-balsa airplane, mostly straight line in design, with a wide shallow fuselage, easily accessible equipment bay, engine on a pylon above the wing, and easily adjustable surfaces and thrust line. Such a plane may not be the most aesthetic job in the sky, but you'll be hypnotized into thinking it is as you learn to fly your first radio job. It's like a virus; once you've had it, you're hooked. So here is the VIRUS. Don't build it unless you're ready to pay the penalty—hours and hours of fascinating fun!

THE VIRUS

Construction

Let's start with the wing for two reasons: first, it's very simple to make, and secondly, when you've finished, you'll be that much more impatient to con-

(Continued on page 12)

struct the fuselage, which does take longer and, admittedly, has a couple of tedious steps which the inspiration of the finished wing will help to ease. Before beginning, obtain a sheet of 7" wide by 34" long 3/32" medium grade balsa sheet. If your hobby dealer does not stock as wide as 7", obtain a 3" and a 4" wide sheet, selecting two pieces that are similar in weight and grade and which butt together snugly along one edge. Be sure to select your material with care, rejecting those sheets that have a curvature to their edges.

Step 1. Lay a piece of wax paper on your work table, then butt the two sheets together, and tape them with masking tape per Fig. 1.

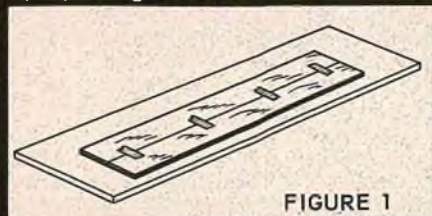


FIGURE 1

Step 2. Next, pick up the sheets, and using the tape as a hinge, open up the butt joint, per Fig. 2.

Step 3. Lay a "bead of glue" along the edge.

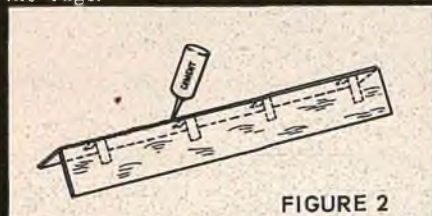


FIGURE 2

Step 4. Now lay the sheets down flat on the table, with the tape hinges down. The butt joint will close tight, and excess glue will squeeze out. Wipe it off, then tape the top together, so both sides are now firmly held together in the flat position, and let dry. See Fig. 3.

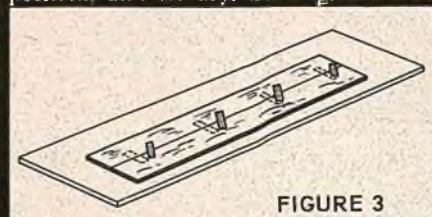


FIGURE 3

Step 5. When dry, cut into two 17" wing panels, shape tips and proceed.

Step 6. Cut out the ribs from medium 3/16" stock. Note rib depth is 1/8" greater than the airfoil curve of the sheet. This makes the ends project out at the leading edge and trailing edge.

Step 7. Pin the ribs of each panel in place on your flat table. Insert the pins at the leading edge as shown in Fig. 4, so the leading edge of the sheet will fit tight against the pins when the

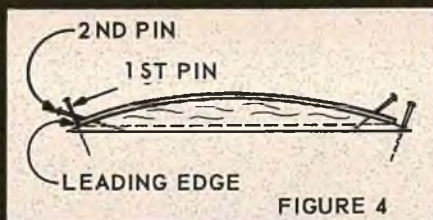


FIGURE 4

sheet is placed in position.

Step 8. Lay a bead of glue along the ribs, using reasonably slow drying glue. Any of the regular brands will do — just don't use the "extra fast" type designed primarily for on-the-spot field repairs.

Step 9. Pin the leading edge of the sheet in place with a second pin, as shown in Fig. 4, at all the ribs, then gently press the sheet down to fit the rib curve. Pin the trailing edge down. Let dry.

Step 10. When dry, pick up the wing panel assembly and trim off the ribs at the leading edge and trailing edge. Also, trim off the center ribs so the bottom flat surface is flush with the leading edge and trailing edge. This is so you can get a flat surface at the center section when you join the two panels. See Fig. 5.



FIGURE 5

Step 11. Next, make a wedge shaped piece of wood to join the panels together at the center. The angle of the wedge, 16 degrees, determines the dihedral, which is 8 degrees for each panel. Fig. 6. If you're lucky, your dealer may have a piece of trailing edge stock which fits the requirement.

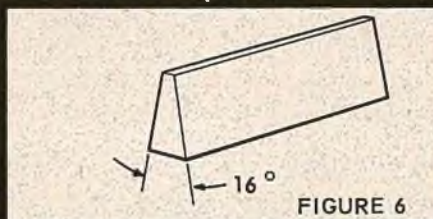


FIGURE 6

Step 12. Glue this center piece to the center rib of one panel. When dry, trim the top to fit the airfoil curve.

Step 13. Block up the tips to 3 1/4" and glue the other panel to the center piece, making sure that the bottom of the center ribs and the center piece are flush on the table from leading edge to trailing edge.

Step 14. To strengthen the center, cover the joint from leading edge to trailing edge on top with a 1" strip of

either strong nylon cloth, or preferably, "Celastic," a hobby material available in most hobby shops. Fig. 7.

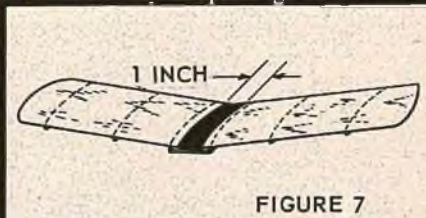


FIGURE 7

Step 15. For additional strength, cover the bottom of the center section from the center to the first ribs with 1/16" flat sheet. Grain should run spanwise.

Step 16. Wing is now finished, except for sanding and doping, and is ready for the engine pylon.

Step 17. Cut engine pylon from 3/16" plywood.

Step 18. Glue side braces, made from 1" trailing edge stock, in place at bottom. Tailor to fit wing curve as in Fig. 8.

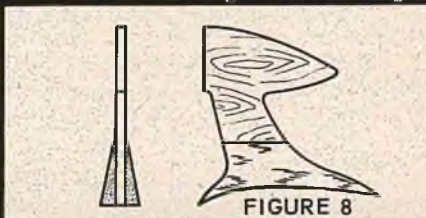


FIGURE 8

Step 19. Make engine angle braces from .010 aluminum and drill mounting holes but do not mount. Fig. 9.

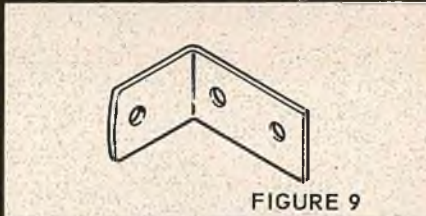


FIGURE 9

Step 20. Butt glue pylon assembly to top of wing and let dry thoroughly.

Step 21. Whole assembly can now be sanded and doped or sprayed with HobbyPox as described earlier.

Step 22. Next, bolt angle braces in place and mount the TeeDec .020 engine.

Fuselage

Step 1. Cut fuselage sides from 2" by 1/16" by 36" stock. Lay flat on table, over wax paper.

Step 2. Glue 1/8" sq. longerons and braces in place. Pin longerons as necessary to hold in place. Glue 1/2" X 1/8" X 4 7/8" nose brace in place on each side.

Step 3. Lay right side on table, glue 1/4" X 3/4" X 1 1/2" tail block in place. Shave sides of block to fit taper angle. Fig. 10.

Step 4. Glue 1/8" X 1 1/2" X 2 11/16" nose aligning block in place.

Step 5. Glue left side to top edges of tail and nose blocks as in Fig. 11.



FIGURE 10



FIGURE 11

Step 6. Make rectangular bulkheads for stations 3, 4, 5, 6, 7. Cutouts can be made now, or later, as discussed in Step 9. It depends on what tools you have. Glue bulkheads in place.

Step 7. Cut $\frac{3}{8}$ " hole in tail block, centered $\frac{5}{8}$ " up from bottom, for escapement rubber to be inserted. Also cut $\frac{3}{16}$ " hole, centered $\frac{3}{8}$ " down from top to accommodate torque rod.

Step 8. Make tail plate $1\frac{1}{2}$ " X $1\frac{1}{8}$ " sq. from $\frac{1}{16}$ " plywood. Glue in place. Drill $\frac{3}{64}$ " hole, centered $\frac{3}{8}$ " down

from top, for torque rod bearing, and $\frac{3}{8}$ " hole, $\frac{3}{8}$ " up from bottom, for escapement rubber access hook.

Step 9. Cut holes in bulkheads (shown dotted on plans), to permit torque rod and rubber to extend freely from tail to escapement at station 2. Holes are not cut before gluing bulkheads in place because the solid bulkhead is easier to put in place; also it helps to keep everything aligned. It is a little awkward cutting the holes after the bulkheads are glued, but better for reasons stated.

Step 10. Make escapement holder frame from $1\frac{15}{16}$ " X $2\frac{3}{8}$ " X $\frac{1}{8}$ " plywood. Cut out to accommodate escapement, drill mounting holes and mount escapement with 3-48 bolts, $\frac{1}{4}$ " long.

Step 11. Cut out top and bottom of fuselage from $\frac{1}{16}$ " sheet. Straight taper from $3\frac{1}{16}$ " at front to $1\frac{1}{8}$ " at tail. You can use 3" wide wood to save money, and start taper 1" back from nose.

Step 12. Glue bottom in place. If any small curve may have developed in the sides when the bulkheads were glued in, the sides can be bent straight to fit the straight taper of the bottom, and pinned until dry. Since you built the

sides on a flat table, this may not happen, but if it did it will be very slight and easily corrected by fitting the bottom on.

Step 13. Glue two $\frac{3}{16}$ " X $\frac{1}{4}$ " X $2\frac{3}{8}$ " balsa cross pieces across the bottom at Station 2, $\frac{1}{8}$ " apart. This makes a slot where the escapement holder fits in at the bottom. Keep excess glue from clogging this slot by wiping it clean with $\frac{1}{8}$ " sq. stick before glue dries.

Step 14. Fit $\frac{1}{8}$ " X $\frac{1}{2}$ " X $2\frac{3}{8}$ " plywood brace behind the $\frac{1}{8}$ " sq. brace at top of Station 2. Notch top corners $\frac{1}{8}$ " square to fit longerons. Glue in place and at same time glue in $\frac{1}{8}$ " X $\frac{3}{8}$ " X $2\frac{3}{4}$ " balsa braces on sides, under top longerons, from Station 2 to 3. Tailor these for a good tight fit to the plywood cross brace.

Step 15. Escapement now can be easily installed and removed by sliding holder into slot at bottom, using small wood screws to fasten at the top.

Step 16. Glue $1\frac{1}{2}$ " X 3" X 2" balsa nose block to front. You can shape it before or after, as you prefer. I like to cut it roughly to shape, glue it, and

(Continued on page 40)

EQUIPMENT RECOMMENDATIONS FOR THE VIRUS

TRANSMITTERS

CS-502 Falcon
Citizenship SPX
Citizenship CTX
Citizenship FLX
Citizenship TXX
Controlaire Mule
Ecktronic Truflite
Ecktronic Pacesetter
F & M Echo
Irving Tone E Q100
Klinetronics Flightline TTR-1
Lee's Lightning
Min-X Powermaster T-2
Min-X Powermite TT-1
Orbit Single
Otarion OT-31
Spacetrone Mustang I

RECEIVERS

CS 505A
CS-511 Honey Bee
Citizenship MDL
Citizenship LT3
Controlaire 5 Relayless
Ecktronic E3V Courier
F & M Pioneer
Kraft K3V
Min-X Sportsmaster RR-1
Otarion O-21
Otarion O-22
Spacetrone Opal 400

ACTUATORS

Babcock Mk II
Bonner SN
C & S Septalette
Citizenship PSN-2
Citizenship SE-2
Elmic Commander

BENCH BITS

(Editor's Note: Due to the number of articles in this issue of RCM designed for the newcomer to radio control, this month's Bench Bits is intended for the more advanced RC'er and is thus not recommended for the beginner.)

● When the Marcytone PRM-1 single channel proportional system was received here at R/C Modeler we were very anxious to try it out. In the Los Angeles County area, however, superregenerative receivers suffer from a chronic and recurrent disease known as Prangitis Interferus, so it was decided to attempt a conversion utilizing an existing and readily available superheterodyne front end. The Kraft 10-channel receiver, less the reed bank, was an ideal choice for us, as the space gained by not having a reed bank on the PC board provided ample room to add the necessary circuitry to operate the Marcy servos. In addition, this receiver is available in kit form from Ace Radio Control with the RF section already wired, needing only a slight bit of work on the audio section for completion. The front-end is also available from Kraft Custom Radio. Using an additional printed circuit board for the Marcy conversion components and contact cementing in place offers another advantage in that the set is readily convertible to ten channel reed operation simply by adding the reed bank and a 1 mf capacitor.

The actual circuit changes required in the Kraft audio section consists of replacing the reed bank coil with a 220 ohm resistor, and adding the small printed circuit board with the Symmetry Detector as used by Marcy. The remaining

circuitry is not changed in any way, allowing the conversion to be made with very little effort.

There is sufficient gain in the audio section to drive TR5 to saturation at all but the very extremes of range. While

driven amplifiers obviously contribute a considerable amount of distortion to the signal, for this application it is actually a help. The signal at the collector of TR5 is always a square wave of constant amplitude (except at extreme range as stated before).

The Marcy symmetry detector produces a DC voltage at the output which is proportional to the ratio of Tone-on time to Tone-off time. Having a tone that comes on with the same amplitude every time removes the possible error which would occur with a decrease in amplitude. The measurer error signal available at the output of the symmetry detector was -0.8 volts to $+0.72$ volts for full stick movement. Response to changes in stick position was good, but rapid movement of the stick from side to side in less time than one-half second caused a noticeable lag in error signal output. This is certainly no disadvantage as I seriously doubt if a slew time faster than one-half second will ever be required during flight. The airplane would look awfully nervous!

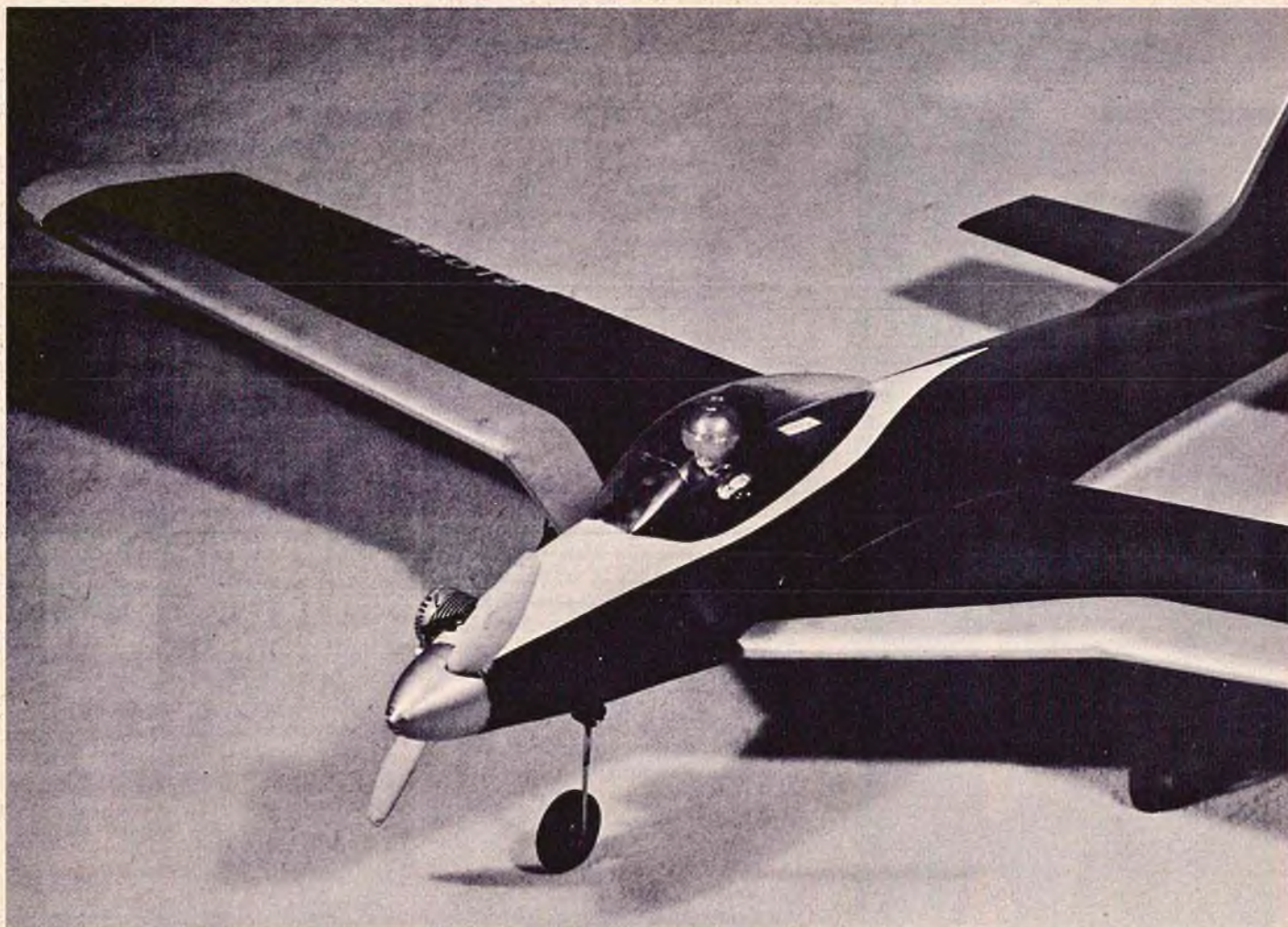
At this point, the question of noise will probably have entered your mind. To date, noise has not been a problem with this system. The effect of noise on an integrating type circuit such as the symmetry detector is to cause a slight DC shift of the error signal which is

(Continued on page 50)

Marcy PRM-1 proportional system with Kraft superhet receiver.



HANK GIUNTA
Technical Editor



F-9 features side-mounted Super Tigre 56 and flying stabilizer. Sleek wing loading make this ship a smooth, fast competition machine.

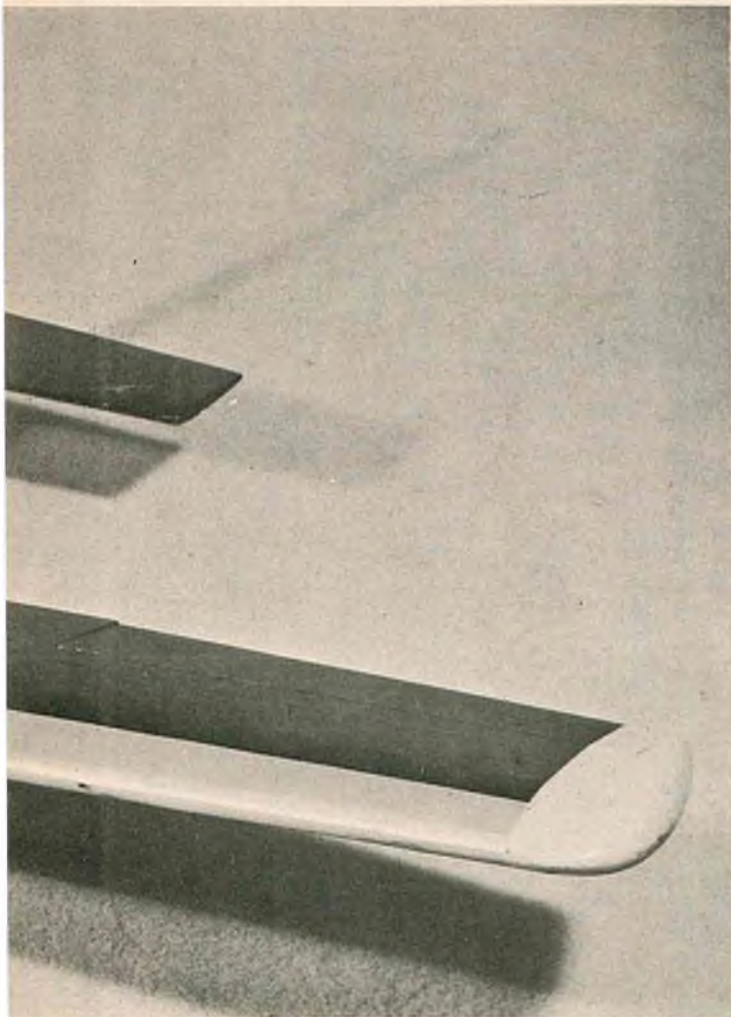
Jet-Like Multi was Highest Pl

F-9

by Darryl Usher

● The F-9 was designed strictly as a contest ship, and since each person has his own personal likes and dislikes, I hope it will prove to have a little something for everyone.

Personally, I have always preferred a high wing loading, because it allows the engine to idle faster with a steeper landing descent, which makes it easier to hit the spot. After building several small airplanes around regular engines, it was decided that the larger models fly more smoothly, but the only way to get the Vertical Eight was with a bigger engine. The F-9 was built with a .45. No effort was made to build it light, and you will notice it has a full length 1/32" plywood doubler and 1/8" ply firewall. You will also notice a large amount of dihedral which takes care of the plane on takeoff, straight flight, and landing.



1 high



Darryl, F-9, and hardware

ing Reed Ship at '63 Nationals

The large vertical fin will hold the F-9 in a normal turn with ease.

The flying tail was designed just to be different, but it has proven its worth in being quite easy to trim and fly. On the first flight I set the flying tail at what looked to be good and level. Later it was measured by blocking the airplane up until the wing was level, only to find it needed more "up", until it measured level with full up-trim.

Then out to the flying field—alone! If it was to crash, I could do without the "I told you so's." Fly it did, albeit needed even more up. In addition, it proved to be somewhat nose heavy, so clay ballast was added in the jet pipes. (Quite handy).

I like an airplane that is easy to fly during the landing, which means that power-off must not change the trim of

the craft. This is accomplished by changing the C. G. to the rear and adding a little down-thrust.

Trimming an airplane is a story in itself and this is simply my approach to the problem. First, I get the airplane to glide both fast and slow with no turn and a nice descent. If it turns when going fast, adjust the ailerons—when slow, adjust the rudder. Adjust the engine thrust up or down so that when the throttle is cut the airplane will not climb or dive. The side thrust is adjusted so that if the ship is pulled off the ground early, it will not swing radically to the right or left.

After the F-9 was trimmed for flight, it was found completely reluctant to spin. More up elevator was necessary, and a servo over-travel was installed. The only reason for this was to slow the

elevator action down. It is not jumpy on elevator, but the down travel was already set for full down for Outside Loops, so the over-travel seemed to be the easiest solution at the time. The total travel could be increased and the down elevator portion of the printed circuit taped off to cut the down elevator for the outside maneuvers.

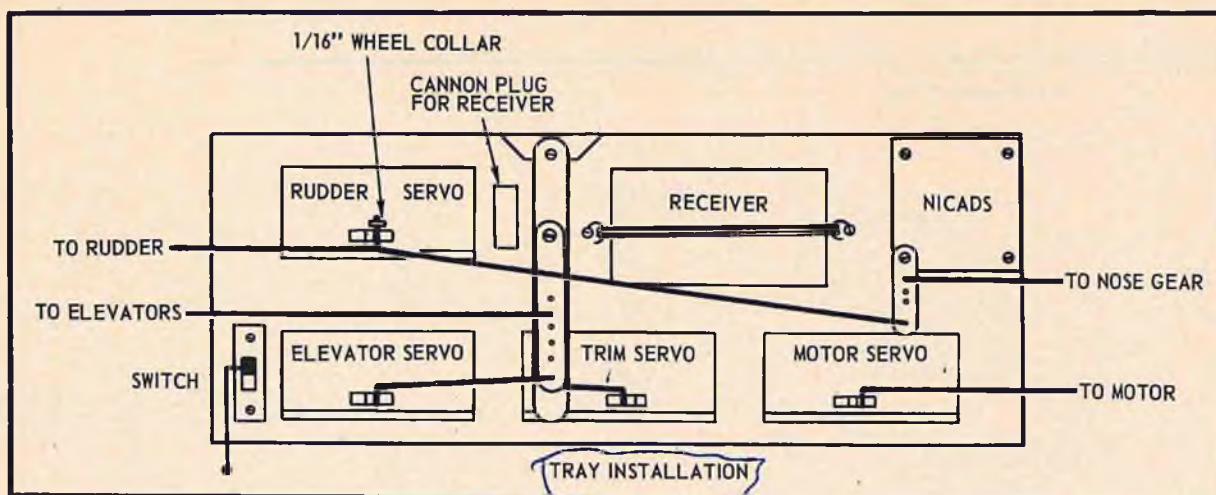
Subsequent flight tests made it quite evident that the .45 would not handle the seven pound ship as was desired. In an effort to lighten the plane, the battery pack was moved from behind the first bulkhead to the center of the wing. The ballast, added to the tail, was removed. This was not a big change and little difference was observed.

(Continued on page 46)

Full Size Timely Plan Available

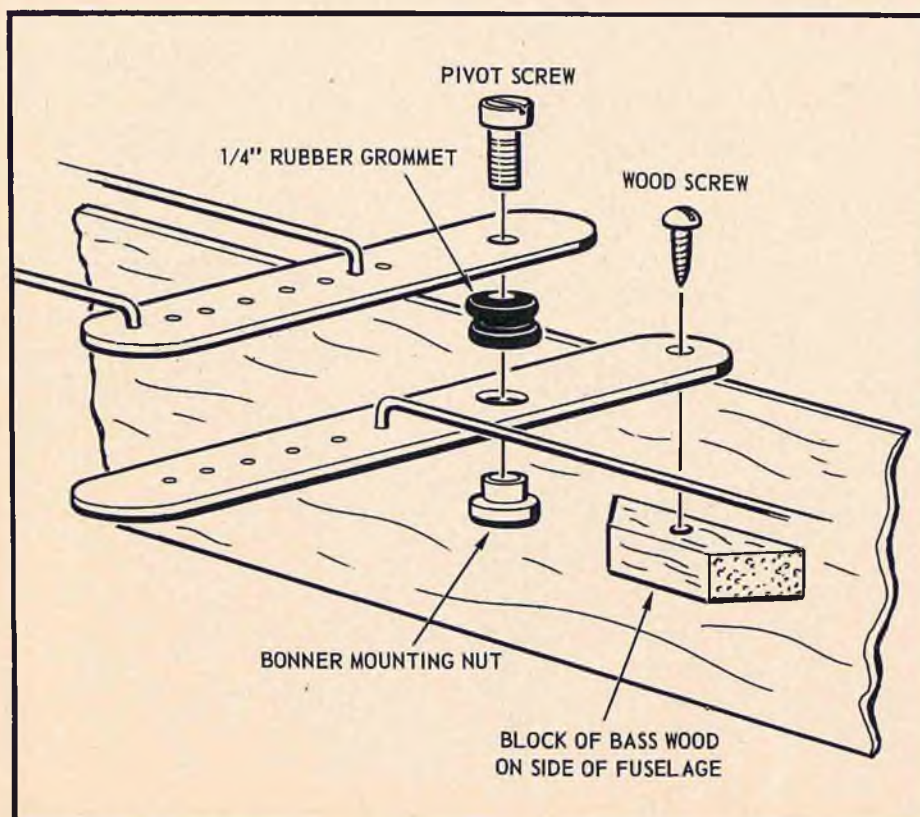
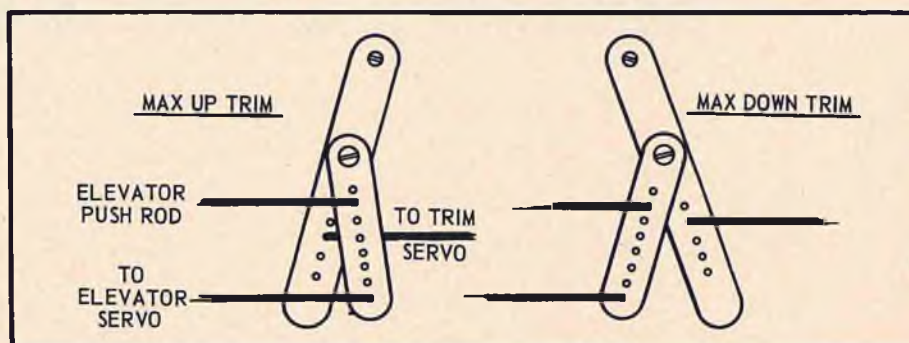
DESIGNED BY: Douglas Aircraft Company
F-9
0 1 2 3
FEET

TYPICAL
FMS. NUMBER
SECTION



Contest-Proven Trim Bar

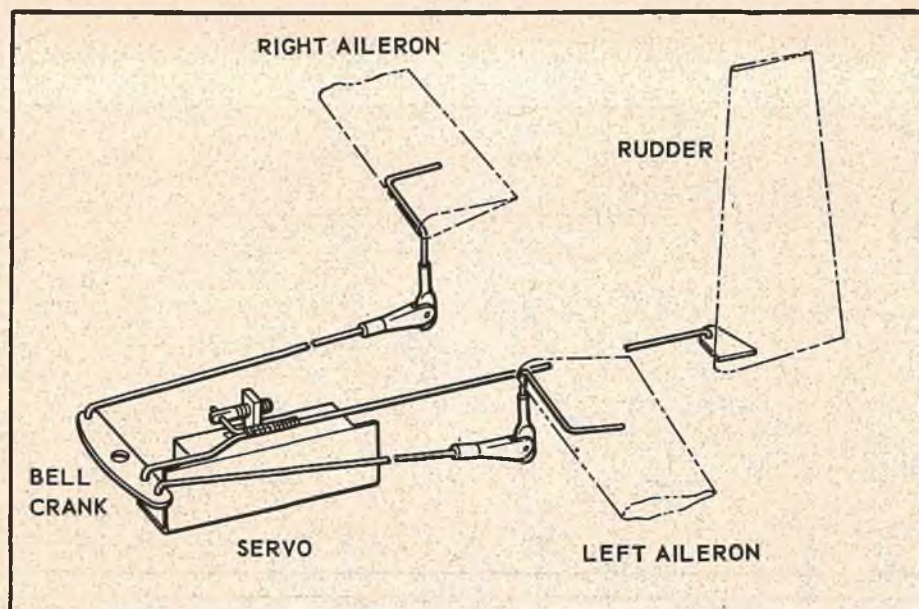
by Ron Chapman



● Next month, RCM will present The Norseman by Ron Chapman. The following trim bar and multi installation is an excerpt from Ron's plans. One major advantage of this installation is that the entire unit, mounted on an aluminum or epoxy tray, can be transferred to another plane in a matter of minutes. The trim bar set-up has proven very successful, as evidenced by Chapman's long line of contest wins. This arrangement provides complete coverage of all trim adjustments.

The NiCads shown in the drawings are 500 mah cells stacked one atop the other, and squeezed between two pieces of 1/8" fiber board and clamped to the tray with 4-40 bolts. One of the bolts acts as a pivot for the nose gear arm, where it is extremely important to reduce movement.

The wiring plug in the illustration is a 15 pin Cannon unit.

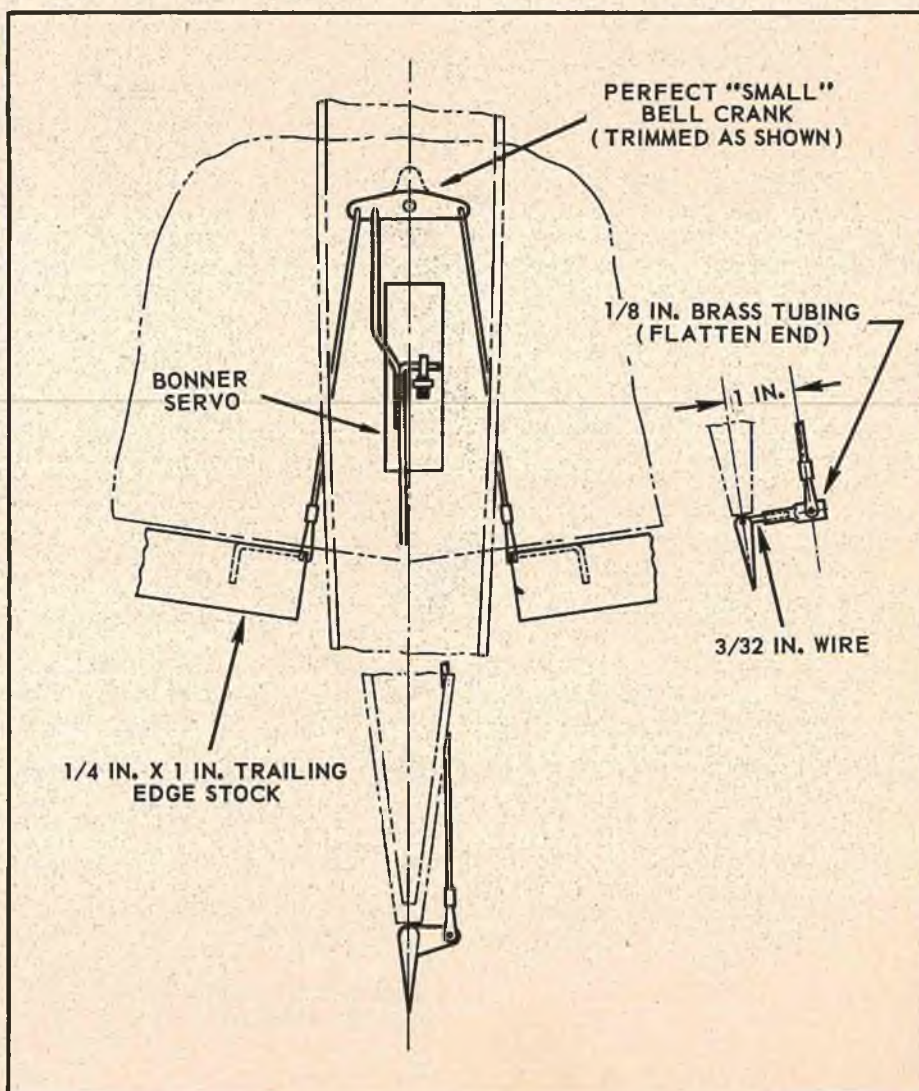


by Charles Cunningham

Coupled Aileron and Rudder On Six Channels

● Our first impression upon seeing Charles Cunningham's coupled aileron and rudder arrangement for six channel usage was, "Why didn't we think of that?"

Chuck employs the arrangement shown in the very popular Falcon 56. Over one hundred successful flights to date bear out his claims for the effectiveness of employing the aileron surface. Further modifications to his Falcon include increasing the rudder area two and a half times, and decreasing the decalage to a total of one percent. Cunningham uses a Veco 19 for power.



Handy Capacitor Checker

by Don Sektnan

● The serious home builder of radio control projects often finds himself in need of various pieces of service equipment. Almost everyone has a multimeter or VTVM, field strength meter, or maybe even a grid dip meter, but there comes a time when a capacitor checker is invaluable in saving hours of work while trouble-shooting RC installations.

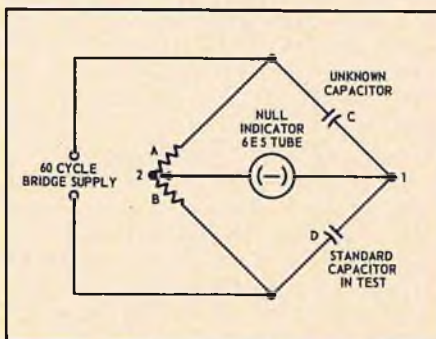
It is at times confusing to read the various kinds of color coding on the type of capacitors that do not have the value stamped on them. Just by holding it the wrong way when reading the colors will throw you off completely. One important point which always creeps up in constructing radio equipment, particularly receivers with critical stages, is the correct microfarad value of the capacitors.

Because of the percent tolerance factor, called GMV (guaranteed minimum value of $+100\%$ -20% of the labeled value), the value may be at the extreme end of the range of percent rating for that particular capacitor and be practically useless for the intended circuit. It has been found that even new capacitors can be either shorted or open.

Capacitor checker kits now on the market carry about a \$20 price tag and thus are expensive items for the average radio control fan. Another disadvantage to the commercial kits are the inaccuracies on the scale ranges. More often than not these are generalized markings taking into account the quality of parts put into the kit and the lay-

out of the parts—the main problem being inner electrode capacitance. The capacitor checker here is very basic—it simply checks microfarad value, and is made up of a few simple parts available from local sources with a leeway in substitution of various parts.

This capacitor checker uses the basic AC bridge circuit with an electron ray tube wired across the bridge to serve as an indicator when the bridge is balanced. This 6E5 tube retails for around \$1.70, is extremely accurate and much cheaper to use than a meter. The basic circuit is shown in Fig. 1. The 6E5 acts

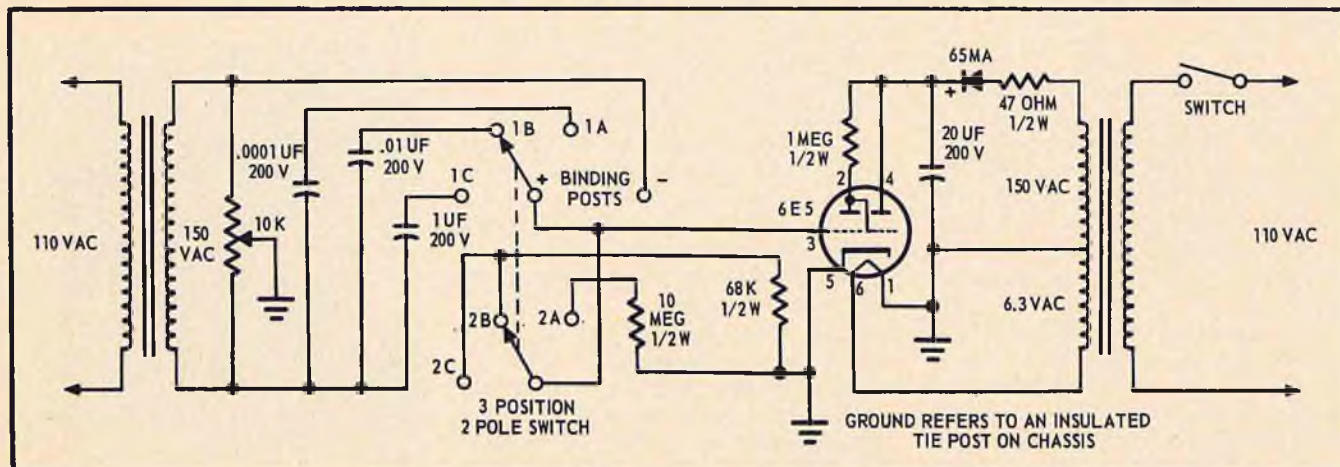


as a grid detector and has a triode section included in it to increase its sensitivity. When the detector indicates a null, the voltage between points 1 and 2 is zero. The voltage across arms A and C are equal, as are the voltages across B and D. The AC signal across the bridge produces a negative grid voltage. As balance is reached, this voltage decreases and the eye shadow angle opens to a 90 degree shadow.



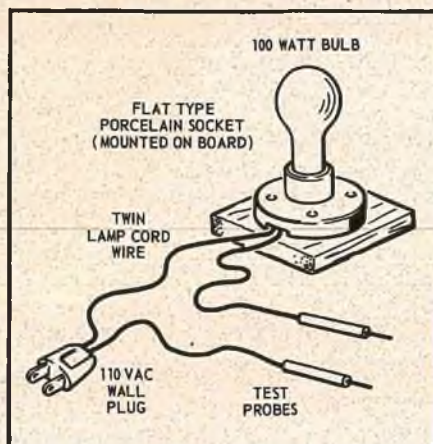
In order to keep the cost to a minimum, a home made cabinet is formed out of tin and sweat soldered together at the seams for rigidity. The box is 7" high, 5" wide, and $4\frac{1}{2}$ " deep. A 6" X 4" aluminum chassis with a 1" lip on the long side is fastened to the back side of the front panel at a 90 degree angle. For those who do not have access to suitable material, a Bud utility cabinet #AU-1029, 6" X 5" : 4", or #AU-1040, 9" X 6" X 5", can be used to make your own chassis. The size isn't too important as the larger size box would permit wider spacing of parts and provide a larger front panel for a calibrated face plate.

(Continued on page 22)

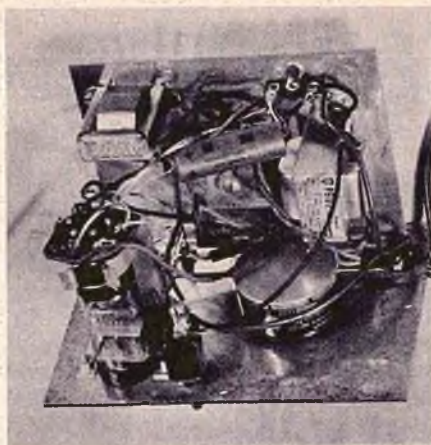


The power supply is a half wave rectifier type using a small power transformer (150V secondary with a 6V filament winding), a selenium rectifier (65 ma), one surge resistor (47 ohms), and one filter capacitor (20mfd 200V). A suitable power transformer is Halldorson P-9103. Here again, any power transformer from 125V up to 250V could be used. This is the range of voltage for the 6E5 tube. If a transformer other than the one specified is used, the design of the filter section will have to be modified accordingly.

To feed in the AC signal on the bridge and to keep the chassis insulated from the shock hazard, use the isolation transformer principle. This one is a Halldorson TV component #B6705 (vertical blocking oscillator 1:1.5 ratio), wired to give 150V on the bridge. 150V was selected as the closest voltage to tube type transmitter operation, so that capacitors may be checked at the voltage range closest to their actual circuit operation. It is not necessary, however, to operate the bridge at this particular voltage, as any lower voltage may be used. For those who have a junk box, an audio innerstage type transformer can be utilized, providing it can stand 110V AC. One simple test can provide the answer and this set-up can be put aside for later projects. Fig. 2 explains how it is to be made. To operate, all you have to do is insert the plug into



a wall socket and place a probe on each end of the transformer winding to be checked. If the bulb doesn't light, the winding is heavy enough to stand 110V AC. If the bulb had lighted, it meant that the transformer windings were too light and the bulb itself was handling the load. If one side checks out satisfactorily, check the other winding to see if it will take the current. It is also a good idea to put a voltmeter on the opposite winding to see the amount of voltage transferred which, in turn, will determine which winding will go on the



bridge and which to the 110V AC supply.

The critical component, quality-wise, is the balance control potentiometer. It is a 10,000 ohm wire wound, linear taper, 2 watt size. A carbon type will not work very effectively in this application.

The electron ray tube is mounted perpendicular to the front face plate through a 1" hole on an "L" shaped bracket. Wrap a couple of layers of tape around the head of the tube to protect it, then push it through the hole. If you prefer, a commercial type mount can be used.

For the range selector, a 3-position, 2-pole rotary switch is needed, Centralab type Intercom switch #1472. One pole of the switch selects the capacitor that is used as the standard for each range, while the second pole selects the grid resistor for the indicator tube. It was determined through experimentation with a resistor substitution box connected in place of the grid resistor, and by putting test capacitors on the binding posts and turning the dial arm from end to end on each range, that a certain size resistor in ohms value gave a good shadow definition on the 6E5 tube.

As recommended by the manual, the one megohm resistor connected between pins 2 and 4 (plate and target electrode), should be kept that size to provide a voltage differential between the two elements. All the resistors in this checker can be one-half watt.

The capacitors in the bridge referred to as the standard, should be high quality, low percent tolerance units such as the silver mica type. The first range, C1, and the one used most frequently, starts at the low value of 2 mmf and cuts off about .005 mfd. C2 range starts at 200 mmf and continues to .3 mfd. C3 range had not been calibrated, but it should go up to approximately 10 mfd. On using each range, it is advisable to stay on the left side of the scale for finer divisions since the reading on the right side tends to bunch up, making it hard-

er to get an accurate definition. The bridge standard capacitor for each range are: C1=.0001 mfd; C2=.01 mfd; C3=1 mfd. All should be rated for 200V.

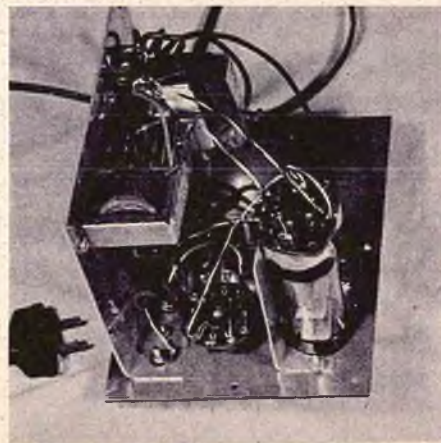
Two methods can be used to calibrate this scale — a commercial capacitor checker which is known to be accurate and which uses a variable condenser tuner (365 mmf) from a radio, and alternately, by connecting silver mica capacitors together in series and parallel to reach the various values on the scale. The latter method is used when no checker is available. Simply connect the silver mica capacitors together in series and parallel (minus the variable tuner) to get approximate scale layed out. Remember the rule that capacitors in parallel are additive to a total sum, and when in series the following formula must be used: $C1 \times C2$. Another

$$\frac{C1 + C2}{C1 \times C2}$$

simple method of calculation is to purchase a slide rule calculated for resistance and capacitance, and set up the numbers on the dial and read the end result.

With pulse work coming into such popularity, this instrument is very useful in helping pick out matched pairs for the multi-vibrators in pulse boxes. For those who want to adventure beyond the realm of radio control, this checker can be used in fixing those radios around the house—assuming, of course, that the wife is in agreeance as to your capabilities!

With this instrument and a multimeter, the RC builder can make an accurate check of most of the parts in the kits he buys before they are soldered into the circuit—which, incidentally, is good practice and can save hours of checking and unsoldering parts after an installation is completed!



Questions and Answers for Beginners

By Jerry Gause, Westee Hobby Imports

Editor's Note: Radio Control For Beginners will be a continuing series of articles on various aspects of our hobby, and is in answer to an overwhelming number of requests for a series of this type. Part I is by Jerry Gause, of Westee Hobby Imports, and is based on his long association with, and extensive knowledge of, problems facing the newcomer to radio control.

● Through our experience in servicing the aircraft and boat modeling public, we have found that there is a vast number of individuals who would like to join the ranks of radio control enthusiasts, but do not know where to begin. In the first place, a great majority of those interested shy away of the sport because it involves "electronics," and secondly, because the initial cost **seems** quite high. In both instances these two ideas are usually exaggerated out of all true proportion, caused in part by the rather advanced articles in various model publications which paint a picture of RC flying or boating as an art suitable only for a well-heeled few with the talent and ability of a computer engineer. If you wish to start in RC, **forget about these misconceptions!**

Here are a few of the questions asked most frequently by beginners. The answers are our own, based on an active interest and concentration in the field of radio control.

How much does it cost?

A good, dependable single channel outfit can be purchased for \$60 to \$80. Multi-channel equipment runs from \$200 to \$400.

Do I need a license?

Yes, but no examination is required—it is only a matter of registration. (An \$8 fee will be charged after the first of the year.)

Can I do stunt maneuvers with Rudder Only control?

Practically any common maneuver can be performed with rudder only control although they will not be as smooth as when you employ the more expensive multi equipment. In the beginning, do not worry too much about this—you will enjoy just plain flying and landing your



plane at a predetermined spot on the field.

How can I bring the plane down without elevator control?

There are several ways. If you do not have motor control, you can spin your plane down by applying rudder for a prolonged period. In addition, with every short application of rudder, most models bank and lose altitude. After the fuel is exhausted the motor will die and the model will glide down. Of course, the plane is controllable by radio with or without the motor running. If you do have motor control on your single chan-

nel model, the plane will start a slow descent when the engine speed is cut down. You can also obtain controls of rudder, elevator, and engine speed from a single channel unit by employing special actuators, but we definitely do not recommend this for your first RC model.

What is an escapement? A servo?

Both an escapement and a servo are actuators responding to the signal received by the receiver—the signal you send by depressing the button on your transmitter. An escapement is powered

(Continued on page 44)



Bob Dunham and test ship for Orbit proportional system prototypes.

.....RCM.....AT.....

Editor's Note: This month, RCM staff members Chuck Waas and Kathy Acton were privileged to be the guests of Orbit Electronics, Garden Grove, California. The following story is the result of their tour of the Orbit facility, a tape recorded interview with Bob Dunham, Jack Bentley, and Milt Boone, and the introduction of the new Orbit Proportional System.

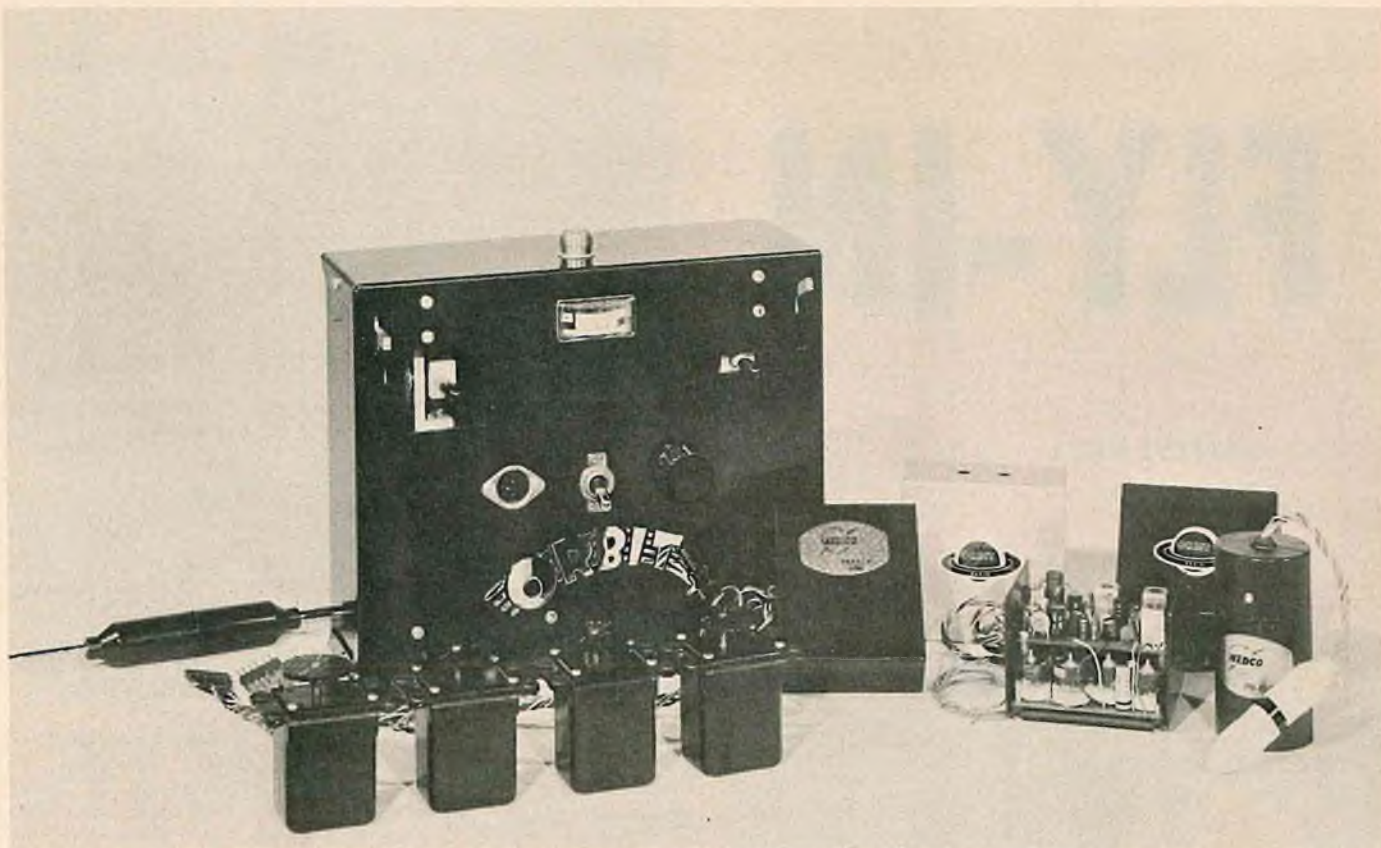
● The three modern buildings comprising the 9,000 square foot Orbit Electronics facility in Garden Grove, California, is a far cry from the modest beginning of this world-renowned manufacturer of radio control equipment. These three buildings are the home of two of the best-known names in the hobby industry—Orbit and Medco. A third name is about to make its debut, yet is already

famous for winning the 1963 World Radio Control Championships at Genk, Belgium — the long-awaited Orbit proportional system!

Although today, there is more Orbit radio control equipment used throughout the world than that of any other single manufacturer, it was not originally intended to be a commercially available item. The first piece of radio control equipment, now known as Orbit, was designed in 1956 by Bob Dunham for his own use in competition flying. Bob, at that time, was the owner of a hobby shop in Lynwood, California, developing his new receiver and transmitter in the back room "between customers." This new receiver-transmitter combination was to employ eight channels of information, and was to offer simultaneous control of

two control surfaces, giving quite an edge over the non-simultaneous, five-channel rigs predominant in contest flying at that time. At first, Bob began building a few units for his friends, then, at the close of each new contest, orders began to come in for the "new rigs." With no means for production, Bob "burned the midnight oil" in order to fill the demands for the new eight channel systems. By 1957, and the Philadelphia Nationals, Bob's equipment was coming into its own, with the half-dozen phototypes all ending up in the top ten at the Nat's, piloted by flyers like Deans and Bonner. Finally, a small production facility was established, and the name Orbit was born.

In the years that followed, the Orbit was to "give them something they didn't



Presenting the newest star in the Orbit sky — the long-awaited Orbit Proportional System.

..... ORBIT

have before," — simultaneous operation, relayless receivers, all-transistorized transmitters, plus the all-important consistent performance that is synonymous with the Orbit name.

Today, that name is known throughout the world — the black box with chrome letters is a familiar sight at any flying field. As one modeler put it, "If it's Orbit, it works!"

To find out why "it works," we were taken on a complete tour of the Orbit and Medco facility, beginning with the final chock-out of reed equipment. Here, every piece of equipment is tested for complete accuracy and performance prior to being shipped to the dealer. Any transmitter or receiver falling short of Orbit quality control standards is rejected immediately. The next point was

the assembly line, where circuit boards were being assembled, supervised by skilled Orbit technicians. At the far end of the room, several workers were fabricating transmitter and receiver "cans" on the sheet metal brakes and shears. The only step not completed under the Orbit roof is the anodizing of the cases themselves.

In the Medco facility we were intrigued by the method used to tune Medco reed banks. Here, a technician uses an electronic counter to adjust the reeds to a tolerance of one cycle per second! An electronic grinder is used to make the minute adjustments necessary to bring each reed bank to its proper tolerance according to Medco standards. Here, too, was an assembly room for constructing the Medco rechargeable NiCad battery

packs.

The high quality control standards that we found to prevail, along with Orbit's progressive engineering and design concepts, probably account for their success in the national space exploration field. Along with equipment for the radio control enthusiast, Orbit electronics have developed and manufactured two-way personal communication radios for NASA to be used by astronauts during lunar exploration! Further development work is progressing on a transmitter to be used in a package to be soft-landed on the moon prior to the first manned landing.

Another interesting development is a control system for a TV camera used for observing atomic tests, performing all

(Continued on page 38)

FLY-IN

CONTEST DATA
CLUB NEWS



Above: Tom Winters established a new Pylon Record time of 1:03.85 minutes at the LARKS Annual held at Bakersfield on October 20, 1963. His original model is based on the Talon design, but using a reflex airfoil and increased area. The model is extremely light at 2 pounds 4 ounces, 11 ounces of which consists of the Orbit proportional receiver and 250mah power pack. Engine is a stock Cox TD .15 turning a 7/6 nylon prop. Tom used K&B 1000 fuel for his record breaking flight. Photo by Hal Balzac.



The photo of Howard Bonner is the first published photograph of the new Bonner Proportional system. Howard looks rather determined as he helps Miss Carole Walker apply full throttle. Prototypes of the new system have been flying since mid-summer. Description, delivery and price should be available soon. The only specifications we have are 38-22-36. Hmm! Must have something to do with the time constants of the new rig! Photo by Dick Tichenor.



Clarence Lee and ecstatic expression. That's his new prototype .19 RC engine for Veco. The new mill performs like a dream in the new transistorized, six channel simultaneous superhet Orbit held by Miss Walker. Photo by Dick Tichenor.



Left: Earl Walter and Morgan Cub during invitational meet at Royersford, Pa. Earl, a member of Valley Forge Signal Seekers, operates a hobby shop in Lansdale, Pa.



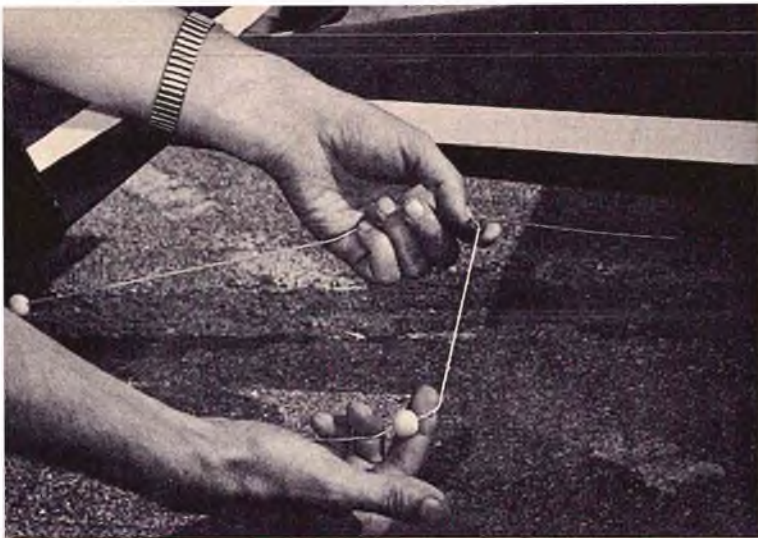
Above: Bill Murray, Valley Forge Signal Seekers member with his Taurus and rudder-only Tri-Squire at Royersford meet. 25 of the 35 members of the Signal Seekers fly multi, but seem to find time for rudder, powered gliders, and anything else that flies!

AMA Clarifies Class II Controversy

We have received numerous letters regarding the controversy as to whether or not elevator trim is permitted under the new Class II rules. In a letter from Ken Hinkel, AMA Radio Control Chairman, to the Omahawk's Radio Control Club, Ken stated that the rules say the elevator is a primary control, and that rudder and elevator control is permissible by any means — simultaneously, independently, or otherwise. The elevator, obviously, cannot be both a primary and an auxiliary aerodynamic control at the same time. By control, it is meant aerodynamic control. Since elevator trim is a *radio* control, or merely another means of moving the existing primary aerodynamic control, trim of the elevator by any means is permissible in Class II Okay?

Right: Winners in the NJRCC Precision Pattern Contest at Asheville, N.C. 1st row, L to R: Bobby Smith, Harold Coleson, Hobbie Steele and Clarence Beaver. 2nd row, L to R: D. C. May, Winfred Shytle, Gregg Doe. 3rd row, standing: Paul Bryum, Herbert Walls, Charles Sully and John Carden.





Top: Close-up of arresting wire used by LARKS for RC carrier landings. Photo by Dick Tichenor.

Above: Willie Smith's Torero snags wire in simulated carrier landing while LARKS prexy Cliff Weirick looks like he just lost a bet! Photo by Dick Tichenor.

Contest Data

October 19-20 was the weekend of the LARK's Annual open contest at Bakersfield, California. The big news of the event was, of course, Tom Winters record-breaking pylon flight. Close on his heels was Zel Ritchie with a time of 1:06.48, and Cliff Weirick with 1:14.20. Class III Expert was won by Jerry Pullen, with Clarence Lee and Nate Rambo taking second and third respectively. Bob Doell captured Class III Novice, while Don Crow won Class II. Class I competition was bested by Lloyd Sager. And if you don't believe these Lark's do it up right, the drawing was won by Frank Capan—taking home a new GE television set!

The Radio Control League of North Carolina held its first annual Precision Pattern Flying Contest in Asheville, N.C. on October 5th and 6th. Although this club celebrated its 10th birthday on November 24th and 25th, this was the first time a Pattern Contest was held by this group of 100 active RC modelers. The setting for the contest was ideal — two 4,000 blacktop runways permanently closed to full-size aircraft. The intersection of the two runways was wisely utilized to provide for any change in wind direction. The abandoned airport used is nestled in a beautiful valley surrounded by the spectacular Smokey Mountains. Weather was ideal — clear, temperature a moderate 75 degrees, and light breezes prevailing. Flying by all contestants was excellent, with good, consistent judging throughout the event. One contestant from Charlotte, N.C., flew every round for both days, flying hard against more experienced fliers—Johnny McDermott, age 13, who just barely missed the third place Multi Novice trophy! Here's a young man to watch!

On October 19th and 20th the Remote Control Association of Central Florida hosted its 3rd Annual Invitational Rendezvous, a fly-for-fun event held at its new flying field near Goldenrod. Event winners included Walt Schoonard, Drag; Cliff Nunnery, Touch-and-Go's and Consecutive Loops; Aubry Radford and Bill Brokelhurst, Spins; and Jim Kirkland winning the Spectacular Flying Award. We have it from a reliable source that club member Harry Sampey wasn't too disappointed by the number of 404 proportional rigs in the transmitter impound area!

Club News

The LARKS are at it again—this time its carrier landings! Wire arresting hooks pick up a cord strung through 1/2" diame-

(Continued on page 41)

Gal's Corner

(Editor's Note: In answer to many requests, and in the interests of self-preservation, this corner of RCM will be reserved exclusively for the fairer sex, it's frequency of appearance determined by the material we receive from the girls, themselves. Subject material can be personal RC activities, suggestions for girls interested in RC, ideas on how to live with a modeler, or feminine strategy on planning a revolution to overthrow radio control! Look at it this way, fellows—at least we'll know what they're thinking! This first column is by Barbara Chercover, wife of one of Canada's top television executives and RC flier.)

● I remember so well that chilly April morning at the breakfast table, not too many years ago. My husband, suddenly roused from his A.M. lethargy, announced in his firmest no-nonsense voice that he was taking up models as a hobby!

My world collapsed. Models! Was I not all the glamour he needed? I, in my clean—if slightly faded—brunch coat, with my hair un-pincurled and even brushed (as all the women's magazines hotly advised), and with my lips glistening with a proud new acquisition: Cute Tomato Lip Gloss. Tears rivaled the glistening cute tomato and rolled down my cheeks, plopping one by one into my coffee cup like solvent crystal beads.

My husband's violent reaction to this natural display of concern nearly shocked me out of my well of insecurity.

"But, honey," he said as he knelt beside my chair, mopping frantically at the tears, "if you feel this strongly about it, I'll give up the whole idea. I only thought it might be fun on weekends and while you're away at your Mother's."

Fresh floods of tears. "But, love—all the boys are doing it!"

After we had both nearly been set awash, our slight problem in semantics was finally overcome, and I, carried away by hysterical relief, agreed that models sounded like a divine hobby. A perfect hobby.

Airplanes—not girls!

And that was the beginning—the be-

(Continued on page 45)

SOLO

by Frank Justin

● I enjoy flying both radio control and full size aircraft, and keep thinking that a lot of the things we learn in full-scale flying could be applied to our hobby. When I first started out in R/C, I discussed this with many of the top R/C flyers of the day, only to be told again and again during these bull sessions that full-scale flying was completely different, and that I was not taking into consideration scale effect, etc., etc., etc. Now that I've been flying radio control for a few years, I find that in some respects they were right—there is no feel to R/C flying—but every rule of flight that is applied to full-scale aviation can also be applied to radio control, and therefore we can learn a great deal from the tremendous library of flight that is available to all of us.

As an example of this theory, I fly a Beechcraft Musketeer, a single engine, four place, trike-gear ship on the low end of the manufacturer's line. When you take delivery of this bird you get a most important document—the owners manual of aircraft performance and limitations. Contained in this manual is the result of hours of test flying by highly trained specialists that recorded every pertinent fact as regards the aircraft's performance. By reference to this book I can tell you at what speed the ship will stall with 0 degrees, 15 degrees, or 30 degrees flap; at a bank angle of 10 degrees, 20 degrees, or 30 degrees. Since there is a ten mile per hour spread in stall speed over the stated conditions, this is important information. But is it information we can apply directly to R/C? Probably not, yet the fact that aircraft will stall at different speeds when the angle of bank and/or flaps is changed is something we should know for radio control flying. How many times have you seen someone bring an R/C ship in at a low, low approach speed, fall off on a wingtip and cartwheel half way down the strip, then turn to the boys and say, "Someone hit me!" 95% of the time, it is stall, or failure to maintain minimum control velocities, as the jet jockeys would say. Failure to maintain minimum control velocities, or MCV, claims as many R/C ships as

faulty equipment or poor installations.

Or, have you seen this one—a trike geared ship, the pilot feeds in full up-trim and the aircraft starts its takeoff roll, wing is negative due to position of gear. The model is rotated to bring wing to a positive angle—the takeoff is steep and aggravated by up-trim. Even a small movement of aileron brings rapid fall-off of the nose. Two controls in the same direction, one on purpose and one by mistake, will put you on your back! Everything gets hairy at MCV! If you don't believe it, watch the contest boys try tail slides. This is a most difficult maneuver because it is performed below MCV. If you were trying a tail slide in my Musketeer you would be pumping controls like a one-man band, to say nothing of the fact the manufacturer won't let you!

It took me forever to do with my R/C ships what I knew I must do with the Musketeer. On landing I had to force myself to feed in a little down trim to increase speed. For some reason I didn't like to see the speed go up in the pattern, but if I keep in mind that the rate of descent is low with higher forward speeds, I might surprise myself with a "grease-on" once in a while. Unlike an R/C model, there is no problem with the Musketeer—I can glance at the airspeed indicator any time I wish, or more simply, feel an increase in rate of descent. I can also feel control pressures, but not so with radio control. Probably the best I can do is to maintain flying speed on the critical takeoff and landing.

If you're a good pilot with a well-trimmed ship, what I've had to say won't excite you much. If you're new to the sport it won't excite you at all. Maybe it will help my grandmother—she's building a single channel, four-engine PanAm clipper. She wants me to test fly it off the creek behind the horse barn, which seems reasonable enough. But when she got store-bought fuel instead of using my home brew, I told her to fly it herself.

Nobody likes a wise old lady!

(Continued on page 47)

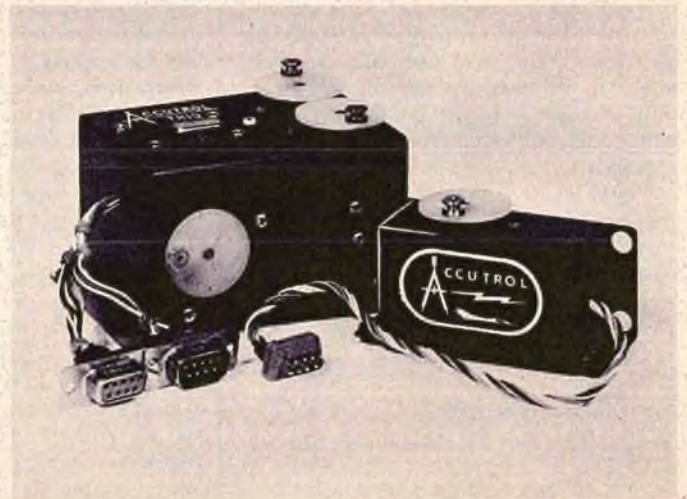


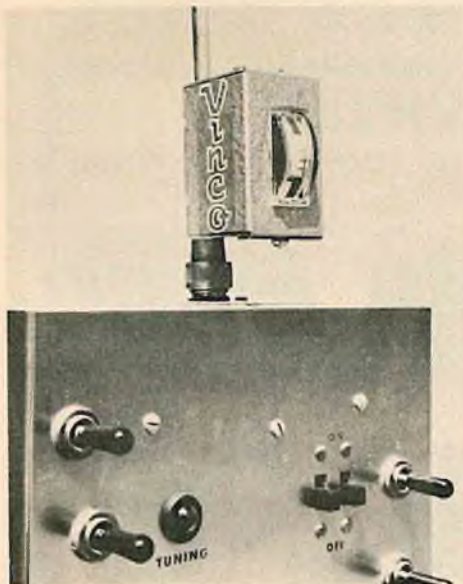
Above: Consolidated Lil' Spirit for .020 RC. Left: Note extensive prefabrication in Veron Topsy Nipper kit.



SHOWC

Below, left: Veron's bid for single channel fame — scale Topsy Nipper for .049. Below: Accutrol trio, proportional servos for custom installations.



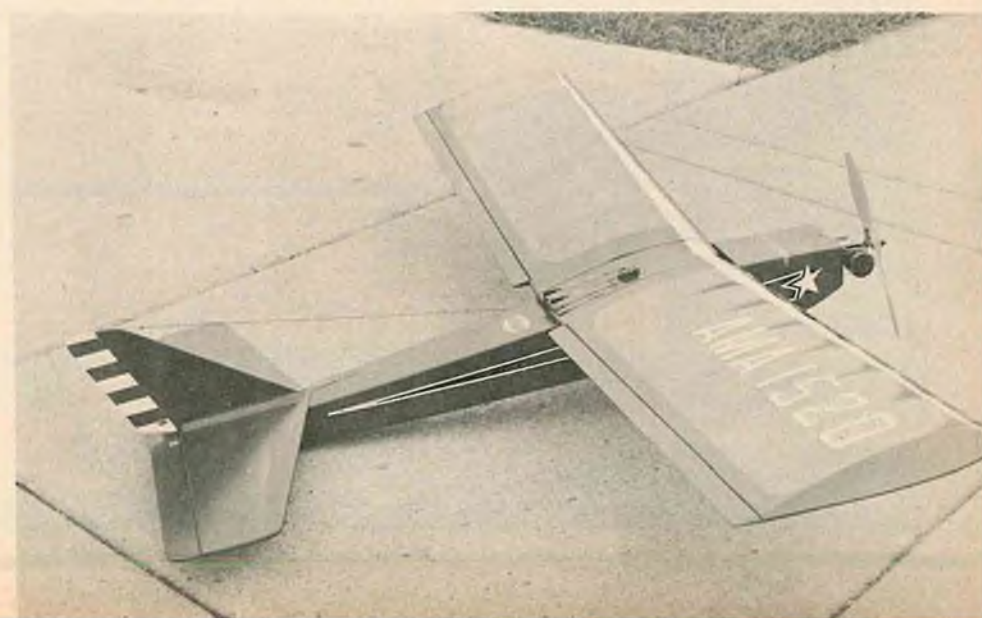


Left: Two new products from Vince, FSM and charger. Below: Velox 44, single channel "floater" from Westee. Jenny, newest addition to Pappy's Live Wire line.

ASE '64

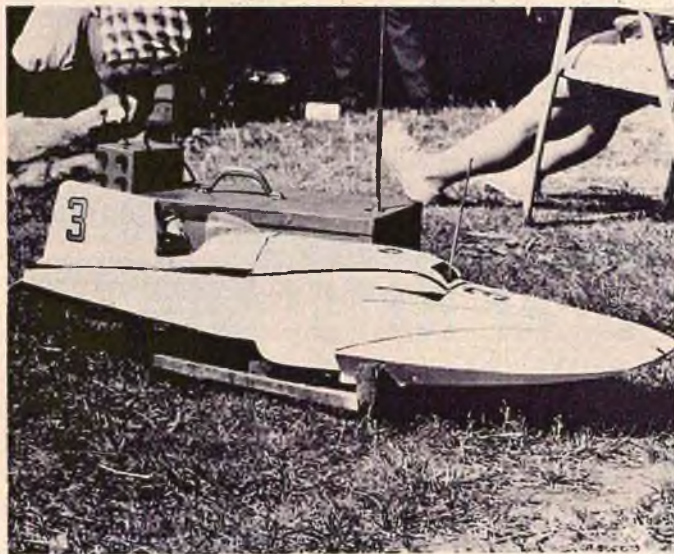
● We're very pleased that the long awaited *Schoolmaster* from *Top Flite* has appeared on dealer shelves. Although designed for single channel operation using escapements or simple proportional control for throttle, rudder, and elevator, the new Willard designed proved its extreme versatility at the 1963 Nationals when Ken put on a demonstration flight using a compact multi-channel receiver and the small Ancco multi-servos. The noted RC designer and former Nationals Champion's explanation of the maiden multi-channel flight best describes what RC'ers can expect from this new concept in RC designs: "I really wasn't sure how the *Schoolmaster* would perform with multi-channel control," Willard explained, "but she took off as if she was designed especially for the equipment. I put her through a number of maneuvers including loops, rolls, and banks, then brought her in like a

(Continued on page 54)



REGATTA

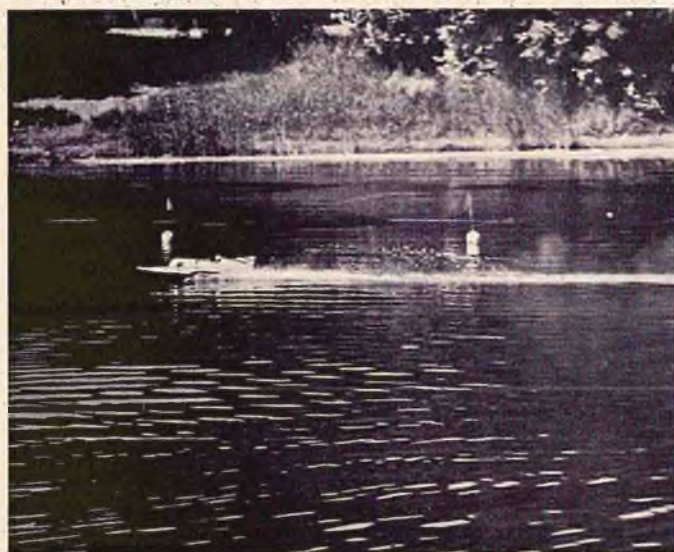
RCM Gets Underway With Its New Boat Department



Sam Newman's 48" Unlimited hydroplane.



Challenger II from Roy Miller.



Roy's Challenger underway.



Lauri, White Heat V design by Leroy Brown.

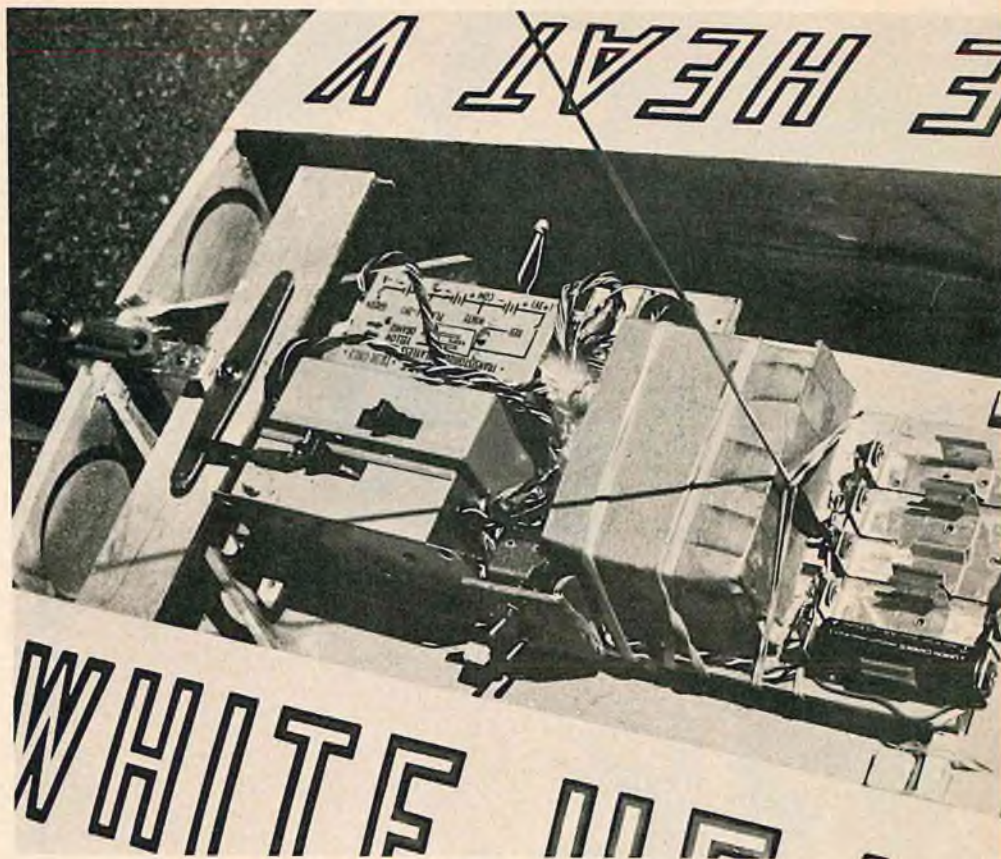
● This month, in response to the increasing number of requests received at RCM, we are initiating a new section of the magazine — *Regatta*, devoted exclusively to radio control boating enthusiasts throughout the world. This portion of R/C Modeler will present RC sport and competition coverage installation hints and kinks, construction plans and articles, new product reviews of items of general interest to the RC model boat fan, and a gab session concerning RC boating in general. This is your column, and will be successful only if you will contribute your ideas, suggestions, photographs, and construction articles for publication in these pages. The letters we receive daily indicate that there is a general "rumble" of discontent with the coverage now given to model boating by various model publications — RC Modeler is making these pages available to you, in the hope you will help us to give model boating the coverage it has long deserved.

One of the most interesting events of the year is the Annual Invitational RC Regatta hosted by the Skippers RC Club at Cermak Park, Illinois. The photo of Sam Newman's 48" Unlimited type hydroplane was taken at the 5th Annual meet in June. This hydro is powered by a water-cooled McCoy 60, swinging a #55 plastic prop on articulated or parallel drive struts. All up weight is 9½ pounds.

Photos two and three are of Roy Miller's fibreglass Challenger II. Roy, of the Minute Breakers RC Club, powers his 36" long, 8½ pound, Challenger with a Fox 59 swinging a #50 plastic prop. This is a smooth running engine, the lack of spray coming from the bottom of the boat, evidencing a lack of vibration. There are four of these boats running in the Chicago area, and all are excellent performers.

Laurie, a White Heat V design, built by Leroy Brooks of Waukegan, Illinois, is shown in photo four being tested, minus cowling, at Lombard, Illinois. This boat captured third place in a ten lap speed event at the Minute Breakers RC Club Regatta at Lombard, Illinois. This was Brook's first time in a Regatta, being a convert from RC aircraft. For the specification minded, Laurie is powered by an O & R, and swings a X70 prop.

Photo number five illustrates a typical radio control equipment installation in a White Heat V. The receiver is a ten channel relay job feeding three Bonner Duramite servos. Two of the servos are used for steering and throttle while the



Three Duramites provide the muscle for this White Heat design.



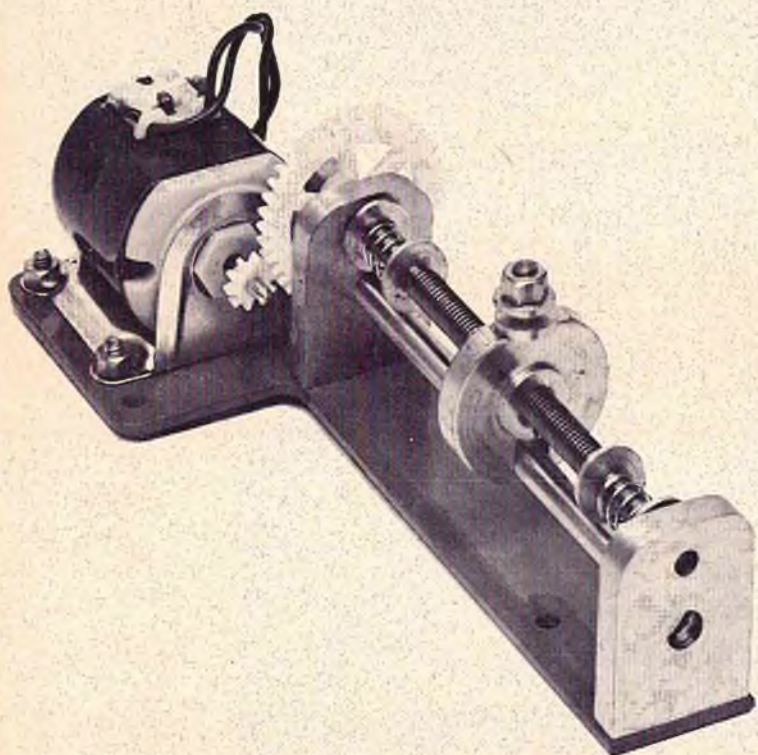
Two photos of Ed Soltis' camera boat.



(Continued on page 36)



Mr. and Mrs. Gary Preuse of Minute Breakers RC Club.



third is employed to ground out the magneto on the O & R Compact engine. The entire servo and receiver mounting board is removable from the hull. Sharp eyed readers will note the modification to a U-Control bell crank to actuate the steering strut. The White Heat V will run fifteen to twenty minutes on an inexpensive white or regular gas and oil mixture in the eight ounce Veco clunk tank.

Ed Soltis of Yonkers, N.Y., sent us the photographs of his radio controlled camera boat. This inboard carries an 8 mm Kodak camera mounted just aft of the bow, and has proven quite successful. Experiments with the camera boat were started as far back as 1959, employing a five channel Raytrol receiver and Duramite servos. Ed, isn't prejudiced — also flies RC model aircraft, but can't seem to shake the water out of his boots — has to have floats on his RC Piper Cub!

It's a family affair — the man and wife team are Mr. and Mrs. Gary Preuse of the Minute Breakers RC Club, seen at most of the Midwestern RC Regattas. Mrs. Preuse is flicking the switches on the Orbit 4 controlling a fibreglass PT hull by G.E.M. models. 39½" long by 10½" wide, the craft is powered by a ST 56 turning a 1¾" Cameron prop. Hull runs very clean and turns well in either direction, proving that 4 channels can do an excellent job with a boat of this type.

We recently had the pleasure of examining a Veron Marlin kit, imported from England by Westee Hobby Imports. This 36" model, in our opinion, is extremely well-suited for beginners in radio controlled model boating. It

(Continued on page 59)



AMA

● What's in the works for AMA R/C modelers? Here are a few:

1. **NATS QUALIFICATIONS**—a study of several Nats and contest reports of sanctioned meets nationwide has produced a promising new procedure to eliminate the past four day ordeal. Idea is not to reduce R/C flying at the Nats but to permit more different kinds of R/C. Example:

2. **V/STOL EVENT**—simple to score and judge, requiring skill, ingenuity, improvements in control systems, aerodynamics, power, piloting, this may be an added event—rules proposal is being developed.

3. **NOVICE/EXPERT**—breaking down Nats R/C, so non-pros can compete at their own level, is being looked at—works well at local meets, but has been impractical nationally due to record keeping problems. Some new solutions are being checked out.

4. **R/C SOCIETY**—the response to a recent attempt to organize an R/C only modeling group indicates a demand. Such a group could be most effective if operated within AMA's structure, having direct communication with the AMA Contest Board and AMA-FAI officers. Top AMA R/C flyers are working on plans.

5. **FCC COMMITTEE**—already they have gotten on the latest F.C.C. docket with AMA proposals for new R/C frequencies, relief from interference on existing freqs. The committee members are: Ed Lorenz, John Phelps, Jack Port, Walt Good, Paul Runge, Vernon McNabb—they raised over \$1200 quickly for legal representation before the FCC, need more to continue the job. Support them by sending \$1 or more to: AMA HQ—FCC FUND, 1025 Conn. Ave. NW, Washington 6, D.C.

6. **NATS OPERATION**—improved and standardized procedures are being worked out for equalized judging, waiting line handling, monitoring, officiating. Suggestions welcomed—send 1 copy to HQ (for Nats Committee), 1 to your District Vice-Pres., 1 to your District Contest Board rep. This is the way to get official action—far better than griping!

AMA IS YOUR ORGANIZATION—TAKE ADVANTAGE OF YOUR DISTRICT OFFICERS IF YOU WANT YOUR VOICE TO GET MAXIMUM RESULTS.

flying knights

● It started in a bean field, just two years ago, when a remote-controlled model aircraft introduced a new sound to the scenic Boston Valley, south of Hamburg, New York. To many of the neighbors, this was a new and interesting sight — a model airplane flying by radio control. To a few of the onlookers, the hobby looked interesting enough to try for themselves. From this event has emerged what looks to be the success story of an RC flying club — the Flying Knights.

Bean fields can be rough, and through their search for a flying site, the owner of a local private air strip was contacted. Permission was granted to use the strip, and it wasn't long before the owner himself, became interested, and was soon an active member of the group.

At the close of that flying season, this small group decided to form a club, and through the cooperation of a local Hamburg newspaper and hobby shops in nearby Buffalo, word was passed of the new club being formed.

Many showed up for that first meeting — some were RC enthusiasts from neighboring towns, who were flying wherever they could find a spot. Others were U-control fliers who had decided to try RC, while still others were altogether new to modeling. Enthusiasm was high, and during meetings held over the winter months, officers were elected, a constitution and by-laws were written, a club name and insignia were chosen, and an

AMA charter obtained.

The club decided that it would be best for all concerned to build their own airstrip, and this past summer, through the joint efforts of the members, land adjacent to the present strip was graded and seeded for a 450' x 120' runway with clear approaches. Plans are in the making to enlarge this runway in the coming year.

The members of the Flying Knights are proud of their accomplishments in the short period since their inception. Less than a year old, the Knights maintain a roster of sixteen active members with more interested in joining. Many of the new modelers have already put airplanes into the air successfully. Some of the members have helped boost the prestige of the club by flying and placing in contests sponsored by other clubs in the Western New York area.

The local library offered the use of its meeting hall to the club, and formal business meetings are held there every third Friday evening. During recent meetings a contest has been planned for the coming Summer, which, if successful, will become an annual event.

As previously mentioned, enthusiasm rates high in the club. Many hands have made the work light. From a few stragglers to a chartered club — from a bean field to an ideal airstrip — the sky's the limit for the Flying Knights!

RCM INTERVIEW

(Continued from page 25)

normal functions by remote radio control. The controls for this camera, already in use, are constructed from two modified Orbit ten-channel transmitters and receivers, and two ten-channel Medco reed banks.

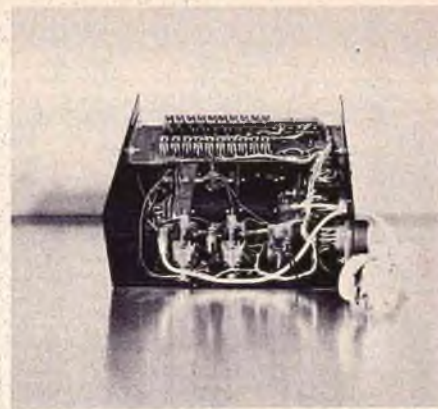
Another commercial use for radio control equipment, developed by Orbit, is a remote control system for caterpillar tractors used in open-pit sulphur mining. The hazards of losing both tractor and driver over the crest of the pits were so great that this method was developed so that the driver could walk a safe distance beside the tractor, directing its normal operation from a portable transmitter. If the caterpillar were to "go over the side," the driver would escape the prior hazards of severe injury and possible death.



TV camera operated by radio control.

Probably the most talked-about development from Orbit Electronics, is the new Orbit Proportional system. Several months ago, Orbit acquired the design and inventory of the Space Control Corporation, a pioneer in the proportional field. This acquisition was based on a study of the Space Control system, and the conclusion that it possessed a good basic concept worthy of further development.

In developing the new Orbit propor-



Close-up of modified Orbit control unit.

tional system. Orbit engineers began with this basic concept. The problems involved were to provide a completely proportional system that would provide the flier with the same reliability as they could obtain with reeds, while offering the infinite degree of control possible with a proportional system. Basically, the new Orbit system is both analog and digital in concept, yet far less complex than proportional systems currently on the market. Fourteen prototype units are continually being flown and tested, with every problem, regardless of how insignificant, being corrected as they are reported to Orbit engineers. One of these units recently won the 1963 Internats at Genk, Belgium. While this might be enough to satisfy the ordinary person as to the performance and reliability of a

Latest in the Orbit line. **ORBIT PROPORTIONAL**



The system features quadruple simultaneous proportional response from the powerful, hand-held all-transistor transmitter. The transmitter operates from a 12 volt, built-in, nickel-cadmium supply of high capacity, and will be available in single-stick, or two-stick configuration. Control functions from either unit is rudder, aileron, elevator, throttle, elevator trim, and aileron trim. The receiver is a compact, rugged, light-weight unit featuring "twin-deck" construction principle for great strength with smallest possible physical dimensions. Super-heterodyne circuitry assures maximum interference rejection with high sensitivity. Pre-wired "pigtailed" from receiver to power source and servos, simplify installation, and eliminate tedious wiring. Servos have built-in amplifier and feed back circuitry for true "closed loop" operation. These units are based on a tried and proven mechanical configuration with more than adequate power for the largest airplanes. Their very light weight contributes to the nominal air-borne system weight of approximately 27 ounces, consisting of receiver, battery pack, and four servos.

Complete system price: Transmitter with battery pack and charger. Receiver with battery pack and charge. Four servos. **\$595.00**

ORBIT

11612 ANABEL AVENUE
GARDEN GROVE, CALIFORNIA



Machine operation of Medco division.

given system, it is not enough for Orbit. Any new theory must be proven in engineering, then *use-proven* in field prototypes until it is felt that the system has been perfected for general production. And, although orders come in daily for the new proportional rig, it will not be produced until Orbit, themselves, feel it is completely ready for the consumer.



Familiar Medco power pack.

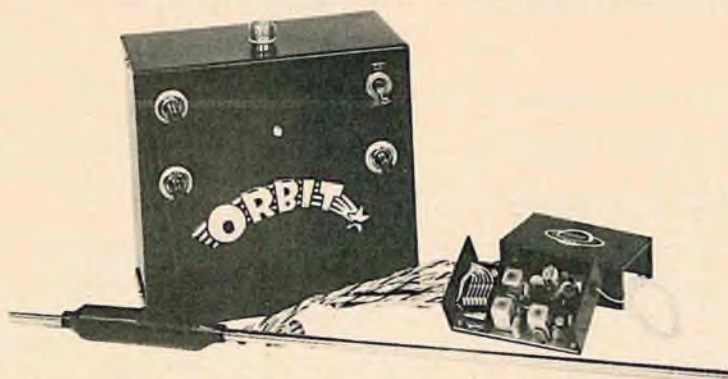
This could be next month, next week, or it could be in production by the time you read this article. It all depends on the Orbit engineers!

From the very beginning of radio control, it has been apparent that proportional control would be the ultimate—but is it the final step in RC? We asked Bob Dunham this question, and his reply was that proportional was an end, or ultimate, in itself, but that progress and future development of proportional would probably never end. We were curious, too, about the future for reed equipment—is it now, or will it soon be obsolete? The answer, according to Dunham, is that reeds will be available for many years for the average sport flyer, and reed production will even be stepped up to meet the demand for relayless 4 and 6 channel superhet rigs to compete under the new AMA Class I and II rules.

What about the beginner to multi channel radio—will proportional be easier, or more difficult for him to learn? Basically, it is felt that proportional will be simpler, but the modeler still has to learn to fly, be it proportional or reeds.

(Continued on page 42)

ORBIT T-4 & R-4 AND T-6 & R-6 ALL TRANSISTORIZED TRANSMITTER & SUPER- HETERODYNE COMBOS. NON-SIMULTANEOUS.



TRANSMITTER T-4 & T-6

9 volt operation. High output. One of the most powerful hand-held units available. Low current drain. Features characteristic Orbit toroid stabilized tone generator. Retains famous Orbit feature of "upward modulation" for real punch when keyed.

Size: 6 1/4 x 6 x 3 Weight: 3 lbs.

R-4 (4-channel) \$65.00

R-6 (6 channel) \$69.00

RECEIVER R-4 & R-6

All transistor superheterodyne circuit for 6.25 volts operation. Features extreme sensitivity and very low current drain. Servo power and signal leads pre-wired from receiver to simplify installations. Just solder connectors for servos to leads, and you're ready to go. Receiver power plug matches to existing commercially available ni-cad packs for further simplification.

Size: 3 x 1 1/2 x 1 Weight: 3 1/4 ozs.

T-4 (4 channel) \$69.00

T-6 (6 channel) \$79.00



Electronic counter for adjusting reed frequencies to a tolerance of one c.p.s.!

BLUEPRINT FOR BEGINNERS

(Continued from page 13)

finish the shaping after the rest of the fuselage is done.

Step 17. Add $\frac{1}{8}$ " X $\frac{1}{2}$ " balsa cross-brace at bottom behind nose block.

Step 18. Glue $\frac{1}{8}$ " dowels in place at stations 4, 7, and at tail for landing gear and stabilizer holders.

Step 19. Glue $\frac{1}{16}$ " sheet top in place. Cut at Station 2, since top from Station 1 to 2 will be an access hatch.

Step 20. Glue $\frac{1}{4}$ " square wing cradles in place.

Step 21. Glue $\frac{1}{16}$ " X 1" X $\frac{25}{16}$ " plywood landing gear doubler to bottom — tailor to fit.

Step 22. Round all corners of fuselage for appearance by sanding with sanding block.

Step 23. Glue $\frac{3}{16}$ " square braces to hatch cover. Tailor them to fit between sides and also between back of nose-block and front of escapement holder.

Step 24. Drill $\frac{7}{64}$ " hole vertically through center of nose block, $\frac{1}{4}$ " from back. This will house the tubing through which nose gear wire is attached. Landing gear is optional if your field is all grass and takeoffs are not possible with $\frac{1}{8}$ " wheels.

Step 25. Fuselage is now ready for sanding and finishing.

Stabilizer

The easiest way to make the stabilizer would be to cut it out of a 4" X 17" X $\frac{3}{32}$ " sheet. However, since flat sheet balsa is subject to warping, you can avoid this by making the "box" structure as shown. Cut out a sheet of 4" X 17" X $\frac{1}{32}$ " to shape, lay it on your flat table, glue the $\frac{1}{8}$ " square leading edge, trailing edge, and $\frac{1}{8}$ " flat tip braces in place — also the $\frac{1}{8}$ " ribs and diagonals. Then glue the $\frac{1}{32}$ " flat top sheet in place and let dry. Now you have a stab that won't warp.

Fin and Rudder

Since there are small surfaces, they can be cut from $\frac{3}{32}$ " flat stock. Just make sure the sheet is not warped when you cut it. The hinges are cut from cloth, or you can buy ready-cut cloth hinges from your hobby dealer. There's only one thing to be careful with, and that's to be sure that when you glue the hinges on, keep the glue away from the

cloth right on the hinge line, otherwise the cloth stiffens up and your rudder won't move freely.

Be very careful in glueing the fin to the fuselage. Glue the $\frac{1}{8}$ " square side braces to the bottom of the fin first, wiping excess glue away so the fin bottom and braces set flush on the fuselage top. Make sure the fin is aligned so there is no offset which would cause a left or right turn. Sight along the fuselage as you glue it in place.

Landing Gear

This is a straight forward wire bending job, although the nose gear attachment is a little unique. Note how the wire is bent so one end is inserted in the tube imbedded in the nose block, and the end juts out at the bottom. Then a washer or nut is slipped on the wire and soldered just below the notching bend below the forward end of the nose-block. Finally, a rubber band, wrapped around the end of the wire jutting out at the bottom and the notch just above the nut, will secure the nose gear wire in place. The nut or washer serves to keep the rubber band from slipping.

Equipment Installation

This is about as simple as it can be. Make a rudder torque rod of hard $\frac{1}{8}$ " square balsa, tipped with .040 wire, bound and glued, to go through the escapement bearing and the tail bearing. The easiest way to install it is to insert it through the $\frac{3}{8}$ " hole at the tail, then fit the front end into the escapement bearing (with the escapement mounted on the plywood holder). Next (and this is somewhat like threading a needle while blindfolded), insert the rear end wire into the tail bearing, at the same time sliding the escapement holder into position at Station 2. Secure with two small wood screws, and escapement and torque rod are mounted. Add the rudder linkage at the rear, plus the arm follower at the escapement, making sure that the rudder is aligned properly with the escapement in neutral, then solder in place.

The mounting of the escapement provides easy access to the circuit contacts for soldering. The battery box fits against the noseblock, and can be secured by a couple of wood screws through the bottom of the box into the nose block. Alternatively, the box with batteries can be held against the nose block by the pressure of the foam padding around the receiver.

The receiver fits behind the batteries. It can be wrapped in foam padding or you can make a cutout in a piece of foam and fit the receiver in the cutout. The $\frac{1}{8}$ " dowel just ahead of the escapement serves a double purpose. It pre-



vents the receiver from sliding back in its foam housing and interfering with the escapement operation, and it provides an anchoring stud on either side of the fuselage to attach a rubber band across the top to hold the access hatch in place.

So now you have the structure finished and equipment installed, and its time to balance the model. The plans show the Center of Gravity (C.G.). You can achieve balance two ways; one is to add weight to the nose or tail as required. The other is to find out where the model balances, then slide the wing forward or back as required until the C.G. is located properly *with respect to the wing*, then glue the dowel in so the wing stays put in the right location when the rubber bands are attached.

You may be surprised at the "down thrust" angle on the engine. So was I, but after trying various angles, this one, with the single surface wing, gave the best transition from power flight to glide.

One last word. Space does not permit a completely detailed explanation of the operation of all the equipment. That would take a book and they're out of date before they're published, what with the rapid changes in the state of the art of radio control. But, if you'll *read the manufacturer's instructions* on the equipment, and add that information to what has been presented here, you're *almost* sure to have a successful introduction to R/C.

Next month we'll try to eliminate that word "almost" by discussing some of the tricks in adjusting and flying the VIRUS. Now I know some of you just won't wait — and that's O.K., so long as you get someone to help you who knows what to look for.

Catching, isn't it?

FLY-IN

(Continued from page 28)

ter wooden beads. The cord is stretched across the runway with five one-pound bags of sand attached at intervals on each end. The photographs by Dick Tichenor shows Willie Smith snagging the line with his Torero while LARK prexy Cliff Weirick appears to have just lost a bet. Could this possibly be a new event for RC contests?

While we're pausing for the moment in the Southern California area, reports have come from several newsletters of continued progress on the formation of an association of Southern California RC clubs. According to these reports, this association was formed on the 17th of October during a dinner meeting of club prexy's and representatives from the LARKS, Radio Control League of Orange County, Valley Flyers, SCRC, San Gabriel Valley Radio Control League, San Diego Drones, Garden Grove RC Club, BIRD Club of Long Beach, and the Escondidos. When the formation of this association is completed, it will be representative of better than 700 active

radio control flyers in that area.

One of the most popular planes among the twenty-five active members of the Edmonton Radio Control Society, is the Gypsy Moth. These models are the ERCS version, modified from Aeromodeler free flight plans, and employing extensive construction changes. Span is 60 inches with 6 to 6½ pound flying weight. The Edmonton group has had five of these models flying simultaneously with super-het multi gear. Needless to say this would be quite a sight! The performance of the RC version Gypsy Moth is absolutely fantastic — completely aerobatic, yet stable as a rock for precision formation flying. Some of the "grandstanding" features of these models include precision touch-and-go's, low, two-foot-off-the-deck passes at twenty miles per hour, and a parachute ejection from the rear seat. These models are flown the year around, using skis for winter flying, as illustrated in the shot on the page facing the table of contents. We had the pleasure of talking with Doug Goddard, the Edmonton prexy, on the phone a few weeks ago. Doug suggested we join them for a week or two of winter flying—if you don't see the next issue, you'll know where to find us!

Ralph Humphry of the Tropic Aeros RC Club, sent us the first bulletin of this Miami, Florida group. Those of you who have attended the King Orange meets in Florida, know this club for their excellent handling and judging of

this Annual event. Two members of the Tropic Aeros, Bob Quick and Charley Gray, put on an RC exhibition for the Colombian Air Force and Club Aeromodelisimo of Bogota, Colombia. Both Bob and Charley used lightweight Taurus' with Fox 59's and Kraft 10-channel gear.

Cuba, anyone?

To our way of thinking, the "Worst Crack-Up Award of the Month" should go to Bob Francis of the Pioneers RC Club, Inc. Bob's beautiful black Sultan made a level three-point landing under full power directly in the middle of an adjacent race track pit. It continued under power through an open pit gate and bounced over a fence, losing its tail in the process. Completely tailless and with engine still running, the Sultan still had enough stability to fly clear across a 4-lane highway and land on the other side. All of which goes to prove that Sultan's don't need tails and, according to the Modulator, that the current practice of using the field on alternate Sundays from the racing enthusiasts is obviously a good idea!

See you next month.

Below: Doug Goddard, ERCS prexy, after another successful flight with his Moth. Doug's not smirking — it's just that the glare of the sun reflecting off the snow is terrific! (That's his story — he wrote the caption! — Ed.)



RCM INTERVIEW

(Continued from page 39)

For the beginner the single stick version may offer the easiest way to visualize what's happening in the air, but it is also felt that he may get into more difficulty faster with this set-up than with the twin stick version favored by flyers making the transition from multi-reed equipment.

While on the subject of the "transition" from reeds, we have heard several viewpoints on this matter. Orbit studies have shown that this so-called "transition," in fact, doesn't exist. A good reed flyer can, in a dozen flights or less, reach the same proficiency he maintained in reed flying, with successive proportional flights increasing his personal prowess.

What are the drawbacks to proportional? Primarily, it is one of cost. This, it is expected, will eventually change, much as today's reed systems are less in cost than their early predecessors. As an example, compare today's twelve channel superhet system to one of the first five or eight channel superregen rigs! You may be surprised. Will the difference in cost between proportional and reeds be worth it to the contest flyer? Definitely, yes—providing him with that "extra edge" necessary in competition flying. Will it be worth it to the average multi sport flyer? This can only be answered by the individual himself, and what he expects from his flying. With an eye toward current price tags, we asked, "Will the proportional system be obsoleted by new developments?" The answer was "Yes—not in the immediate future, for this is why Orbit is spending the time *now* to perfect the new system, but in the normal course of progress by providing better equipment at less cost to the RC modeler."

And that is the Orbit story, as we see it.



Assembly line for Orbit transmitters.



A parade of world-famous Medco reed banks.



A technician assembles Medco power packs.

QUESTIONS

(Continued from page 23)

by a twisted loop of rubber and is widely used in single channel operation. A servo has its own electric motor for power and does not require a "rubber motor" that has to be wound before each flight. Motorized servos are used for multi-channel installations, and quite frequently, for single channel boat operation. Due to certain problems inherent with servos used for single channel model aircraft operation, the beginner is advised to use a reliable compound escapement.

What range does a transmitter have?

More than you need—we are referring to good, up-to-date equipment and not some "attractively priced promotional junk" or outdated equipment. As a rule, the range is about $1\frac{1}{2}$ miles in the air. A normal distance for flying your plane is anywhere between 50 and 1000 yards. Beyond this point your model is too far to see, making it difficult to determine its response to control signals.

Can I fly if there is another plane in the air at the same time?

Yes, if you have a "superhet" receiver. A selective, superhet receiver is definitely recommended, especially in areas plagued by interference on the Citizen Band frequencies, however it is correspondingly more expensive. As a rule, on any flying field or boating pond, the enthusiasts give an equal chance to everybody to operate their model.

Do I have to have a separate receiver and actuator for each new model?

No. You can transfer your receiver and actuator from one model to another. The common practice is to use a "wiring harness" with miniature plugs and sockets, plus the use of servo and receiver "trays" to facilitate this transfer.

We have found from observation and experience, that beginners can be grouped into three basic categories: (a) those who seek and take advice and enjoy RC modeling for a long time with a minimum of expense; (b) those who want to do too much with inadequate equipment (they usually never get more than half way through before getting discouraged and forgetting about the whole thing); and (c) those whose financial resources seem to be unlimited—they buy the most expensive equipment in the hope that

this will compensate for their lack of experience in building or operating the model. It does not!

The years of working with beginners have convinced us that there are two practical ways to start in radio control—either single channel, or six-channel multi. To clarify this, by "multi" it is understood that the operator is sending several different tone signals on the same frequency—sometimes simultaneously—to control the plane or boat. Basically, this gives a smoother and more versatile operation of the model, but costs more than "single channel." Single channel operation permits you to send one signal only, but it is very satisfactory to start with most economical, and just as enjoyable and exciting. There are other systems available, such as "single proportional," "poor man's multi," etc., but we strongly suggest that you forget about these until you have operated your first model, choosing one of the first two systems.

As in every line of endeavor there are several **don'ts** which should be pointed out right at the start:

(1) **DON'T** start in radio control with a scale or superscale model and full-house radio control equipment.

(2) **DON'T** try to save money by buying so-called "bargains" unless you are absolutely sure of what you are buying, and that the equipment will do what you expect it to do. You may save money—sometimes!—but you must be familiar with the product. This is, as a rule, not the case with the beginner, and an experienced RC'er would probably never buy some of these "bargains."

(3) **DON'T** listen to too many active RC'ers—they will give you so much well-meaning advice, based on their own interests and enthusiasms, that in the end you will have no idea which is right. Stick to the advice of one or two who you know to have adequate experience, and most of all, deal with a hobby shop that **specializes** in radio control and who depends on your **future** business. After you have flown your first couple of models you will have gained enough knowledge to select and weed out the information you receive.

(4) **DON'T** work on your model or RC installations with the "good enough" attitude! Every mistake you make on a radio controlled model, or every shortcut you take will cost you something—money, time, or disappointment.

(5) **DON'T**—unless you are an **absolute** expert—try to build your own RC equipment from scratch. As a rule, it is **more costly** than buying a ready-made unit or transmitter-receiver kit of a

reputable brand. In most instances, the home "scratch builder" units do not work as well anyway. There are very few financial shortcuts when it comes to radio control equipment.

Before deciding where you would like to start in RC, write to the Federal Communications Commission in Washington, D.C. for a Citizens Band License Application Form. At the time of this writing, the license is free and no examination is required, but it may take up to six weeks to get your license. **Do not attempt to fly without this license!**

Now it is time to decide in which one of the following groups you would like to start your RC adventure:

Group I: Simplest and least expensive. This is single channel, $\frac{1}{2}$ A or $\frac{1}{4}$ A engine size flying. It permits flying in the most limited space, and is compact for transportation purposes. The equipment will enable you to control your model for left or right turns, and although we do not recommend it for your first attempt, you can also obtain elevator and engine speed control. The disadvantage of this group is that the wind conditions might sometimes stop you from flying because the smaller planes do not handle too well in gusty weather due to their low weight and engine power. In addition, smaller planes have a distinct tendency to be more erratic in flight than their larger cousins.

Group II: Almost as inexpensive as the first group. It is single channel, using the same radio equipment, but employing a larger model and engine. This group is highly recommended to those who cannot afford the more expensive multi-channel equipment. You may or may not employ elevator control, although addition of engine speed control is highly recommended. This group will permit you to fly even on windy days with reasonable comfort.

Group III: The more expensive multi-channel—specifically 6 or 10 channel. Equipmentwise, we are breaking this group into two categories—6 or 10—but basically the operation of the model by the beginner will be the same, i.e., on six channels only. This group permits controlling each surface individually by sending different signals for different surfaces or controls. Flying requires a larger model, more expensive engine, and more time to build. The reward for these additional expenditures is smoother flying, more positive control, and ownership of equipment which will be good for several years, even when you become advanced in this field. If you can afford

(Continued on page 49)

GAL'S CORNER

(Continued from page 29)

ginning of a love affair between a man and a glider, a man and an Astro-Hog; and finally, a man and his own fulfillment—the creation of an original design.

But, as with most affairs, strange changes began to come over the enchanted—changes sometimes subtle, sometimes bazaar.

Take the vacation bit. We have been fortunate enough to have a four week vacation each year. As we enjoy exploring strange places, every day of our holidays used to find us looking for old churches, fascinating out-of-the-way restaurants, and points of local color.

Not so now. Not so since the third corner of the triangle has appeared in our lives. Now, ten miles out of each "exciting new city," my mesmerized spouse begins hinting broadly at an important mission which he must attend to before he could possibly turn his attention to lesser matters.

For several years, I was convinced he had been surreptitiously employed by the FBI for dangerous undercover work. Now, wise from experience, I know that in this city, as in all cities, there lurks on some innocent shaded avenue The Enemy: A Hobby Shop!

How he knows on which avenue, in what direction, where on that street and when its doors are open, I simply do not know. Nor shall I ever know, for I am certain that along with the wind enthusiasm and the single-purposed mind, comes a built-in diagram, a mental snapshot of explicit directions to each and every hobby shop in this land. We never take a wrong turn. We never look for a number. We simply go there as Caesar went to Egypt; as Napoleon went to Josephine. Propelled by the strongest of a conqueror's desires, we march upon Hobby-Land!

However, these newly gained eccentricities are not by any means limited to vacations. Why, right here in our own home my roommate has been known to execute the most astonishing feats of endurance, entirely unknown to him before models.

For instance, he may crawl into bed at 4:00 A.M. after a continuous round of business meetings, followed by a singularly arduous evening party as energetically as a sloth with acute tired

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blood, yet the first faint blush of dawn will find him girating around the bedroom, dressing to go to the field, in the frenzied manner of a Max Sennet comedy.

Why, many's the Sunday morning I've stretched an affectionate hand toward his side of the bed with happy visions of weekend rewards (like breakfast in bed), only to discover that I was the sole occupant not only of the room, but of the entire house! Later in the morning, glancing up from my solitary breakfast, I have become accustomed to seeing, through the window, our miniature station wagon bustling homeward looking as though its inferiority at being a small car had finally manifested itself in delusions of grandeur! Overnight it had become an airplane, and the sun sparkled on the red wings protruding from its windows in expansive approval.

Leaping joyously from his lead-footed Viscount, my would-be Kazmirski flings me a hasty, "Hi!" and, once inside the house, pauses on his flight to the work-

shop only long enough for a quick coffee and a few short tales of aero-heroism at the field. (It seems "she" did three consecutive rolls without dropping her nose! And in case there's anyone here so untutored as not to know what that means, I'll tell you: it means that my husband has had a delightful Sunday morning, the relaxation from which will stay with him through numerous frustrating business ordeals in the week to come, and will—stockpiled with other such experiences—probably add a mere ten or fifteen years to our life together).

Then he's off to the basement from which emanates for hours thereafter sounds of happy, off-key singing, the asphyxiating odor of a clear goo known as dope, and most mysterious of all, a series of softly compelling musical notes, (100% audio modulation of the carrier ... what else?) which float eerily up the stairs and provide a distracting contrast to the familiar clanking and banging of a modeler up to his ailerons in balsa.

(Continued on page 48)

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THE F-9

(Continued from page 17)

The Super Tigre .56 with its new throttle came into existence about three weeks prior to the '63 Nats', and a fast engine switch took place. Idle problems with the new mill took the better part of the first week, and trying to get a pylon racer ready for competition took the next two, so off to the Nats we went—new engine, nose heavy, and NO pylon racer!

After several flights at the Nationals, I replaced the weight in the tail to offset the new engine and larger fuel supply. No trouble with fuel draw has been experienced, but care should be taken to keep the fuel meticulously clean.

The F-9 sits high and light on the nose wheel, with brakes being used on the main gear. In windy weather, put the brakes on and taxi with more engine in order to keep the nose wheel firmly on the ground. The brakes were operated on down-trim. The nose high attitude will make very nice take-offs, but require you to hold the nose high when landing. This is where the high wing loading and rearward C. G. comes in handy. The plane will land on the main gear and tail skid. The nose should stay up with ease during the landing, but if not, move the C. G. back a little at a time. I fly off the grass most of the time, and takeoffs are very easy.

The original model has a 1/2 turn spin recovery, but this may vary depending on control travel and overall gross weight.

Construction-wise, it is better to build the wing first so the fuselage and wing can be matched with the top of the fuselage left open. The wing is standard construction with 3/32" sheet used throughout. The type of control hinges and linkage will be left to your preference. The battery pack was carried in the wing of the original F-9. This was necessary in order to leave room for fuel and to aid in moving the C. G. to the rear. The landing gear is 1/8" wire and should be cut to give the needed propeller clearance.

The fuselage sides are cut from 3/32" sheet balsa stock with 1/32" ply doublers contact cemented on full length. Assemble the sides to the bulkheads and firewall, omitting the nose and tail at this time. After this assembly sets up,

put on the nose ring and tail. At this time, the wing can be fitted and the wing hold-down glued in place. (No more oily rubber bands!) A 1/2" triangular piece of soft balsa was used in the lower corner of the fuselage so the bottom edge can be rounded off. The



top formers between those shown are rounded off using the others as a guide. Finally, the top is planked with 1/4" X 1/8" strips.

The stabilizer is built in one piece using a 3/8" brass tube with a dowel in the center as a stiffener. 1/8" dowels going through the tubular spar are glued to the stab ribs tying the stab and spar together. Cut out a slot in the fuselage to let the spar down to the proper location, then the nylon bearings are glued in place. I used cable clamps on the inside to take up the end play, although anything could be used inside or outside for this purpose. Be sure the push-rods are on at this time. The vertical fin and two fairing blocks are glued on—they can be rough-cut first and finished after they dry.

Install the nose wheel and block. The original nose wheel can be removed at any time to facilitate service and replacement. The nose block is cut to let the engine oil drain out into the nose wheel-well. The engine cut-out is made and the engine compartment covered with fibreglass resin to keep it from soaking up fuel. The entire airplane is covered with silk and doped.

The fuel tank is a large balloon (5 & 10 cent store variety), holding about 12 ounces of fuel. A length of tubing in the neck will keep the fuel line from collapsing where it is wrapped. Use a refueling bulb and remove the air from the tank, then hold the line closed and fill the bulb with fuel, filling the tank part way, again holding the line closed and filling the bulb. Repeat until the tank is full. If you always empty the tank before you fill, you will find that 3 to 4 bulbs will fill it to capacity. This way there will be no air in the tank—all fuel.

Good luck with the F-9.

SOLO

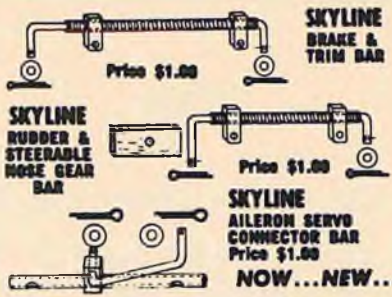
(Continued from page 29)

Fibreglass bodies are not new to the R/C'er, but every once in a while someone in our hobby does something so outstanding that it needs the immediate attention of those interested. I purchased a fibreglass fuselage that is a work of art! The builder first obtains your requirements as to needs or proportional, preference as to servo placement, type of motor, etc. After a two-week wait you receive a fully painted (DuPont Aircraft Enamel) fuselage with all blind nuts in place for the servos and engine, and only the mounting of nose gear, construction of wing, stab, and rudder remaining to complete a magnificent model. The vertical fin is already in place, and drawings of suggested wing and horizontal stabilizer are included with the fuselage. It is reported that this ship flies well with a Taurus wing and stab.

The bare fuselage is only one pound six ounces (painted), and the workmanship is superb. One indication of its desirability is that the weekend I took delivery of the unit, I carted it out to the local flying field and set it on my car—the next morning I called the builder with orders for three units! And here is the most important point—\$30 complete! For more information contact GlasKraft, 4213 West Roberts Drive, Santa Ana, California.

This month's assignment was to select and review a readily available kit that would make a good trainer for the newcomer to multi-serving as the "transition model" from single channel. Although there are many such models available on every dealer's shelves, we select the Top Flite "Tauri" for this purpose. With two Taurus' under my belt, the chance to build and review a Tauri wasn't exactly the "big thrill." That is, until I opened the kit. Top Flite has a facility to give the modeler a complete kit, and this was certainly no exception. Kit designers would do well to pursue this trend of "completeness"—especially for the benefit of those RC'ers in rural areas—where it is virtually impossible to run down to a local hobby shop for the numerous "goodies" necessary to complete a model. To the man in the country, the search

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for a 3-48 hex head set may be a real problem! With the Tauri, building can commence and continue without the necessity for taking time out to fabricate and fit special hardware.

Another excellent feature of this kit are the tabs on the wing ribs—permitting perfect wing alignment. If the builder follows this procedure, combining it with a jig or level work surface, the wing will be absolutely true, an all-important necessity in RC.

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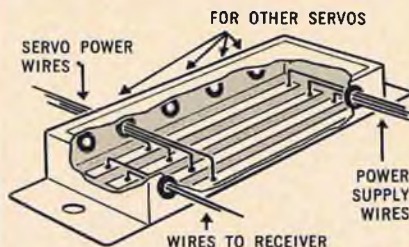
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Although the Tauri is designed for 6 or 8 channel, we decided to try a "full-house" installation in this model. If you decide to follow suit, mount the receiver on a piece of 1/16" ply and slide it in parallel to the bulkhead. This will give you enough gain in space for the four servos. The front wing dowel should be moved forward of the bulkhead for this particular installation.

(Continued on page 48)

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SOLO

(Continued from page 47)

We don't like building wings, so consequently tackle them first to get them out of the way. This serves a double function—if you completely finish and dope the wing, it will be completely cured by the time the rest of the model is completed. The Tauri wing is exceptionally simple to construct. Strip ailerons were added, ala Taurus, with 1/16 flex wire up through the wing for attachment to aileron horns.

Both the nose and main gear on the Tauri is designed for excellent ground handling. A "built-in" shock cord device on the main gear works well, and takes most of the beating in a rough landing. We mounted a single DuBro on the nose gear to further increase the ground handling potential.

Insofar as radio gear is concerned, the Tauri is well laid out for a neat, uncramped installation. Switches and connector plugs were ruled out. In the case of the former, we simply plug in our NiCad pack at the start of the flying session, and leave it connected during the afternoon. Normal receiver draw is low enough to offer very few problems insofar as battery drain is concerned. In the case of connector plugs, these would interfere with the push rods, so we used one of our own Micro-Tie servo connectors, eliminating the necessity for plugs and the many soldered connections that often flex and break. The servos were all mounted on the servo tray with wiring done outside the model.

Since Top Flite's shaped parts are hollowed and well-formed, the fuselage finished up well. In fact, the balsa was picked with such care that only the wing tips were not identical in weight! Finishing is a matter of individual taste, but we've finished the last two with "Quick." Quick can be found on almost any modeler's shelves—it's the stuff left over from the last model! Maybe that's why no one has asked me to finish their RC scale job for them!

When completed, we felt that the Tauri with full house gear might be too hot and fast a ship for the beginner. Bravely sporting an OS 35 in the nose (with intake reduced), we went down to the local field for the test flights. We should have believed Ed Kazmirski—the ship was completely docile, and

would fly quite well on just the rudder. Yet, use the ailerons and elevator and the Tauri became quite maneuverable. It's quite a "change of pace" to have a model that is calm enough for a trainer without looking like a cattle car from the Chicago Northwestern. The Tauri underwent many such flights, and was handled by several rudder-only boys who had never flown multi, and with a great degree of success.

We recommend the Tauri for the newcomer to multi—whether 4, 6, or 8 channels, or the "whole route." It's a pleasure to fly, and will give the novice a chance to gain the needed experience for handling the hotter, faster ships. Build for strength and lightness, do a neat, clean job of radio installation, ask for help in trimming out your first flights, and you're on your way to becoming a proficient flier.

GAL'S CORNER

(Continued from page 45)

So you can see how fortunate I was on that April morning, not so many years ago, to find my competition was to be a harmless hobby—a simple pastime. No glamorous female model for my husband—just a model airplane.

Oh, yes, it's true we had to forego that dishwasher this year, but—after all—those motors are expensive, and a fellow can't possibly compete with just one!

Our vacation? Well, we've gone to Dallas, Texas—in July! The Nationals were held there, you know. Actually I didn't really see Dallas, but I can give you the exact layout of the Dallas airbase, in case you should ever want it. Anyway, who wants to sightsee when its 125 degrees in the shade?

This summer we'll be moving—we've found the dearest little house about 35 miles from town. Well, yes, that is a bit far for us to commute every day during rush hour—but, listen to this! It's right across the road from the Flying Field!

Anyway, you see how lucky I was that my husband was interested only in planes... not anything as simple as a girl... nothing so inexpensive as a mannequin... not anything so undemanding as a female...

Well, you see... how lucky... I was...

QUESTIONS AND ANSWERS

(Continued from page 36)

it, start with this group. If you cannot, don't worry! You will have just as much fun with a "single," and you can always trade in your equipment the next season for the more advanced "rig."

Group IV: for the model mariner. Same as the second group but modified to suit model boating requirements. By employing electric power you will be able to control your model right, left, stop, and possibly, forward and reverse. If you decide to use a combustion engine, you will control right, left, fast, slow. Electric operation runs quietly, gives no problems when it comes to starting your power plant. If you have had some experience with either glow or diesel engines, you will have no problems either. If you like an audience when operating your model—do choose a combustion engine—when it starts roaring, they'll come from all directions!

Group V: the more expensive category for the model mariner. Usually 4 to 8 channel operation is about the maximum you can use for any practical purpose. If you plan to run a high speed hydroplane, this is what you should have. Use "relay type" receivers, or a receiver with a "relay bank" and servos for this application.

Insofar as the selection of equipment

is concerned, there are a number of reputable firms manufacturing RC gear. We are not in a position to elaborate on the merits of each—the space does not allow this. We only can repeat that good equipment costs more than equipment which is not so dependable, and the difference usually is not very great, percentage-wise. If you feel you must buy a "bargain," make sure you know what you are spending your money on! **Operating a radio controlled model with good equipment is simple,** and anybody who can build a model should be capable of installing his equipment simply by following the instructions furnished with it. Do not let the "electronics" end of it bother you—don't worry for the time being about what makes the receiver and transmitter work—you can't do anything about it anyway. And if you are worried about the cost—well, add up what you spend on a comparable hobby, or if you are a modeler, on the cost of two good control line stunters, and you will see that the cost is just about the same. Furthermore, once you have your transmitter, receiver, and actuator, the expense with the second model will involve only the new kit and some additional hardware.

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Circle No. 120 on Reader Service Page

R/C MODELER

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THE NORSEMAN

By

Ron Chapman

in the

February issue

R/C PYLON "DUCK HAWK"

ANSWER TO R/C BUILDERS DREAM

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- RACING PILOT
- SELECTED Balsa WOOD

- FOR 4-6 CHANNELS

- SPAN.....54" • ENGINE SIZE.....15-19
- LENGTH.....40" • 15 (AMA RULES)
- AREA.....576 SQ. IN. • 19 (WEST COAST)



6719 SALT LAKE, BELL, CALIF.

MAKERS OF

- R C NYLON ACCESSORIES (BELLCRANKS, ETC.)
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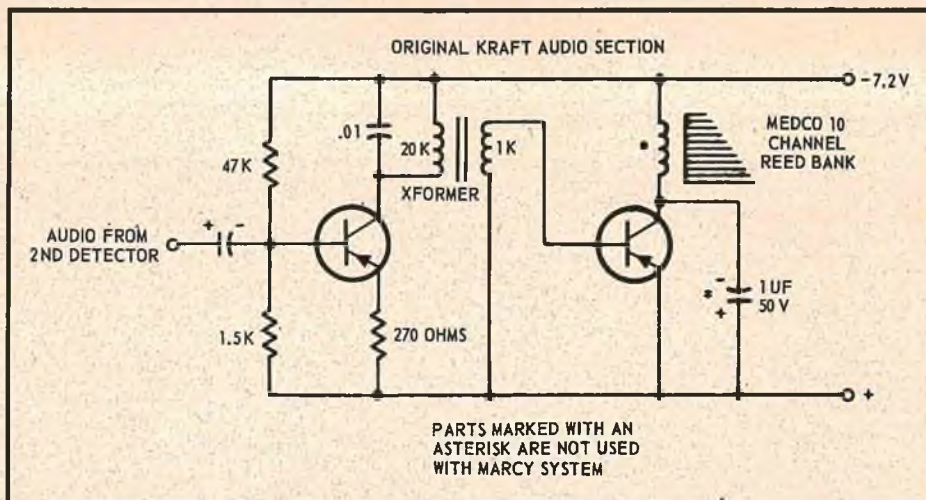
BENCH BITS

(Continued from page 15)

easily overridden by the control stick. A noise generator was used to purposely introduce noise into the system so that its effects could be noted. A very slight displacement of the servo was detected. Of course, if the noise gets so bad as to saturate the audio output stage, you are in trouble, but this is an indication that something is definitely amiss in either the receiver or transmitter. Power converters in the transmitter may cause problems if they are not adequately filtered, however the unit built here at RCM was operated from a well-filtered converter with no difficulties.

As you will note, the Marcytone servos are designed to operate from a center-tapped 7.2 volt battery supply. This supply should have a capacity of at least 500 milliampere-hours for an adequate margin of safety. The Kraft superhet may be operated with no trouble at all on 7.2 volts. We thought a problem might have arisen with the higher voltage in the form of regeneration to the IF amplifier, however, the receiver is well bypassed, and absolutely no trouble was encountered in this respect. In the event that you do experience trouble with regeneration in the IF amplifier (very unlikely), the cure is simple: merely increase the value of the 270 ohm decoupling resistor to somewhere between 470 and 820 ohms, the best value being determined by trial and error. If you have had an unusually hard day sweeping up the pieces at the local field, stick in a 680 ohm resistor and forget it. We were very pleased with the general "unfussiness" of the entire system.

We had experienced some trouble with the Marcy feedback servo in the form of oscillation (approximately 24 KC), and a wider deadband than was comfortable. We found that this trouble occurred when used with either the superregen or superhet detectors. When using the test circuit as recommended in the instruction manuals accompanying the kits, the oscillation was noticeable but the deadband was not. This is not surprising, since the test circuit has the full 7.2 volts across the test potentio-



Neat, compact installation in Kraft superhet.

NOW, 24 HOUR ASSEMBLY!

COMPLETE CONTROLS!
Rudder, Elevator,
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Wing Span: 57"
Wing Area: 620 sq. in.
Wght.: 5 lbs.

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New Type Kit!

Assemble the "Jenny"
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plywood fuselage! Kit
has many unusual fea-
tures plus all the bits
and pieces required.

SINGLE TO MULTI CHANNEL RADIOS!

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2 or 3 wheel
landing gear!

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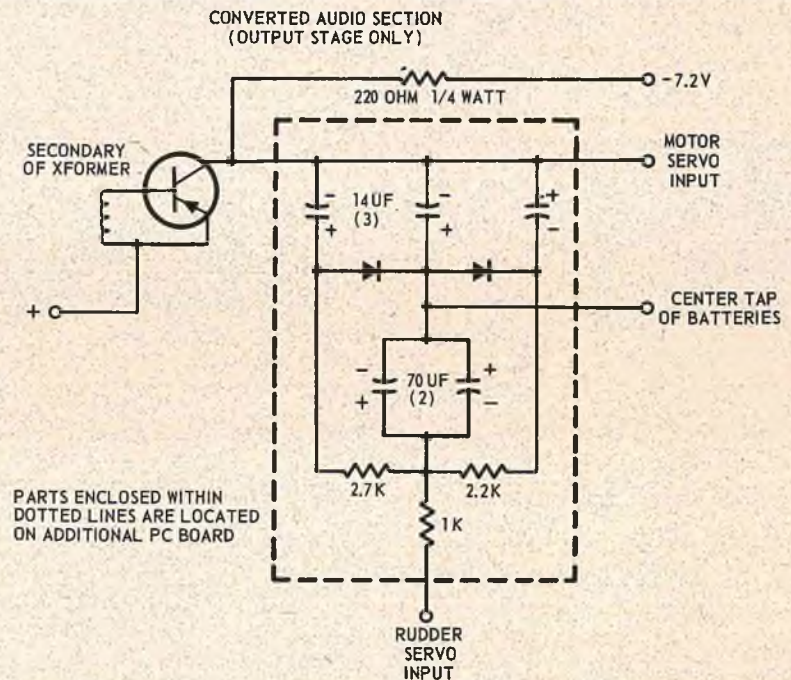
BENCH BITS

meter, making it extremely difficult to produce an error voltage of 100 millivolts or less by manual rotation of the potentiometer. Using a wire-wound pot with its poorer resolution aggravates the problem further. Adding series resistors to the ends of the test pot in order to reduce the error voltage to plus and minus .5 volt with full rotation showed up the deadband. Subsequent work on the servo cured the oscillation but not the deadband.

While the deadband would not prevent successful flights, we felt that a tighter response would be much easier on the nerves. (Knees, too!) It is our understanding that an improved servo is in the works.

To satisfy our curiosity, a Space Control servo was wired into the system, and the whole works was operated at 4.8 volts center-tapped. The transmitter adjustments (modulator) had to be changed to reposition the center of the servo due to the loss of tone amplitude at the receiver, but this was a relatively simple procedure.

All things taken into account, we feel that this superhet conversion is simple enough to warrant consideration if you are plagued with the interference problem and its versatility (proportional or conversion back to reeds) insures that the money invested will give maximum value.



Printed circuit board for Marcy superhet conversion. Actual size.

SHOWCASE '64

(Continued from page 31)

flamingo on a duck pond! This model performed even more excitingly using six channels than it did with single channel."

The Schoolmaster kit features a die-cut one piece, all-balsa fuselage that eliminates the need for splicing fuselage lengths, plus a planked all-balsa wing that assures strong, warp-proof wings without the need for fabric covering. Formed wire for conventional or trike gear plus nylon bell crank and all necessary hardware is included for a complete kit. In our opinion, material selection and die cutting equal or exceed the extremely high Top-Flite standards. Plans are extremely well detailed. RCM will feature a step-by-step photo and text construction sequence for both the single and multi versions of the Schoolmaster in the February issue.

Specifications: span, 39"; length, 33"; area, 292 sq. in.; Engine, .049 to .09. Price: \$5.95. Circle #1 on Reader Service Card.

One of the most reliable models we

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Schoolmaster

1/2A R/C MODEL
KIT NO. RC-8 **\$5.95**



Wingspan: 39 in. Length: 33 in.
Wing area: 292 sq. in. Engine: .049



Above: Complete single channel package from Lee's.

have ever flown was the Spirit by Consolidated Models. Although this kit did not receive the popularity it deserved, it was a single channel trainer par excellence. Several hundred flights were racked up on this ship using a VariComp and throttle SN before installing six channel equipment. The model continues to fly in its usual dependable way. Now, Consolidated introduces the Lil' Spirit, designed for .020 to .049 engines, and lightweight relayless single channel equipment. We bought the kit from a local dealer and was quite surprised at the amount of prefabrication and quality that was purchased for \$3.95! The plans are highly detailed, the wood has been hand selected, and the entire model goes together like a jigsaw puzzle in a weekend's time. We installed C&S relayless equipment with the Septalette proportional actuator, as shown on the kit plans, and have found the model to equal, if not surpass, its bigger brother in flight characteristics! Highly recommended for the beginner. Circle #2 on the Reader Service Card.

Among the new multi kits making their debut during the past month was the Citation, John Roth's USAF R/C championship design from the Andrews AFB meets in 1961 and 1962. Kitted by

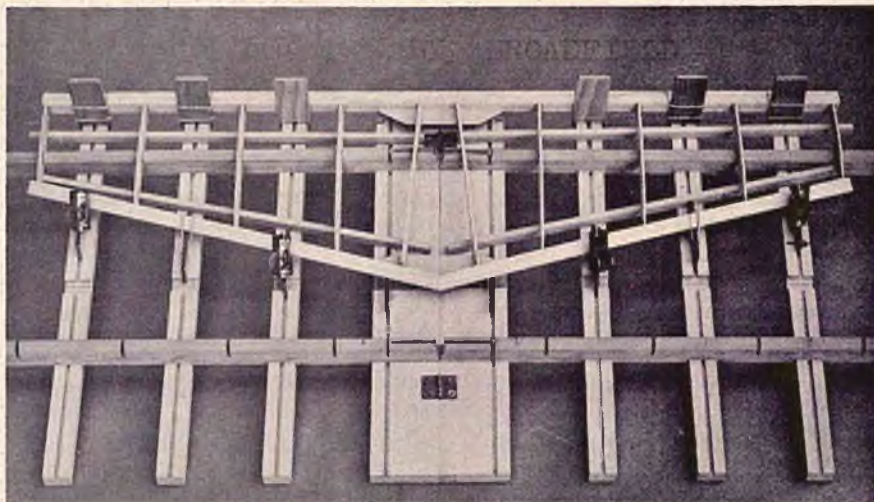
The Schoolmaster, versatile RC from Top Flite.

Jetco Models and retailing for \$24.95, the Citation has a 62" span with an area of 740 square inches. Dihedral is 4 degrees. Length is 50" and recommended mills are in the .35 to .45 range. John's design is not only a proven contest performer, but is equally well suited as a multi trainer when the smaller mill is used. When used for the latter, be sure to keep the weight down. Those familiar with Jetco plans can expect the same high detailing in this new offering. Shaped and hollowed blocks, hardware, formed gear, bellcranks, canopy,—it's all there. *Circle #3 on the Reader Service Card.*

From Veron Models in England, via *Westee Hobby Imports*, came one of the finest kits we have ever seen—a 34" span single channel model of the full-scale lightweight *Tipsy Nipper*. Designed for .049 to .074 engines and lightweight single channel gear, the *Tipsy Nipper* kit contains pre-shaped and pre-hollowed blocks, extremely high quality wood, landing gear (of course it's preformed!), spinner, and beautifully formed scale canopy, and lightweight rubber tires (or is it tyres?) as only the British can make them. There are some die cut parts, but have obviously been included so as not to disappoint die-cutting addicts—these can be gently blown out of the sheet! \$9.95 from Westee. We suggest you get this kit—we're going to—our Managing Editor fled the scene with the one we obtained for review! *Circle #4 on the Reader Service Card.*

Another import from *Westee* is the *Velox*, a 44" span pusher for .020 or slightly-on-the-sick-side .049's. Although this kit was not designed originally for radio control, it is, nevertheless well suited for the smaller lightweight units. Several of these ships are flying in the Chicago area and are reported to be very nice floaters. The balsa tubular fuselage boom is preshaped and hollow, as are all of the blocks for the pod, nose, etc. Kit includes spinner, wheels, shaped landing gear, etc. Price is \$8.95. Especially for those of you who get in a rut with conventional looking models. *Circle #5 on the Reader Service Card.*

Pappy *DeBolt's* got a new one out—the newest addition to the *Live Wire* line is the *Jenny*, a 57" span model with 620 square inches of area. Like Pappy sez, this one goes together in 24 hours, more like assembling one of the youngster's plastic model kits than building a normal model! The design is functional, and no attempt has been made to add the "frills." Taking advantage of past experience plus some new ideas, the structure practically falls together. As an example,



Wing-A-Jig from Broadfield assures precision-made flying surfaces.

there are no servo or engine mounts to install—the plywood portion of the fuselage serves as a mount for both the engine and the servos. If this isn't enough, it even mounts the landing gear, too! All major parts of the model are machined to *exact* size, ready to cement together. The smaller parts are die cut so that there is nothing to be made. The plywood fuselage parts are precision machined to close tolerances, and have the mounting holes pre-drilled! Since the *Jenny* has been designed for the complete flying range from single channel through full-house proportional, a universal engine mount with rubber shock mounts has been included to take care of the wide range of engines (.19 to .45) that will be used with this kit. Formed dural landing gear and control horns, nylon strip hinges, and a complete hardware package are included. Price is tentatively set at \$14.95. For beginners, start with single channel and work up to ten channels or proportional gear—all with the *Jenny*! *DeBolt Model Engineering Company.* *Circle #6 on the Reader Service Card.*

We have all been talking about getting the new or young modelers interested in RC, and have realized that a complete single channel "package" would be in the best interests of the true beginner, both from a standpoint of simplicity and

of economy. *Lee's Hobby Industries* has done just that with a complete *single channel package*, available nation-wide for \$19.95. Pre-wired, the components consist of the Kraft 3VK relayless receiver, Citizenship's SE-2 compound escapement; Dubro's new vibration-proof, two pencell battery box; two Burgess alkaline energizers, and a knife grip slide switch, all in a completely wired and harnessed system. Each unit is carefully tested prior to packaging, and adequate harness length is provided for installation in most RC kits using .010 to .19 mills. The receiver is also available separately and built-up for \$12.95. Available direct from Lee's. Also available to Hobby Dealers at standard discounts. *Circle #7 on the Reader Service Card.*

From *Accutronic Engineering*, comes news of the *Accutrol Trio, Model PR301*, compact triple feedback proportional servo unit giving rudder, elevator and motor controls. The trio consists of three feedback servos in a package no larger than two regular standard servos. All wiring connections are internal, with even the receiver, battery and aileron plugging directly in the Trio unit. This servo system may be operated with any proportional system, according to the manufacturer. It is only necessary that the factory know the required voltage. Weight of the complete unit is eight ounces;

size, $1\frac{3}{4}$ " x $2\frac{1}{4}$ " x 3"; travel, $\frac{5}{8}$ " linear; motor, ruggedized Micro Mo; thrust, in excess of four pounds; voltage requirements, 2.4V motor, 4.8V feedback ref., 0.3V control voltage (other voltages available on request); price, \$120.00.

The Accutrol Solo Model PR101 is the smallest single servo for individual use or for aileron use with the Accutrol Trio. This is a 2.8 ounce feedback servo measuring $1\frac{1}{4}$ " x $1\frac{1}{32}$ " x $2\frac{1}{4}$ ", with additional specifications the same as listed above. Price of the single servo is \$40.00.

RCM has not tested either of the above units but suggest you circle #8 on the Reader Service Card for additional information direct from the factory.

One item we feel is indispensable to RCers demanding maximum performance from their RC engine is the ZimTac tachometer from ZimTac Products. This tachometer is used by RCM for our own personal RC activities as well as for testing new RC mills for performance tests. We have found this compact, rugged unit to be accurate to plus or minus 200 RPM. The ZimTac is available in two ranges: from 0-10,000 RPM and from 0-25,000 RPM. Both units are electronically calibrated and list for \$18.95. This piece of test equipment is not a luxury but a necessity for peak performance and for comparing the RPM differential between various fuel and prop combinations. Circle #9 on the Reader Service Card.

Another excellent choice in field test gear is the Minimeter field strength meter from Vinco Industries. This miniaturized meter is simply snapped onto the transmitter antenna and is ready for use, constantly measuring the output of the antenna during flight. Initially, the Minimeter can be used to tune the transmitter to peak performance prior to flight. In addition, the meter also indicates when transmitter batteries are running low. \$10.95, and available direct from Vinco. Circle #10 on the Reader Service Card.

Another item from Vinco Industries is the Variamp, a compact D.C. power supply using full-wave rectification with an isolation transformer. An extremely well-made unit, the Variamp battery charger is fully transistorized for smooth adjustment throughout its entire charge range. A dual scale is provided—0-100 milliamps and 0.1-2 amps, facilitating accurate readings. The Variamp meter is a constant monitor on how this unit is performing, removing all guesswork from

(Continued on page 56)

GREATEST ALL PURPOSE R/C MODEL EVER DESIGNED

★Contest ★Sport ★Multi-Training

JOHN ROTH'S CITATION

U.S.A.F. R/C CHAMPIONSHIP DESIGN
IN 1961 AND 1962

FOR ALL .35 TO .45 ENGINES

ASSEMBLES
IN A JIFFY!

IDEAL TRANSITION
DESIGN TO MULTI
FLYING!



EASIEST MULTI TO
BUILD AND FLY!

Specifications

Wingspan..... 62 in.
Wing area..... 740 sq. in.
Overall length..... 50"
Dihedral..... 4°

COMPLETE
KIT ONLY

\$24.95
(Less Engine)

Winner of the Andrews Air Force Base meet in '61 and '62, the "Citation" has proven itself to be a consistent winner. Though designed for competitive flying, its functional construction, good looks and excellent flight characteristics should appeal to many R/C enthusiasts just making the transition to "Multi" flying.

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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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Now you can get the equipment choice of your dreams and take up to 24 months to pay for it. And here's a BIG plus — as a bonus we provide Credit Life Insurance on all account balance at no additional cost to you. This EXTRA protection for you and your family is just another reason why thousands of modelers have switched to AERO-TROL Engineering.

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We don't care if you are a novice or an expert — if you would like to know all the facts about our services to you, just write your name and address on a post card and send to us. We will promptly send you COMPLETE information and everything you will need for getting started right now with America's leading supplier of Radio Control Equipment — exclusively.

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High Ridge,
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Circle No. 126 on Reader Service Page

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PROVIDES—



A FIRST step in simplified RC operation. The new double-duty Broadfield RC Field Box for your costly supplies.

PROVIDES: Waist-high stand to prepare YOUR plane for flying, with plenty space for tools—meters—fuel, etc.

PREVENTS: plane damage & injury to person. New-Hold-Down stakes to stake down box on windy days.

EZY-to-Build: completely pre-fab KIT

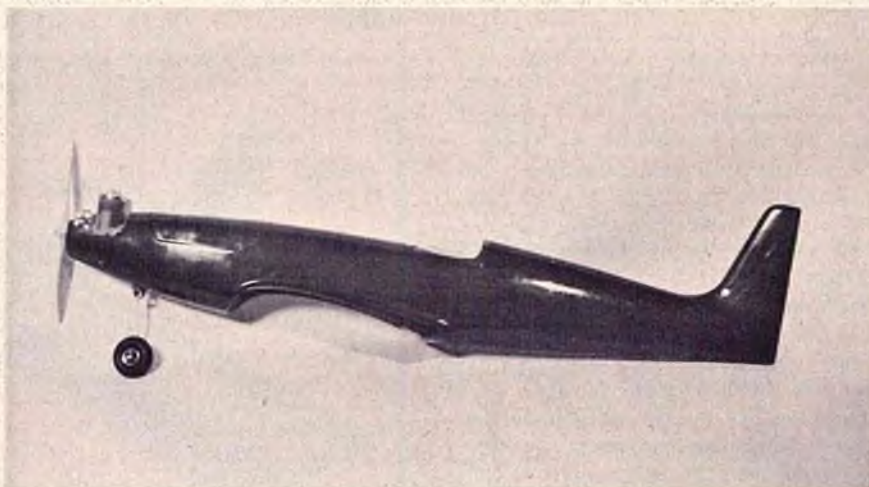
- Pre-fab plywood & wood parts
- Hold-A-Plane brackets-shaped
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- Assembly plan & color decal. & glue

Assembled	Pre-fab KIT
J-7-F RC Field box	J-7-F RC Field box
\$21.95 (add)	\$12.95
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BROADFIELD AIR-MODELS
ASHLAND, MASS.

Circle No. 127 on Reader Service Page



Beautiful fibreglass fuselage from GlasKraft. See Solo column by Frank Justin for details.

battery charging. The meter also indicates incorrect wiring of batteries as well as loose connections within the wiring circuit. When the switch is in "off" position, the meter will read battery voltage. An excellent, precision-made, trouble free instrument designed for maximum long-life performance. \$22.50 from Vinco. Circle #11 on the Reader Service Card.

Bob George and Gordon Anderson of R.G.A. Specialties made our list of Favorite People when they introduced Glo-Life to the modeling world. We first heard about this fuel additive from Bernie Williams at the 1963 Nationals and obtained a bottle from Ace Radio. Since that time we have used Glo-Life in every one of our engines with results that far exceed the manufacturer's claims for their product. Whether for break-in, general running, or for removing varnish from a tired mill, Glo-Life is a product we will recommend without reservation! In talking with Clarence Lee, one of the world's top model engine designers, we found that he, too, advises the use of Glo-Life. Enough said? \$2.25. Circle #12 on the Reader Service Card. Next month we'll bring you data on three additional products from R.G.A. — their Servo Solver, Servo Overdrive, and Switcher Board for multi installations.

The photographs of the wing jig are from Broadfield Air Models, manufacturer of the famous Broadfield Field Box. Based on his knowledge as a full-scale aircraft jig and fixture designer during the war years, Broadfield introduces the Wing-A-Jig, the first full-scale

type ready made jig for assembly of RC wings up to 72" span and 6" to 12½" chord. This jig features pre-cut rib and spar holders, adjustable chord with assorted size supporters for accurate alignment of leading and trailing edges, and adaptable for even chord or tapered wings. Special jig parts are included for stabilizer assemblies. The jig is made of highly selected wood parts which are precision cut and notched. The Wing-A-Jig can be assembled in minutes with wood and machine screws for an accurate, ready-to-use wing and stabilizer jig. Price will be about \$15.95 direct from Broadfield. For further information, Circle #13 on the Reader Service Card.

Aero Publishers, Inc. has announced the publication of their 1963-64 edition of the annual *Catalog of Aviation and Space Books*. This new 32 page catalog contains listings and descriptions of the many new aviation and space books that are published by this California firm that has been publishing aviation books exclusively since 1939. Included are books on all aerospace subjects, including aviation history, engineering, production, modeling, maintenance, piloting, space travel, military aviation, air transportation, plus descriptive and pictorial books of early and modern aircraft. Copies of this new catalog can be obtained free by circling #14 on the Reader Service Card. We have obtained a copy of this booklet and recommend that you do likewise—the books published by Aero Publishers are tops in the field of full-scale and model aviation.

KLINETRONICS

ASTROGUIDE PROPORTIONAL

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KLINETRONICS ASTROGUIDE

- Fully transistorized transmitter and receiver.
- First commercial system to use Bonner "Duramite closed loop" Servo. More than enough power to operate, nose gear, brakes, etc. Thermistor temperature compensated from -20° to $+160^{\circ}$ F. New Servo lid has feed back pot built into it and wired to new amplifier and connectors.
- System uses 4 separate tones for control of all functions simultaneously. These tones are electronically commutated without the use of relays, so that only one tone is on the air at a time. The commutation rate is 60 CPS.
- The transmitter has 4 separate lever type controls, each is trimable from the XMTR, fully metered for output and battery. Aux. channel provided for landing gear operation.
- 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.
- Transmitter has usual high output Klinetronics is noted for. Requires 12 V NiCad power supply.

Price complete — including XMTR — REC. servo lids with amplifiers, all Ni Cad power packs and connectors custom charger \$499.95

Proportional closed loop Servos with amplifier complete as a separate item for use on space control, Sampey, Dee Bee, and other proportional control systems. Fits in standard Bonner "Duramite" or "Transmite" servos... SSA-P complete \$25.95. Gives you the power to operate those extra controls.

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Circle No. 113 on Reader Service Page

MODEL OF THE MONTH



Frank Johnson's F-82 with Miss Midway City of 1963. Photo by Dick Tichenor.

REGATTA

(Continued from page 36)

has a wide enough beam for stability, while the design of the hull is such that it can achieve considerable speed. Construction is entirely of balsa so that the building is simplified for those used to working with soft wood. The extent of the prefabrication in this kit is excellent, and normally not found in kits selling in this price bracket. One feature we liked was the unusually large space for power plant and RC components, with the entire top removable for easy access. In addition, the model has 24 watertight compartments, so if damaged, will still remain afloat! The best engines for this machine is a 3.55cc (.19) diesel such as the Sea Otter or AM-35, or .35 glow mills. With either of these powerplants, the Marlin will really move! For electric power, the Pittman Boatmaster or Taycol Supermarine Special (6-12V) is recommended. Price is \$16.95. *Circle # 15 on the Reader Service Card* if you would like additional information on the Marlin.

Two additional imports from Westee are the Trident Trawler, a 28" freighter made of block construction and including all necessary decorative fittings and priced at \$17.95, and the Vosper Rescue Launch, a 28" model that is reportedly on the speedy size. Again, all decorative fittings are included in the \$13.95 price. For information on either of these ships, *Circle #16 on the Reader Service Card*.

Lee's Hobby Distributors are introducing the Rudder Actuator for RC boating use, a unit which has several excellent features. With the actuator you can maintain trimmable rudder control in any degree with extremely strong thrust. It requires only a 1.5V to 3V power supply, and can be adapted for any usage where power and degree of movement is important. Use of Lee's rudder actuator is highly recommended with two channels on relay type equipment. *Circle #17 on the Reader Service Card*. Price is \$9.95.

A model boat finish that we have found to be excellent in every respect is Poly-Aqua, an epoxy resin finish designed for full-scale marine units. We

(Continued on page 60)

DEAR RCM:

(Continued from page 9)

Atlantic—particularly in the field of radio—so appreciate the challenge you have set yourself. If you can match the technical competence and accuracy of the best, particularly in reports and draughtmanship, and develop your own brand of individuality, you will have a winner.

Regards from one small corner of the field—you're getting my vote.

Dennis Boyd
Auckland, New Zealand

Thanks, Dennis—we hope we can live up to everyone's expectations, and follow in the same traditions of quality set by the model magazines both at home and abroad.

As a beginner in R/C, I have found that it is very hard for an individual to get information—the owners of some hobby shops have very little know-how or technical information for the neophyte, and the fellows at some of the RC clubs are so engrossed in multi and proportional, that they forget when they were flying with escapements, and all but shun the beginner. If this sport is to continue, I think the struggling neophyte must get help from any and all reliable sources, and this includes manufacturers, dealers, RC clubs, and the model magazines. I hope that you always remember the beginner in your fine publication. By the way, do you have any information about the Glass City proportional units and their reliability?

Beverley D. Brown
Vauxhall, New Jersey

We'll never forget the beginner—and any of you who can't get help locally, write us! It may take a little longer, but we'll get the answers for you! On electronics problems, write Hank Giunta, Technical Editor; for multi or proportional problems, address Chuck Waas or Frank Justin; for single or Class II, write Don Dewey. All c/o RCM. We don't have any information on the Glass City units, Bev, but have asked them to write you directly.

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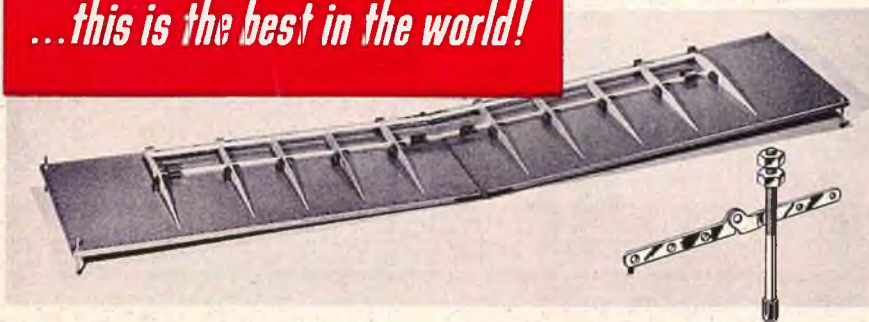
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REGATTA

(Continued from page 59)

have found that this material can be applied with conventional spray equipment, compressor powered, or more simply, with an Ambroid Jet Pak, or applied by brush. Unlike most epoxy finishes, Poly-Aqua can be applied outdoors with little chance of picking up dust particles. Humidity has very little effect on application of this finish, and temperatures can be as low as 40 degrees for brush application, or 60 degrees for spray. The best part of all is that it dries tack free in five to fifteen minutes and thoroughly dry in two to three hours without the necessity for heat lamps. The hardener and base mixture are contained in two cans which are welded together — when poured, they pour equally, automatically insuring the proper mixture. No induction period is required as with most epoxy paints, and Poly-Aqua can be used after only a few minutes stirring.

The finished result produces an extremely high gloss with an even deeper lustre brought about by an application of Ditzler D-125 marine rubbing compound. To test the fuel proof qualities of the paint, Cox Thimble Drome "red can" was poured directly onto the finish and allow to stand momentarily. Only a very slight blemish was noted, and this was subsequently removed by wiping with a cloth. Poly-Aqua is available at most major boating supply stores, or, you can write to the manufacturer, the D. J. Peterson Co., Inc., Shebogan, Wisconsin.

Before securing until next month, Everett C. Johnson, 867 Harwood Street, Imperial Beach, California, would like to locate a set of plans for a radio controlled (60" to 72") paddle-wheel boat on the order of the Robert E. Lee. Type of power drive is not too important. Can anyone help him out?

See you next issue.

FOR YOU:

Each month the staff of R/C Modeler wraps up another issue designed to bring you the finest material and latest information in the radio control field.

Successful designers and flyers explain the latest trends in RC, providing YOU, The 'RC'er, with up-to-the-minute data on every phase of our sport.

Whether at home or abroad, your RCM editors are constantly searching for new and better material. Foreign news, compiled by Cliff Rausin, is brought to you while it's still news; W. R. Weaver discusses RC techniques in the Far East; Bill Murray scans the Canadian scene; and whether in Germany or Belgium, South Africa or New Zealand, RC activities from every far-off point of the globe are as near as your mailbox.

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EDITOR'S MEMO

(Continued from page 6)

opinion, his Norseman is one of the best competition machines in the air today. The construction article will feature the latest modifications to Ron's long line of prototypes. It is hot, smooth, and fast. In the hands of a good flier, it will provide a definite edge over the usual contest multis. We think you'll like it.

Despite the Great Plague, we've been working on the prototype of Len Purdy's Jubilee. Soon to be released, this ready-to-fly multi bird is completely formed of Air-O-Sheet, a revolutionary new building material that Len has been testing for several years. The February issue will carry a complete report on our examination of this intriguing new material, the results of our test flights of Len's new ship, and the first public presentation of the Jubilee.

And on to another month. We appreciate your many letters, whether they contain suggestions, criticisms, or just plain RC talk — this is what makes this mag worthwhile. We try to answer them all — sometimes we get behind and hope you understand. Keep them coming — send photographs — and let us know what you want to see in RCM.

Since you will receive this January

DON'T MISS PART 3 OF KEN WILLARD'S BLUEPRINT FOR BEGINNERS COMING NEXT MONTH

issue a couple of weeks before Christmas, the staff of R/C Modeler — Chuck, Hank, Cliff, Gay, Al, Barry, George, Kathleen, Sally, and Clare, along with our foreign staff, the three Bills, Maurice, Harry, and Dave, and yours truly, extend our very best wishes to each and every one of you for a very Merry Christmas and a happy and peaceful New Year.

And we'll see you next month — if we don't contract chickenpox in the meantime . . .

ANOTHER FIRST . . .

R/C MODELER

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RC Modeler will be happy to answer any of your technical questions or problems, whenever possible. If your question includes items you saw in RC Modeler, please give us the page number and issue when you write.

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