

# GRID LEAKS

25C

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CONTENTS COPYRIGHTED 1961 BY GRID LEAKS

## A Five Position Elevator For Your Reed Ship

BY GOEFFREY D. PIKE OF ENGLAND

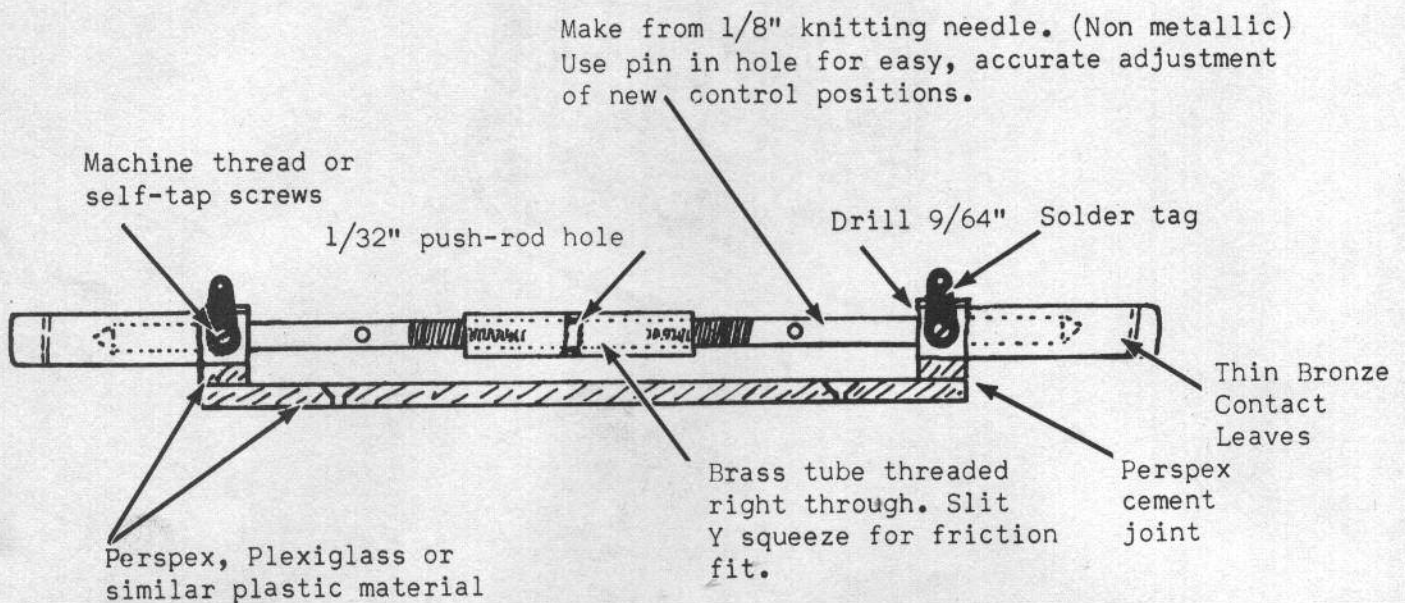
The system presented here enables the serious multi flyer to obtain an extremely high degree of control during all precision and aerobatic manoeuvres. No less important however, is the noticeable ease with which the really smooth and precise patterns may be executed. The writer believes that the five-position control surface is a real step forward in "multi" flying, and successfully bridges the gap between proportional and hand-pulsing of systems.

proof and functional. The absence of a "trim" servo also helps by keeping down the weight and expense of the plane, and few will dispute the advantages here.

All test flying so far has been carried out with 2 "Orions" and positively no teething troubles or disadvantages have become apparent. A 10-channel Bramco Apollo receiver with four Bonner Transmites have been used today and appear to be a nice set up. However, a relay equipped receiver could be used in just the same way.

In no way a gimmick, this simple addition is fool-

Although the drawings are self-explanatory, it

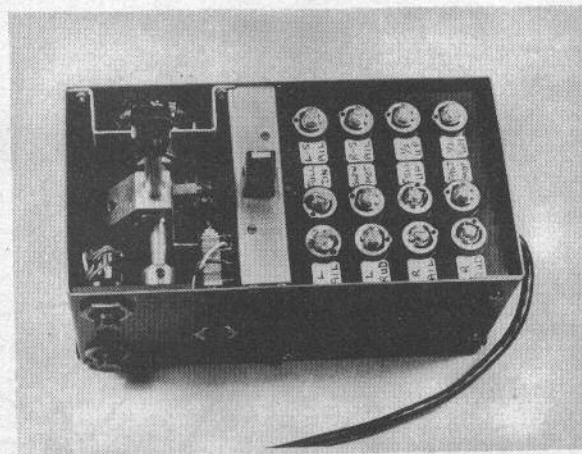
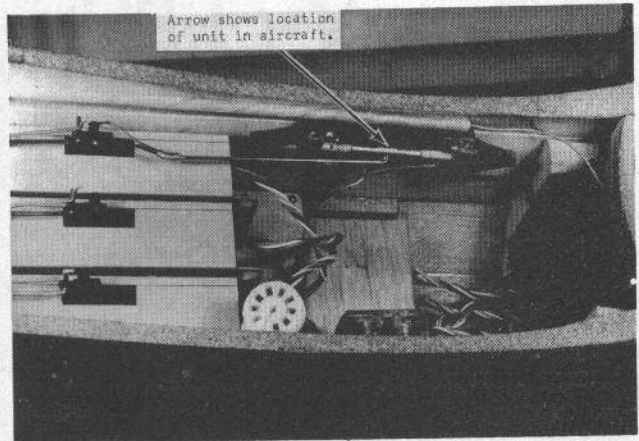
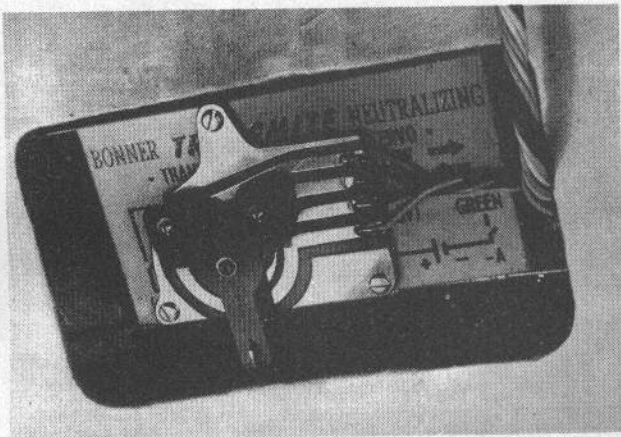


might be mentioned that the extra control positions are obtained by driving the servo through one of the simple circuit breakers. As soon as this switch opens, the servo gently oscillates back and forth, always maintaining this exact position, regardless of air loads or of battery state. When full deflection is commanded, then the switch is simply by-passed, and the servo runs on to full travel.

In practice, the pulsing effect is undetectable and for inverted flight and spiral climbs, etc., the new

position is just held, while full attention may be given to hand pulsing of ailerons.

Since the writer favors a ground based transmitter, a new control box was constructed which offers a type of stick control through the five positions. Although it is very nice to handle, it is felt that an extra lever switch as used to operate the usual "trim" control, will also be just as effective. In the case of the popular hand-held transmitters, this would certainly seem to be the more convenient method.



Double Pole Change Over switch in rudder position, stick controls elevator and rudder. C. O. switch in control box changes stick over to full aileron as usual.

Motor  
Full  
Speed

Double Pole Change Over switch in new aileron position, stick controls elevator and  $\frac{1}{2}$  aileron. C. O. switch in control box then simply doubles up on aileron movement.

Motor not  
quite at  
Full  
Speed

## FIVE POSITION ELEVATOR, CONTINUED

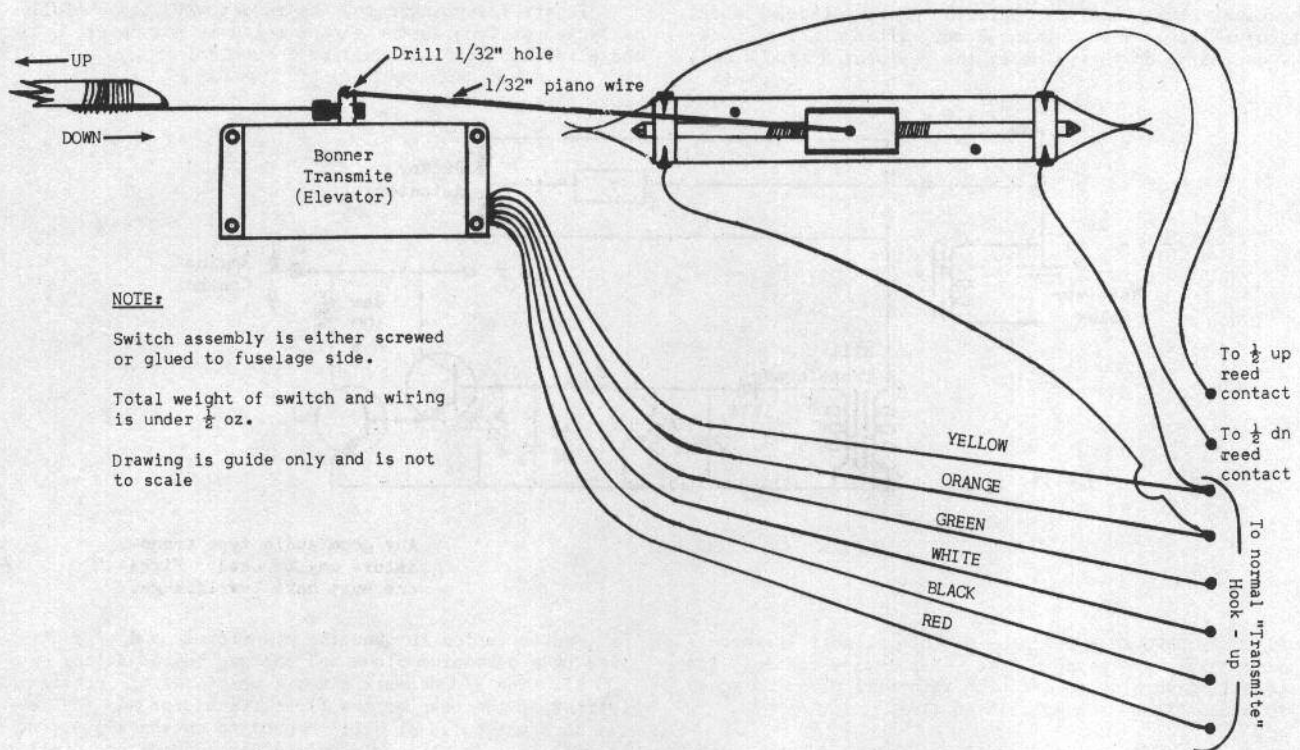
Although it was originally intended to control only the elevator in this way, the tremendous increase in flying pleasure obtained during some four months of proving flights, has indicated that if we were now to extend the system to the ailerons, using 12-channels then we should indeed have a combination that would be hard to beat.

ED. NOTE: Goeff had included color transparencies, and since these could not be used to illustrate this article, we asked a favor of him to get us some black and whites. This he kindly obliged, and also offered some later information. Goeff continues:

Since sending you the article, I have gone ahead and extended the system to give a five position aileron-control, in ADDITION to five position elevator. The results of this are truly sensational! By adjusting

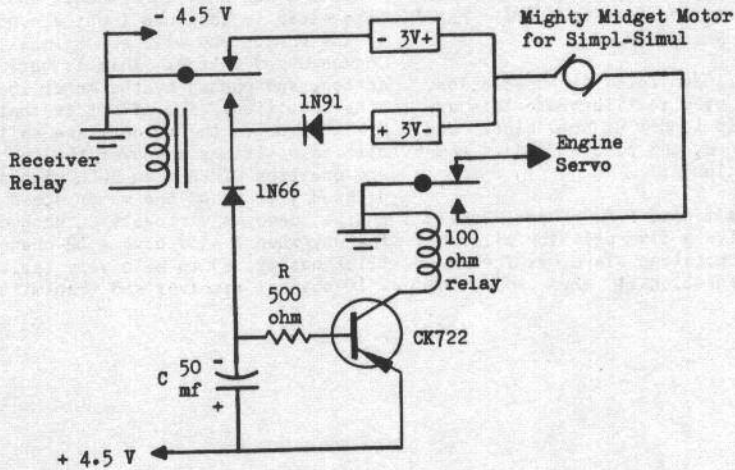
the extra aileron position to about 10% travel, it is possible to fly with a smoothness and precision beyond my fondest dreams.

As I had only 10 channels and needed 12, you may be interested to know how I got around this problem. In one of the photos you will see a small DPCO (Double Pole - Change Over) switch. This is spring loaded in one direction, and pushed by the motor speed servo into the other position. The effect is that the two channels that NORMALLY serve the rudder, are switched over to the new aileron positions whenever the motor speed servo is in any position OTHER than FULL high speed. As it is only necessary to "tap" the motor speed servo about 1/8", the engine speed is virtually unchanged. Although I look to the day when I will have a 12 channel outfit, the above trick has proved to be a very satisfactory way to use a 10 channel receiver and transmitter as a 12.



# Pulse Omission And Pulse Frequency Circuits

BY FRANCIS PLESSIER OF FRANCE

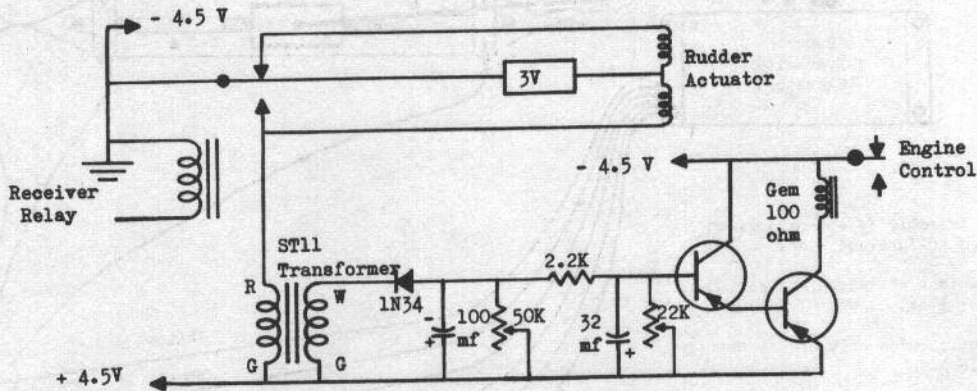


**PULSE OMISSION DETECTOR** -- This simple circuit is used with a low voltage receiver requiring  $4\frac{1}{2}$  volts to operate and will provide Fail Safe combined with engine control.

As long as there is pulsing, the second relay is actuated, and the Mighty Midget used as the actuator in the usual Simpl Simul or Galloping Ghost method, works its usual way. When pulsing stops, after a slight delay depending on the value of the resistor R (500 ohms),

and Capacitor C (50 mf), the second relay opens, the Mighty Midget is brought back to neutral by the centering rubber bands, and the Engine servo is actuated by switching from high to low speed, when pulsing comes again.

In the foregoing case, the rudder will stay fully deflected as long as the second relay is not open; if the plane is "hot" it could be a problem!



Any good audio type transistors may be used. First one must have low leakage.

**PULSE FREQUENCY DETECTOR** -- This circuit is for a Rudder Only plane using pulse. For Engine control low rate will give high speed; high rate will give low speed with proportional rudder all the time.

The circuit is very simple but may need some tinkering depending on component differences. A miniature - or subminiature - pot can be left in the box to house the unit for final adjustment.

It works very simply: Each time the relay closes,

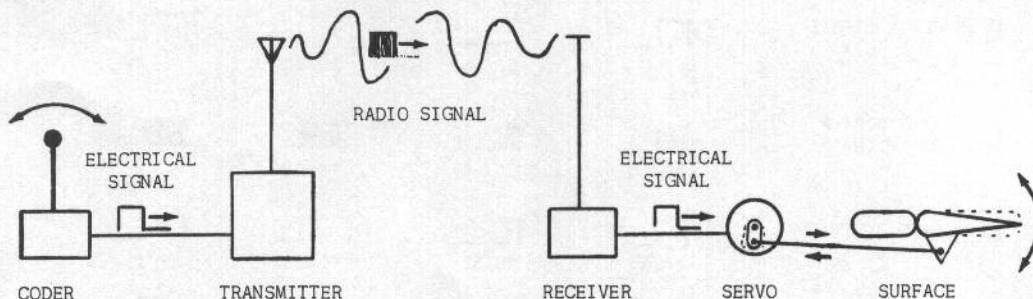
an impulse is fed through the transformer and rectified by a germanium diode and charges the capacitor -- 100 mf. The R/C network gives a practically constant current at the base of the first transistor and the relay does not pulse at all. Depending on the adjustment it will pull in at 3 or 4 pulses per second and with only a very small time lag.

I have found this circuit very nice for adding motor control to an existing rudder only plane and have had quite a bit of success with it here in France.

# Proportional Control For Rudder Only

BY JAMES SHOWS

FIGURE 1



EDITOR'S NOTE: This is the first of a series of articles by an RCer who is an expert on the subject. He also has more than his share of contest trophies to add weight to his words. A very busy work schedule prevented him from going to many of the meets, but his performances to the ones he did attend was convincing. In our opinion--as an observer--here might be an answer to that shot in the arm many seem to think rudder-only needs. In our opinion--as a manufacturer--here is an answer to helping the beginner get started, and get started right. Talking about 4 or 6 channels for a guy just going into R/C is strictly for the birds!

GRID LEAKS is proud to present this first in a series we feel will make a valuable contribution to R/C.

Proportional control for radio controlled model airplanes is far from new. It has probably received a great deal more attention in R/C literature than all other systems combined, and yet appears to enjoy the least success. The purpose of this series of articles is to provide the reader with a basic understanding of proportional systems; a detailed, step by step, description of the system which has been flown successfully by the writer, and a discussion of the installation, adjustment, operation, malfunction or limitations of a proportional rudder-only system.

By combining proportional rudder control with the POD (Pulse Omission Detector) trimmable motor control unit, complete command of the model from very smooth precision patterns to consistent true spins is had.

The model can be powered with a large engine with complete throttle control (much more important to rudder only than for multi) and yet maintain good control by strong rudder power. Using this system, the writer's model is equipped with a rudder which is 60 percent of the total vertical surface area and with a throw of 35 degrees either side of center.

It may be wise at the outset to define what is meant by proportional control. This is a system where by the control surface moves from the center or neutral position in proportion to the movement of the control in the flyer's hand. Immediately, questions arise! "Does the surface flap?" "If not, what about those I see flapping?" And "What's the difference between proportional control and pulse control?"

To answer the first question, proportional systems may have flapping surfaces which control the direction of flight by varying the control surface maximum deflection dwell time in proportion to the control stick position. Flapping control surfaces, while generally

satisfactory, are less efficient and cause excessive and unwanted drag. The major drawback is the limited size of the control surface. If this is made large for high maneuverability, the model will try to follow the flapping surface which results in a snaking motion in flight. The system to be discussed has a minor quiver of the rudder surface which is usually masked out when the engine is running.

The other answer is yes. Proportional control and pulse control, as used in the writer's system, are one and the same. The position of the control stick is translated into short coded electrical pulses which is transmitted to the model.

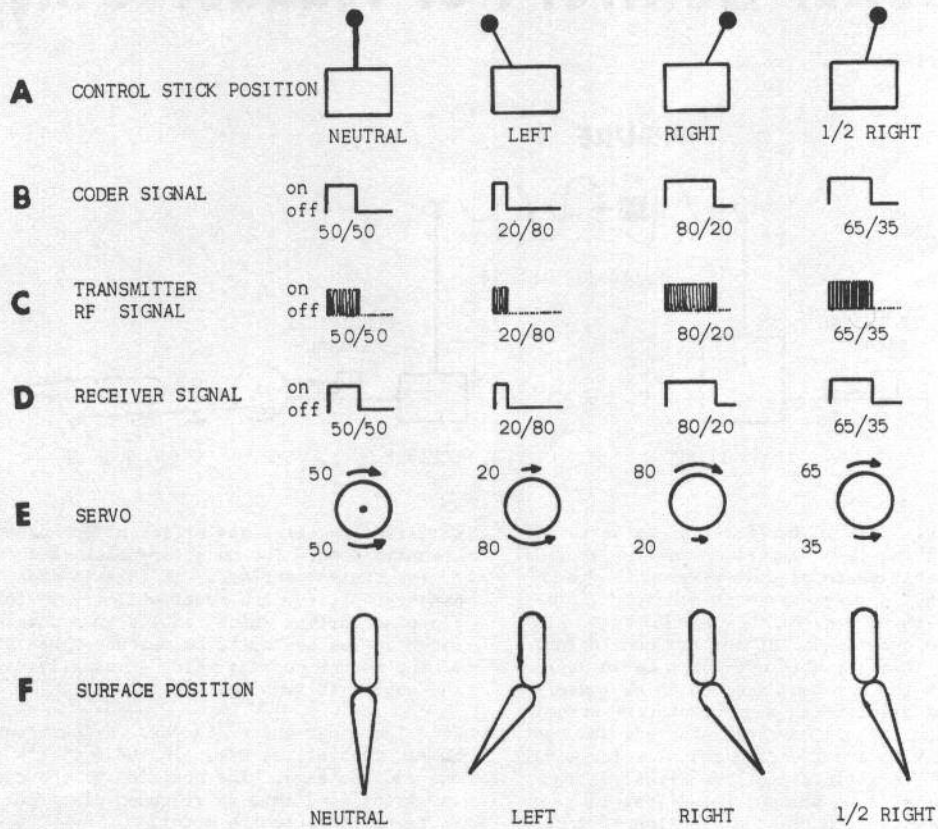
All proportional systems, however, do not operate on the pulse coded principle. Some systems work on a continuous variable signal. By varying the transmitted audio tone, for example, from 500 to 1500 cycles per second, the control surface is driven from extreme position to the other. A tone of 1000 cycles per second, will provide neutral position with other intermediate frequency providing a corresponding intermediate control surface deflection. This type system usually operates on the closed loop or feed back principle and is best exemplified by the Space Control System.

The pulse coded system which includes most of the proportional control systems currently being flown may be defined as an open loop system since they depend on a mechanical centering system for the control surface -- magnetic and aerodynamic centering forces are included in this category.

To better understand the pulse coded system let us refer to the block diagrams shown in Figure 1. In the block labeled coder, mechanical power from the hand is used to move the control stick. Stick motion is converted to equivalent electrical pulses which triggers a signal from the transmitter. The coder may be electric motor driven contacts or an electronic relay type. The coded radio frequency is transmitted to the receiver and control surface servo. The transmitter and receiver may be operated on either radio frequency (RF) carrier wave or audio tone RF modulation.

With the coder in neutral, Figure IIA, which we will say is opening and closing the transmitter keying switch at one cycle per second, Figure IIB, the signal is transmitted for .5 second and off for .5 second, see Figure IIC. (This example is too slow for flying and will be covered later.) If the stick is moved to the extreme left, usually 30 to 45 degrees, the signal is changed to .2 second on and .8 second off. Moving the

**FIGURE II**



stick to the extreme right will correspondingly cause the signal to be .8 second on and .2 second off. Any intermediate stick position will cause an intermediate pulse width.

The receiver converts the coded radio signal back to electrical signal which is the same as the one put out by the coder, Figure IID. This electrical signal is used to drive the receiver relay. The receiver relay acts like an amplifier in that it converts the small receiver electrical current to a large servo current. If an electronic relay type coder is used it will be noted that the receiver relay exactly duplicates the pulse coder relay.

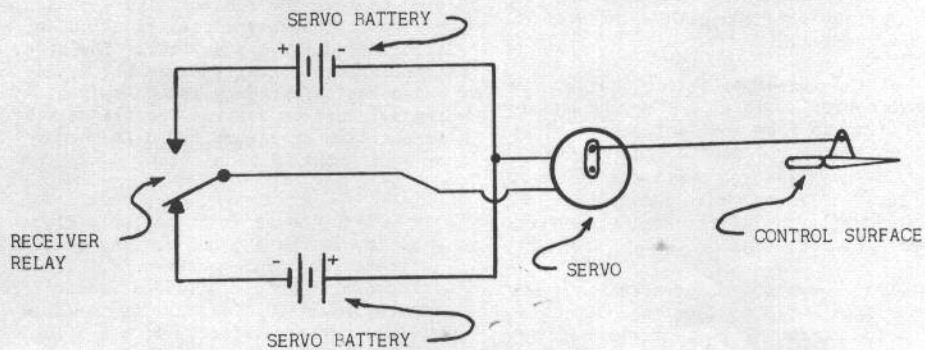
Figure III shows a relay to servo circuit which is used to reverse the voltage polarity to the servo caus-

ing the direction of the servo armature to follow the relay. The action of the servo is shown in Figure IIE. By proper servo design the pulses are translated into small motions in each direction. Longer dwell time is needed to drive the servo in the signaled direction until the external centering force balances the input signal. The control surface deflection will correspond to the stick position Figure IIF.

The pulse width can be 100% on to 100% off to obtain a steady extreme position. However, if it is limited to no more than a 90/10 ratio, pulsing never stops, and a steady on or off can be used to provide motor control with a pulse omission detector.

The next article will describe the units used in the writer's system.

**FIGURE III**



# R/C Mobile Robot

A SCIENCE FAIR PROJECT

BY STEPHEN J. PALMER

EDITOR'S NOTE: We received the letter below along with circuitry we felt would be of more than just passing interest to the serious experimenter in the R/C picture. The project is quite unusual, but we believe it will be of more than slight interest to our readers. It is especially interesting in view of the age of the person who wrote it, and rather than edit it, we are presenting it as written by our correspondent. Several of the ideas presented by its author may be of interest to our readers, and we invite your comments.

"First I would like to compliment you on the articles that have appeared in Grid Leaks lately. I doubt if I could begin to comprehend the amount of work you must put into the magazine, but I for one appreciate it.

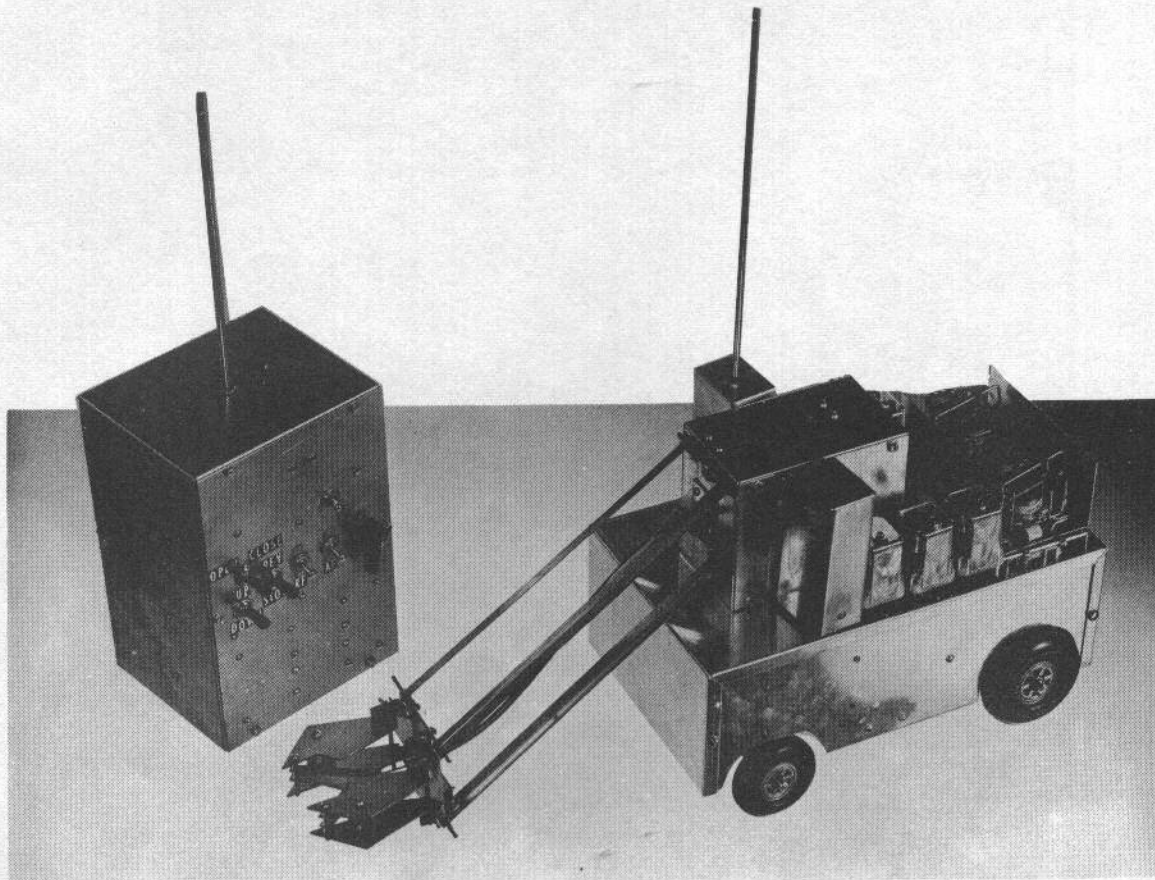
"I also have a subscription to Radio Control Models and Electronics. Between the two magazines I have been able to keep up with radio control rather well despite the fact that I have been quite busy lately. I would like to suggest that perhaps Grid Leaks could reprint a few of the better articles in RCM&E, along with a list of suitable American parts substitutions for the con-

struction projects. The one article that sticks in my mind is the 'Super Pulser' in the July 1961 issue. Perhaps your other readers might also be interested in an arrangement of this kind for other others in RCM&E.

"Also thought your readers might be interested in my school science fair project, which was finally completed this spring. I say finally, because I have been working on it for three years. The title of the project was a Radio Controlled Mobile Robot.

"In 1960 I was awarded a prize from the National Science Foundation through the Indiana Junior Academy of Science for the completion of this project. This was a help to get more test equipment for furthering other, advanced work.

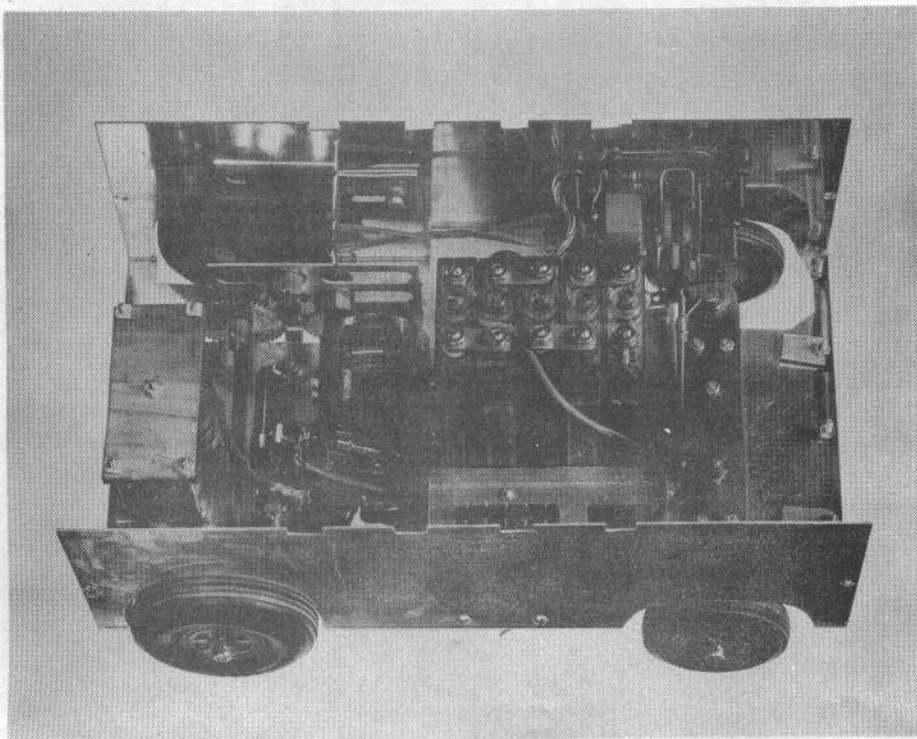
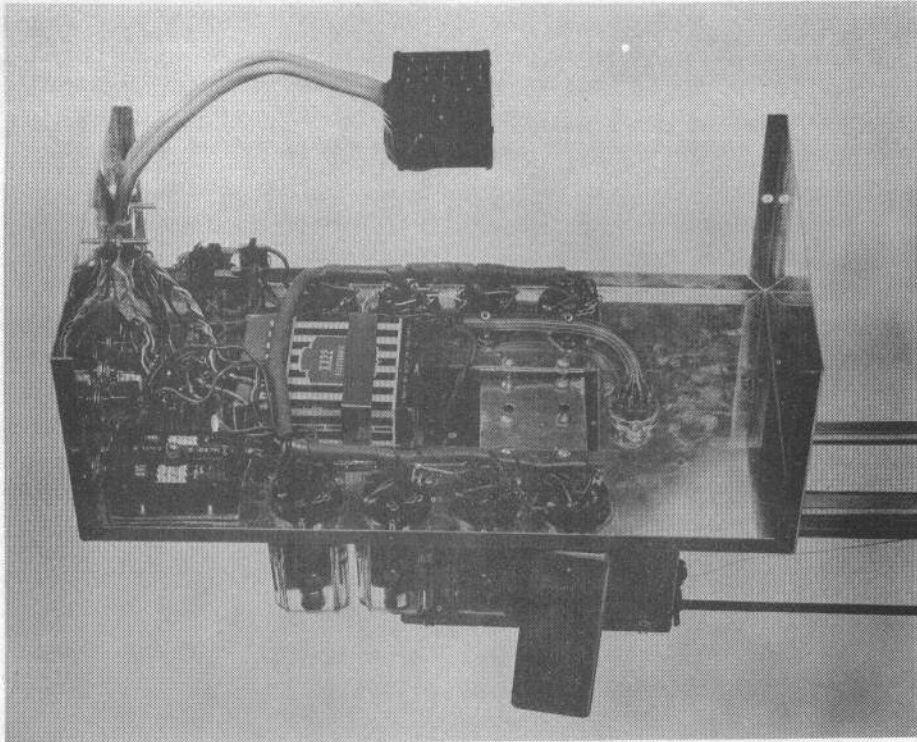
"This project won first place in the South Bend City Science Fair, and second place in the University of Notre Dame High School Project Contest. But more importantly I won honorable mention in the Future Scientists of America Awards Competition, which is a national contest.



"What I think will really interest you, however, is that the basic radio part of this project was based on the Marcytone multichannel system. The transmitter is a sort of Kraft-Marcytone combination and for the audio generators I am using two phase shift generators and an amplifier from Doig's 'Ulti' system. One generator takes care of the lower three tones, and the other the upper four. One channel is being pulsed for proportional control with a Gershberg transistorized pulser (the one in Model Airplane News some time ago using the \$5.00 Xener) The transmitter is powered by a B & S power converter, 7 nickle cadmium cells. All this is stuffed into an al-

uminum case measuring 9 x 6 x 5".

"The receiver in the Robot is a modified Marcytone with six channels using the regular Marcy LC filters. The seventh channel is an experimental one with a Rameco pot core in their special circuit, modified for 30 volts. I am using a Bonner servo to open and close a hand, and a plain old gear train and motor from Wilson's of Cleveland to raise and lower the arm. Steering is controlled by a Tomoser proportional actuator, and the Robot is propelled by a geareddown Pittman boat motor. It





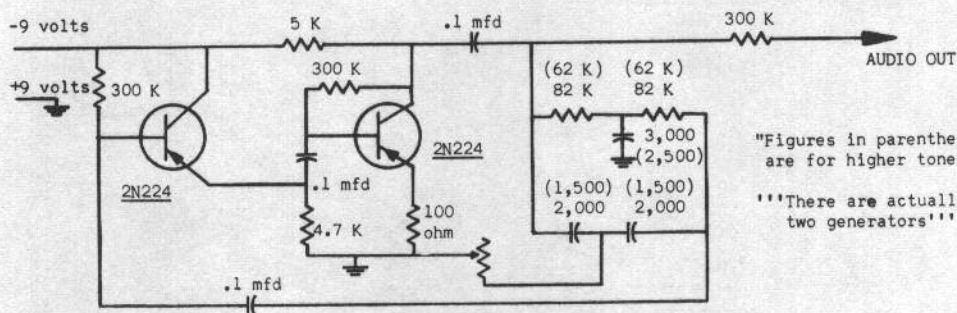
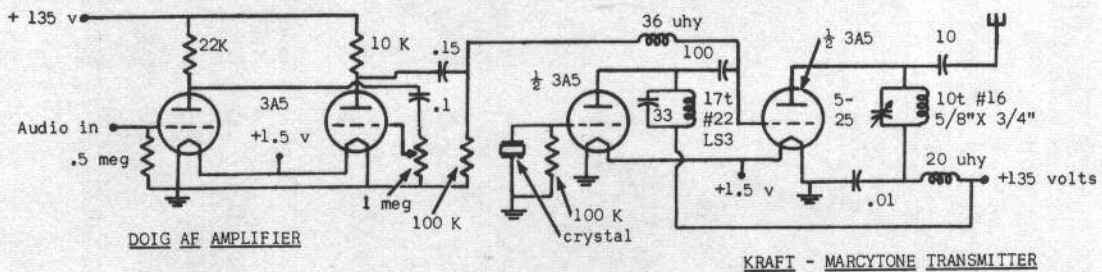
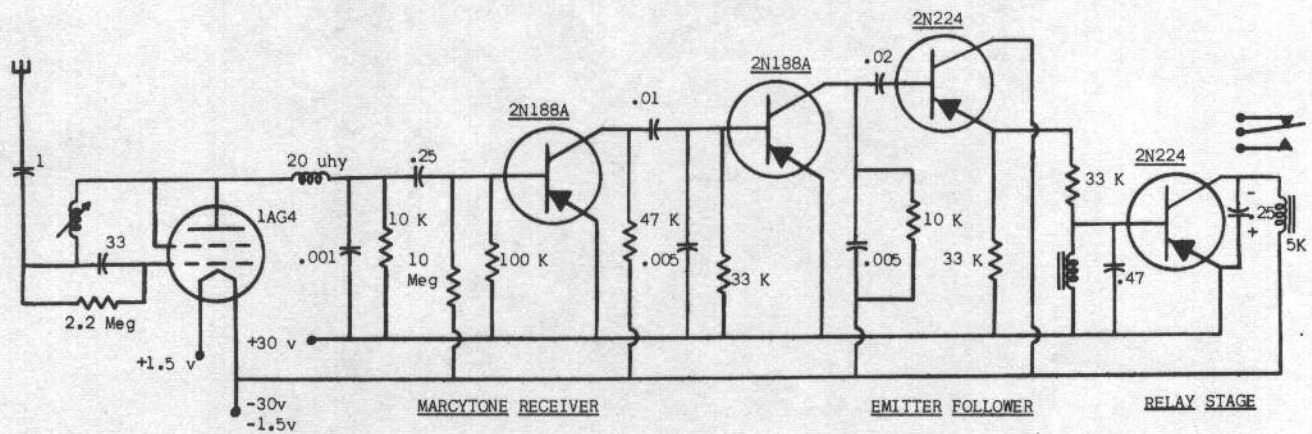
## ROBOT, CONTINUED

is all installed in plug in modules which go on top of the basic robot body which is a 12 x 7 x 4" aluminum box. The drive motor is controlled by two power relays, one for stop and go and one for forward and reverse, these also are in an aluminum module that plugs into the top of the Robot. The robot is thus capable of ten functions --right, left, stop, start, forward, reverse, up arm, down arm, open hand, and close hand. All motors are supplied by rechargeable nickle cadmium cells and the receiver is powered by oversize dry batteries.

"The systems work perfectly now, although it took

two years to perfect. The range has never been checked, since all I need is 25 feet; however, I have to operate with no antenna on the receiver and with the transmitter antenna collapsed, so range should be adequate. The only real trouble I have had with the project, is that at the science fairs where this is shown, the judges refuse to believe I made the thing!

"If you think your readers would be interested, I have some pictures of the project and also some of the schematics."



"Figures in parentheses are for higher tones"

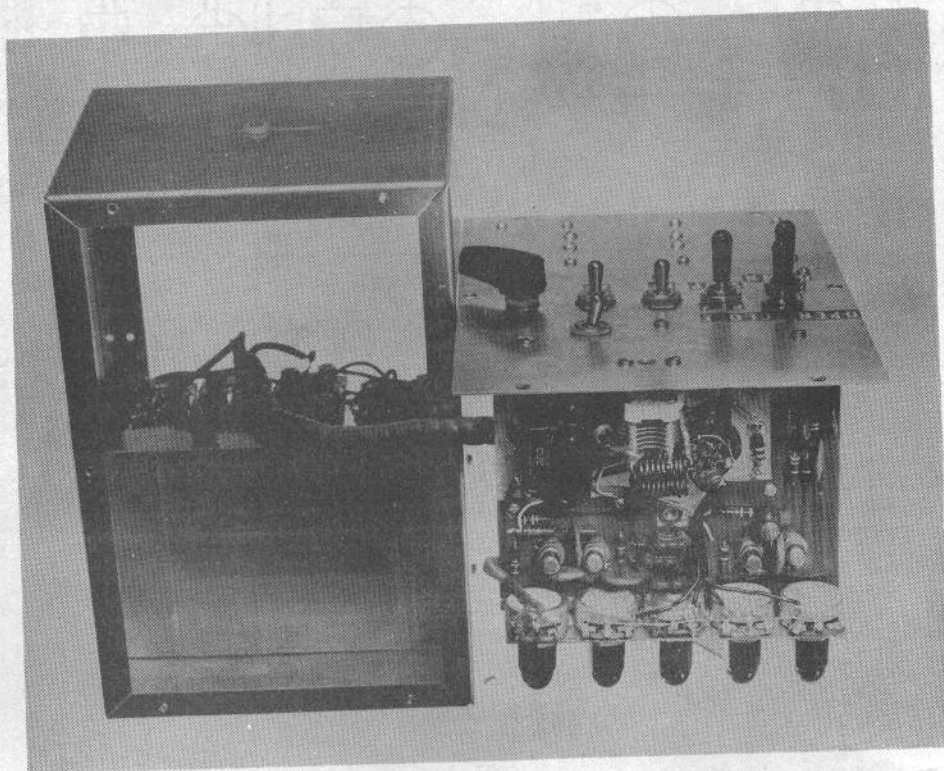
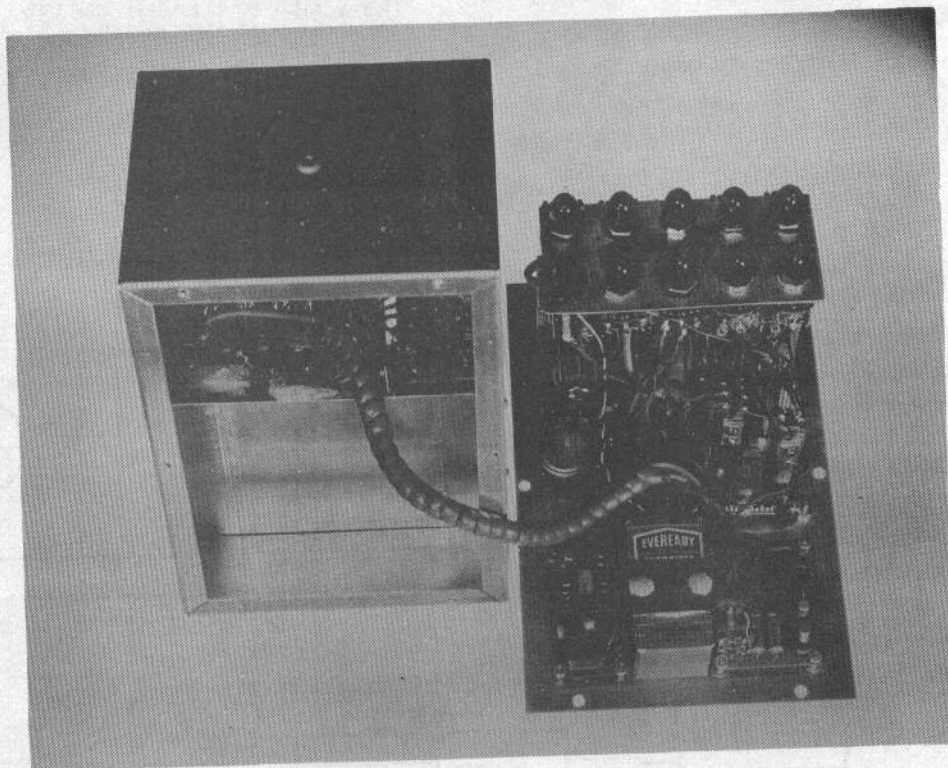
'''There are actually two generators'''

EDITOR'S NOTE: You can imagine our reply to that! And then came the next letter:

"Here are the pictures of my project. These photographs are courtesy of de Groff Studios and as you can see are very high quality. I am indebted to Mr. de Groff for taking them and I would appreciate if you could mention the studio's name if you use them

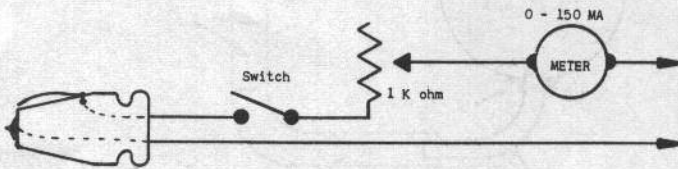
"A few further comments on the schematics: As you can see the receiver is basically Marcytone with the emitter follower stage added to improve impedance matching when using seven channels. Current rise in the relay stage is over five milliamps with this extra."

EDITOR'S NOTE: Believe most of our readers will be with us when we say to Stephen--"Congratulations!"



# Bits And Pieces

## NICAD BATTERY CHARGER



Here is a gadget I use in my car for charging Ni-cads. It is capable of approximately 32 milliamps on a 6 volt system. The meter is an inexpensive Shurite with an internal resistance of 46 ohms. A better meter will allow about 180 ma out. Does a nice job especially if pure DC is required. The end plug was salvaged from a spotlight that plugs into the cigarette lighter.

Be sure to check polarity of the car. My Ford has a positive ground. I have not tried this on a 12 volt--but see no reason why it wouldn't work.

Zack Allerton, Jr.  
New Castle, Penna.

## MORE SELECTIVE SUPER-REGEN

In response to your BITS AND PIECES of July - August issue of GL on selective super-regens, I have made avrious tests in the last three months which verify the fact that two airplanes can actually fly simultaneously, one operating on 26.995 mc and one on 27.255 mc.

The basic reason for this is that the Kraft Tone Receiver will respond to only the dominant CW signal in the area. Based on this concept, you will find that if you are operating on 27.255 mc, and a 26.995 mc carrier wave is in the area, he will far enough away from your frequency due to the high Q of the Kraft receiver, so that your signal is the dominant CW signal.

Results of our tests are as follows: Each receiver was carefully tuned to its transmitter; with one being a 26.995 mc job and the other 27.255 mc. The antennas of both transmitters were removed for simulated distance -- antennas replaced and ground checks were made with good results. Then flights and these, too, with good results --I hope other modellerstry this. It sure adds to the fun of rudder only flying.

Both receiving and transmitting units in the foregoing tests and flights were Kraft Single Channel.

We found a few limitations. Both transmitters must be within 20 ft. of each other during operation. They should have a power output within .25 watts of each other.

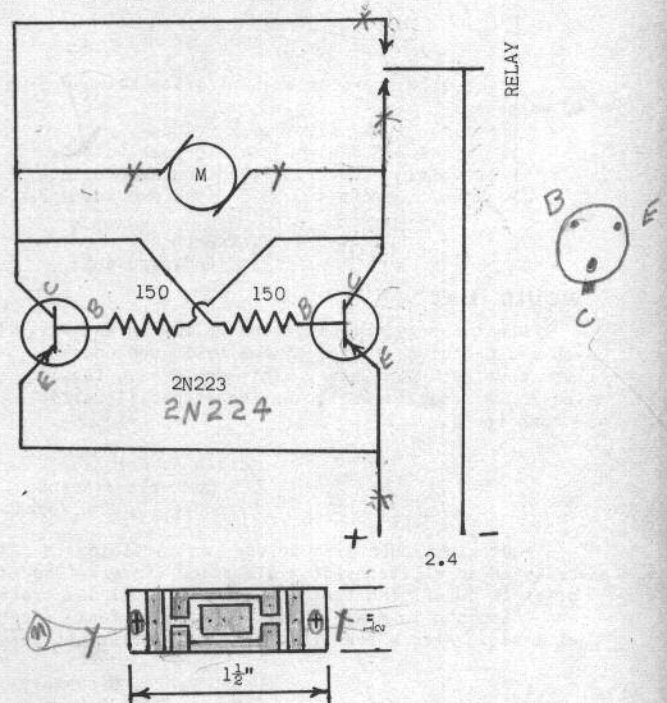
Loren Tregellas  
2828 Bonn  
Wichita, 17, Kansas

## SOLVING VIBRATION TROUBLES

An item of interest to R/Cer's who may have some vibration troubles is the use of a vibrating sander. We had some intermittent trouble with a receiver, and to check for sure we strapped the receiver, battery boxes and whatever we could, to the sander. After it quit a second time, we traced the trouble to a loose electro. A second job we isolated the trouble as being inside of a battery box. Simple, but it can save crackups.

J. I. Kinnaman  
Baker, Oregon

## SINGLE BATTERY SERVO SET UP



The simple circuit shown is designed to allow a motor to be driven in both directions from a single battery and a single SPDT relay. It can be connected as shown for use with a pulse system, or the wires to the relay contacts can be run through servo limit and neutralizing contacts and to two relays in a multi setup. A multi type servo can be connected to center electrically from a fail safe relay in a proportional control system. In all of these systems the advantage remains the same, that of requiring only a single set of batteries.

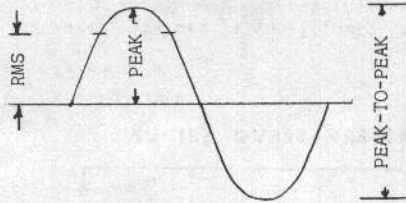
The circuit can be constructed on the simple printed circuit board shown, and can be mounted in almost any type of servo can.

The next obvious step is to replace the relays with other transistors and go relayless with a single battery. This has been tried and works real well with servos with a motor of at least 8 ohms resistance. Starting is unreliable with motors of lower resistance due to the internal resistance of the inexpensive NPN type of transistors. (This circuit is not shown.)

S. E. Meek  
Dumas, Texas

## AC VOLTAGE TERMS

The audio tone experimenter should have a practical working knowledge of AC voltages and their relationships. An AC sine wave voltage is continually varying from zero to peak. The voltage indicated by an AC voltmeter is the root-mean-square (RMS) value of the voltage being investigated. In other words, it is the "effective voltage", power or work-wise, of the one under investigation. The effective voltage (RMS) of a pure sine wave is equal to .707 times the peak voltage.



The following relationships exist between SINE wave AC voltages:

- RMS times 1.414 gives peak voltage
- RMS times 2.828 gives peak-to-peak voltage
- Peak voltage times .707 gives RMS voltage
- Peak voltage times 0.3535 gives RMS voltage.

G. McGeorge  
Highland, Indiana

## WOULD LIKE

Don't change your magazine policy in any way. But you could include a list of the basic contents on the back cover of each issue. This would save looking thru the whole magazine while hunting a specific article in a back issue.

Adrian A. Warntz  
555 Cumberland Avenue  
Syracuse 10, New York

Our club would like to see an article in Grid Leaks on an all transistor direction finder. (The tall grass in our flying fields is murder to find a crate in and too big to mow) Should have a 500 foot range, at least. Also a transistorized pulser circuit for GG.

Bob Penko, Secretary  
Mentor R/C Club  
Willoughby, Ohio

## POLAROID YOUR DECALS

If you have trouble fuel proofing decals, try coating the decal with a print coater found in a Polaroid film package. This coating will protect it from Butyrate dope which can be brushed over the print coat giving a neat fuel-proof decal. The print coat is water-soluble and may be washed off before doping if a good application is not obtained.--Orange County, California-BLIP.

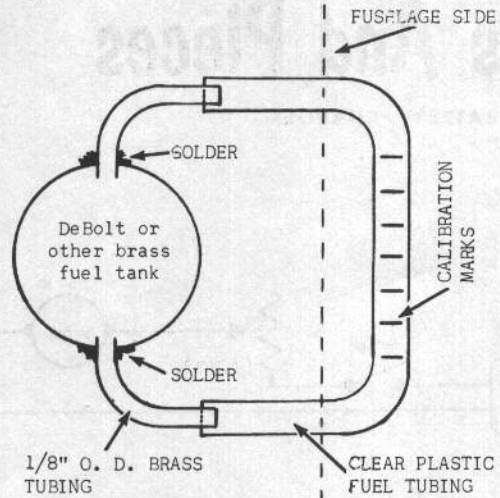
## BOAT TIP

Enjoy your construction articles very much. I have built the four channel Marcytone and have never had a speck of trouble with it. I hope you will include more power boat construction projects and tips.

I have a tip for power boat builders: 1/8" copper tubing connector makes a fine packing gland. Drill out the center to fit the drive shaft and then drill the coupling end to fit the stuffing box. The oiled string for packing can be bought at plumbing shops.

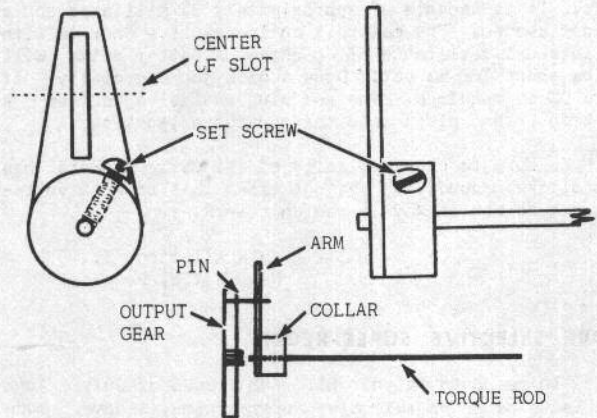
Dan Ocken  
1519 Winnetka Ave. No.  
Minneapolis 27, Minnesota

## FUEL GAUGE



THE FUEL LEVEL IN TUBING IS THE SAME AS THE LEVEL IN THE TANK.

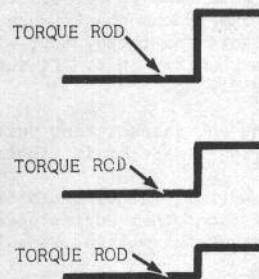
## SIMPLE SIMUL



Arm is made from 1/32" hard brass soldered to a brass collar. Collar is cut from 5/16" brass rod, which is tapped for a 2/56 set screw and drilled for the torque rod.

The distance from the center of the collar to the center of the slot should be equal to the distance of the center of the output gear to the arm.

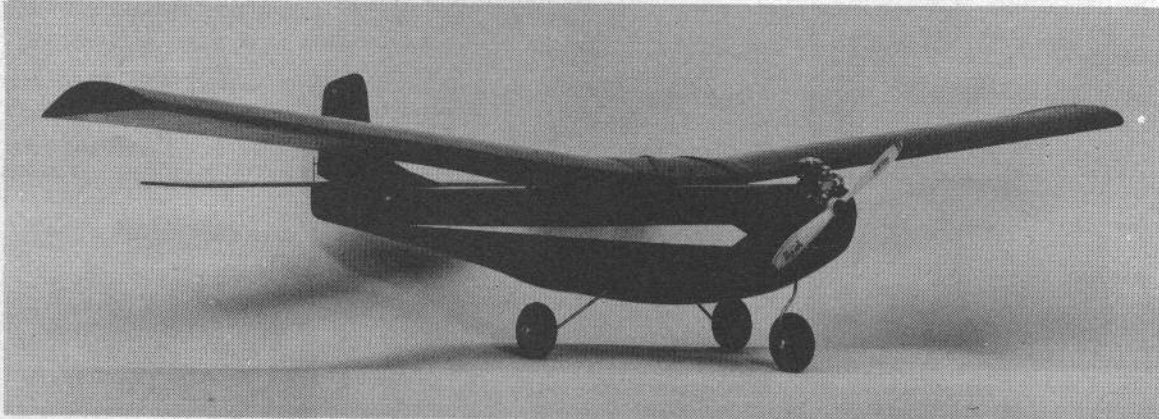
This arrangement is excellent for Simpl-Simul since it permits me to experiment with torque rods of different amounts of offset (at the rudder-elevator end) and thus I can find just the amount of rudder and elevator end) and thus I can find just the amount of rudder and elevator movement I need.



Both of the above ideas from  
George H. Wolsky  
786 East 182nd St.  
Bronx 60, New York

# What's New

ECKTRONICS FREEDOM 7 KIT



From Ecktronics have come deliveries of their entry in the R/C plane kit field--their Freedom 7. Feature is a trike landing gear, has a shoulder wing, and clean lines.

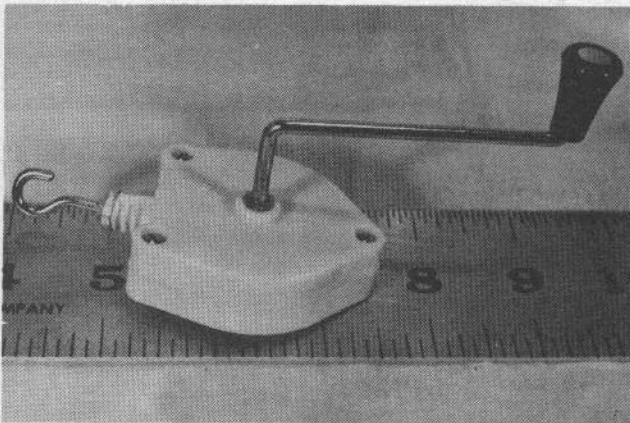
Size is perfect for quick building, yet gives good performance even in windy conditions. Plenty of room for R/C equipment. Fly it rudder only, with rudder and motor control, or with rudder, motor and kick up elevator.

Complete deluxe kit includes everything except for liquids and silk. All wood parts are pre-cut, sides are one piece. Formed landing gear, hardware, decals, even

## FUSEAL

FUSEAL is a foam tape with special adhesive backing and is to be used for cushioning your wing and sealing fuselage against dirt. Use it also to cushion sides and back of your receiver. Simple to apply. Will compress to 1/32" if desired. Comes 3/16" thick x 3/8". Package contains 3 feet. Is completely fuel proof. 50¢

## D - M RUBBER WINDER



The D-M Winder is just it for winding your escapement rubber. Fits snugly into the palm of your hand. A 5 to 1 gear ratio. Detachable wide angle crank. Has a firm feel, so rubber will not unwind easily. Brass and nylon gears make it weather proof and practically indestructible. Available from your dealer or Ace. 95¢

wheels are included.

Perhaps the finest feature of all is the amount of detail in the plans and instructions. Building and flying instructions are step-by-step and the radio control installation is completely illustrated. Wiring to the Ecktronics Kraft assembled receiver, or the Ace Kraft Single Receiver Kit.

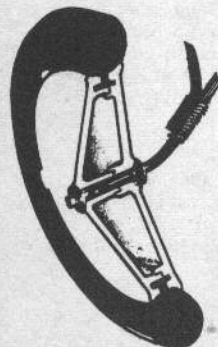
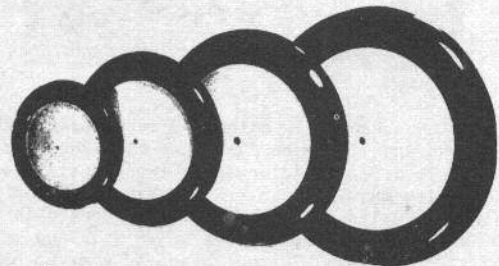
The Freedom 7 has a span of 40 inches, with a wing area of 280 square inches, and an all up weight of 25 oz. Requires a hot .049 to .099 engine.

Available from your dealer or Ace R/C. \$7.95.

## WILLIAMS WHEELS

# SCALE WHEELS

SEMI-PNEUMATIC

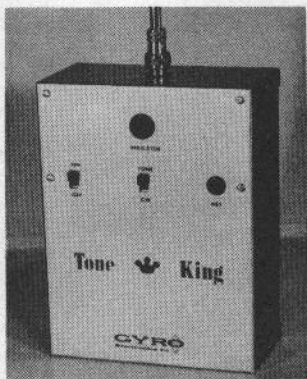


## VINTAGE AIRPLANE WHEELS

1 7/8" DIAMETER	..... PAIR	\$1.25
2 1/2" DIAMETER	..... PAIR	\$1.95
3 1/8" DIAMETER	..... PAIR	\$2.95
3 3/4" DIAMETER	..... PAIR	\$3.95
4 3/8" DIAMETER	..... PAIR	\$4.95
5" DIAMETER	..... PAIR	\$5.95

Williams Brothers continue to come up with items in the hard to get or hard to make class. Their latest, in larger sizes should appeal to the R/C fan.

## TONE KING TRANSMITTER



Added to the Ace Transmitter line is the factory-assembled, certified and guaranteed Gyro Tone King. Designed for both CW and Tone operation, it is a versatile unit, housed in a two tone 3 x 6 x 8 aluminum case. Requires  $1\frac{1}{2}$  volts of A from a type 4F battery, and 135v of B from 2 -  $67\frac{1}{2}$  145 type batteries. Comes with a collapsible and removable antenna. Set at factory for 400 cps at 100% modulation, cycles may be shifted from that in a range of from 270 to 1700 cps to fit almost any receiver available. Completely assembled, certified and sealed, to meet FCC specs. Only \$28.50.

## TONE KING RECEIVER



Another completely assembled receiver has been added to the Ace line--the Gyro Tone King Receiver. Uses vacuum tube-detector followed by two transistors for a current rise thru the Gem relay. May be pulsed rapidly. Requires  $1\frac{1}{2}$  volts A,  $22\frac{1}{2}$  volts of B. Housed in an aluminum case, it measures  $2\frac{1}{8} \times 1\frac{5}{8} \times 1$ , and weighs in at only  $2\frac{1}{2}$  ounces. Current rises to 4 ma upon receipt of 400 cycles audio signal, as produced by Kraft, or Tone King transmitter. Tuning range is 26 to 29 mc. Completely assembled, with installation kit. Only \$24.95.

## SURGICAL TUBING

Because of demands from the field, Ace has added a package of surgical tubing to its list of small parts. A demand for this high quality soft rubber in  $1/8$ " ID has results in making this available to the field in lengths up to 3 feet. Per foot price is only 35¢.

## BLACKWELL PLANS

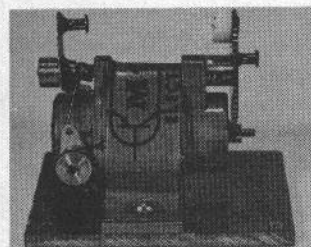
Blackwell Models announce that the plans including templates for the serious do-it-yourself R/C builder who may want to modify the design anyway, are available for the Snapdragon, TLOC, S.C.W and Ranger. Specify which -- Price will be \$1.00 per set. Available from Ace.

## NEW EDITION R C HANDBOOK

Soon to be released by the publishers is the most popular RC book ever published. The Gernsback Library-Radio Control Handbook, by Howard G. McEntee, RC Editor of American Models. This is one that is practical and will offer a lot of meat to the advanced R/C modeller. A completely revised job--the original sold over 8 printings. Assumes you know theory and concentrates on advancing the RC art by offering circuits, ideas and data on receivers, servoes, pulsers, and transmitters and all other R/C details. Gernsback Library #93, 304 pages, it will be available at your dealers or Ace R/C soon. Well worth the \$4.95 price tag.



## MOST GG SERVO



Most pulsers and servoes have been so popular the manufacturer, and the national representative, Gyro, are hard put to meet demands. But they hope to meet demands soon, and also announce that shortly--in time for next season--will be a Galloping Ghost or Simpl Simul type of servo. It will be built around the Mighty Midget motor, and will feature PUSH ROD action, with variable and adjustable linkage for elevator--a most sought after and desirable feature. Unit is housed on a micarta base. Is complete with full directions. May be used with any receiver and transmitter capable of being pulsed up to 10 times per second. May be used with pulsers at the transmitter of the MOST, Simpl Simul or Baisden type. Will provide rudder and elevator control proportionally. Use in planes up to .19 power without any extra precautions. Larger ships require balance of surfaces. Coming soon. Available from Ace R/C or your dealer. Only \$11.95.

## IN THE WORKS

In the works are many fine new receiver and transmitter kits by Ace R/C. It would be premature to say too much about some of them too soon, but scheduled for early release is an all transistor low voltage receiver by Phil Kraft. This will operate an escapement directly and is of the 3 volt type especially designed to fit the needs of trend to smaller .024 to .010 ships. It will priced at a very low figure. Shortly after the 1st of the year, watch for its debut. For other kits from Ace, watch our ads and next issues of Grid Leaks.

From Ektronics will come the completely assembled, tested, version of the foregoing Kraft receiver. Also in the line of plane kits, comes the good news that the Nomad by Ted Strader, as featured in Flying Models magazine in the September 1961 issue. This is a 48" span Soaring type .20 powered design. Release date soon.

# P C Bases For Marcy 6

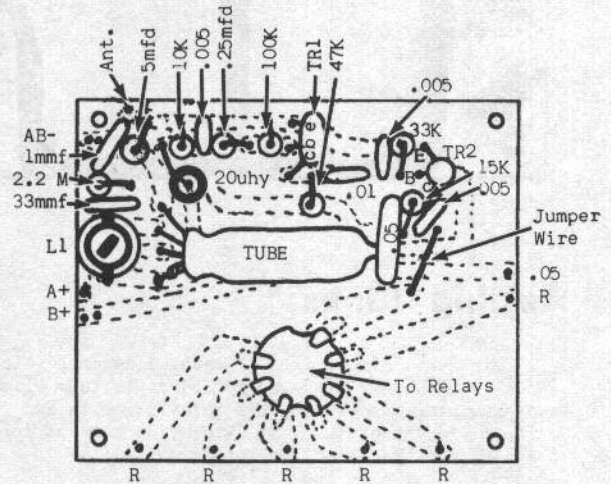
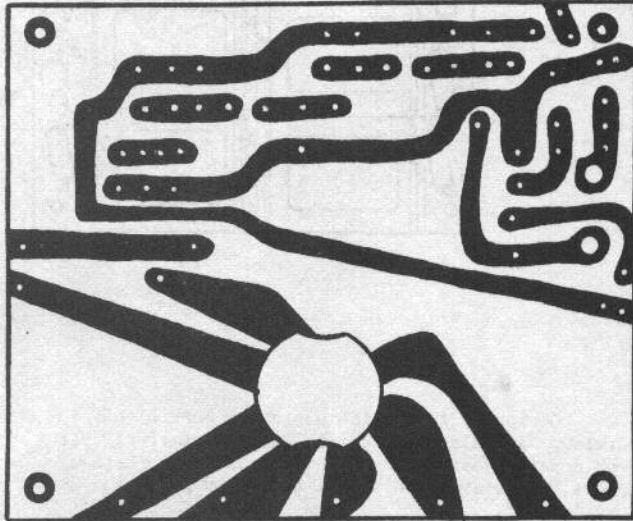
BY R. F. HARTWIG

Many builders and users of the Marcy Six channel Receiver have reported innovations in their building of it --one such is quite intriguing in that it uses a set of printed circuit bases, and houses the complete unit in one, instead of separating the RF-Audio decks into two separate packages.

Utilizing sandwich type of construction, the drawings presented here, we hope, will enable present users to convert to this much smaller and more compact idea.

The PC boards and original design work is the effort of R. F. Hartwig of Fort Wayne, Indiana.

A study of the boards, and the drawings of the component placing will enable the serious R/Cer to duplicate the unit. The three decks are stacked in Dagwood-Sandwich style, and are held together with bolts and nuts with the spacers used to keep the decks apart. Drawings are shown Full Size.



Bend as shown



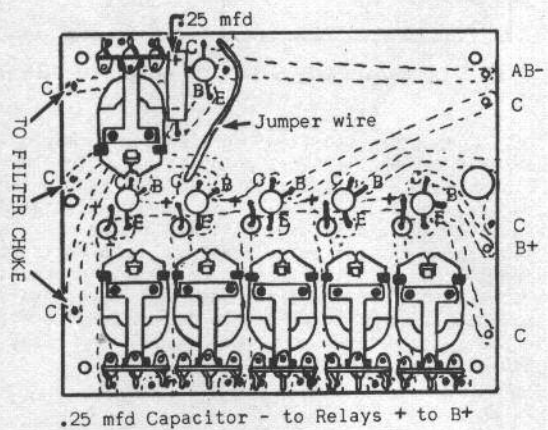
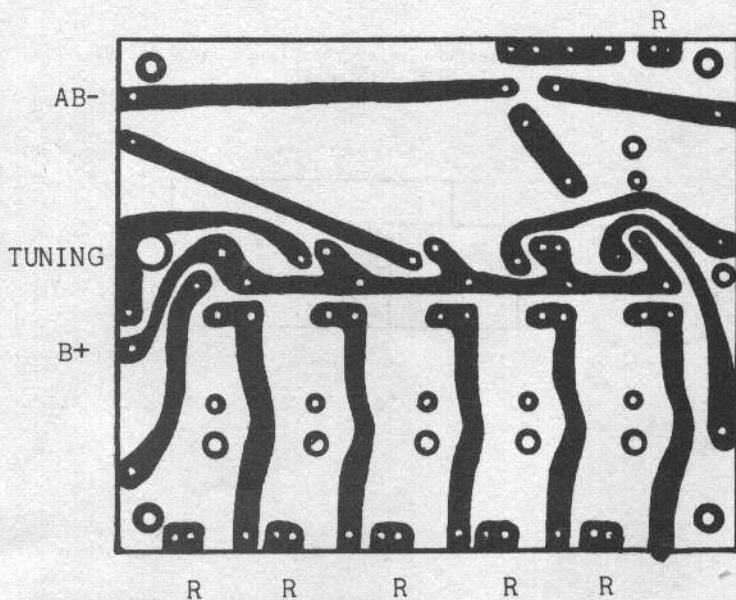
PC 7 pin tube socket

SPACERS ARE

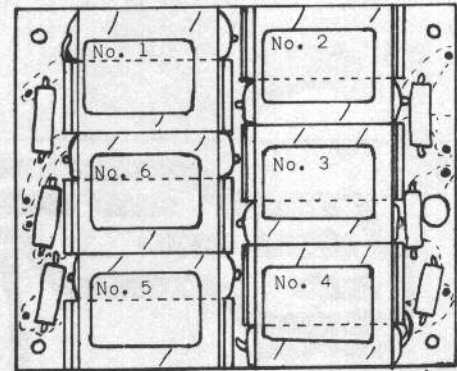
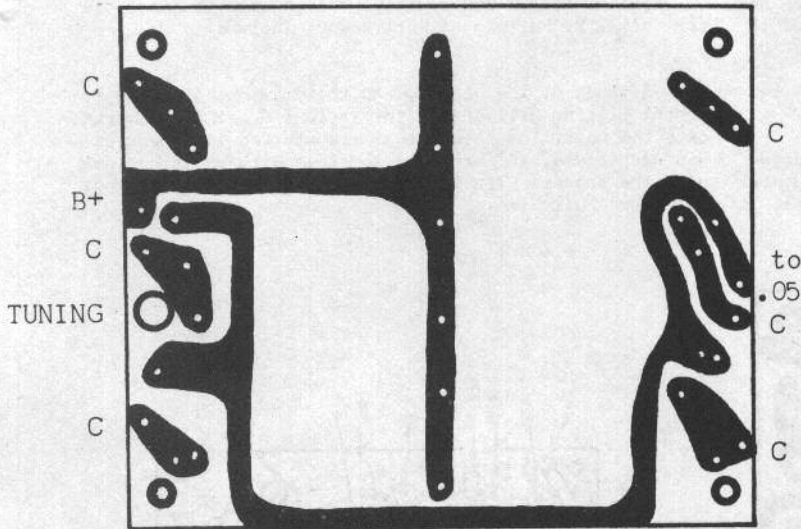
7/8 FROM RELAY BASE TO RECEIVER BASE

1/4 FROM FILTER CHOKE BASE TO RELAY BASE

RELAYS HANG DOWN AND FILTER CHOKES ARE ON TOP



Two additional drawings next page.

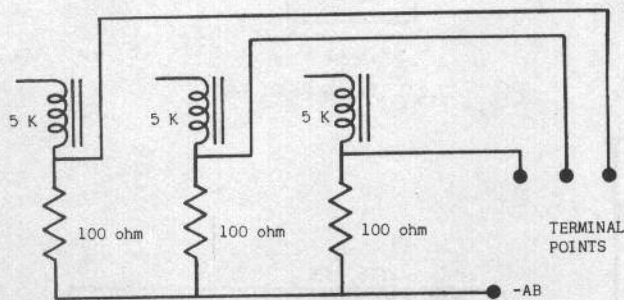


## Testing Kinks

Here is a simple trick I read of several years ago, and have used ever since. The object is to eliminate shorting plugs and so on from relay circuits and transmitter plate circuits and still provide a means for real checking of the current in the circuit.

I haven't checked this circuit out on low resistance relay stages yet, but it should work OK or an alternate method can be used.

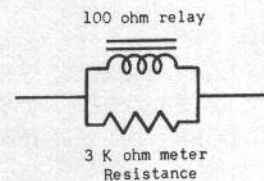
Below is a partial Marcy 6 Receiver schematic.



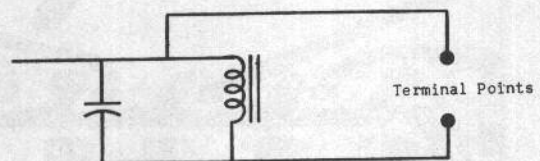
Add a 100 ohm 1/2 watt resistor in series with each relay.

Connect a good (low resistance) 0-5 ma, or 0-10 ma, meter from each terminal point to AB-. The 100 ohm resistor acts as a meter shunt and will reduce the meter reading about 15 to 20%. This can be calibrated before installation and is not critical, as the procedure is to tune for a maximum meter reading. On a multi stage unit the 100 ohm resistors should be closely matched. Exact value is not important but matching is necessary so that balance between stages can be adjusted. The effect of a 100 resistor in series with a 5000 ohm relay is practically negligible.

Obviously this trick would not work with a 100 ohm relay. In this case, simply use a voltmeter. Set it on a range just high enough to read the voltage drop across the relay. This will generally be in the 3 or 5-volt range.

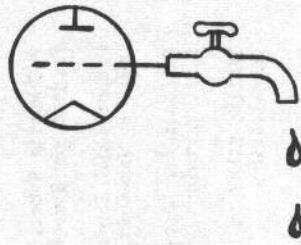


This reduces the relay resistance from 100 ohm to 96.8 ohm, a whole 3.2%--No sweat.





# Grid Leaks At Play



Dear R/C Fan:

The weekend just closing has been one of the most terrific for yours truly in a long, long time. We were favored by visits from some of our designers, some of our engineers, some of our manufacturers.

Try these names for size: Phil Kraft of Los Angeles, Marcy Inkmann of Racine, Wisconsin, Red Costlow, Philco sales engineer, of Minneapolis, Minnesota, Fred Wollman of Ancco Engineering also of Minneapolis, Al Kline, Marv Doucey and Bill Adrian, associated with Klinetronics of Decatur, Illinois.

Much discussion, friendly disagreements, the beginner situation, AMA rules, ideal R/C aircraft size, engines and what can be done about them, the future of R/C, what to do to really stir up something different for local contests, and so on.

We shall probably use bits and pieces of the conference--much of which was tape recorded for future reference--in a lot of future issues. We'll limit this issue--since we had to hold this page till last already beyond deadline time--to just hitting the high spots.

From Fred Wollman comes news of an improved servo in still the submini size. A wee bit bigger than the previous one, now comes this one only .2 of an ounce more in weight, but quite a number of improvements. The price will probably be about the same as the smaller one which will probably be discontinued soon in favor of this to set a standard. Coming later from the Ancco shops, will be a servo amplifier which will fit in this case. Price and delivery not finalized on the latter. Ancco servoes and throttles should soon be produced fast enough to meet an almost unexpected demand. When this happens, Fred plans to introduce many related R/C specialty items and cater to needs no other manufacturer has done anything about.

Kline's Electro fuse and Electro plane was present and in the hands of Marv Doucey gave a very nice performance in spite of very gusty and 30 mile winds. Equipment was the Klinetronics Superhet Relayless receiver, and Klinetronics Transmitter. Al Kline, incidentally, stated that deliveries were beginning on his charger, and that other items listed by them were in the works and should be appearing soon. The Electro fuse should be rolling by mid November.

Red Costlow's presence helped solve a few knotty transistor selection problems and resolve some ideas to which direction some of the designers were to go on ideas they had for far in the future.

Marcy Inkmann explained the principles of his Triple Simultaneous Proportional System. Presently Marcy is finished with the transmitter and receiver end, but is hard at it now winding up the design of his own servo, which he hopes will be the most satisfactory configuration of any of the feedback units on the market. Marcy has flown the system almost a year with excellent results, and although we had to leave the flying site to meet some more incoming guests, Marcy's Stormer put on quite a show which even some of the "bang-bang" enthusiasts thought excellent. We'll have more on Marcy's system, as soon as it is available.

Phil Kraft, whose single channel receivers won first in the U. S. Nats Rudder only, and the Canadian Championships in Rudder only, brought along the finalized versions of his single channel Superhet, and 10 channel relayless Superhet, and --hold your breath--a Transistor Amplifier for 10 channel relayless receivers, giving 2 trimmable, and 3 self neutralizing actions from existing Duramites! This will be offered to fit alongside of the 10 channel superhet receiver or if the builder likes may be packaged separately away from the receiver. The stacking is the procedure recommended by the designer.

On the Superhet 10's we feel Phil has done an outstanding job. The unit is very small in size, measuring 1 3/4" wide, by 3 1/4" long, x by 1" thick. It has AGC action that cures the troubles that have caused mysterious troubles with earlier superhets. Design is conventional and layout has been done to minimize these mysterious gremlins the modeller's would rather not encounter. Uses the 6 volts required by the servoes. No extra batteries used. We'll be bringing you circuitry for the superhets in the next issue of GL.

Since this is the bottom of the page, and we've run out of room, we must stop. We have haven't run out of things to share with you, only space in which to tell them.

Till next time, Sincerely

# *The Radio Control*

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## **GRID LEAKS**

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Project, By Stephen J. Palmer

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R. F. Hartwig

TESTING KINKS on testing in the  
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Play, and Bits and Pieces

**C. A. DEES, JR.,**  
4002 MONITOR DRIVE  
HAMPTON, VIRGINIA