

**G<sup>®</sup> GRID  
EAKS**

# **Radio Control World**

Vol. 7 No. 5 September-October 1966 35 cents

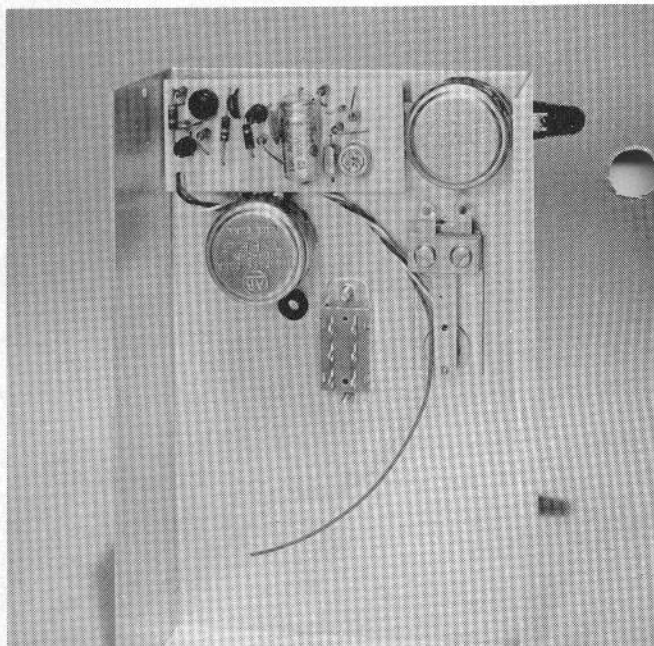
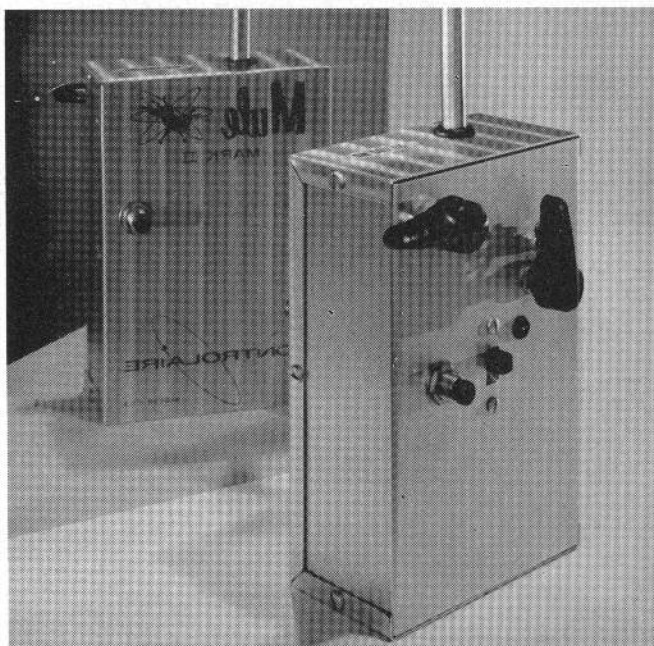
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*Add-on Switcher for Motors  
Jim Kirkland's SACS  
Installing R C in a Sailboat*

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## Controlaire G-G Conversion Kit for the Mark II Mule Tx

The Galloping Mule Conversion Kit from Controlaire allows any owner of a Mark II Mule transmitter to convert his unit to Galloping Ghost operation with a minimum of time and effort. Best of all, you don't need to get rid of your escapement equipped aircraft as the conversion does not change the normal operation of the Mule!

While the conversion doesn't produce a super-deluxe G-G Tx, it does supply the Mule with all the capabilities necessary for Galloping Ghost flying or model car control. The added circuitry comes from the Controlaire all-silicon G-G transmitter which is highly temperature and voltage stable.

The case front remains unchanged and no relocation of original parts is

needed. In fact, the conversion unit can be added and connected without even removing the Mule P.C. board. One photo shows the case back with the added levers and switches. The second photo shows the back interior and the kit mounted in position. In operation the regular Mule slide switch is the master on/off switch with the added slide switch on the back controlling power to the pulser. Pulse width is obtained from the spring centered, vertical lever; pulse rate from the spring centered horizontal lever. The back push button gives solid carrier and the regular push button switch solid tone. Complete control of pulse width and rate is available by adjustment of each pot shaft within each lever handle. Price of the conversion kit is \$14.98.

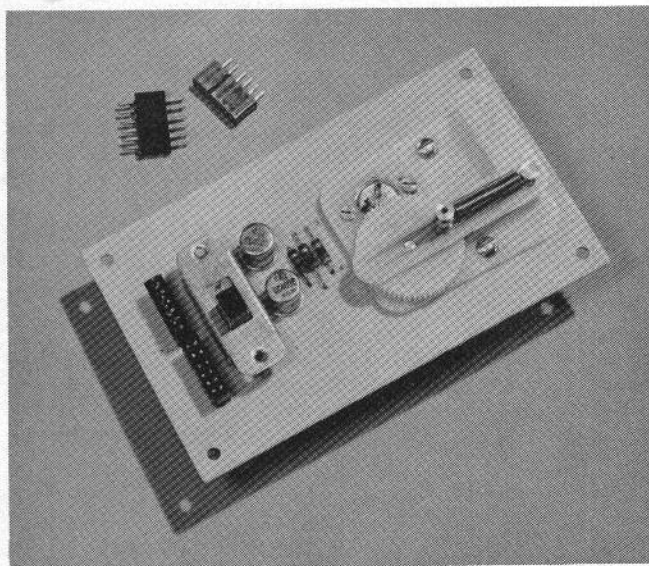
## Controlaire Ghost – Board and Switcher Kit

R/C flyers using or about to use the Controlaire Ghost Actuator will welcome this new item from Controlaire. A printed circuit/board mount has been combined with a servo switcher and related components to give you added convenience when installing the Ghost Actuator in your model.

Aside from forming the circuit, the P.C. board acts as a mount plate for the Ghost. Four bolts fasten the unit in the aircraft. The switcher circuitry is identical to the popular NND-1. A few items have been added; two plugs, mounted on the board, are used to connect the power supply and the receiver to the unit. The battery pack and Rx are not furnished but their connecting plugs are. A slide switch is also fixed to the board, and it is used to turn on/off the radio gear in the model. R.F. chokes have been added to further reduce motor "noise."

The entire unit with actuator weighs 2¾ oz. and is 4¼" long and 2½" wide. Prices are as follows — Board and Switcher Kit, less Ghost, \$7.98; Board and Switcher assembled, less Ghost, \$9.98; and Board and Switcher assembled, with Ghost installed, \$21.50.

Controlaire is also offering a Galloping Ghost package consisting of a G-G Transmitter, SH-100 or C'aire 4 Receiver, Ghost Actuator mounted on an assembled Board and Switcher unit, factory wired with battery box and all connectors. Price of the above package with C'aire 4 superregen Rx — \$99.98; with the SH-100 superhet Rx — \$109.98. An ideal package for a flyer wanting to get into Galloping Ghost operation.



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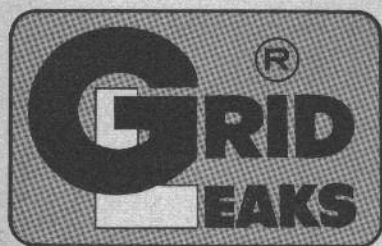
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# The Editor's OPEN CHANNEL



## Radio Control World

VOL. 7

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WE'LL TURN OVER the beginning of this issue's column to our assistant:

"The picture above left is of Mr. & Mrs. Dan Walters of Topeka, Kansas. They are awarding the Wichahawks perpetual trophy to 14-year-old Rick Swantz of Denver, Colorado, for sportsmanship and outstanding achievement in the Jr.-Sr. Classes of RC at the Wichahawks contest.

"Many of you who have been around the RC circle for the last 10 years or so in the Middlewest will remember Dan and his son Ronald at many contests and at the Sunday fly-ins. This beautiful perpetual trophy is in memory of Ronald Walters who passed away in January of this year. Ronald was a veteran RC'er, and we remember him flying RC in the days of ground based transmitters and escapements at the age of 7 or 8. He was an active free flighter and RC'er until two years ago when his health did not permit much outdoor activity. At the time of his passing he was only 16 years of age.

"This trophy will be awarded each year at the Wichahawk annual AAA contest in Wichita, Kansas.

"This fine tribute by the Wichita modelers should be an inspiration to the youth of today.

"We at Ace and GL-RCW wish to congratulate the Wichahawks on this tribute to Ronnie, and to the youth of America.—Bud Atkinson"

We've had inquiries as to what constitutes the maneuvers which will be used for the FAI flyoff in Oklahoma City. They are quite different from the AMA pattern and we present them here:

The maneuvers described are in accordance with the FAI pattern.  
*(Continued on next page)*

THE COVER: Norman Rosenstock with his Wild One. This is strictly for the experienced builder and pilot. Uses a Jenny foam wing to facilitate faster building. Proportional is recommended.



## The Open Channel

(Continued from page 1)

cordance with the provisional rules generated at the 1965 CIAM RC Subcommittee.

Scoring is from 0 to 10 points on each.

1. Take off.
2. Double stall turn.
3. Combined Immelman and inverted Immelman.
4. Three loops.
5. Three inverted loops (outside).
6. Three rolls.
7. Slow roll.
8. Rolling circle.
9. Tailslide.
10. Horizontal 8.
11. Cuban 8—Savoy knot.
12. Vertical 8.
13. Inverted straight flight.
14. Inverted 8.
15. Top hat.
16. Three turn spin.
17. Rectangular approach.
18. Landing.

OUR MAN BUD ATKINSON has been making the contest circuits. Oklahoma City, Dayton, Lincoln, Wichita, KC/RC, and by the time you get this, the Nationals. He has had nothing but praise for all of the contests attended so far, but he really went out of his way in praising the Wright Brothers memorial in Dayton. In part he says, "If any club deserves the gold plated glue tube, it is the WORKS. These boys really work. This was one of the finest contests I have ever attended. There were over 100 contestants and the field facilities equalled the Nats. They ran four flight lines. Weather was ideal. There were the usual glitches and fail safes, and cries of 'I ain't got it', but the number of flights made were excellent."

"Scale looked up too, with 12 entries. Scale is coming up in the world!"

WE HOPE THIS ISSUE reflects even more the slight change in editorial direction that the GL-RCW is taking. We need your letters to help. We want to make GL the magazine that gives out the handy hints to help make your hobby happy. Send us your gimmick ideas. They may seem simple to you, but for someone who has never seen idea or used it, it can be just what he is looking for.

Among items scheduled for the November-December issue of GL is a full size plan for a .020 biplane—*The Flipper* by Vic Smeed. John Reynolds will follow up on how to build the 36" scale racing sailboat, *The Snipe*. And there will be many more.

WE ARE GOING TO TRY, in future issues, to maintain a balance between aircraft, boats and cars. Let's face it, there is interest in all three—some R/Cers even work robots and other gizmos. It is conceivable that we may sometimes be too heavy in one

(Continued on page 24)

## Readers Write

### NO PROBLEM . . .

Finally managed to take the Jr. Falcon out yesterday afternoon. The control system worked perfectly, and we logged nine 5 minute flights before the rains came again.

The radio gear now includes a brand new Pioneer Relayless Superhet, Ace Add-On-Switch, Adams single actuator and three 450 Mah nicad pencils. I didn't install the Adams Twin which you shipped me recently, and frankly found no evidence at all of "blow back" of the rudder, not even when making 3 turn full power spins in trying to get the ship to loop. I would say that I was concerned with a problem that really doesn't exist, at least not with .049 power on 3.6 volts.

Now that I have the system working so nicely, I want to thank you again for all the help and encouragement you gave me.

We are going to convert the Bi-Hawk to single channel proportional control, and will be fitting a Chicken Hawk, with one of the new LR-3 Actuators by Rand for full control, the latter using my SH-100 relay receiver. Hope we have as much luck with these two ships as we are having with the Falcon. I really don't know when we will find the time to build a ship for the 12 channel Orbit that I have—but this is fun, real fun, for us "Sunday Flyers".

Please keep up the single channel coverage in your publication. It's great!

HOWARD K. LAMBERT  
Holden, Mass.

### A FAN

I would like to thank you for your wonderful magazine with its originality and educational aspect. Being a R/C Boating enthusiast, your magazine has over the years had articles on original design and working layouts for the boater. This is more than I can say for your nearest competition, and their society magazine.

WILLIAM G. BAKER  
Puyallup, Washington

### ON PRODUCT EVALUATION

After reading your March-April issue, I feel inclined to comment on Mr. Gould's letter, and your comments concerning R.C. product reports.

After becoming enthused about multi model airplane flying, I too did much reading and research prior to purchasing my radio gear. You might question the neophyte starting right out with multi-proportional, but I am an Air Force fighter pilot with over 2500 hours of single seat jet time, and I figured this qualified me to handle a propo trainer with full controls.

With this in mind, I purchased an Orbit 3 plus 1, with extra servo, a S.T. 23 R.C., and a Tauri. Many hours later my beauty was ready to fly. With the aid of an interested but equally inexperienced friend, we found a suitable flying field, and had at it.

The first try, after a lovely R.O.C. I locked up on the stick and managed to deftly roll inverted and land upside down, with the S.T. winding full-blower. This effectively removed my rudder, pilot, and canopy. After over-night repairs, we tried it again. Another smooth R.O.C., and during a nice smooth climb-out, I noticed that I had failed to raise the antenna to its full extension. While madly trying to rectify this oversight, the Tauri gently turned left and landed in a tree, unscathed. We retrieved the aircraft, and tried it again, this time with the antenna up. This resulted in the wildest flight I have ever seen, with the Tauri going from full power tail slides, into spins, spirals, split-S's, screaming dives followed by 10 G pull outs, all with the fearless fighter pilot merely trying to fly straight and level. It ended, inevitably, with a shattered wing and fuselage, after the funniest maneuver of all. The Tauri had gone into a tight spiral dive, and disappeared behind a small hill. All of us who were witness to this event mentally wrote off the aircraft, when it came screaming around the other side of the hill, did a fantastic 360 around a small bush, with the wing tip about two feet above the ground, pulled up and spun in.

After applying copious amounts of fiberglass and resin, and removing the landing gear to compensate for the added weight, she flew again. Each flight got better than the last, although each to this time has ended in minor bashes, for one reason or the other. Like once it twanged off of high wires right after take-off, and landed straight in (90 degrees) on a highway. I was finally learning to *not* hit the stops on each and every control movement, but in so doing I was being very tough on the Orbit gear. My Tauri looks like the aftermath of the Battle of Britain, but she still flies. Now to the point of this diatribe. Through all this crashing and bashing about, my Orbit 3 plus 1 has functioned 100 percent correctly. No glitches, fail-safes, instant response to my lousy controls, and seeming immunity from pushrods being pulled loose from control horns, and servo boards tearing loose and slamming into my receiver. In addition, I have been able to control the aircraft at ranges where I could just barely make out what it was doing.

This then is an unsolicited, and unqualified product report from a ham-handed customer. Maybe if more users would let you know how their radio gear is performing in the field, and if you could print both the good and the bad, others in Mr. Gould's shoes could use hard experience to dictate what R.C. gear they'll buy. Here's to no more crashes.

JOSEPH P. SMITH  
CAPT., USAF  
Weisbaden, Germany

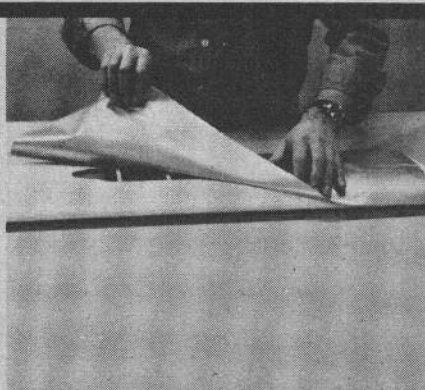


*Revolutionary New!*

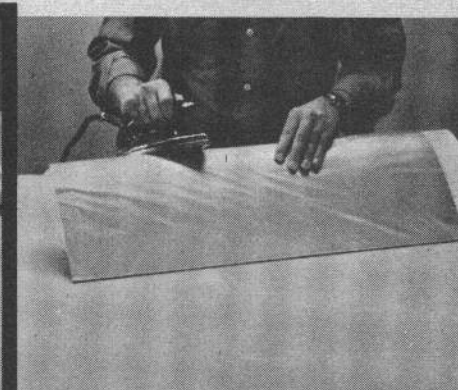
**TOP FLITE**  
**MONOKOTE** T.M.

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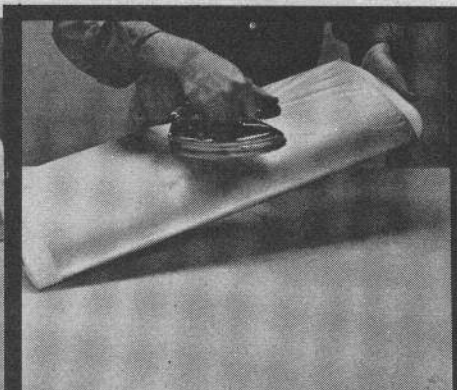
| Patent Pending



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S. A. C. S. is the name for a neat little switch developed by well known modeller Jim Kirkland. Story provides details.

# The Slaved Auxiliary Circuit System

*Simple printed circuit switch provides many switching applications for all-purpose flying.*

By JIM KIRKLAND

The Slaved Auxiliary Circuit System was designed primarily as a sort of insurance package for the contest flyer. However, the system's potential is unlimited in application for all RC uses, and there are many scale applications as well as uses by the Sunday or weekend flyer.

The ultra-light weight and low-drag operation of the S. A. C. switching units make the system suitable for any type of RC installation. Even small pulse servos will easily operate the switching units. The switching action available from one of these small units is limited only by the imagination and ingenuity of the individual using them.

The units are vibration-proof and may be mounted in any position desired. The most common method being to use 4 drops of Goo per switch and sticking them to the inside of the fuselage sides. The slaving pushrod should have a clevis on the end connecting to

the switching unit in order to make adjustments for proper operation. Especially so, when a trim function is used to activate the S. A. C. switch. The slaving pushrods may be connected to the main pushrods, the unused end of double-ended servos, or the unused side of the disc on disc type servo.

The use of the "A" units provide two levels of braking power to an electric brake system. Addition of the "B" unit allows selective braking to either wheel, at either level of braking power, to aid in turning the model under adverse wind conditions and in taxiing on rough terrain. When used with the WAG electric brakes, the low level braking power provides an easy stop that is comparable to that obtained when using the proportional brake applicator being marketed for use with some propo systems. The use of the "D" unit to provide heat to the glow-plug at idle rounds out the complete insurance pack-

age for the competition pilot.

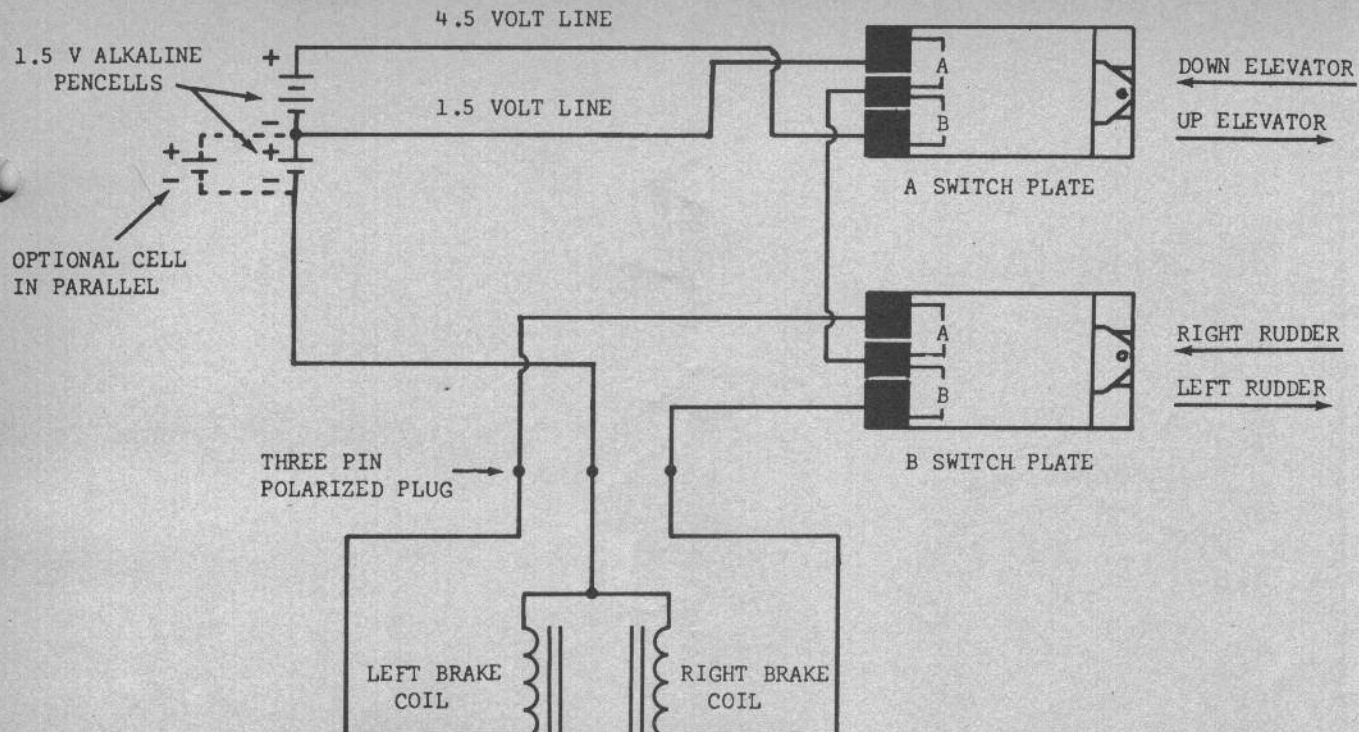
The use of the "A" and "B" switches on conventional geared models will assure positive ground control under any conditions. However, the "B" unit should be wired to operate on the UP elevator condition only. Even so, it is possible to have two levels of braking power with some additional wiring by using another S. A. C. switch in the aileron circuit as a selector unit!

The Sunday flyer and experimenter will undoubtedly find a variety of uses for the S. A. C. switch. By making specialized printed circuit boards to use in conjunction with the 3 fingered wipers there is an unlimited number of switching actions available. By ganging the units, the variety available would stagger the imagination!

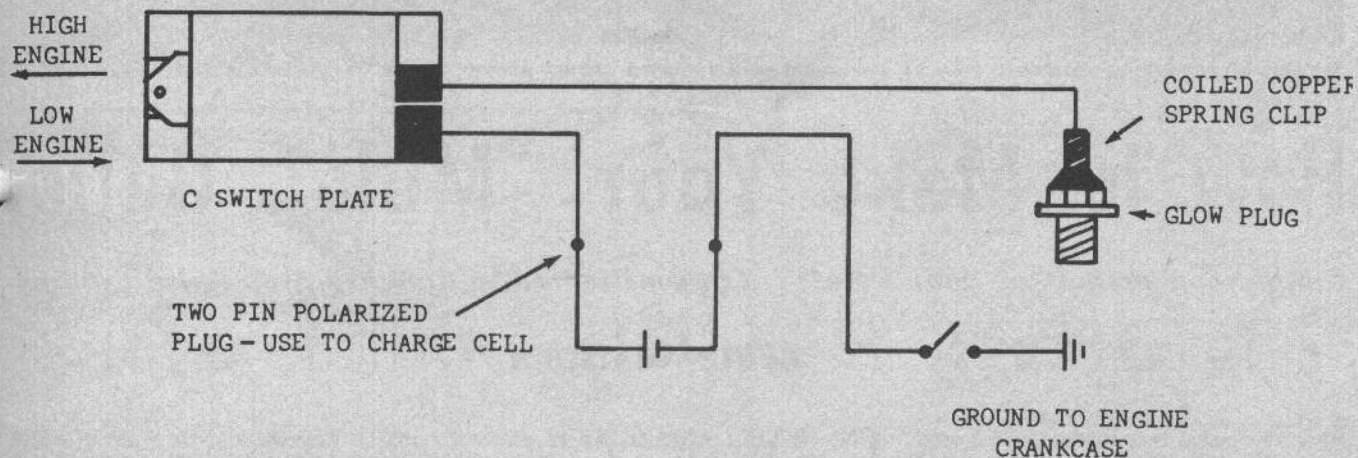
The "A" switch applies electric brake power at either 1.5 or 4.5 volts as desired on the application of UP and

*(Continued on page 22)*



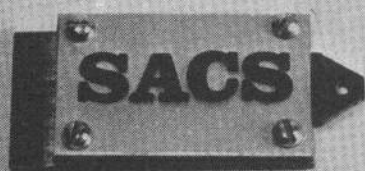


Using "A" plate, SACS switch controls voltage, while "B" plate feeds voltage to left or right brake on another SACS.

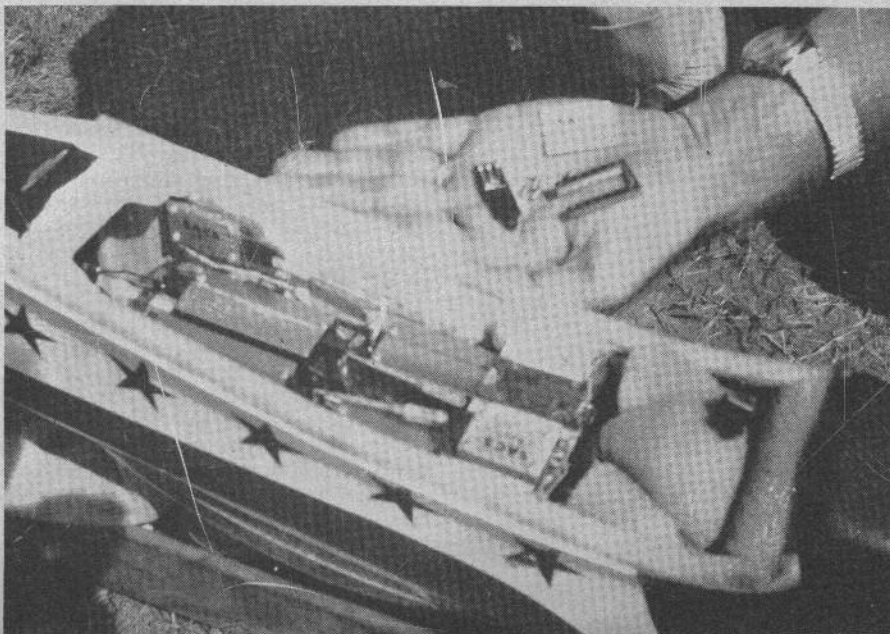


"C" switch plate acts as SPST micro switch to put a 1.2 amp nickel cadmium into glow plug when throttle goes below half.

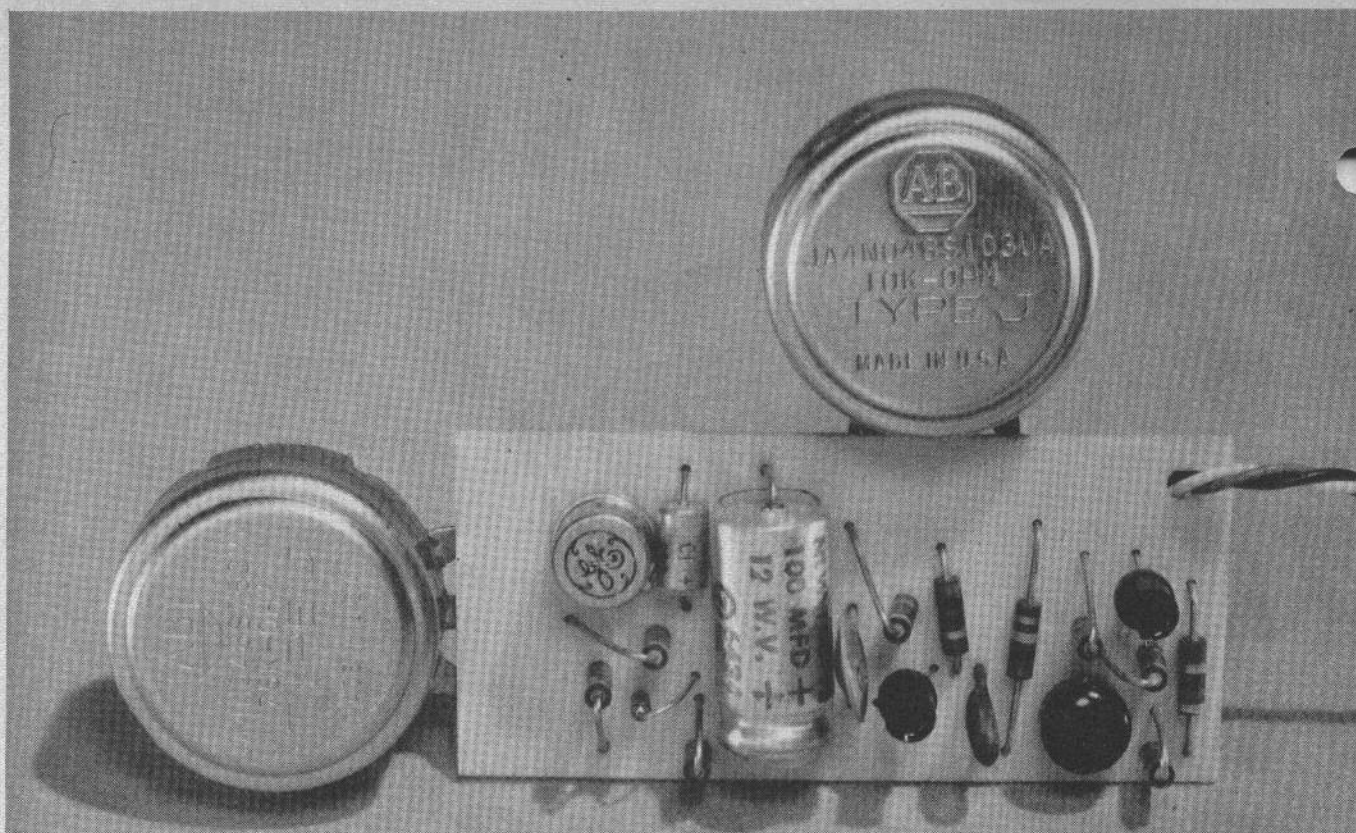
Servos will easily operate the switching units. Has unlimited potential.



SACS are ultra light and have low drag operation; they are vibration-proof and may be mounted in any position. Measure 13/16 x 1-5/8 overall. Note size.







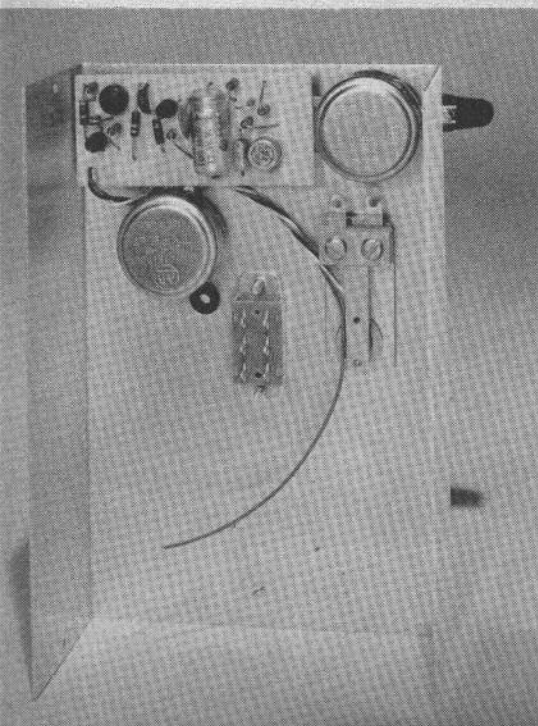
Topside of printed circuit board with all parts and pots mounted shown above. Study all plans carefully after reading article.

# How to Make Your "Mule" Gallop

*Simple conversion for your "Mule" Transmitter adds dimension of Pulse Control.*

By DON BAISDEN

Here the board is mounted in the case back of a Mule Tx. Note the location of the slide and pushbutton switches.



I'M OFTEN AMAZED and amused at the ingenuity exhibited by model builders when their rigs show up on the flying field. One boundless area of endeavor seems to be the problem of how to mount a pulser in about a 4" x 6" case to a transistor transmitter roughly the same size. Here is an approach that may solve some problems for you if you are thinking of "going pulse" this year and are wondering how to utilize that MULE. Let's point out at the start that this is not an attempt to come up with a super deluxe Galloping Ghost transmitter but merely a relatively easy and quick conversion to give a MULE all the capabilities necessary for Galloping Ghost flying or model car control.

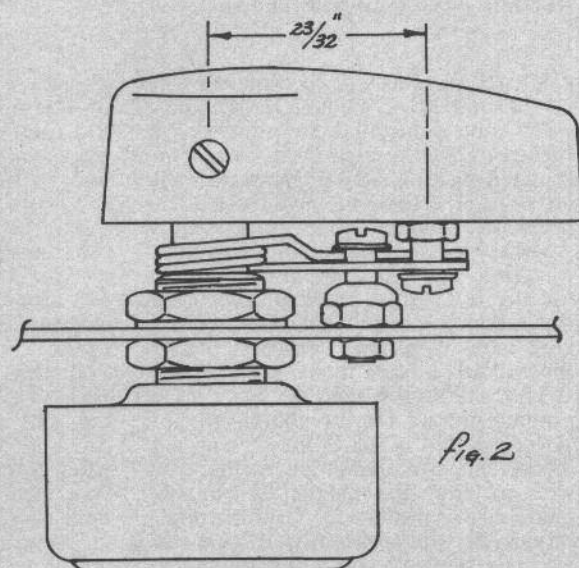
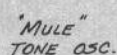
The circuit utilized for the pulser is from the latest model of Controilaire's all silicon Galloping Ghost transmitter which is voltage and temperature stable. The conversion does not change the basic operation of the MULE for escapement flying. The pulser and its associated controls are all mounted on the rear cover of the transmitter and all connections from the pulser are made to readily accessible points, mak-

ing it unnecessary to remove MULE chassis from the case. In operation, the existing MULE on-off switch is the master switch with the added on-off switch on the back controlling power to the pulser which will not operate without the front switch on. Pulse width control is affected by the spring centered vertical lever, pulse, rate by the spring centered horizontal lever, while solid carrier is obtained with the added push button on the back and solid tone with the existing MULE push button.

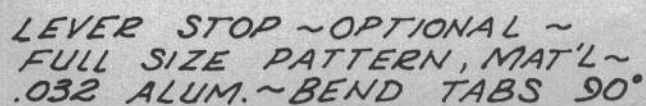
Construction is started by cutting out the full size hole template (Fig. 1) or making an overlay drawing if you do not care to cut up your magazine. Remove the sub-antenna grommet and place the template on the inside of the case back with the top edges even and check to see that the sub-antenna hole aligns pretty closely with the location shown on the template. This will indicate to you whether or not your template is oriented correctly. Tape or hold the template in place and transfer the hole centers and the four corners of the slide switch cut out to the case with a scribe or some other sharp pointed tool.

(Continued on page 26)

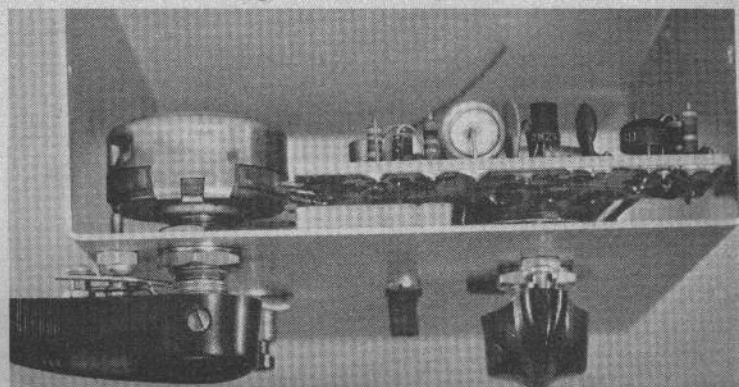




CENTERING SPRING DETAIL  
SPRING MAT'L ~.040 MUSIC WIRE



### View of Tx case back gives relationship of board and case.







# SAILBOATING by Radio Control

By JOHN W. REYNOLDS

*Used in the Snipe, these R/C installations  
can be successfully adapted to any sail boat*

The Snipe, free sailing. This determines where to place radio gear and batteries.

GLRCW asked me to come up with a simple R/C sailboat design and a radio control installation summary. It turned into quite a project, since I am a pro at making simple things difficult. However, I believe we have most of the problems whipped and can present a summary of the many simple systems we tried, and are therefore adaptable for any R/C single channel sailboating. As a bonus we will also have in the next issue a simple step-by-step plan for building a scale model sailboat.

The sailboat which we used as a proving ground for the equipment and systems tested is the Snipe—which is a pioneer in small sailboat racing. We will get into the details of our 36" model in the next issue. In this presentation we will primarily discuss the methods of radio-controlling the Snipe.

Before installing radio gear into any sailboat, it is always a good idea to free sail the boat. To free sail means to simply rig the boat the way you think it should be for sailing and let it loose on a pond or lake. After this experimenting you will learn the characteristics of your boat. Our Snipe performed well in winds up to ten miles per hour; it would not capsize readily and had a weather helm (tended to turn into the wind). Elastic bands fastened to the tiller and the main sheet (see drawing) served to correct for wind shifts and puffs. After a little adjusting of the sails and elastic, the Snipe held a considerably straight course. Free sailing will give you an idea of where best to install the batteries and the radio gear. On our Snipe

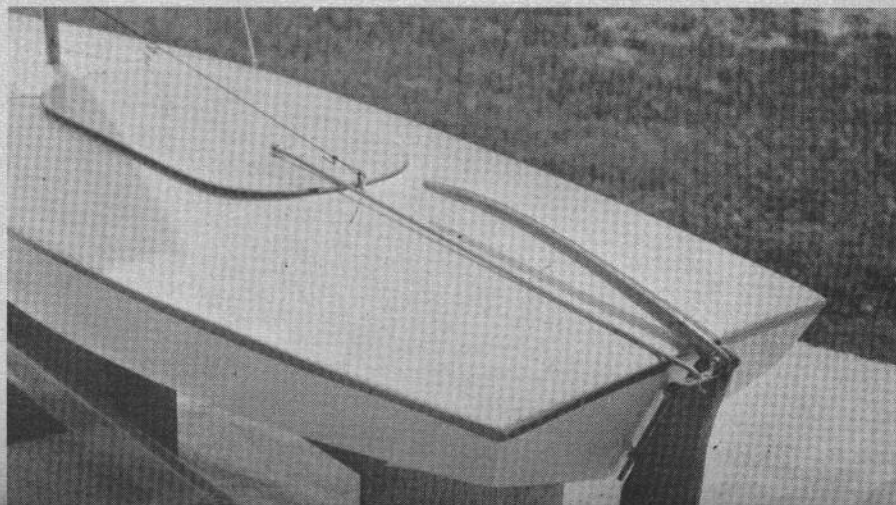
we found that water splashed the center board box on some tacks, just as on the prototype, and therefore the R/C gear should not be mounted in the bottom of the Snipe. This is one of the plusses of free sailing, since it gives you the opportunity of learning many of the characteristics of your boat, what corrective measures to take if any, and will also know better what she will and will not do when you control her by radio.

In this type of article it is not possible to give a complete course on sailing, but some hints and tips should prove helpful. Some points are: 1. The wind bouncing off the sails makes the boat go. The sails form air foils that tend to go across the wind. The boat

hull and keel (centerboard) and rudder resist slipping sideways on the water. 2. The set of the sails determines the normal course of an uncontrolled boat that has the rudder locked on center. This means that by applying a little pressure to the tiller to hold the boat across the wind, you cause continued pressure on the sails and force the boat to be blown forward and go faster. 3. The rudder steers the boat and is used to turn the hull when maneuvering, and to correct course changes caused by wind shifts and puffs. The angle of the sails to the centerline of the boat is called the "set" of the sails.

You will note in the diagram showing the sailboat going in a circle, that the sails are set all the way out (90 de-

Since takeoff on Royal 13A and O. S. Servo is via disc, note that pushrod is engaged in a 3 hole bell crank.





grees) to go downwind. They should be set somewhere around 45 degrees to go across the wind, and around 15 degrees to go to the windward. Sailboats won't move forward when headed (facing) into the wind. Sails are set on your models by strings attached to the boom and the jib club. These strings are called sheets and are secured to the center of the deck in any fashion you choose. The sheets prevent the sails from going out beyond the set you desire.

The rudder turns the boat hull under the sails and the sails flop over to the downwind side of the boat. After you have free sailed your models, a lot of what has been said here will make sense, and you will also be able to determine how much radio control you need or want.

For the Snipe we tried a number of different R/C systems. We wanted simplicity and we also wanted to keep the costs down.

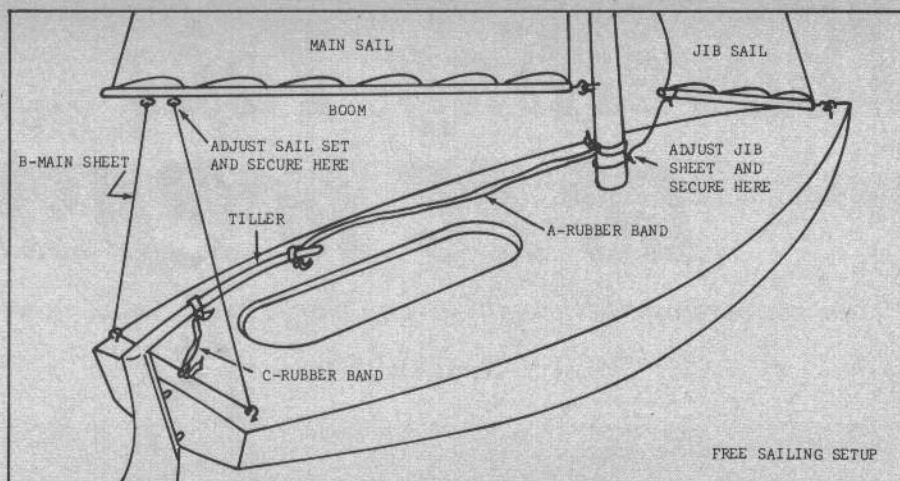
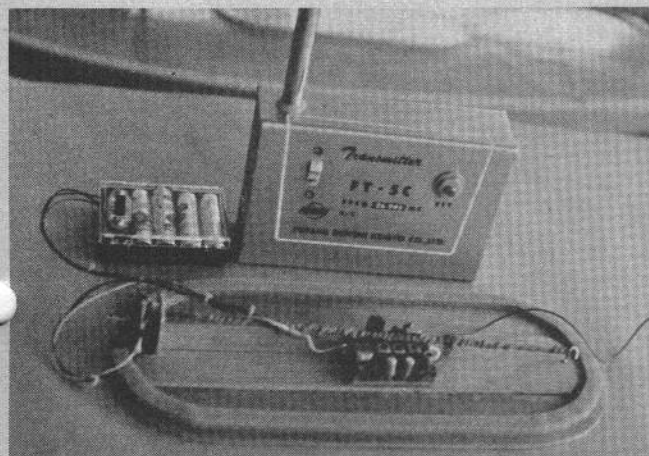
Generally the receiving gear is divided into superegen and superhet equipment. If you live in an area that is relatively free of interference from both the Class D Two Way Voice communications of the Citizens Banders, and Class C use of R/C frequencies by other modelers, you can entertain the idea of using superegen equipment which is the least expensive. If, however, you live in any area that has a lot of interference both by two-way voice and other modelling activity, you will need to go superhet since this is about the only way to get around the interference problems. It also presents a higher initial investment.

We will discuss both superegen and superhet equipment, also go into escapements and motorized servos. Primarily we will concern ourselves with rudder only operations, since quite satisfactory sailboating experience can be had this way.

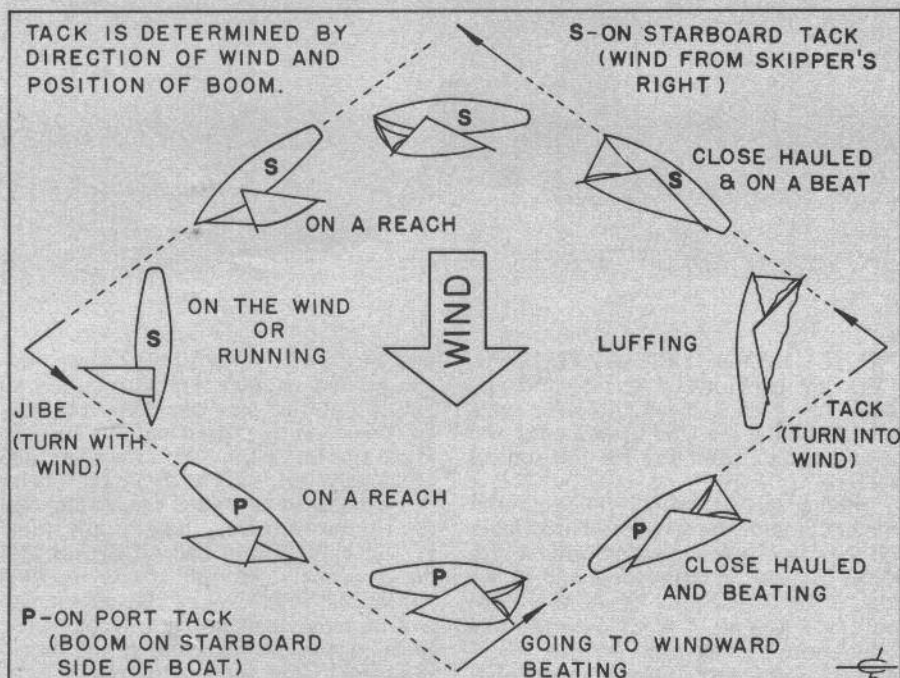
The most inexpensive superegen package is the one imported by MRC-Enya—the Futaba F-66. Everything is included—receiver, transmitter and escapement as well as wiring harness and battery holders. The escapement is very well made and, as is shown for the

(Continued on page 24)

**Futaba FT5C—Citizenship SSH—SE2 Escapement combination.** Receiver and escapement are mounted under cockpit cover.

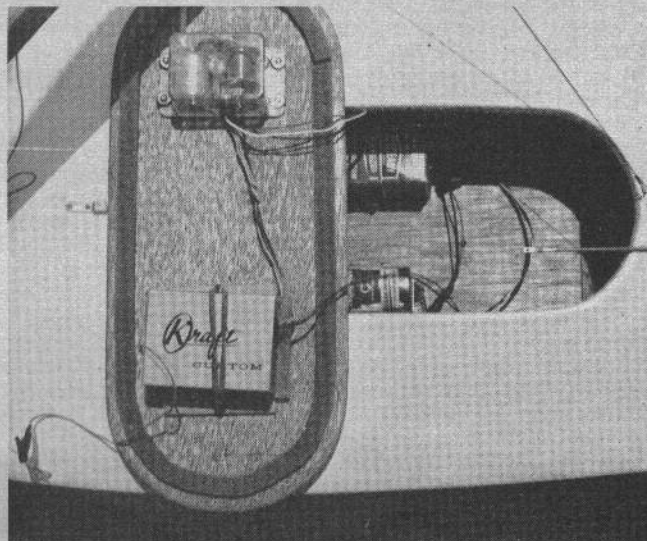


Rubber band "A" holds tiller and rudder at neutral, but boat will want to turn into wind in puffs or shifts. Main sheet "B" holds main sail at pre-determined set. Rubber band "C" helps hold main sail in but does not pull tiller until puff or wind shift pushes main and boom out. Rubber band "C" is connected to main sheet at any point where main moves in opposite direction to that of boom.



The set of the sails determine the course the boat would go if rudder was held at neutral and wind did not shift.

This photograph shows the KTR1 combination. Royal 13A is shown under cockpit cover along with the KR1 receiver.

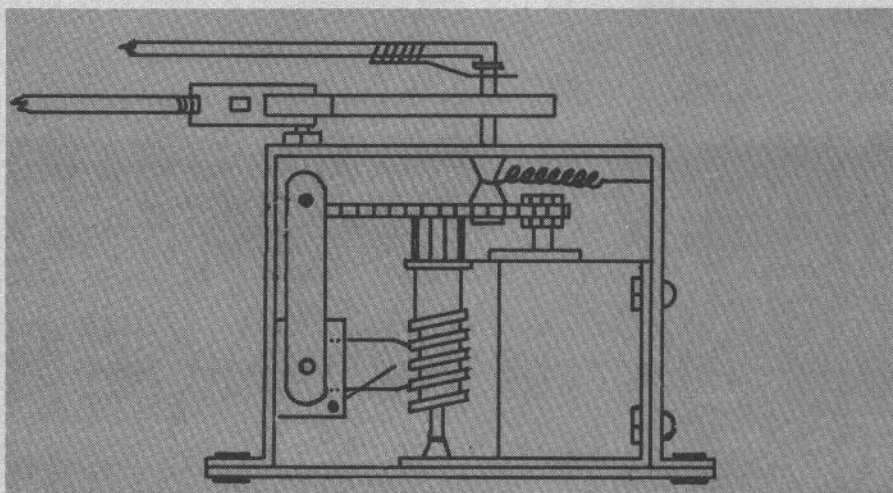




# Converting Your GO-AC to PUSHROD

*This conversion, although large, works well in planes up to .35 size engines.*

By JULIUS H. BARLEY



**T**HE RAND LR3 ACTUATOR, using pushrods to rudder and elevator has a lot going for it, since most modellers like the ease of adjusting the linkages, and trimming for the control surfaces.

Having more than one plane around the house with the so-called Bird Cages in the rear following the bird, I decided to bend no more wires and tinker less, so I converted my Go-Ac to a push pull type action. I wanted to use the same principle as used by the Rand actuator, and since I was limited in the amount that I could spend for my hobby, I took one last look at the torque rod servos, and decided a change could be made.

After about a month of experimenting, I came up with the conversion you see in the drawings. I also tried it with a Mighty Midget motor, but this was a little more complicated, since you had to use a larger gear for more power. The Go-Ac possesses adequate power without a lot of extra gimmickry. Since that time I have also made up variations of this servo, using the principles, and using smaller motors. However, this particular article will be concerned with the conversion of the Go-Ac, since I am reasonably sure there are quite a lot of these around.

Use sheet aluminum of at least 1/32" thickness, and transfer the drawings (full size) shown in Step 1 to the aluminum sheet and cut out with a tin shears and drill all holes as shown. The large hole on the top of the servo is approximately 7/8" diameter. A nickel

was used as it is just the right size and can be laid on and marked around.

Cut out the base as seen from the top view on the drawing for step 2. Place the formed outside case or frame previously drilled on the base plate. Mark holes to be drilled for joining the top frame with the base using 1/8" eyelets or nuts and bolts if eyelets are not available.

Prepare your existing Go-Ac model S-A by removing throttle arm completely but leave the centering spring as is, fastened to the aluminum frame. Lay the Go-Ac on the plans as is seen, and position it in place. You will see that the shaft extends below the bottom base line of the servo drawing. This must be cut down and filed flush with the base.

At this point of the construction, the upright shaft or bolt should be installed in the top rear of the frame for the rudder arm, or plastic T shaped drive for rudder pushrod. Insert 1/8" x 3/4" bolt from bottom upward and tighten with the nut on top. Put a drop of solder on the nut. If you have eyelets and tool for riveting same, an eyelet installed in the hole and a 3/4" length of 1/8 O.D. tubing could be soldered in place of the bolt. I might add at this time that a package of assorted eyelets can be obtained from Ace R/C—their catalog No. 14L112—which will furnish all your needs nicely. Now install the Go-Ac in the frame. All that is necessary is to position the Go-Ac and gear shaft in the center of the large hole, being sure to have free

movement of motor rotation. Place clamp or vise grips on frame of two parts and drill holes needed to join the Go-Ac with the frame. Install bolts or eyelets and mount the servo.

You are now ready for the rudder bar or arm. This was made from phenolic, and could also be made from epoxy base material. I used 1/16" Plexiglass, which I had on hand, and it seems to work nicely. It is necessary to press fit an eyelet in the pivot hole of the arm with the hole size of 1/8" to drop on the shaft. This can be laid aside for later installation.

The arm was made by scribe marks on outline and a slot of the material. Place the square of material in the vise, with slot parallel with the top of the vise. Using a hack saw or blade saw along the top of the vise, this will remove 1/2 of the slot. Turn over and saw out remaining half of the slot. The rest of the shaping is done in the vise to keep from breaking the tail. Smooth up all edges with a flat file, including the slot.

At this time, we will need some method of holding the elevator pushrod in the drive tubing of the nylon gear. This can be done by inserting an eyelet of the long type in a hollow shaft of the nylon gear, using the flange top of the eyelet to receive keeper wires of the pushrod. A DuBro Kwik-Link can be worked down to fit into the tube. In either case solder quickly to keep excessive heat from the shaft of the nylon gear, or squeeze with the side cutter pliers.

Take the rudder arm and slide it in place with the slot under the elevator drive and keeper, and insert the long eyelet down over the bolt or tubing. At the swivel hole of the arm, drop a small washer for a neat fit over upright shaft or bolt, and press the eyelet all the way into the rudder arm. Cut off whatever excess shaft protrudes. Tap lightly on the top of the pin to secure the washer from coming off.

Study the drawings, particularly of the side views in top. Using 3/32" O.D. brass tubing, cut a 2 1/4" long piece for shaft. Use 3/32" brass or steel flat stock and make the gear arm or rack. It is shown full size. Now file 3 teeth with a small 3 corner file. Drill holes as shown and install on shaft position on the drawing by bending tab out slightly on frame to receive the shaft. Then bend the tabs back in place, and

*(Continued on page 27)*

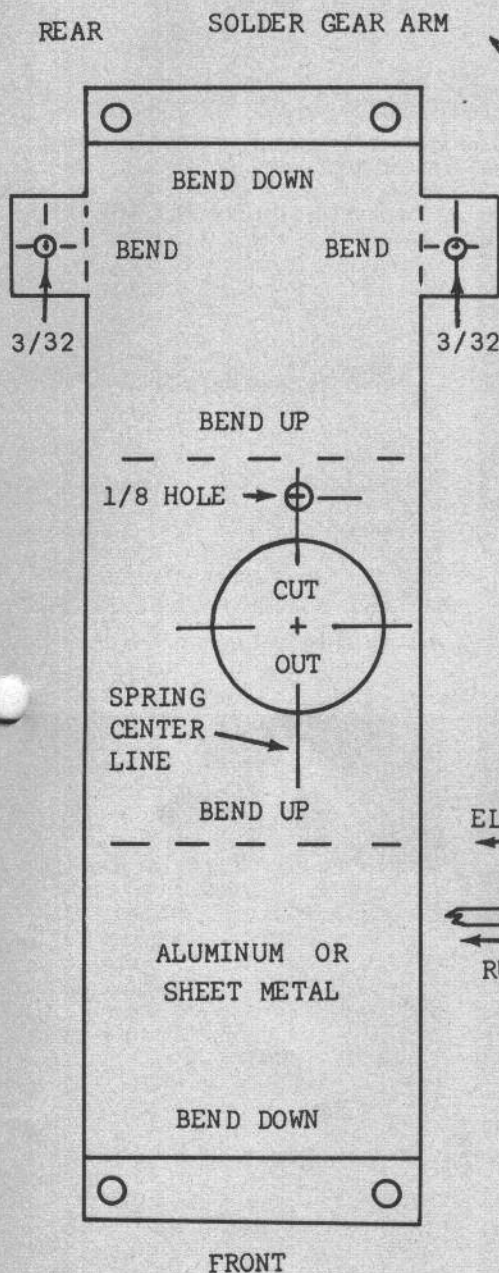


FULL SIZE  
DRAWINGS

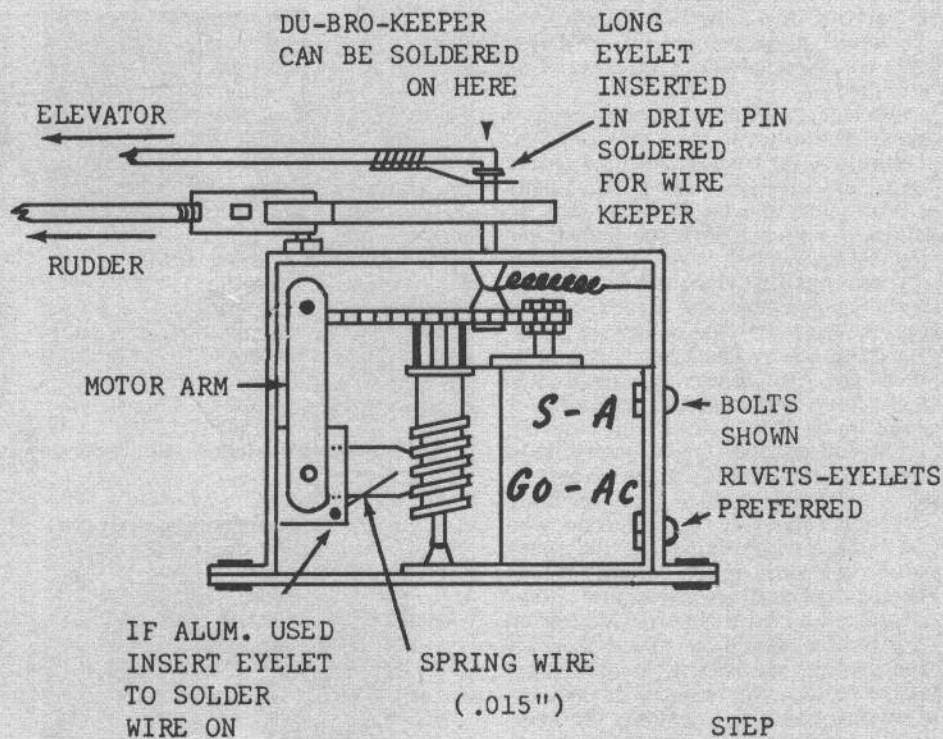
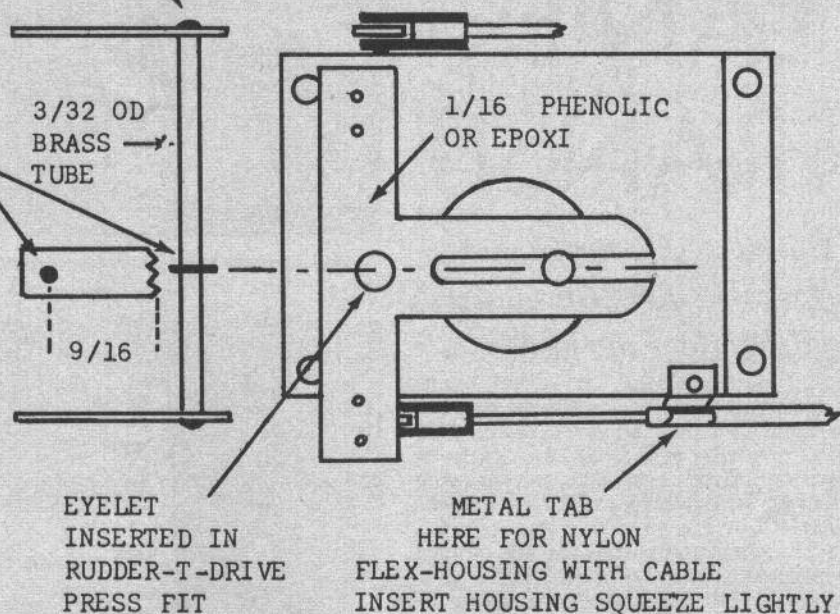
SOLDER AFTER  
INSERTING 3/32 BRASS  
TUBE WITH GEAR  
ARM INSTALLED

TOP VIEW

STEP  
#2  
BASE



STEP  
#1



STEP  
#3

SIDE VIEW

These drawings are full size and will help you make the metal parts in converting your Go-Ac to pushrod action.



# A Look at the LANIER TRANSIT

*Almost ready-to-fly series  
of planes that still qualify  
for "Builder of the Model"*

**A**DVERTISED as "Ready to Fly" Len Purdy's Lanier Products had four airplanes in their stables as of this writing. More were on the drawing boards, and so that statement may be obsolete by the time this hits in print.

The wing and stabilizers are molded foam cores which come in the kit pre-covered with a micro thin covering of Air-O-Sheet. This is stated to be about 8 ounces less than a comparable foam wing covered with balsa. The material is dentable, but has the advantage of lightness and is easily repairable.

Fuselage is vacuum formed Air-O-Sheet finished including motor mounts and main landing gears. The material used is completely fuel proof, so that no painting or doping is required.

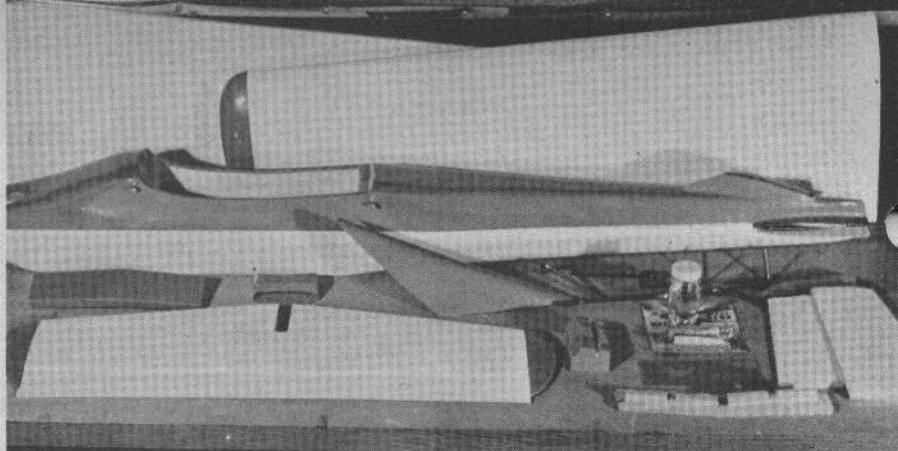
Claimed to be completely warp free and not affected by temperature or humidity.

Fuselage is a compromise of weight versus rigidity and some modelers inspecting the kit have commented on the "soft" aft fuselage. Tests and flights indicate that it will do ably, and no causes of flutter or airborne flexing has ever been observed, says Mr. Purdy.

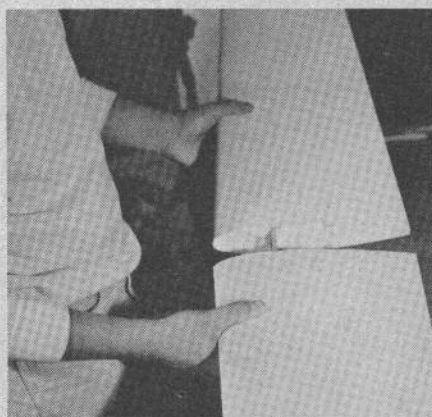
When you first open the kit and get ready to assemble the Ready to Fly job, you note that the quality is generally quite good. There are a few spots where the Air-O-Sheet appears that it might have been trimmed better, but it is not much of a trick to trim yourself.

The instructions, obviously written to cover all four planes in the series, we believe would confuse the beginner. They are adequate for someone who has built aircraft, but since the plane is billed as ready to fly, we have a feeling that the instructions should either be applied to each specific kit, or an added sheet should be included which mentions the specifics of the particular kit the customer purchased. It obviously is not possible to go into the complete nomenclature of an aircraft structure, or a complete building program, but this could be clarified and simplified. This point was mentioned to Len, and he stated it was one that Lanier was well aware of and was doing something about. So in the future, as time permits, Lanier will have souped up instructions.

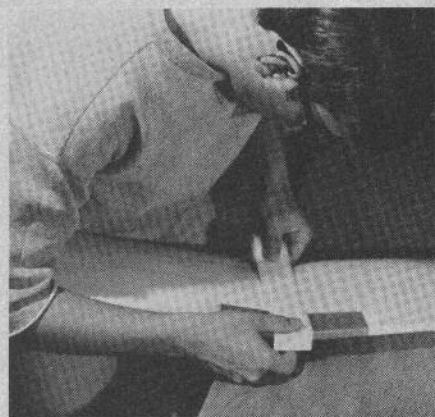
*(Continued on page 23)*



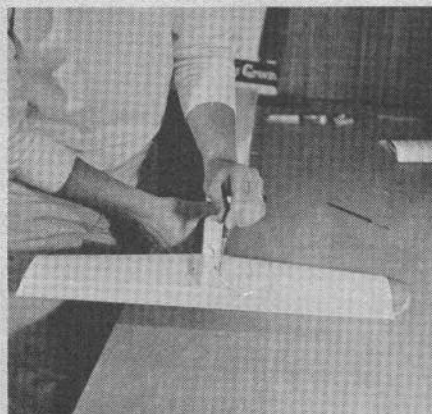
The Transit kit is complete except for control equipment. Easily assembled.



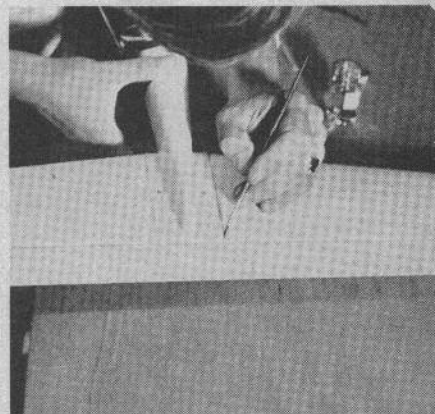
Wing halves quickly spliced together.



A strip of special tape covers the joint.



Stabilizer installed with 2-56 screws, and furnished plastic cement.



Generously epoxy bottom fin to fuse.



Leading trailing edge doublers epoxied.



# Add-on Switcher for Motorized Actuators

*Simple circuitry adapts Relayless Receivers for use with Actuators of the Rand Type.*

Circuit By GERALD PERKINS

**M**OST EVERYONE agrees that a relayless receiver, when used with an Add-on Switcher and a double coil actuator, is superior to a receiver which uses a relay. It requires no contact cleaning, no tiresome adjustment, and does not need arc suppression. While there have been some circuits presented that did the job for motorized actuators, not all were fully capable of doing the job with many of the actuators on the market, since they were limited as to current carrying capacity, and voltage characteristics of the transistors, and also were finicky about which motor they liked to work with. Some also used two sets of batteries.

This circuit, by Gerald Perkins of

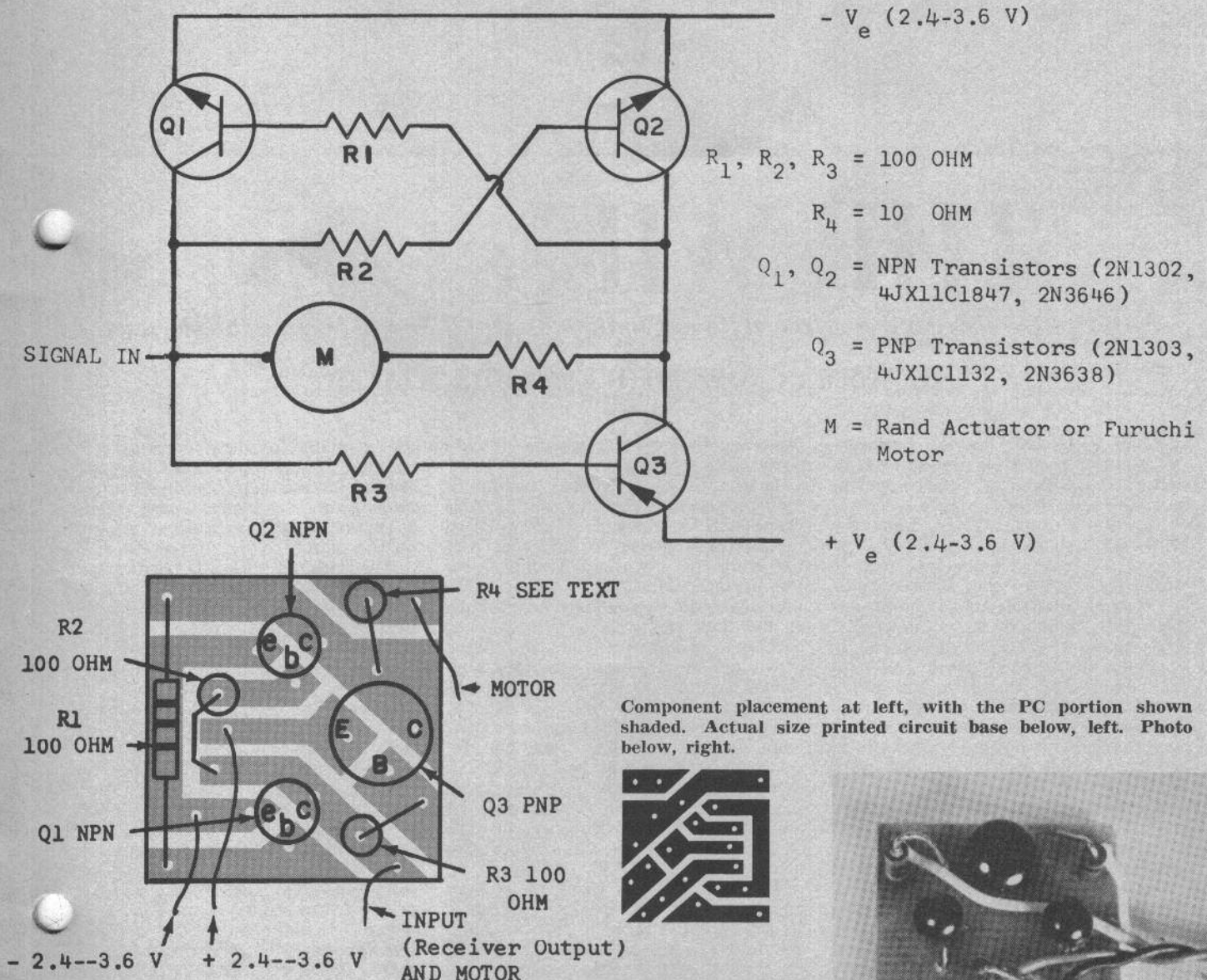
Hendersonville, North Carolina, happily overcomes most of those objections. It is a simple and straight forward single pole double throw type of switcher, is very simple to wire and has a component callout of only 7 electronic parts. It does have one variable factor, but this simply means that it is adaptable for a wide range of relayless receivers and also a wide range of actuating devices.

It uses three transistors, two of which must be the complementary types—NPN and PNP of the switching variety. Gerald says that he has used the Texas Instrument 2N1302-3 and 2N1304-5 because of the low  $V_{CE}$  saturation and fairly uniform characteristics.

The GE 4JX1C1132 and 4JX11C1847 also will work well. The Fairchild 2N3638 and 2N3646 work very well and also, since they are epoxy units, seem to withstand the current drains without overheating.

$R_4$  which is in series with the motor is the variable in the circuit. By varying this you can tailor the speed of the actuator to suit the voltages that are going to be used, from 2.4 to 4.8 volts, or even more in some cases. Drain should not in any case exceed 500 milliamperes with the Fairchild units and 300 milliamperes with the TI or GE devices.

A full size printed circuit board pat-  
(Continued on page 25)







Aptly named the Wild One, this ship by Norman Rosenstock features large rudder to give it that extra oomph for maneuverability.

# THE WILD ONE

*An airplane designed for free-style aerobatics and will do knife-edge maneuvers.*

By NORMAN ROSENSTOCK and BILL WINTER

**T**HIS IS A FAST, wild, over-controlled airplane for free-style aerobatics and is intended for the competent multiflier and definitely is not a project for the beginner. It is small (54-inch span), powerful (Enya .60), and highly aerobatic (maneuvers include knife-edge flight for over 500 feet without loss of altitude, and right or left snap rolls, right side up or inverted). The original weighs 7 pounds but easily can be built to weigh in at less than 6½ pounds—go careful on the paint! Many maneuvers can be left to the imagination of the builder with an airplane having this power-to-weight ratio in such a small package. It will snap roll going straight up.

The basic design was evolved from the Raider 10. The tail moment was increased three inches, stabilizer area reduced by 25% and its location changed to the top longer on position. Vertical tail area was increased, with 75% of the area put into the rudder. Thinking here is that the rudder is seldom used except for drastic maneuvers, such as spins, snap rolls, or for taxi maneuvering in a strong wind. If rudder is needed, usually one wants all he

can get. In this case the fin is only some place to hang the rudder.

In the Raider 10 the top hatch is long, extending from the trailing edge position to the firewall. The top hatch permits easy access to equipment—as for trimming—without disassembling the airplane. However, the large opening weakened the fuselage. Inasmuch as the tank rarely needed access, two hatches were substituted for the one big one—one for the tank and the other for the equipment section. This is evident on the plan.

The wing is a Jenny Foam-core wing from Custom Products. You can get this core with landing gear blocks, although I installed the gear blocks in the standard core wing. The dihedral angle was reduced, with only one inch elevation at each tip—a total of two inches.

The stab also was foam, made from leftovers from the wing core package. It can be cut out roughly with a hand saw and sanded to final shape. A ¼ sq. trailing edge and tip blocks are attached first to the core, and shaped to agree with it, after which the 1/16 sheet balsa skin is put on with any of

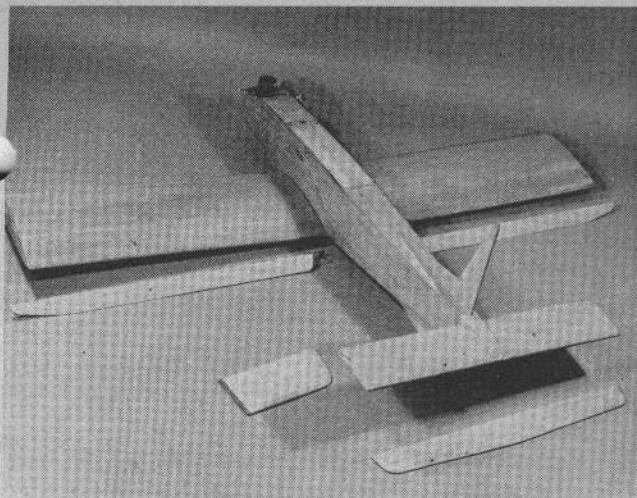
the available contact cements recommended. The wing is standard, except for the landing gear block—balsa trailing edge and tip blocks before sheeting, as on the tail. Specifications are given on the plan.

The wing uses DuBro hardware, including the 120-degree aileron bellcrank, and horns. Covering is optional—I used silk and Hobbypoxy. The fuselage is made out of ⅛-inch sheet—6 x 48, one for each side. First step is to glue the motor mounts in the proper location, then the ⅛-inch sheet doublers—grain same direction—leaving spaces for the bulkheads.

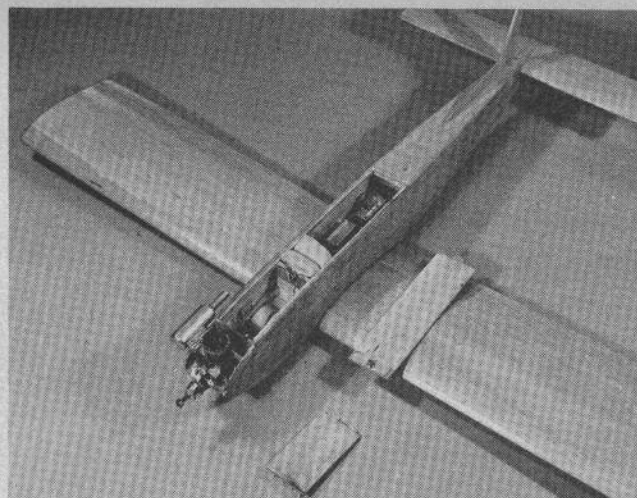
The fuselage is all sheet, except for three blocks in the nose, as seen on the drawings. Note that one of these blocks is recessed for the battery pack, which cannot fly about in a crackup. The wing is held in place by a single dowel in the front for keying, and either one or two nylon screws (I used two). The dowel is ⅜ and projects into a ¾ diameter receptacle (dowel) drilled to take the ⅜ dowel pin. The receptacle is set in place with epoxy and must be carefully lined up.

*(Continued on page 23)*

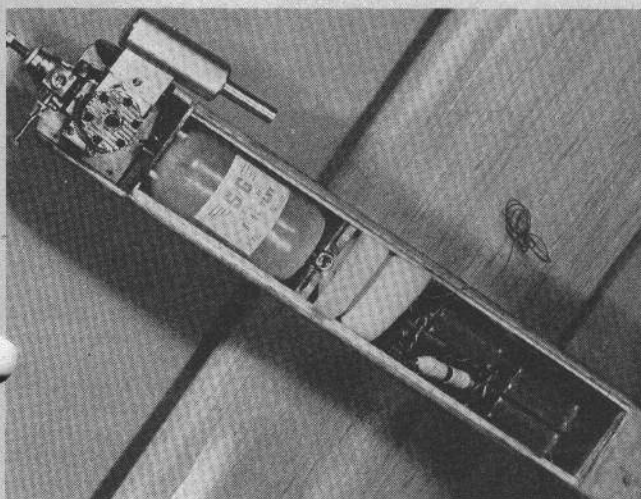




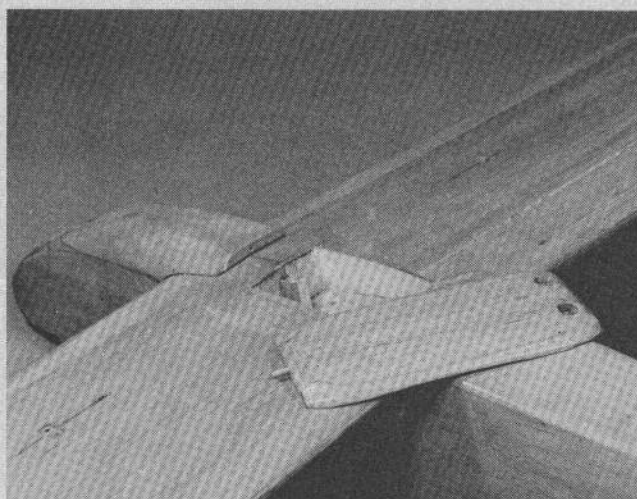
**Straightforward with no real gimmicks. Evolved from Blackwell's Raider 10, with moment and areas changed.**



**Note keying arrangement on hatch covers. Makes their installation a sure-fire proposition every time. Foolproof.**

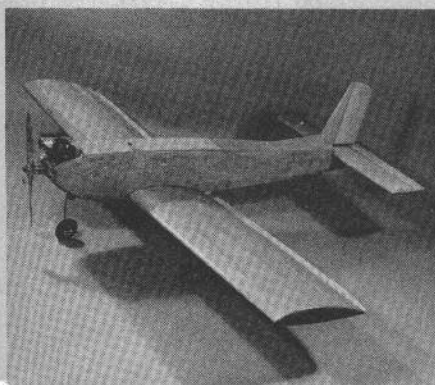


**View shows fuel tank installed. Antenna shown on right wing panel to be extended after hatch covers are mounted.**

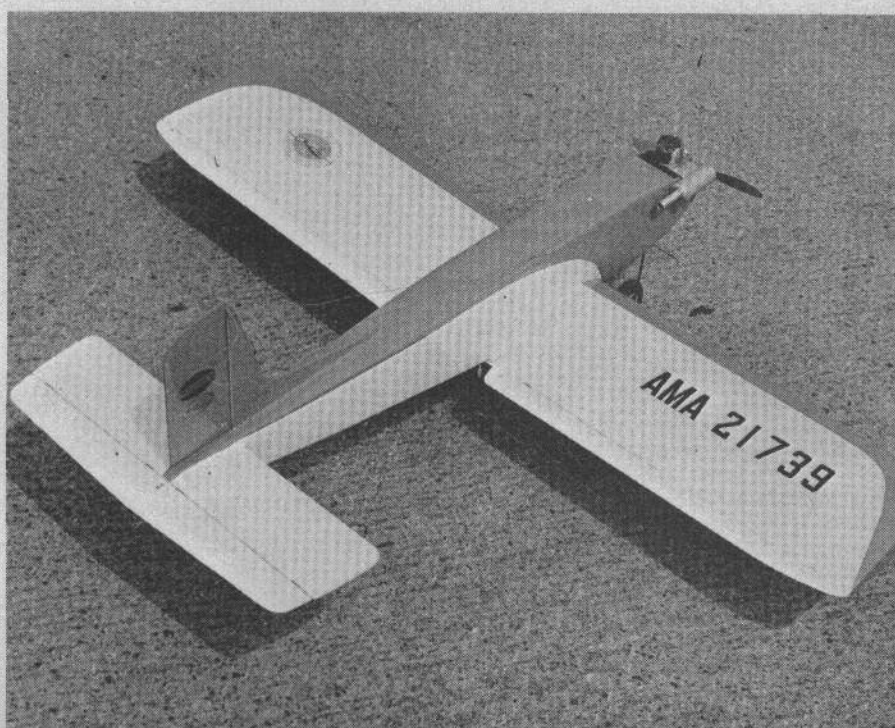


**Keying pin is piece of doweling which slips into fore section. Whole wing can now also be removed if desired.**

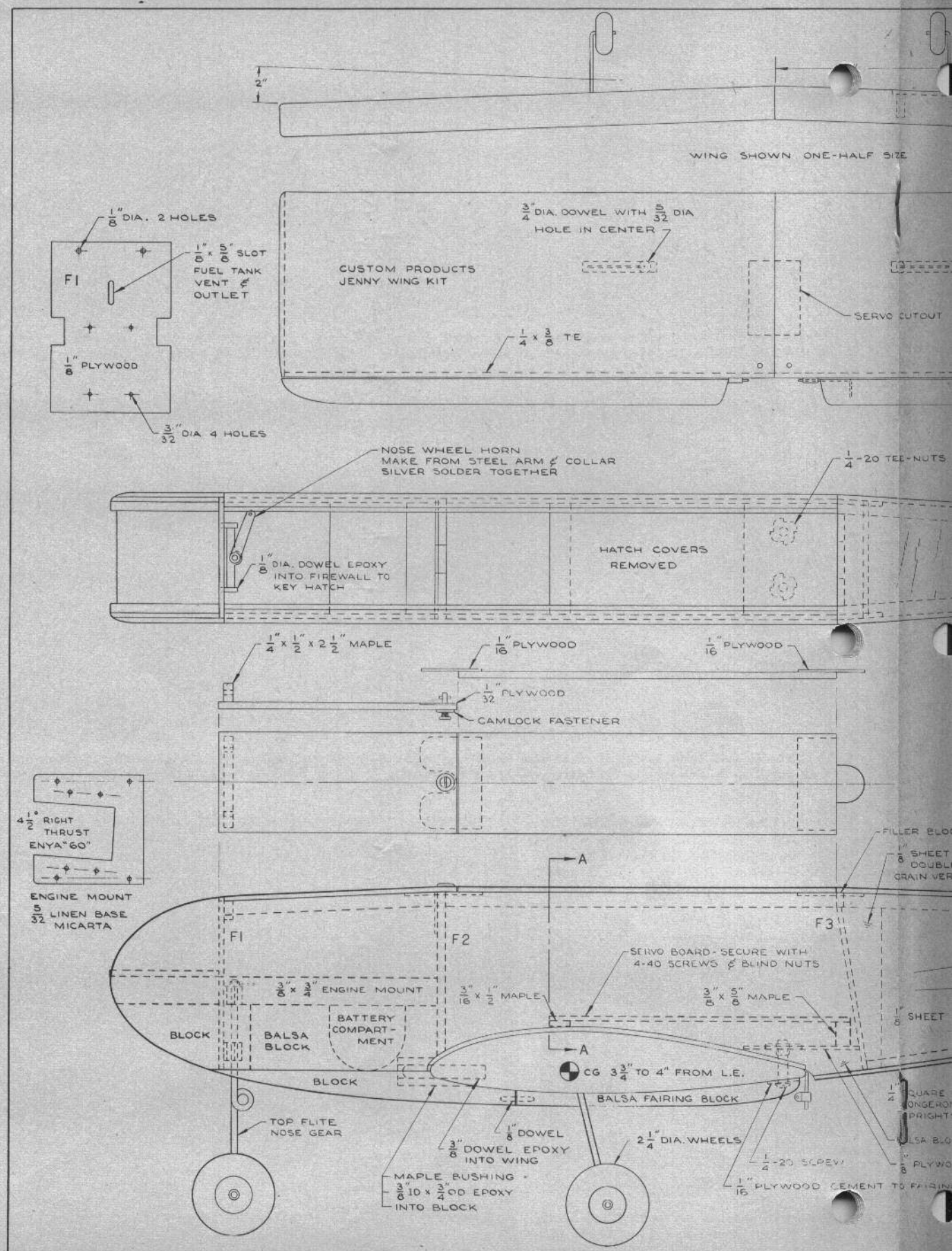
**Here is completed structure ready for finishing. Neat, functional construction throughout is the feature of this plane. When the Wild One bores through inverted rolls, it is a sight to see.**



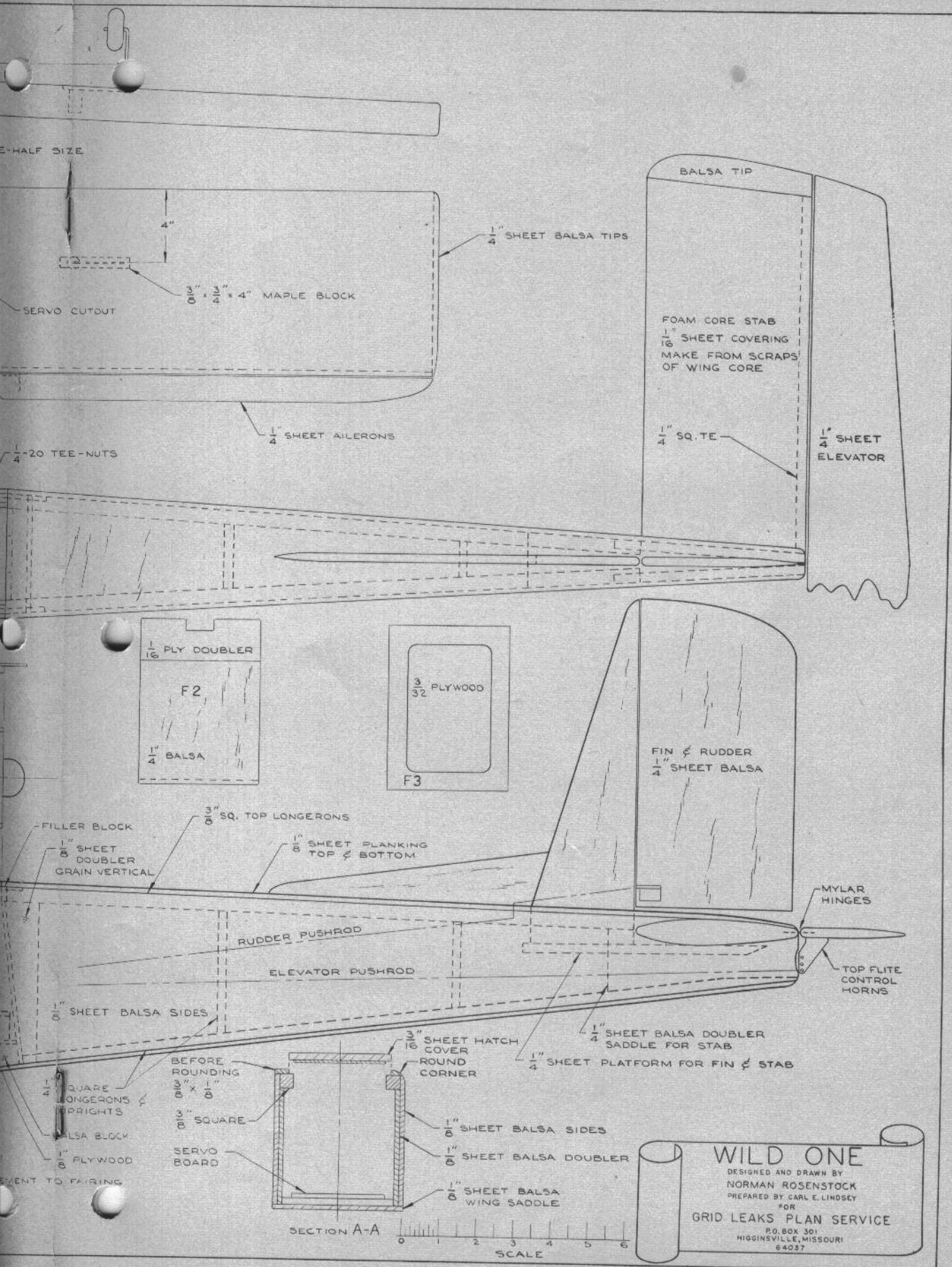
**Full strip allerons on foam Jenny wing help speed construction of this job considerably. Muffler is one Norman makes on custom basis. Batteries are under fuel tank. Photos by Norman Rosenstock.**











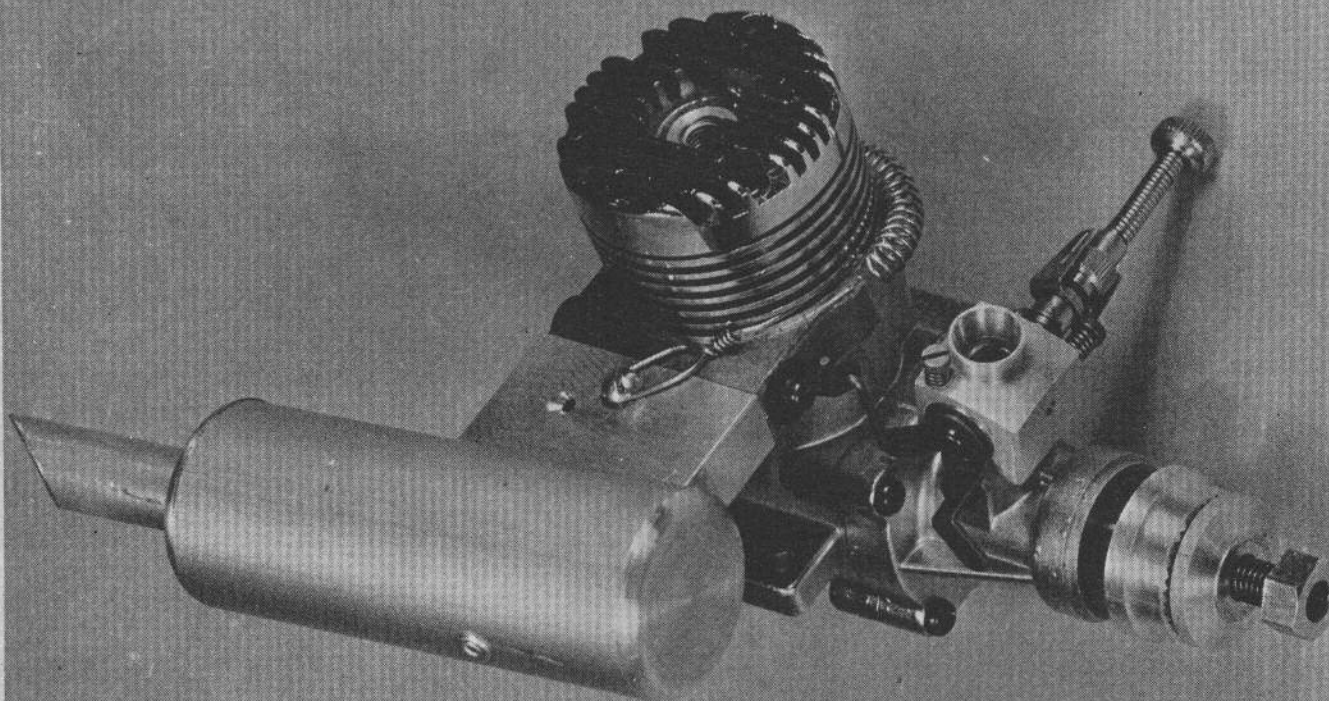
# WILD ONE

DESIGNED AND DRAWN BY  
 NORMAN ROSENSTOCK  
 PREPARED BY CARL E. LINDSEY  
 FOR

GRID LEAKS PLAN SERVICE  
 P.O. BOX 301  
 HIGGINSVILLE, MISSOURI  
 64037

FULL SIZE PLANS AVAILABLE - SEE PAGE 31





Rosenstock Muffler featured in "The Wild One" on page 14.



Polished aluminum prop nut spinner.



**ROSENSTOCK MUFFLER**—A custom muffler is being offered by Norman Rosenstock of 94 Cedar Drive, Plainview, New York. He makes these in four different models for the Enya .60, the Merco, the Super Tigre, and the new Veco 61. They are available, directly from Norman on a custom basis, at \$10.00 per muffler. They appear to be beautiful workmanship, and are being used extensively on the East Coast.

**PROP NUT SPINNERS**—From Hale's Hobby Products comes a polished aluminum AMA safety prop nut spinner. This is a highly polished job, and will take a polish with a soft rag if it should become smudged.

These may be used with or without prop nuts, and if they are used without the nut you can also leave off the washer.

They come in two sizes: The  $\frac{1}{4}$ " SAE spinner fits ST 40, ST 56, OS 49, Merco 49 and Merco 61. The  $\frac{5}{16}$ " SAE will fit Veco Engines.

These are quality choice items, and are sure to meet the modeller's highest expectation. A  $\frac{1}{8}$ " piece of music wire may be used as a wrench to tighten.

Either model available from Ace R/C at \$1.29 each.

**CUSTOM CRAFT FIELD BOX**—A neat, completely finished, field box is being offered by Bennett Custom Craft, Wichita, Kansas. Closed, the unit measures  $8\frac{3}{4}$ " deep, is 16" wide and 12" tall.

Has a unique method for holding your plane body. Upon flipping back

the top cover, the two plane holders are easily erected, and are quite sturdy. Yet when you are ready to pack up they are very easily and neatly folded flat.

Under section has one large compartment and three pull out drawers. Unit is given several coats of clear fuel proof finish. This is completely finished, and for the serious modeller can be a very satisfying bit of gear.

Price has been set at \$19.95. Will be available through Royal Products and Ace R/C.

**KWIK FLI FIBERGLAS FUSELAGE**—Paul A. Ennis, Rt. 5, Parker Rd., Salisbury, Maryland, 21801, is manufacturing a fiberglass fuselage for the Kwik Fli II. This generally has the same plan and profile view of the standard wooden version, but is completely rounded and is streamlined with wing fairings molded in.

No servo bearers are installed as each radio systems servos are different size and require different mounting.

The fuselage comes completely assembled, all joints are sanded smooth and filled. Complete fuselage is primed with gray lac primer surfacer ready for dope or Hobby Pox.

Nose is made for a 2" spinner, and fuselage weight is approximately 15 ounces.

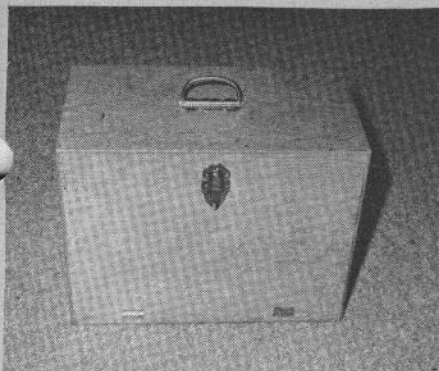
Fuselage retails for \$32.00.

For further details write to Mr. Ennis at the address above.

The picture shows a Jaguar aircraft using the KF II fiberglass fuselage. Wing and tail and canopy section are

(Continued on page 32)

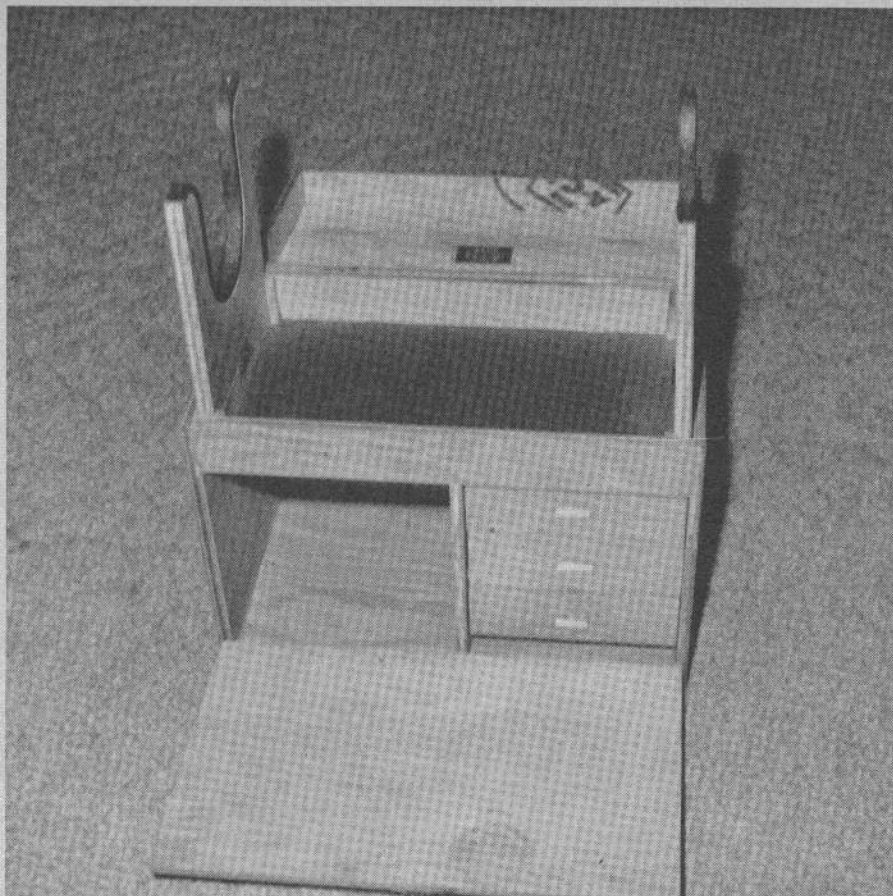




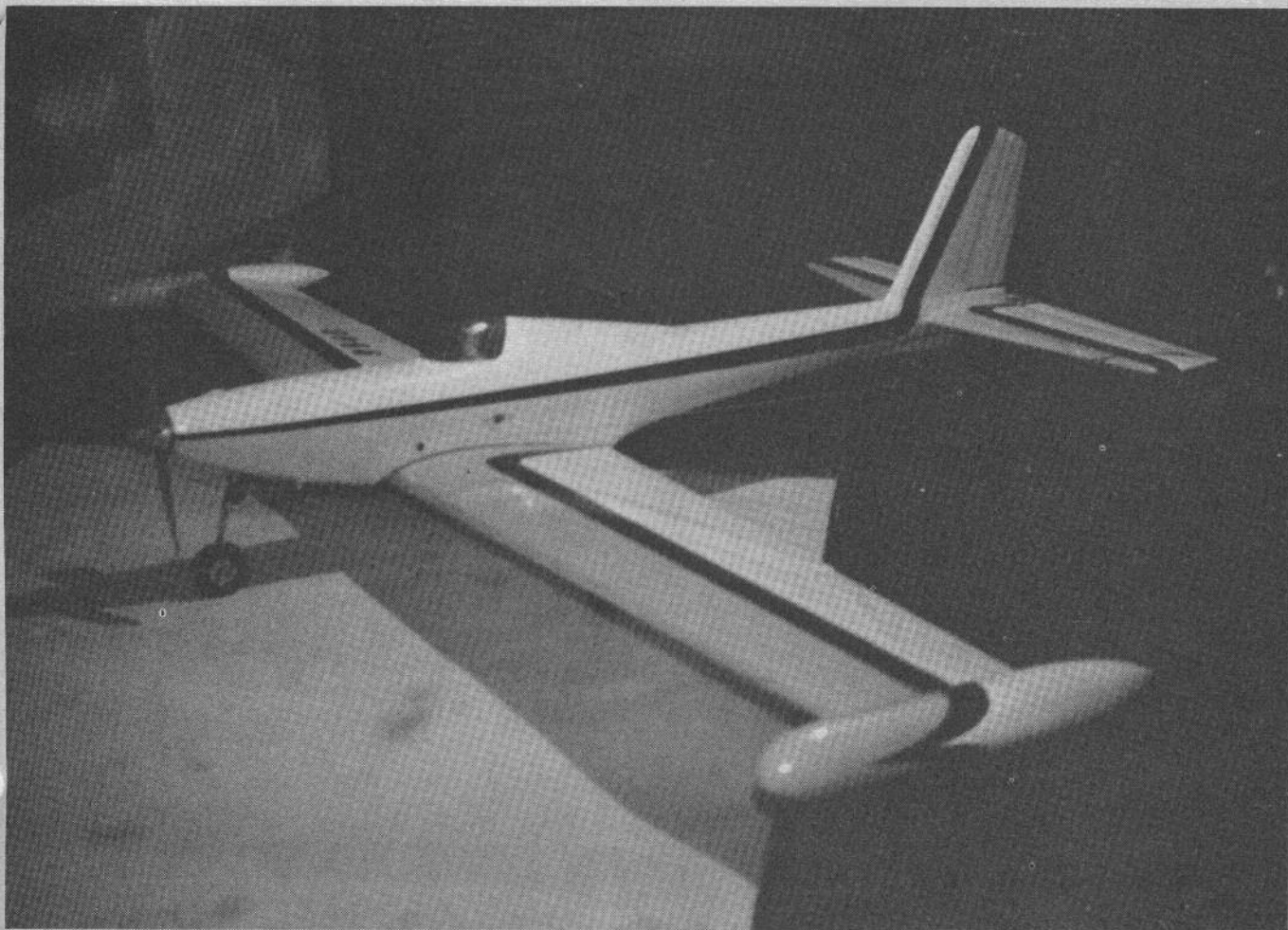
Neat, completely finished field box by Bennet Custom Craft measures 16" wide, 12" tall and 8 $\frac{3}{4}$ " deep.



Top open, above; completely open, right.



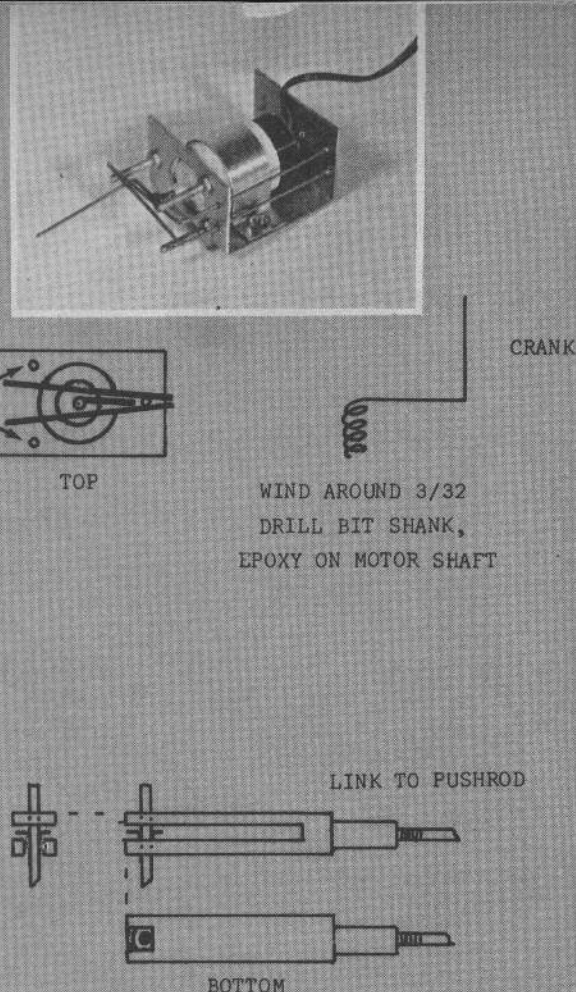
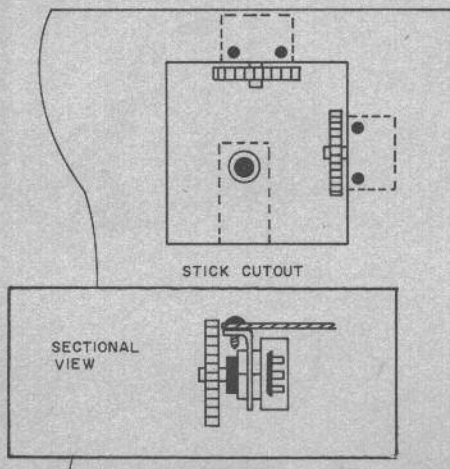
Kwik Fli fuselage is streamlined version done in fiberglass.





# Bits and Pieces

Ed Gerhardt's trim pot mounting.



Bob Karlsson's Proportional Servo from Micro-MO TO-5.

## PROPORTIONAL SERVO FROM TO5

Here is a very fast acting servo I made from the Micro-Mo TO5 motor for use with my decoder. For 1.2 volts use a 41-1 gear box, for 2.4 volts use the 141-1. It is very easy to adjust—you can even adjust to go in one direction less than the other (Useful in rate sensitive circuits).

They have surprising power, since I've used them on only 1.2 volts in .35 powered airplanes. Centering is positive. A 2.7 ohm resistor should be used in series on 2.4 volts, none on 1.2.

I have two of these servos, plus my decoder with no POD, plus four pole switch in a box 1 3/4" wide, 1 1/4" front to back and 1 3/8" high. Two 225 mah nickel cadmiums and a Kraft relayless are used for an all-up weight of 5 1/4 ounces! Okay for .020 to .07 airplanes. Batteries give about an hour of continuous use.

BOB KARLSSON  
Wilmington, Delaware

## TRIM POT MOUNTING

In my pulser transmitter box I have an open stick assembly similar to the Protrol. Instead of cutting slots for the trim pot, I used the dime size pots from Lafayette, and mounted them at the edge of the stick cut out so that the wheel is just above the face of the transmitter box. For trim wheels I used the Cox plastic spur gears about 7/8" di-

ameter from the slot-car counter. A bushing bent from .010 brass made a perfect fit on the pot shaft. Mounting bracket is .050 aluminum fastened to the case with #0 self-tapping screws.

ED GERHARDT  
Basking Ridge, New Jersey

## HINTS FOR YOUR HOBBY

Those coffee cans with the plastic lids are great for dope cans. The brush can be left in, if the handle is cut down, eliminating cleaning. If dope is to be kept longer than a few days, seal the lid with masking tape.

Those who use polyester resin for cement and buy it by the quart (\$1.60 that way) can use a liquid soap bottle as a dispenser. No more dipping or pouring, just squirt the amount wanted into the mixing container and Voila! Mix! Seal with a screw of appropriate size.

Believe it or not, after intensive scientific investigation, two batteries taped together and wired in parallel produce more current and last three times longer than just one. For starting engines you have to have current. Dr. Ohm will agree, I'm sure.

Radio dial cord will not stretch, so is suitable for brake cable.

Use fabric hinge material doped to the leading edge of the wing before covering to avoid getting dings. It gets very hard and yet not brittle. Protects, yet doesn't offend.

Use a #8 or #10 nut threaded on



black fuel tubing to act as the weight. Black tubing won't "pinhole" at the outlet like surgical tubing but being of heavier construction needs a weight not always available.

That pourable styrofoam mix makes for good crash protection for proportional receivers. I have tested it thoroughly and can attest to reduced damage, compared with a reed receiver wrapped in foam rubber. It must be because the receiver is secured and the foam absorbs the shock load evenly, even at the corners. (Not suitable for reeds due to vibration.)

**BILL NASH**  
Birds Eye View Newsletter  
Long Beach, California

### THIRD HAND GIZMO

The drawing shown appeared in the May 1965 issue of **RADIO CONTROL MODELS & ELECTRONICS**. This British publication regularly has some very good ideas.

Often wishing I had a third hand when soldering PC work on receivers or pulsers and the like, I decided to make up a device like this to use at my workbench.

It is proving very effective, and the two photographs show it is a very easy way of mounting the components, a few at a time, and then turning the work so that it can be soldered, and the extra leads then clipped off. Then it can easily be again turned, and following the layout instructions insert remaining components.

The two nuts are used to semi-lock the action of the turning of the bracket, so that it is just free enough to turn readily upon pressure, and tight enough to hold without unwanted action.

**FRED ROWE**  
Clayton, Missouri

### TOTE BOX

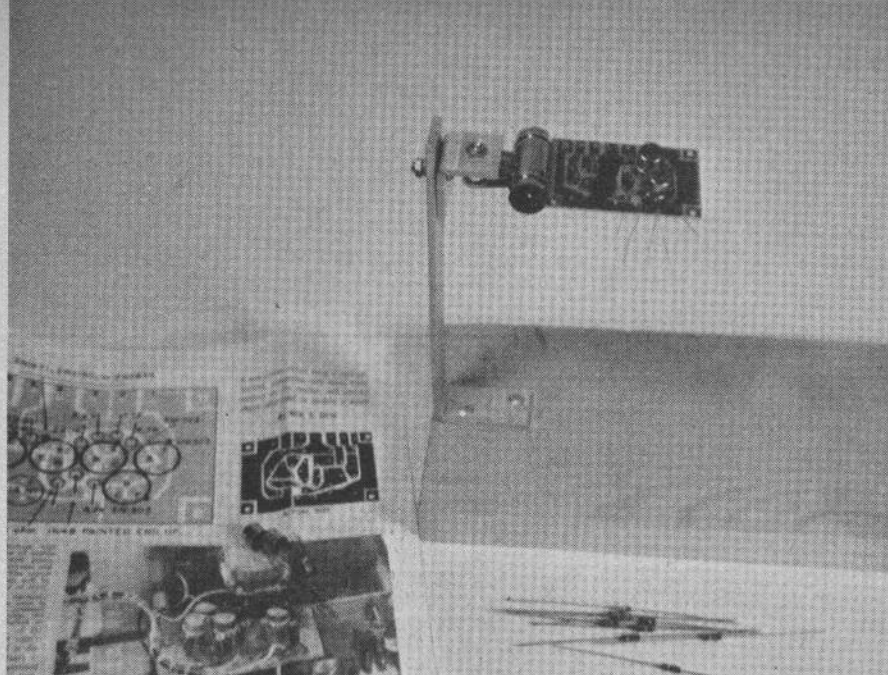
Our local Western Auto Store had a polyethylene Handi-Carrier on sale the other day for 88c. As shown in the picture, this has a tote handle, and while it is designed for carrying cleaning supplies, gardening items, or tools, it also makes an excellent tote box for your R/C modelling endeavors, since it is a convenient way to carry your fuel, starting battery, extra props, the small hand tools you inevitably need on the field, your transmitter if you desire, and even a lunch!

The sturdy polyethylene handle is part of the divider that goes the long way down the Handi-Carrier. Has three compartments, the largest measuring 4 x 14", while the other on the other side is 4 x 14" but is divided in the middle, furnishing two compartments of 4 x 7" each.

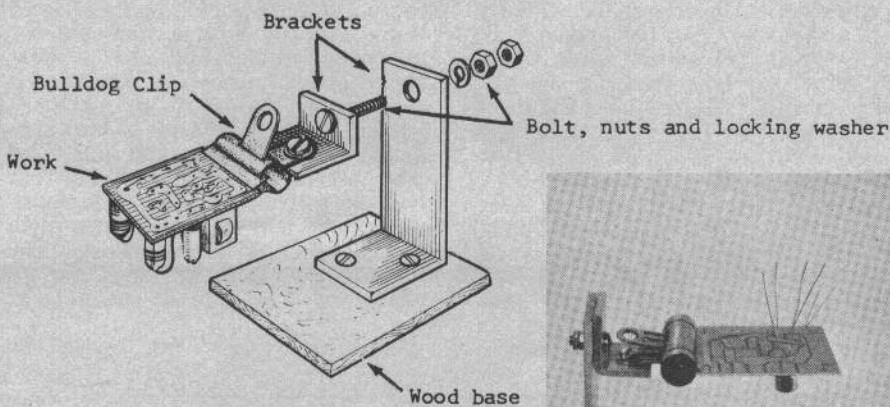
The particular device we obtained in the Western Auto Store is manufactured by Sesco, Inc., of Pittsburgh, Pennsylvania, and goes under the trade name of Festival, a trademark.

We understand that other carrying boxes of this type are available from other stores of the dime and variety type. At 88c, which ours was bought for, this represents an excellent buy. Seems to be completely fuel proof, and

(Continued on page 30)

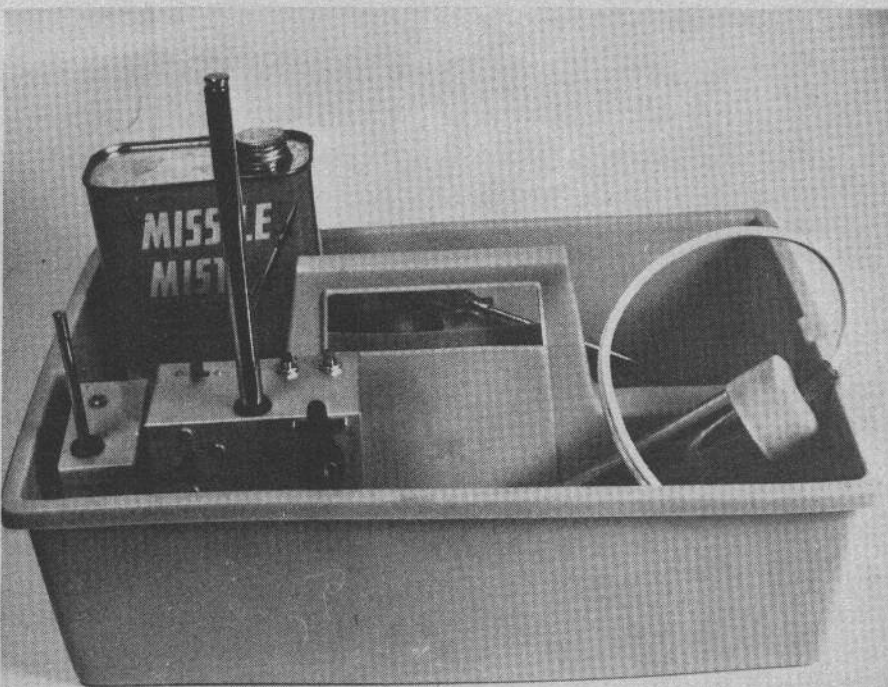


Fred Rowe's third hand gizmo clamps work for soldering.



Idea first appeared in British R/C Models and Electronics.

Sesco's polyethylene Handi-Carrier makes good tote box.





## The Slaved Auxiliary

(Continued from page 4)

DOWN elevator respectively. The slaving pushrod that connects "A" to the elevator servo should be adjusted so that the switching action occurs within the last 10% of control action toward both UP and DOWN control positions. If you must mount the S.A.C. switch in the fuselage in such a manner, or if the servo travel in the model for the given control positions is opposite to that shown in the drawing and indicated by arrows, then reverse the 1.5 and 4.5 volt lines where they are soldered to the S. A. C. switch.

The "B" Switch applies electric brake power to either the left or right brake selectively at either level of braking power available from the "A" switch. The slaving pushrod that connects "B" with the rudder servo should be adjusted so that the switching action occurs within the last 10% of control action toward both right and left control positions. The selection of the proper braking action to correspond with the applied rudder can be obtained by switching the two outside wires coming from the two separate brake coils to the polarized plug, or switching the 2 outside wires on the "B" switch. This arrangement is important as will be seen when the "B" unit operation is explained. Proper operation of the steering circuit will be achieved when upon application of LEFT rudder simultaneously with either UP or DOWN elevator, the left wheel will have braking action applied, thus, aiding in the intended direction of turn. The opposite

condition would prevail upon application of RIGHT rudder simultaneously with either UP or DOWN elevator. UP elevator best for steering—no-nose-over.

The 1.5 volt level of braking power (UP elevator) is preferred for all braking actions where an easy smooth stop is needed and for all 'turn' commands. When used for a straight-ahead stop it is very difficult to determine visually just when the brakes were applied, thus there is no need for a proportional brake system. When used in a turn, the inner wheel does not completely lock, so the appearance is of a very positive turn command but not a pivoted turn.

The 4.5 volt level of braking power (DOWN elevator) should be used only for very positive stops, such as 'hanging' the model after proto return and for short field landing techniques when required by field conditions on making the final landing and stop.

The "C" switch applies voltage to the engine glow-plug from approximately  $\frac{1}{2}$  throttle on down to full idle. The slaving pushrod that connects switch to the throttle servo should be so adjusted to idle properly with a good idle-bar glow plug installed and used without voltage at idle. Once this condition is achieved and the switch and circuit is installed it acts as a degree of insurance against engine failure and idle. An added benefit is that a glow plug that gives the best top end engine performance can be selected without regard to the plug's idling characteristics. The voltage applied with the S. A. C. switch system will take care of the plug at idle.

Since this circuit is 'hot' at anytime

the throttle is at low speed, and most modelers shut the engine down at low speed, it is imperative that one of two different precautions be taken to break the circuit. The 1.2 ampere hour nickel cadmium is good for about 25 minutes of glow-plug operation which is sufficient for 8 to 10 flights. But if the circuit is left 'hot' it drains the cell quickly. When engine is shut down you must remove the coil spring clip from the glow-plug immediately, or use a switch in the circuit. Some of the proportional systems using the long type of slide switch have an unused section on the switch and the S. A. C. circuit can be wired into the receiver switch using this unused portion of the switch.

All of the foregoing has been mentioned to use with existing servos. Separate channel operation can be used if there is any doubt about using any of the present functions for the foregoing, such as UP elevator on brake.

Because of the fine adjustment possible with the S. A. C. switches when used with the Williams Nylon Clevis, another interesting possibility exists for the type "A" switchboard. When slaved to the throttle servo and properly adjusted, it can be made to retract gear or lower flaps. To do this it should be adjusted so that full movement of the master throttle control would not make either circuit "A" or "B". Throttle trim would be spring loaded to neutral on the transmitter. With the throttle full open, with the master throttle control, pushing the trim to full open, and releasing, would momentarily close one of the circuits and start the retract gear into its 180° cycle. Each similar action would start another 180° gear cycle. Then with the master throttle control at full throttle, pushing the throttle trim to full low position, would momentarily close the flap servo circuit. The flap servo could either be positionable or trimable throughout the 360° rotation of the flap servo for any desired flap setting. When used in this manner the gear could not be inadvertently actuated on the ground during taxi, and likewise the flaps could not be extended at a high speed. Of course, a separate channel and a separate servo could be used to do the same thing, without being nearly so critical of adjustment, for those who have the more expensive proportional rigs. The uses of this type of circuitry are virtually unlimited, and the modeler's own ingenuity is probably the only limiting factor.

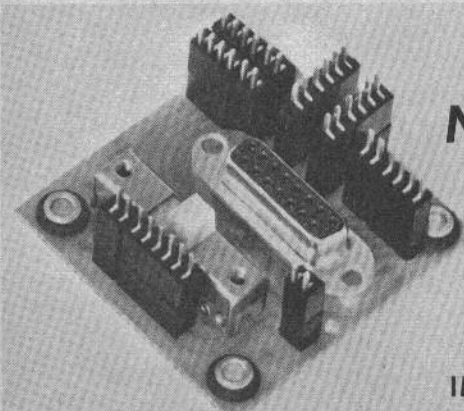
The S. A. C. Switcher configuration "D" operates as a micro switch or an SPDT relay. There is no added drag on servo output when using the S. A. C. Switch.

All available from Ace R/C,  
Higginville, Mo.

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TO PROTECT FLYING SITES!

## ZIP CODE AND YOU

The Post Office has worked out Zip Coding to speed GRID LEAKS to you. This becomes mandatory January 1, 1967. Check your wrapper NOW. If your address is listed less a Zip Code Number, write on the wrapper and return to us. This will insure your not missing any copies, since the PO has stated any second Class Mail not Zipped, cannot be mailed!



## A HALLCO RC NERVE CENTER OR SERVO BOARD

REDUCES: Building time

ADDS: Interchangeability

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THE HALL COMPANY Urbana, Ohio 43078



## The Wild One

(Continued from page 14)

It was found that the standard maple blocks for the nylon screws were not strong enough; violent maneuvers ripped out the threads. This was cured by obtaining 1/4-20 metal T-nuts from the hardware store and inserting these into the hardwood blocks to give metal threads capable of standing any maneuver.

Details and specifications are given on the plans. The individual modeler may wish to make his own substitutions for standard parts and hardware.

For free-style maneuvers requiring high rate of climb, a 12 x 5 Top Flite wood prop was used; for knife-edge flight or other maneuvers requiring speed, an 11 x 8 Top Flite wood prop was employed. These speeds are estimated at 60-70 mph. The competent modeler requires no detailed instructions on trimming and flying—especially if capable of handling a ship with this high performance, but he should be doubly sure to check out his decalage and that no warps exist.

The control surface movements are of interest. The ailerons have up and down travel of 9/16 inch each way from neutral. The elevator travel is up and down 5/8 inch from neutral, and the rudder right and left, 1 1/2 to 2 inches each way from neutral. (It may be necessary, depending on the servo used, to drill an additional hole in the horn closer to the base to get approximately 20 degrees of movement.)

These movements are for proportional control because they can be used as necessary. If you build for reeds, the amount of control will have to be reduced to approximately two-thirds the amounts given—all but the rudder, which must be the same.

The radio system is the Kraft KP-6 and has given trouble-free service.

Rots of ruck.

## Lanier Transit

(Continued from page 12)

We do not mean to imply that with the instructions furnished, a builder cannot successfully build the Transit or any Lanier product. Far from it. We believe the kits and the prices at which they are offered represent an excellent buy for the money.

If your time is worth anything and, for most of us, time is an extremely important factor, the kits represent excellent buys and should advance the state of the art. With improved instructions, they would be just that much better.

The model went together well. Again some trimming was required. All in all—since we wanted pictures of the step by step process—some 6 hours went into building the airframe ready to install the radio gear. We would like to explore the possibility of using a different cement rather than the solvent that is used for the Air-O-Sheet cement,

since we have a hunch that a better cement can be researched. This will take time and would definitely further improve the Lanier kits.

We did not do any finishing of the model as far as adding stripes of Scotch Decorator tape, or using AMT spray lacquer. The instructions caution NOT to use dope, epoxy paint, and even cautions against other brands of lacquer. The models do come in two tone, however, and look quite well without any additional bits.

Center of gravity is extremely important, and this is called out in the instructions and Len mentions it repeatedly in correspondence.

Epoxy glue, and Air-O-Sheet cement is included. In future kits also will be included such items as pushrod ends, control horns and keepers, aileron horns or threaded aileron wire, and a nose steering arm. These should add quite a bit to the value of the kits especially since the price is to remain the same.

Even with their high state of prefabrication, the Lanier Models do qualify under the Builder of the Model rule.

All in all, the Lanier kits to us seem to be an important breakthrough, especially since they can cut valuable bench time down, and allow you to get airborne as soon as possible.

## ARE YOU SUFFERING FROM "NO NITRO-ITUS"?

**SYMPTOMS** — Quitting ten half way through a flight. Varnishing of Piston and Cylinder.

**REMEDY** — The Proper Cool Running Fox Fuel.

To select the best fuel for your R/C model we suggest that you first try Duke's Fuel, since it was specially compounded to meet average R/C conditions. If your motor slows when you remove the glow plug wire try switching to Missile Mist. If you get insufficient oil symptoms, try switching to Superfuel. In very hot weather most engines perform better on straight Superfuel. The old wives tale that nitro is poison to R/C engines became popular years ago when modified control line engines with jerry rigged carburetors were all that was available. It just isn't so for modern R/C engines with well engineered carburetors, exhaust dampers, and idle bar plugs. You must use nitro in moderation to approach the performance built into your engine. Many modelers spend \$500-\$1000 on a model and then endanger the whole project by "saving" five or ten dollars back when modified control line engines.

**FOX SUPERFUEL** — Featuring PLUS Lubrication  
28% Oil 5% Nitro Pt. 95¢ Qt. \$1.69 Gal. \$5.95

**DUKE'S FUEL** — Blended especially for the R/C and Sport flying of today!  
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## IF THE WAR SHORTAGE LASTS 4 YEARS, IS ONE FOX GLOW PLUG ENOUGH?

We are too modest to say — but many users report they get well over 100 flights per Fox Plug.

1. The Fox developed Rhodium Alloy element has almost twice the white hot strength of platinum, yet performs better than platinum.
2. The Fox seal is the only non ceramic seal material to withstand 1700 F. It will not fall like ceramic seals under thermal shock or torquing stresses.

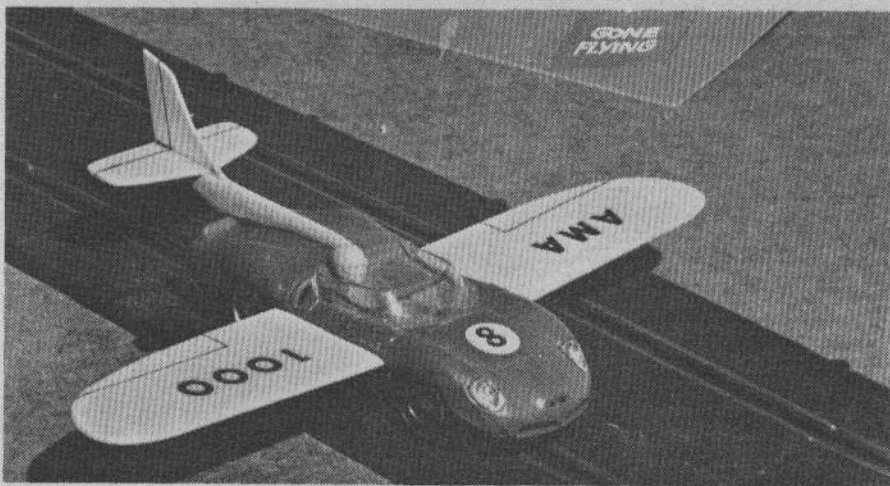
## FOX GLOW PLUGS ARE STILL AVAILABLE

	<b>FOX DUAL RANGE R/C GLOW PLUGS</b>		<b>FOX-FIRE GLOW PLUGS</b>
	FOX R/C SHORT 98¢		FOX-FIRE SHORT 49¢
	FOX R/C LONG 98¢		FOX-FIRE LONG 49¢
			FOX-FIRE HEAVY DUTY 75¢

Dual Range means that at idle it acts like a hot plug to keep your engine idling. At full throttle it acts like a cold plug to avoid pre-ignition and heat soak. The one piece machined on idle bar can't fall off and ruin your engine. Also it will never burn off.

A real gift to modeling. Lights up like a Christmas tree on 1.5 volts. Produces Quickest Starts, Fastest Runs, and Most Wins.

## MANY FLYING SITES OPEN UP WITH INSURANCE PROTECTION



## SLOTS OF FUN

Pete Moss, (no relation to Stirling), darling of the slot race set, has quit racing. He claims it was because of his big wreck at the Hobby Trade Show. Pete popped his slot in the hairpin. It was bloody awful. A three-quarter inch scratch on the bonnet of his Lotus.

Pete had been in the same groove too long—was ready for a change—for some real excitement—for flying a model airplane.

Pete never got off the ground in his first model airplane contest. But, now he is on the right track, has joined the Academy of Model Aeronautics.

Retired slot racers attention! Pete Moss says, "For real speed, thrills, satisfaction and attention—build a model airplane and join the AMA."

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## The Open Channel

(Continued from page 2)

issue on one thing, but with your patience, over the year this should balance out.

As far as aircraft is concerned, GL will begin to concentrate on scale and semi scale in 1967. We'd be happy to hear from you, giving us your suggestions. We are also always on the lookout for choice electronic ideas.

JESS KRIESER and his family visited GL and Ace the latter part of July. It was quite interesting to get them together with Bud Atkinson and Carl Lindsey and hear the reminiscences of scale aircraft of all types. It became quite apparent that here were experts in the field of digging for information concerning scale and vintage aircraft.

Jess is at work on a Sperry Messenger, a biplane of the 1920's, that will appear in GL sometime in 1967. This is a 100% scale since it lends itself to that type of construction; there is nothing semi about it. As far as models are concerned, it is unusual in that it will have the ailerons coupled for both wings, a feature that should make for good aerodynamic response.

Jess also brought with him a semi-scale Cessna Skylane completely finished except for the installation of the radio gear. Six of these have been successfully flown with a number of dif-

ferent R/C systems. Bud installed  $\frac{3}{4}$  of a new Kraft KP-4B system in it and we went flying the Sunday afternoon of the Jess' visit. Quite a gift, since Jess brought the Skylane as a present for your editor.

Write!  
Paul.

## Sailboating

(Continued from page 9)

SE-2 escapement, needs only a simple mounting bracket. Mount the receiver and escapement on the cockpit cover for easy access. Secure the batteries to the floor on the bottom of the boat. The escapement cranks operates in a slot, and pivots a rod under the tiller.

The Citizenship LT3 supergen also was tried with an SE-2 and performed well.

Our first venture into a superhet was with the Citizenship SSH receiver. With this we used a Futaba FT5C. Immunity from interference was assured, and with this route we could go either escapement or by adding relay we could also use a motorized servo later if we chose. With Ace R/C having a special on the Futaba FT5C and SSH receiver at \$34.95—a considerable saving—this route showed itself as having many possibilities.

Using escapements does have some

limitations. Considerable power and about 25 degrees of rudder throw are required to control the boat if there is a good breeze. The rubber band that operates the escapement (any escapement) just does not have the length necessary for the many operations required for a long sail. It also becomes a bit marginal in a strong breeze.

There are a number of servos on the market that do provide more muscle than escapements. Most of them are self-neutralizing and give sequential operation.

For those who aren't familiar with single channel servos, they all go through a sequence because the motor turns in one direction. Operation normally is: Press the transmitter button and hold for right; press, release momentarily, press again and hold for left. Some servos give a "compound" action. A momentary release, press and hold before the servo returns to neutral (after command for left) and they will lock in a switch to operate another servo or escapement. This is difficult to explain, but the devices work very well, and one of the newest compound servos was selected for our next Snipe control set-up. This switching action could provide additional control for the more imaginative minded reader.

The next system was selected for the modeler who can't drive a nail straight and gets dizzy looking at wiring diagrams, wants reliable radio equipment that can be sailed or flown. Even the boat was simplified.

A fiberglass kit was developed for the Snipe shown in this article. There is no Mickey Mouse in the following R/C system. It can be expanded later to include sail control and an additional function.

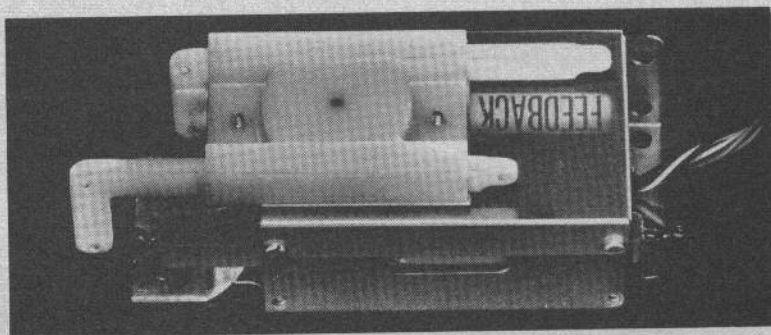
The new 13 RA rudder servo by Royal Products Corporation was mounted on the cockpit cover. The receiver and transmitter were a Kraft KTR1 combination. This is superhet receiving equipment and has a relay. A relay receiver is, as a rule, required by the motorized servos.

Batteries were mounted on the floor of the boat and mechanical linkage between the servo and the rudder was by pushrod on top of the deck. This system, like the escapement system, required securing the cockpit cover firmly in position by using polyurethane tape of the PUFs or Fusel type, on the underside of the cover. A screw eye aft served as a latch, and also a place where the main sheet could be secured.

The first time out (and without any tinkering or chasing) this little boat performed beautifully. By making the bell crank hardware longer than required, and putting in three holes, you have several options. You can choose the degree of rudder throw you require.

On the water the little Snipe wanted another command so she could perform more. The pictures were taken without assistance. After changing the set of the sails one time, I was able to maneuver the boat into position, put the transmitter down and take a picture. At one time the wind came up and the

## What Is The Ailer-Rand?



### SOMETHING FOR THE MULTI-FLYER.

The Ailer-Rand is another new product from the drawing boards of Rand Manufacturing Co. It is a device to interconnect ailerons and the servo. Push pull output makes it most suitable for strip aileron operation. Linear output gives the same amount of output motion in relation to stick movement, — at the extreme as well as at neutral. The Ailer-Rand has its own brackets, making it unnecessary to drill holes or alter servos. This complete package eliminates cumbersome Mickey Mouse hookups. The offset input is not only easy to connect, but provides a rigid system for dependable flying.

Model AR-1: \$4.00 See Your Dealer  
Weight:  $\frac{3}{4}$  oz.

Size: 3" x 1-3/16" x 1-7/16"

Material: Delrin plastic and aluminum  
Send 15c for latest catalogue



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little boat became uncontrollable for lack of servo power. When the wind subsided, the boat responded to commands and came back to port.

This combination provided an easy-to-do smooth operating radio control. It would not be satisfactory for the model builder who wanted to race in competition since a more powerful servo is required.

We secured an O. S. rudder servo. We could have used this with the KTR1 combo, but wanted to try it with the Futaba FT5C and SSH Citizenship combination. This required hooking in a 100 ohm relay in the place normally used for the escapement. This did keep the transmitter and receiver cost down. We mounted the O.S. servo in the cockpit cover, so that the same pushrod that was used with the 13 RA could be used.

Although the O. S. rudder servo provides less stroke, it does give more power. It is my opinion that you will now have a boat of definite racing capability with the O. S. unit, because of the slight extra bit of power.

We could go into the simple experiments with sail control in addition to rudder and quite likely can cover them later in another article. The purpose of these words and pictures is to show GL readers who have little knowledge of sailboating how this can be most easily obtained with the many commercial units that are available. I hope my discourse has done just that.

Most of what you need to know about small boat sailing has been explained. Those things left hazy or incomplete are really matters of your personal preference and there are no rules or guidelines other than common sense. Particular items of radio equipment are also personal preference, since most of the equipment that is available today will do the job. The items we mentioned and reported on just happened to be within easy access and should be easy for you to obtain should you choose to duplicate or expand on what has been explained here.

Obviously you get pretty much what you pay for in quality and reliability. This doesn't mean that the highest priced outfits are the best, necessarily, but the systems we tested should give you your money's worth. Find out what your local R/C flyers are using and ask their advice for good single channel equipment.

If you are an old R/C enthusiast and plan to use some of the old R/C gear you've got lying around, just for the fun, you'll be surprised at how much you can do with a small sail boat of the Snipe category in achieving good rudder control.

For those of you who like to scratch build your projects, in the next issue of GL we'll give you detailed blow-by-blow building description of the 36" scale Snipe so that you can build her this winter, and have it ready to go on the water when the spring peepers come out.

Sailing is fun! Try it!

## Add-on Switcher

(Continued from page 13)

tern is shown for those who wish to use the photo process. Your local blue print shop, or any place that has a process camera (such as a printer with offset equipment), can prepare a negative for you at nominal cost. Use 1/32", 3/64" or 1/16 inch copper clad laminate.

If you wish you can also use the Ex-acto process. You scribe in the lines where you wish to scrape the copper off, and then peel, brother, peel. Since all the lines are straight, this method is fairly simple to use. Use a size 60 drill for the holes which are for the components.

All of the components are available from most electronic houses, and a kit with completely etched and drilled base will be available from Ace R/C.

Basing leads of the TI, GE and Fairchild transistors are the same, so you will not have any difficulty in mounting the transistors on the PC base. Install Q1, then Q2, then Q3, seeing that they stand about 1/8 inch above the PC base. Then install the four resistors. Note that three stand on end, and one lies flat on the board. R4, you will find, may vary from 2.7 ohm to 10 ohm depending on the voltage supply used, and motor you will be using in

your actuator. If you are using it with the Rand, get it high enough so that the motor control portion of the Rand will cycle through on full on or full off. If this resistor is too high the Rand unit will not cycle through the motor control positions.

Solder 19 strand #26 hookup into the four positions required on the PC board using wire that is long enough to effect the hookup in your model.

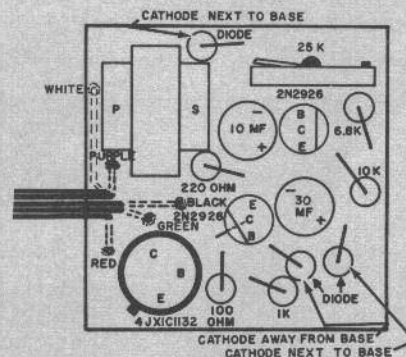
Double check all solder connections on the PC base. Clean the printed circuit board. Isopropyl alcohol makes an excellent cleaning agent. If you wish you can spray the printed circuit board with clear Krylon or paint with clear dope to prevent any high resistance shorts and to prevent the copper from tarnishing. Insert the four wires through a rubber grommet (a servo mounting grommet is ideal). Mount the AOS-M in an Ace PB#1 plastic box, which measures 1 x 1 x 3/4. You can make half moon cutouts in both the bottom and the lid to accept the grommet. Use foam rubber or polyurethane padding in the box to prevent the switcher from rattling about.

The completed unit may be mounted anywhere in the airplane near the receiver and actuator. It can be hard mounted, or foam can be used if desired for shock mounting.

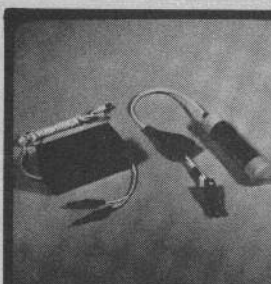
## GLITCHES!

GL authors, artists and editors are humans. Strange as that may seem to some of you, this could account for some of the goofs that appear. We will make every effort to correct these goofs just as quickly as possible—and give you our word that every attempt will be made to try to keep them from happening.

In the July-August issue, the High Pulse Rate Detector by Dennis Jaecks had two errors. First, Dennis' name is Jaecks, and not Jaeckes as we had it. Second, on the pictorial, we left off one of the lead out wires. Schematic and placement of parts are correct, but one of the lead outs is missing. The drawing here shows it in correct place.



On the More Muscle for the Adams Actuator, the text calls for 700 turns while one of the photo cut lines calls for 750 turns. The correct call out is 700 turns.



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## Make Your "Mule" Gallop

(Continued from page 6)

You will probably come out better by pilot-drilling all seven holes with a 3/32" drill initially, then open the two switch holes up to 1/8". The three larger holes can be opened up to 3/16" or 1/4" with a drill and then taken up to 3/8" with a tapered hand ream as larger drills do not work too well on thin aluminum. After scribing the outline of the rectangular opening for the slide switch, a series of 3/32" diameter holes are drilled within the outline to remove the bulk of the metal and the opening finished with a small file.

After deburring the case holes, refer to Fig. 2 for a detail of the centering spring arrangement. The two spring detents may now be installed in the 3/32" holes in the case back. Run the 2-56 screws thru the aircraft nuts from the normal direction once to impress threads in the nylon locking insert and then assemble with brass eyelets as shown in Fig. 2.

Now that the hard part is done, the electronic construction may be started. Assuming that you have a printed circuit board cut and drilled by either the photoetch or X-Acto knife and peel method; (See Fig. 3) follow the assembly steps below using resin core solder and a 25 to 40 watt soldering iron.

Refer to Fig. 4 for parts placement and hole numbers. Locate all parts as close as possible (within reason) to the

board to preclude interference later with transmitter parts. Excess lead material should be removed after soldering with a small pair of diagonal cutters.

Consult the parts placement for the general location. We will not go into full step by steps in this article, because of the length involved.

Generally install your electrolytic capacitors first, observing the correct polarity.

Next install the disc capacitors and then install all resistors, making sure to see which stand vertically and which lie flat.

The small glass DHD 806 diode has an identification band around one end of its body; this denotes the cathode lead end. Install the DHD 806 in holes 7 and 12, with a cathode lead-in and standing vertically over hole 7.

Install the 2N1671 unijunction transistor in holes 1, 2, 3, with the identification tab on case oriented between holes 2 and 3. Locate this transistor within 1/16" from the circuit board.

Install the 2N3638 transistor in holes 32, 33 and 34. This transistor is epoxy encapsulated and there is no lead identification tab, but inspection of the leads will reveal that there is only one position it can be installed in, fitting down close to the board without mangling the leads.

The two 2N2924 transistors are installed in this step. Notice that the three leads are located in line and equally spaced. Bend the two end leads

away from the center slightly. Refer to Fig. 4 for correct orientation of the flat portion of the epoxy case. Stand these transistors about 1/8" above the circuit board.

Cut a 4" yellow, a 4" black and an 8" red length of flexible hookup wire strip 1/8" of insulation from one end and tin the leads. Thread the wires thru hole 41 and solder the yellow wire to the circuit land adjacent to hole 42, the black wire to the land containing hole 40 and the red wire to the land containing hole 43.

The control pots are added next, with the 75K pulse rate pot (elevator) being located at the end of the board with the lugs soldered to the lands containing holes 1, 4 and 6. The 10K pulse width pot (rudder) lugs are soldered to the lands containing holes 18, 19 and 28. Lay the circuit board with the foil side up and position the pots with the shafts projecting upward and about 1/16" clearance between the pot body and the edge of the board. Utilize the 1/16" diameter spots on the circuit lands to aid in aligning the pots. Initially, tack solder only the center lugs of both pots and trial fit the unit in the case; shift the pots as necessary to match the holes and final solder all lugs.

Install the sub-antenna grommet, slide switch and pushbutton to the case back and install the pulser in the case with a 3/8" pot nut on the inside of the case and a 3/8" lock washer and nut

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on the outside on each pot shank. Slip the lever centering springs on the pot shafts and engage the ends in position on each side of the case mounted spring detent eyelets. Adjust the in and out location of the pots until springs are positioned correctly and finally tighten the pot nuts.

Strip 1/8" of insulation from the red, black and yellow wire from the pulser, tin the ends and solder the black wire to the upper lug of the slide switch and the yellow wire to one lug of the push-button switch.

Cut a 5" length of yellow and a 5" length of black flexible hook-up wire, remove 1/8" of insulation and tin all ends. Solder the black wire to the center terminal of the slide switch and the yellow wire to the remaining lug of the pushbutton switch.

You are now ready to wire the pulser to the MULE but, before doing so, set the pots somewhere near the middle of their rotation range. With this accomplished, solder the red wire to the upper right hand lug of the MULE switch on the component side of the board. Notice that there are two slotted holes in the circuit board located beneath the square shield can with lugs protruding through them; solder the black wire to the upper lug and the yellow wire to the lower lug. The back cover may now be installed to the transmitter. Route the new wires down below the sub-antenna and make sure the sub-antenna protrudes through its grommet correctly.

Modify the control levers as per the photo on page 7 to remove the phenolic ridge to allow the lever to seat flush against the centering spring. Drill and tap the lever for a 2-56 screw and install the spring detent as shown in Fig. 2.

#### ALIGNMENT

Pulser adjustment is relatively easy with the aid of a tone monitor. The cut and try method consists of turning the unit on to find out if the pots are set in an operable range. If you can hear the unit pulsing on the monitor, then it is simply a matter of setting the pots for neutral pulse rate and width. If the unit is not pulsing, rotate the pots both ways in turn until the operable range is found. If you were not successful so far, remove the back of the transmitter and take voltage readings between the center lugs of the pots (resistor leads at holes 4 and 19) and the case ground. Remember that the case is grounded to the battery positive and the best place to pick up a ground connection is on the perimeter land of the MULE chassis or the positive battery snap. Set the voltage of the rate pot (hole 4) at -3.5 volts and the width pot (hole 18) at -4.5 volts, and again see if the unit is operating. If the pulser is not running now, you can be pretty sure of a mistake in the wiring or shorted circuit lands. Pulser output may be checked on a scope by taking a signal from the lugs of the pushbutton.

Final adjustment of the neutral pulse rate and width should be made in conjunction with an operating receiver and actuator. Once this is done, the levers may be installed and you are in business. Stops to limit the lever throw are optional and may be achieved by many methods. A simple bent up sheet metal stop is shown in Fig. 5. This type is held in place with the pot nut and spring detent screw.

#### Go-Ac Conversion

(Continued from page 10)

be sure that the gear arm is in the center of the worm gear, and is not too tight. Slip washers on the shaft end on both sides, and install throttle arms made from 1/16" brass or steel flat stock, as shown on the side view. Solder in place at 90° with relation to the gear arm. Install the spring return wire in the gear arm, using a brass eyelet in the tab as shown and soldering. A small bolt with nuts can also be used.

That covers every phase of the construction, and from your efforts you can derive a great amount of pleasure from the smoother operation of your Go-Ac. You will also experience easy adjustment of the control surfaces, and a much better looking model, because you will eliminate the bird cage.

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# Those Men and Their Machines

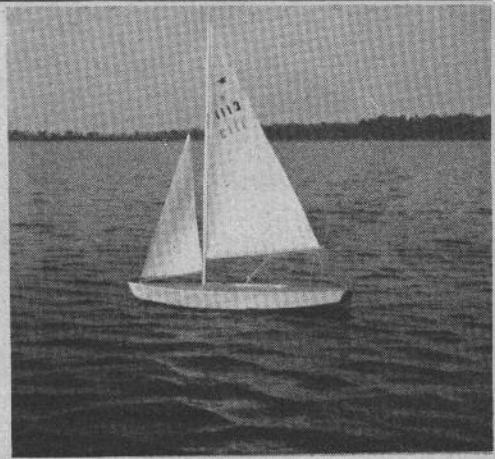
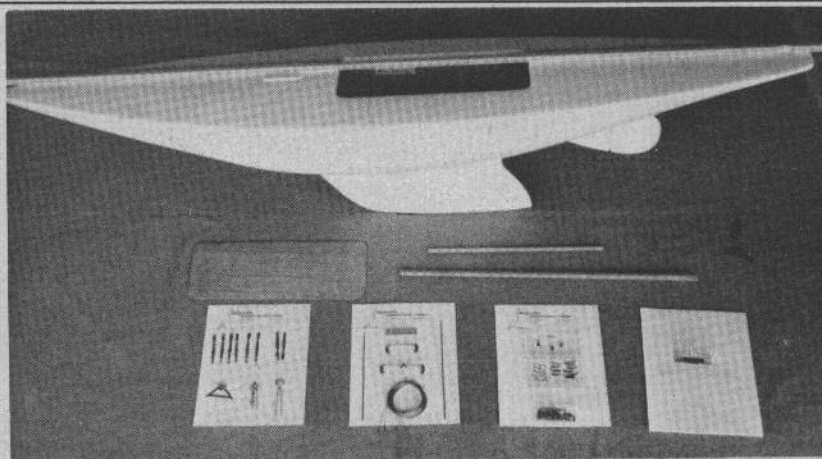


Bryan Lakin, Springfield, Missouri and his plane Deb-N-Air.

*Here's your chance to get  
your picture in paper!  
Send latest print in now!*

**W**ITH THIS ISSUE of GRID LEAKS we are starting a new feature. We hope to run photographs that we feel will be of interest not only to yourselves, but to all of our readers. If you have a photo of yourself and one of your favorite flying crafts—why not send it in? We will evaluate it and try to let you know what issue it will appear in—if we decide to publish it. Each published photo will be worth a subscription to GRID LEAKS for one year. Please give us as much details as possible telling us your full name, the name of your machine, how it is equipped and other pertinent data. Also, if you belong to a club, please tell us which one. Sorry, but no photographs can be returned. Got it? Okay—here goes....

BRYAN LAKIN of Springfield, Missouri, is our first man. His photo is shown at the left. Machine is the Deb-N-Air. He is 34 years of age, and has been in R/C for five years. He was

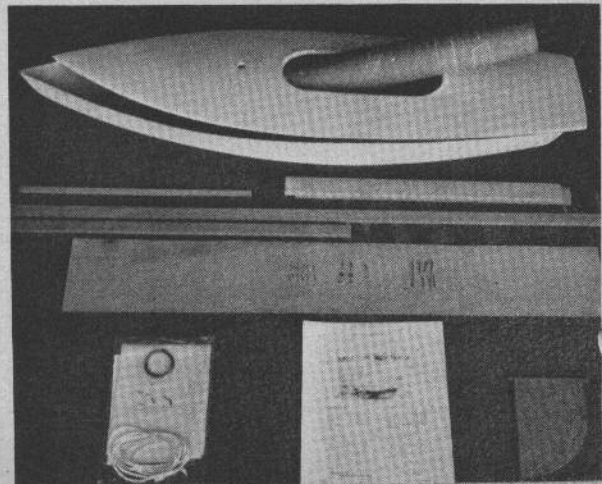


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a U-Control fan before he got into radio control. Bryan is known as the manufacturer of the Lakin Nose Gears. An avid contest goer in the middlewest, Bryan is slowly edging up on the total number of points per contest. Congratulations, Bryan, and we hope you enjoy your year's free subscription.

Radio Control is, of course, an international sport and to keep the feeling world-wide and to cover the interests of as many readers as possible, our second entry is from the Philippines:

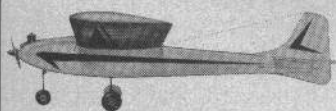
The man is named BEN JUAN, who is club president of the Cebu Model Crafters of Casay, Dalaguete, Cebu, Philippines. His machine is a Tauri, equipped with an eight channel combo, a simultaneous transmitter, and super-het, both German made. Quite a bit of activity is evidenced in R/C in the Philippines, and the Cebu Model Crafters are helped considerably by Simeon Torrecampo, who is Presidential Assistant on Community Development.

There you have it! This might possibly be the easiest contest to win that you've ever entered. Send no box tops. All we want is a good picture of you and your favorite flying machine!



Ben Juan, Casay, Dalaguete, Cebu, Philippines, and his Tauri.

## LOOK TO MIDWEST FOR LEADERSHIP



### The ARISTO-CAT

SPAN 45" LENGTH 40" WEIGHT 10.5 oz. AREA 170 sq. in. KIT NO. 110

CLASS 2 WINNER AT THE 1965 NATIONALS

Now at last! Midwest proudly presents Bud Atkinson's famous design. The "Cat" has piled up an amazing number of trophies in Class 2 and 3. Championship performances by both novice and expert have been chalked up coast to coast. Optional ailerons have proven to produce top performance in both multi and proportional! This Aristo-Cat kit includes everything you would expect from Midwest. Select Micro cut balsa, clean "Super Sharp" die cuts, excellent detail. Simple plans, nylon hardware and accessories. **\$24.95**

COMING JULY 15



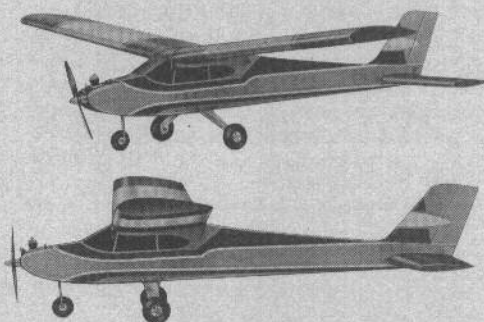
### SKY SQUIRE

SPAN — 57" AREA — 584 SQ. IN.  
LENGTH — 45"

10 Channel Trainer. Designed to let the beginner fly without the added worry of speed. The Sky Squire has been landed, once it has been set up on the final approach, with the transmitter off. This is built in stability.

KIT NO. 114 **\$22.95**

## NEW!



### ASTRO-MITE FOAM WING & STAB

Midwest is proud to introduce the first combination foam wing and stab kit. We have made a marriage between balsa wood and foam. The Astro-Mite was designed to build and fly in a hurry. Top quality material and pre-fabrication. Light enough for escapement flying with .049 and roomy enough for servos with .10. Ideal trainer for pulse rudder or galloping ghost systems.

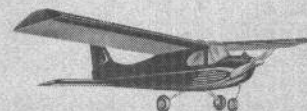
SPAN — 44" AREA — 264 SQ. INCHES CLASS 1 OR 2  
KIT NO. 112 **\$8.95**

If your dealer does not stock MIDWEST,  
write to factory for prompt delivery.



### TRI-SQUIRE ..... \$12.95

Tri-Squire Kit No. TS 106 R.C. Intermediate for .09 to .19 engines. This stable flyer is an ideal multi trainer — 4, 6 or 8 channels . . . the perfect step up from rudder only models . . . wing span 51 1/2", length 38" . . . Prefab construction . . . the Midwest way . . . "drop-out" die-cut balsa, complete, full size plans and construction tips.



### LIL TRI SQUIRE

Clean, functional lines, simplicity of construction. Top quality material and prefabrication. Light enough for escapement flying with .049. Roomy enough for servos with .099. Don't miss this one. It will perform. Vincent Micchia's latest design.

Span 40" Area 320 sq. in.  
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has many unusual fea-  
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and pieces required.

.19 to .45  
Engines

2 or 3 wheel  
landing gear!

SINGLE TO MULTI CHANNEL RADIOS!

## deBOLT MODEL ENG. CO.

3833 HARLEM RD.  
BUFFALO 15, N. Y., U. S. A.

### Bits and Pieces

(Continued from page 21)

is of substantial enough material so that it should be long lasting.

### DEANS CONNECTORS

These are perfectly good connectors with analog proportional if you remember to remove oxidation from contact surfaces regularly—if you remove it often enough eventually there are no contact surfaces. Coating contacts with Lubriplate will cure the oxidation problem and save wear on contacts.

### SWIZZLE STICKS

The small diameter plastic straws served with mixed drinks are excellent for pushrod guides through wings, etc. These are light, friction and static free and quite strong. Since they are impervious to hot fuel, dope and darn near anything, it is best to fasten them with contact cement.

### ADAMS ACTUATORS

These are fine pulse proportional control devices and cheap too—just the thing for .19 engines and down. With aerodynamic balanced surfaces they could be used on some larger engine planes. After many attempts at using these devices, I can pass on what may be useful dope:

1. Limit travel of actuator with sponge rubber stops to 45° action each way—this is a must.

2. Mount on 3/32" plywood bulkhead if you occasionally make one point landings. These units are small and hard to pick out of receiver (when anything less than 3/32" is used).

3. Use an AOSK add-on switches available from Ace R/C, anchor with R.T.V. silicon.

4. Travel of left rudder (fail safe) should be limited to 50% of right rudder by bending tongue rod at rudder while Adams unit is at maximum left travel. Center rudder travel by pulser trim.

HANK WAECHTER

The Middle Tennessee Radio Control Society Club Paper

### INFO FROM RAND

The following information is from Herb Abrams of Rand Manufacturing Company:

"We, at RAND, want to thank the modelers for their enthusiastic response to the introduction of our new product, the LR 3 Actuator.

"Even after a year of testing and debugging of this unit, we found that in our first production run, we had some trouble with the idler gear. We changed our material from a glass-filled Delrin, which was too brittle, to unfilled Delrin, and we changed the mold to provide a thicker section.

"RAND has taken pride in its high standards of quality and will continue

testing and making changes that will improve its design.

"Two other questions we have received from modelers writing to us:

"(1) The use of switcher with 2.4 V. will provide marginal motor control because of voltage drop across the switcher. If 3.6 V. is used, some means of limiting the stick motion must be employed to prevent unwanted motor control.

"(2) The modeler should understand that the actuator produces elevator control as a result of the crank motion controlled by the pulse rate. Neutral pulse must be adjusted to provide a minimum of 90° and preferably 150° motion of the crank. This will be approximately 5/16" motion of the elevator plate. I have observed some modelers' equipment that have had such a high neutral pulse rate that no elevator control was evident. However, it appeared to the modeler as improper elevator control because UP elevator motion appeared in proportion to the amount of rudder control. Therefore, this emphasis on elevator control as a result of crank motion. I believe the modelers have misunderstood the statement about Gallopless Ghost. We remove the gallop with a high pulse rate but the controls MUST wiggle."

### EASY FUEL PROOFER

The polaroid black and white picture coaters will provide an excellent fuel proofer for decals or the FCC identification stickers, available from a number of sources. Simply coat the decals or stickers the same as you would a polaroid picture, using the polaroid applicator.

### PROPO TIPS

With more and more proportionals arriving on the scene, we become more aware of a different philosophy in our installations. How do we isolate engine noise, metal to metal vibrations and/or other unwanted radiations. I have usually installed motor push rods utilizing kwik keepers and .063 wire from servo to motor and a kwik link to motor arm for adjustment of maximum throttle control. I installed this type of push rod in my proportional Taurus but substitut-

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ed a Williams Nylon Clevis. This isolated motor vibration completely, but was dissatisfied with smoothness of operation. Here I had a digital type servo with finite operation but .063 wire did not add but rather detracted from smoothness. How do we get from servo, around receiver, over battery pack, under tank, through 2 or more bulk heads, around a radial mount for the engine, and still have smoothness of operation? Answer: Nylon teflon tubing and heavy cable. RC cable and tubing for 75¢ will do a nose gear and motor control, 37¢ per control is not bad. If we use any one of the silicone grease sprays we can coat the inside of tubing and insure even greater smoothness. How do we affix adapters to cable so we can attach to servo and motor or nose gear? I take a 1" long 2-56 screw and cut head off or cut screw end off 10" Williams nylon keeper, you need the nylon clevis anyway. Grind or file concentrically one-quarter inch back so you get slip fit to small diameter brass tubing. Wrap masking tape around threads and hold in vise ground end up. Cut three-eighths inch piece of brass tubing deburr I.D. and O.D. both ends. Tin solder ground end or screw, slip on tubing and flow solder down to ground end. Do not fill to top. Lay aside (I do several at a time and save for next plane as I fly Kraft Proportional and do not crash and I don't have any planes to cannibalize.) My servos take a 6-32 take off, I remove these—take a 6-32 screw, cut head off file or grind flat, center punch, drill .070 hole one-quarter inch deep into soft screw. Solder cable into screw. Install 6-32 screw assembly to servo, route cable to motor arm keeping bends to a minimum. Install nylon tubing over cable. Leaving clearance for servo throw due to varied designs of planes and installations the nylon tubing will not necessarily rest against side of fuselage. Shim out to minimize bends and epoxy tubing as success of the tubing and cable method depends on restricting the tubing from any movement. Install motor, install previous assembly to motor arm (2-56 screw and tubing) with motor servo in high position. Move motor arm to high position, cut tubing and cable, estimating that you only have one-eighth inch left in brass tubing to assemble cable to tubing. Trim nylon at motor end for servo throw. Tin solder cable and solder in tubing. Your installation is complete. Cable in nylon tubing creates no noise and with nylon clevis you isolate motor. Note: If above installation is still not to your liking open nylon by drilling oversize so brass tubing can enter nylon tubing this will shorten unsupported cable.

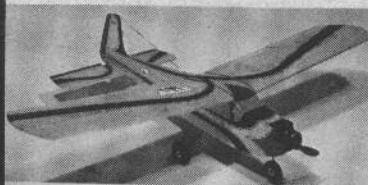
ERNIE METZER  
TRCC Club Paper,  
Tucson, Arizona

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# FOUR ACES!

**FOR FLYABILITY YOU CAN'T BEAT A MAMBO!**

## Mighty Mambo



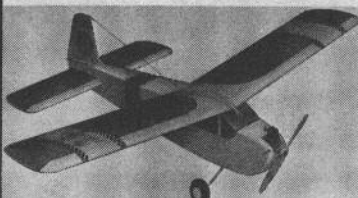
ENGINES: .29 to .45  
SPAN: 68 in.  
FOR: Single, intermediate,  
or full-house R/C trainer.  
PRICE: \$21.95

## Mambo Special



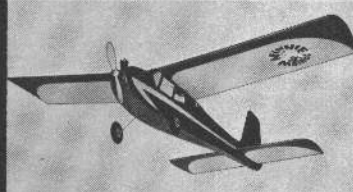
ENGINES: .09 to .19  
SPAN: 52 in.  
FOR: One to 6 channels.  
PRICE: \$12.95

## Mambo Trainer



ENGINES: .09 to .19  
SPAN: 48 in.  
FOR: Single-channel trainer.  
PRICE: \$8.95

## Minnie Mambo



ENGINES: Half-A  
SPAN: 36 in.  
FOR: Single-channel trainer.  
PRICE: \$4.95

NEW 1966 CATALOG ON REQUEST: Contains more than 100 items. Send 10¢ in coin to cover mailing and handling. PROFESSIONAL SECRETS OF MODEL AIRPLANE BUILDING: 15¢. PROFESSIONAL SECRETS OF CONTROL-LINE AND CARRIER FLYING: 15¢. WRITE TO ▼

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## Seen These?

(Continued from page 18)

original. The wing has the standard KF II root rib.

**SHIPE SPECIAL**—This is a GRID LEAKS special. Offered through Ace Radio Control the SSH Receiver by Citizenship, which is the smallest relayless superhet receiver available, along with the Futaba FT5C Transmitter, which has been praised in Britain as the most powerful transmitter available for single channel equipment, is being offered to GRID LEAKS readers in conjunction with the article on John Reynolds's Snipe, for a limited time at \$34.95. This is limited to GRID LEAKS

readers, and the offer has been made through Ace R/C at \$39.95. If you will, however, send us the label from your GRID LEAKS, along with your order, we'll see that this bargain is passed on to you at the exceptionally low price of \$34.95. Figure it out for yourself, this is only \$5.00 more than you would normally pay for the receiver by itself. When this supply is exhausted, that's it. At this low price there is no frequency choice.

Send your orders to Ace R/C, Box 301, Higginsville, Mo., 64037. Sorry, but no phone orders or COD orders can be accepted.

**VINYL LETTERS AND NUMBER SETS**—Here are some long last-

ing tough Vinyl Letters and Number sets for numbering models, boats, names on tool boxes, even for signs and mail boxes. These are not decals, but if they are to be used on models with glow engines, a top coating is required, since they are not fuel proof. Available directly from Model Plan Service, P. O. Box 824, Tustin, California, 92680. They are available in the following sizes and colors:

MPS 700—50 black on gold letters, 1½" high, per package \$ .29  
MPS 701—70 black on gold letters & numbers, 1", per package \$ .49  
MPS 702—130 white on black letters & numbers, 2", per package \$1.95  
MPS 703—130 black on gold letters & numbers, 2", per package \$1.95  
MPS 704—78 fire red on white letters & numbers, 3¼", per package \$1.95  
MPS 705—78 torch yellow on white letters & numbers, 3¼", per package \$1.95  
MPS 706—124 black on gold letters & numbers, 3¼", per package \$2.95  
MPS 707—124 white on black letters & numbers, 3¼", per package \$2.95  
Add 10c for each package (32c for Airmail) to cover postage and handling.

**FOR THE MULTI-FLYER**—The Ailer-Rand is another new product from the drawing boards of Rand Manufacturing Co. It is a device to interconnect ailerons and the servo. Push pull output makes it most suitable for strip aileron operation. Linear output gives the same amount of output motion in relation to stick movement, at the extreme as well as at neutral. The Ailer-Rand has its own brackets, making it unnecessary to drill holes or alter servos. The offset input is not only easy to connect, but provides a rigid system for dependable flying.

Model AR-1 is \$4.00; weight is ¾ oz. Size is 3" x 1-3/16" x 1-7/16" and is made of Delrin plastic and aluminum.

**NEW PLANES BY LANIER**—Three new airplanes were announced by Lanier Industries of Briarwood Road, Oakwood, Georgia, 30566. They are two models of the Thunderball, which may be had with either a standard wing or a 5° swept wing. This model is designed to fly with 10 channels or proportional rudder, motor, elevator, trim and aileron control. Span is 65", area is 585 square inches, has a symmetrical 17% airfoil, and is designed for .45 to .60 engines. With a standard wing the Thunderball is priced at \$39.95. With the 5° swept wing price is \$44.95.

The Comet is a shoulder wing design, which features a fuel access hatch. May also be used for 10 channels or proportional rudder, motor, elevator, trim and aileron control. Has 65" span, and area of 585 square inches, and a symmetrical 17% airfoil for use with .4 to .60 engines. Price is \$39.95.

**MANY FLYING SITE PROBLEMS ARE SOLVED BY AMA'S CLUB PROGRAM**

### R.C.S. DIGIFIVE PROPORTIONAL EQUIPMENT

Now Available World Wide

This renowned British five channel equipment uses Bonner Stick assemblies and either Digimites or Orbit Proportional Servos.

The unit is supplied complete with Nicad Cells, built in mains charger, wiring harness and sockets for your choice of servo which you obtain locally.

Price \$275 for a magnificent British outfit fully guaranteed and superbly made. Airmailed direct to you post free.

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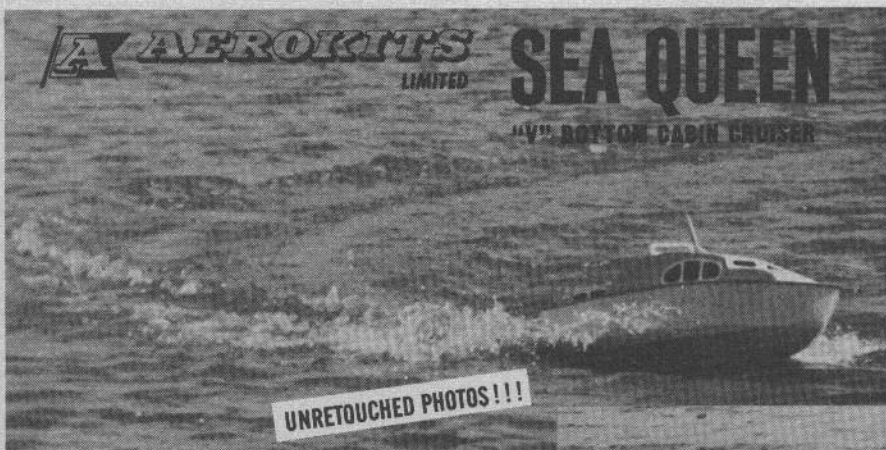
**RADIO CONTROL SPECIALISTS LIMITED**  
NATIONAL WORKS, BATH ROAD, HOUNSLOW,  
LONDON, ENGLAND



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LINE OF MARINE KITS AND FITTINGS



UNRETOUCHED PHOTOS!!!

The SEA QUEEN is the answer for the R/C modeler looking for a fair-sized, rugged boat suitable for carrying a quantity of R/C equipment, yet capable of speed and able to run on rougher water.

It is constructed of aircraft waterproof plywood and while it can be powered with engines as small as 3.5 c.c. it performs its best with the O & R C-III driving the Octura X70 prop. Available in kit form it features a slotted keel to ensure perfect prop-tube alignment, precision-cut and numbered parts, complete full-size plans and instructions with construction sketches. Builds easily and quickly, even for the novice.

**SPECIFICATIONS**  
Length 46½" Beam 14½"

**\$29.95**

Plus \$2.50 for Postage & Handling

If your dealer cannot supply you—send stamped, self-addressed envelope for literature and prices.

**OCTURA MODELS**

ONE SOURCE FOR ALL R/C BOATING SUPPLIES!!!  
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# SIG FIRST IN BALSA AND MODEL SUPPLIES

## Why?

Why are these Cedar Rapids Skyhawks so dynamic? So ready for action? So pleased as pumpnickles? Why indeed... they are Sig air-modelers. They've found the source for just about any aeromodeling supply, or kit, or engine, or part, or gimmick, or... well you name it and Sig can ship it. They're big in R/C equipment too, and carry many famous brands in stock. See your Sig Dealer, and you too can go-go like this gallant group of Skyhawks.



### SIG 'AA' Balsa - NEW PRICE LIST

SHEETS			STRIPS			BLOCKS		
36" LENGTHS	1/2" WIDTHS	1/4" THICK	36" LENGTHS	1/2" WIDTHS	1/4" THICK	3" LENGTHS	1/2" WIDTHS	1/4" THICK
1/32 x 3	12c		1/16 x 30	2c		1 SO	5c	
1/16 x 2	15c		1/16 x 30	2c		1 x 2	8c	
3/32 x 2	17c		3/32 x 30	2c		1 x 3	12c	
1/8 x 2	21c		1/16 x 30	2c		1 x 4	16c	
3/16 x 2	25c		1/16 x 30	2c		1 x 5	20c	
1/4 x 2	29c		1/16 x 30	2c		1 x 6	24c	
3/8 x 2	38c		1/16 x 30	2c		1 x 7	28c	
1/2 x 2	42c		1/16 x 30	2c		1 x 8	32c	
3/4 x 2	46c		1/16 x 30	2c		1 x 9	36c	
5/8 x 2	50c		1/16 x 30	2c		1 x 10	40c	
3/2 x 2	54c		1/16 x 30	2c		1 x 11	44c	
1/2 x 3	58c		1/16 x 30	2c		1 x 12	48c	
3/4 x 3	62c		1/16 x 30	2c		1 x 13	52c	
5/8 x 3	66c		1/16 x 30	2c		1 x 14	56c	
3/2 x 3	70c		1/16 x 30	2c		1 x 15	60c	
1/2 x 4	74c		1/16 x 30	2c		1 x 16	64c	
3/4 x 4	78c		1/16 x 30	2c		1 x 17	68c	
5/8 x 4	82c		1/16 x 30	2c		1 x 18	72c	
3/2 x 4	86c		1/16 x 30	2c		1 x 19	76c	
1/2 x 5	90c		1/16 x 30	2c		1 x 20	80c	
3/4 x 5	94c		1/16 x 30	2c		1 x 21	84c	
5/8 x 5	98c		1/16 x 30	2c		1 x 22	88c	
3/2 x 5	102c		1/16 x 30	2c		1 x 23	92c	
1/2 x 6	106c		1/16 x 30	2c		1 x 24	96c	
3/4 x 6	110c		1/16 x 30	2c		1 x 25	100c	
5/8 x 6	114c		1/16 x 30	2c		1 x 26	104c	
3/2 x 6	118c		1/16 x 30	2c		1 x 27	108c	
1/2 x 7	122c		1/16 x 30	2c		1 x 28	112c	
3/4 x 7	126c		1/16 x 30	2c		1 x 29	116c	
5/8 x 7	130c		1/16 x 30	2c		1 x 30	120c	
3/2 x 7	134c		1/16 x 30	2c		1 x 31	124c	
1/2 x 8	138c		1/16 x 30	2c		1 x 32	128c	
3/4 x 8	142c		1/16 x 30	2c		1 x 33	132c	
5/8 x 8	146c		1/16 x 30	2c		1 x 34	136c	
3/2 x 8	150c		1/16 x 30	2c		1 x 35	140c	
1/2 x 9	154c		1/16 x 30	2c		1 x 36	144c	
3/4 x 9	158c		1/16 x 30	2c		1 x 37	148c	
5/8 x 9	162c		1/16 x 30	2c		1 x 38	152c	
3/2 x 9	166c		1/16 x 30	2c		1 x 39	156c	
1/2 x 10	170c		1/16 x 30	2c		1 x 40	160c	
3/4 x 10	174c		1/16 x 30	2c		1 x 41	164c	
5/8 x 10	178c		1/16 x 30	2c		1 x 42	168c	
3/2 x 10	182c		1/16 x 30	2c		1 x 43	172c	
1/2 x 11	186c		1/16 x 30	2c		1 x 44	176c	
3/4 x 11	190c		1/16 x 30	2c		1 x 45	180c	
5/8 x 11	194c		1/16 x 30	2c		1 x 46	184c	
3/2 x 11	198c		1/16 x 30	2c		1 x 47	188c	
1/2 x 12	202c		1/16 x 30	2c		1 x 48	192c	
3/4 x 12	206c		1/16 x 30	2c		1 x 49	196c	
5/8 x 12	210c		1/16 x 30	2c		1 x 50	200c	
3/2 x 12	214c		1/16 x 30	2c		1 x 51	204c	
1/2 x 13	218c		1/16 x 30	2c		1 x 52	208c	
3/4 x 13	222c		1/16 x 30	2c		1 x 53	212c	
5/8 x 13	226c		1/16 x 30	2c		1 x 54	216c	
3/2 x 13	230c		1/16 x 30	2c		1 x 55	220c	
1/2 x 14	234c		1/16 x 30	2c		1 x 56	224c	
3/4 x 14	238c		1/16 x 30	2c		1 x 57	228c	
5/8 x 14	242c		1/16 x 30	2c		1 x 58	232c	
3/2 x 14	246c		1/16 x 30	2c		1 x 59	236c	
1/2 x 15	250c		1/16 x 30	2c		1 x 60	240c	
3/4 x 15	254c		1/16 x 30	2c		1 x 61	244c	
5/8 x 15	258c		1/16 x 30	2c		1 x 62	248c	
3/2 x 15	262c		1/16 x 30	2c		1 x 63	252c	
1/2 x 16	266c		1/16 x 30	2c		1 x 64	256c	
3/4 x 16	270c		1/16 x 30	2c		1 x 65	260c	
5/8 x 16	274c		1/16 x 30	2c		1 x 66	264c	
3/2 x 16	278c		1/16 x 30	2c		1 x 67	268c	
1/2 x 17	282c		1/16 x 30	2c		1 x 68	272c	
3/4 x 17	286c		1/16 x 30	2c		1 x 69	276c	
5/8 x 17	290c		1/16 x 30	2c		1 x 70	280c	
3/2 x 17	294c		1/16 x 30	2c		1 x 71	284c	
1/2 x 18	298c		1/16 x 30	2c		1 x 72	288c	
3/4 x 18	302c		1/16 x 30	2c		1 x 73	292c	
5/8 x 18	306c		1/16 x 30	2c		1 x 74	296c	
3/2 x 18	310c		1/16 x 30	2c		1 x 75	300c	
1/2 x 19	314c		1/16 x 30	2c		1 x 76	304c	
3/4 x 19	318c		1/16 x 30	2c		1 x 77	308c	
5/8 x 19	322c		1/16 x 30	2c		1 x 78	312c	
3/2 x 19	326c		1/16 x 30	2c		1 x 79	316c	
1/2 x 20	330c		1/16 x 30	2c		1 x 80	320c	
3/4 x 20	334c		1/16 x 30	2c		1 x 81	324c	
5/8 x 20	338c		1/16 x 30	2c		1 x 82	328c	
3/2 x 20	342c		1/16 x 30	2c		1 x 83	332c	
1/2 x 21	346c		1/16 x 30	2c		1 x 84	336c	
3/4 x 21	350c		1/16 x 30	2c		1 x 85	340c	
5/8 x 21	354c		1/16 x 30	2c		1 x 86	344c	
3/2 x 21	358c		1/16 x 30	2c		1 x 87	348c	
1/2 x 22	362c		1/16 x 30	2c		1 x 88	352c	
3/4 x 22	366c		1/16 x 30	2c		1 x 89	356c	
5/8 x 22	370c		1/16 x 30	2c		1 x 90	360c	
3/2 x 22	374c		1/16 x 30	2c		1 x 91	364c	
1/2 x 23	378c		1/16 x 30	2c		1 x 92	368c	
3/4 x 23	382c		1/16 x 30	2c		1 x 93	372c	
5/8 x 23	386c		1/16 x 30	2c		1 x 94	376c	
3/2 x 23	390c		1/16 x 30	2c		1 x 95	380c	
1/2 x 24	394c		1/16 x 30	2c		1 x 96	384c	
3/4 x 24	398c		1/16 x 30	2c		1 x 97	388c	
5/8 x 24	402c		1/16 x 30	2c		1 x 98	392c	
3/2 x 24	406c		1/16 x 30	2c		1 x 99	396c	
1/2 x 25	410c		1/16 x 30	2c		1 x 100	400c	

### SIG BAG OF BALSA

1 BAG - ALL BLOCKS	79c
2 BAG - BLOCK, STRIP, SHEET	79c
CELOPHANE-WRAPPED PACKET OF "OFF-SIZE" OR BLEMISHED BALSA STRIPS AND SHEETS.	50c

### SIG SPRUCE

36" LENGTHS	48" LENGTHS
1/16 x 1/8	3/32 x 3/32
1/16 x 3/16	3/32 x 1/8
1/16 x 1/4	3/32 x 1/4
3/32 x 3/32	3/32 x 1/4
3/32 x 1/8	1/8 x 1/8
3/32 x 3/16	1/8 x 3/16
1/8 x 3/8	1/8 x 1/4
1/8 x 1/2	1/8 x 3/8
1/8 x 3/4	1/8 x 1/2
1/4 x 1/4	1/4 x 1/4
1/4 x 1/2	1/4 x 1/2
1/4 x 3/4	1/4 x 3/4
1/2 x 1/2	1/2 x 1/2
1/2 x 3/4	1/2 x 3/4
1/2 x 1	1/2 x 1
3/4 x 3/4	3/4 x 3/4
3/4 x 1	3/4 x 1
1 x 1	1 x 1

### SIG BASS WOOD

1/2" LENGTHS	36" LENGTHS
1/16 x 1/8	3/32 x 3/32
1/16 x 3/16	3/32 x 1/8
1/16 x 1/4	3/32 x 1/4
3/32 x 3/32	3/32 x 1/4
3/32 x 1/8	1/8 x 1/8
3/32 x 3/16	1/8 x 3/16
1/8 x 3/8	1/8 x 1/4
1/8 x 1/2	1/8 x 3/8
1/8 x 3/4	1/8 x 1/2
1/4 x 1/4	1/4 x 1/4
1/4 x 1/2	1/4 x 1/2
1/4 x 3/4	1/4 x 3/4
1/2 x 1/2	1/2 x 1/2
1/2 x 3/4	1/2 x 3/4
1/2 x 1	1/2 x 1
3/4 x 3/4	3/4 x 3/4
3/4 x 1	3/4 x 1
1 x 1	1 x 1

### SIG BIRCH DOWELS

12" LENGTHS	36" LENGTHS
1/16 x 1/8	3/32 x 3/32
1/16 x 3/16	3/32 x 1/8
1/16 x 1/4	3/32 x 1/4
3/32 x 3/32	3/32 x 1/4
3/32 x 1/8	1/8 x 1/8
3/32 x 3/16	1/8 x 3/16
1/8 x 3/8	1/8 x 1/4
1/8 x 1/2	1/8 x 3/8
1/8 x 3/4	1/8 x 1/2
1/4 x 1/4	1/4 x 1/4
1/4 x 1/2	1/4 x 1/2
1/4 x 3/4	1/4 x 3/4
1/2 x 1/2	1/2 x 1/2
1/2 x 3/4	1/2 x 3/4
1/2 x 1	1/2 x 1
3/4 x 3/4	3/4 x 3/4
3/4 x 1	3/4 x 1
1 x 1	1 x 1

### SIG BAMBOO STRIP

1/16 x 1/8	3/32 x 3/32
1/16 x 3/16	3/32 x 1/8
1/16 x 1/4	3/32 x 1/4
3/32 x 3/32	3/32 x 1/4
3/32 x 1/8	1/8 x 1/8
3/32 x 3/16	1/8 x 3/16
1/8 x 3/8	1/8 x 1/4
1/8 x 1/2	1/8 x 3/8
1/8 x 3/4	1/8 x 1/2
1/4 x 1/4	1/4 x 1/4
1/4 x 1/2	1/4 x 1/2
1/4 x 3/4	1/4 x 3/4
1/2 x 1/2	1/2 x 1/2
1/2 x 3/4	1/2 x 3/4
1/2 x 1	1/2 x 1
3/4 x 3/4	3/4 x 3/4
3/4 x 1	3/4 x 1
1 x 1	1 x 1

### SIG MOTOR MOUNTS

1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG

### SIG MAHOGANY VENEER

1/2" THICK, 6" x 12" SHEET	20c
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### SIG MODEL PINS

1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG
1/2" LONG	3/8" LONG

### SIG DOPE BRUSHES

CAMEL HAIR: 5/8" 19c 1" 25c	
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### SURGICAL KNIVES

WITH PLASTIC HANDLES. IDEAL FOR CUTTING LIGHTWEIGHT BALSA AND TRIMMING PLASTIC MODELS ETC. NO. 10 STRAIGHT BLADE, NO. 11 ROUNDED BLADE. 35c each	
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### RAZOR PLANE

USES DOUBLE-EDGED BLADES \$1.50	
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Go First Class——Fly The  
The very finest——

**BEE  
LINE**

Way



## Most Complete Line of Foam Wings

Bee Line has now developed a process whereby the Birch Veneer is applied to the foam airfoil by use of a heat-shrink technique. The outer surface is similar to silk span which makes an excellent surface for attachment of Monokote. An outstanding fuel proof finish can be obtained by applying two coats of enamel primer directly to the silk span surface, lightly sand with 400 emery paper and follow with two light coats of enamel color.

Each series represents a stage of construction and configuration. Any type airfoil can be produced in any series. To order, merely indicate series and type. Examples: BL-24 Kwik Fli II, BL-19 Aristo Cat, BL-23 Stormer, etc.)

Types: Regular Taurus, Swept Taurus, Sweeper, Sr. Falcon, Cherokee, Aristo Cat, Zeus MK III, Jenny, P-Shooter,, Candy, Patriot, Beach Comber, Wind-jammer, Citron, Kwik Fli II, Stormer, Tauri, Falcon 56, Propo-Cat, Go-Go Cat.

### BL-19 SERIES CLASS II configuration \$8.95

\*Precut airfoil. Strictly a do-it-yourself kit.

### BL-20 SERIES \$10.95

#### CLASS II configuration

\*Precut airfoil \*Precut dihedral \*Precut gusset slots \*Preglued balsa trailing edge stiffener \*Precut Ply gussets.

### BL-21 SERIES \$11.95

#### CLASS III configuration

\*Precut airfoil \*Precut dihedral \*Precut gusset slots \*Precut gussets \*Servo cut-out \*Preglued balsa trailing edge stiffener \*Gear slots and hardwood gear mounts where applicable.

### BL-22 SERIES \$28.95

#### CLASS II configuration

\*Precut airfoil \*Precut dihedral \*Precut gusset slots \*Preglued balsa trailing edge stiffener \*Precut gussets \*Covered airfoil (1/84" birch veneer) \*Tips covered \*Gear slots and hardwood gear mounts where applicable.

### BL-23 SERIES \$29.95

#### CLASS III configuration

\*Precut airfoil \*Precut dihedral \*Precut gusset slots \*Preglued balsa trailing edge stiffener \*Precut gussets \*Covered airfoil (1/84" birch veneer) \*Tips covered \*Gear slots and hardwood gear mounts where applicable.

### BL-24 SERIES \$33.95

#### CLASS III configuration

\*Precut airfoil \*Precut dihedral \*Precut gusset slots \*Precut gussets \*Servo cutout \*Covered airfoil (1/84" birch veneer) \*Tips covered \*Covered strip ailerons as integral part of wing \*Differential hinged ailerons with nylon \*Aileron hardware installed \*Hardwood gear mounts installed where applicable. (All have Built-in Strip Ailerons)

### BL-25 SERIES \$35.95

#### CLASS III configuration (All have regular ailerons)

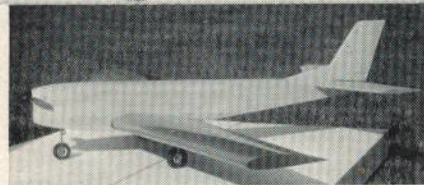
\*Precut airfoil \*Precut dihedral \*Precut gusset slots \*Precut gussets \*Servo cut-out \*Covered airfoil (1/84" birch veneer) \*Tips covered \*Regular ailerons differential hinged with nylon \*Aileron torque rods and cranks installed \*Hardwood gear mounts installed where applicable.



COMING SOON—THE SWEEPER. Kit will include: fibre glass fuselage, BL-24 series Sweeper wing, matching stab with built-in, nylon hinged elevators, nose gear and main gear. Watch this space for further developments.

CUSTOMIZED Wing Service. Send plans and specifications direct

NOW—BEE LINE is distributor for Easypoxy repair kits. \$1.95. It stays where you put it—will not run. Kit includes mixing boards and spatulas. Hardens in two hours. Ideal for use on foam and repairs. See your dealer or order direct.



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