

R/C DATA SERVICE

PUBLISHED BI-MONTHLY AT HIGGINSVILLE, MO.
CONTENTS COPYRIGHTED 1958 BY GRID LEAKS



1958 Nationals

Although we were not privileged to attend the Nats in Chicago this year, Grid Leaks had the good fortune to get pictorial coverage by Red Costlow of Minneapolis as well as oral accounts from Max Boal and Bud Atkinson of Kansas City.

Consensus of opinion is that the elimination is a distinct improvement. By having flyers qualify for the elimination by flying the precision pattern, this enabled a much less congested flight line than previous years. It does have disadvantages but by and large the contestants we talked to think they are minor. Weather is, of course, a big unknown in a case of this kind and Friday and Saturday were very windy which kept scores down.

While the following results from the board are not by any means official, they do give the trends that developed. These standings were subject to official tabulation.

Rudder Junior--R. Bennet

Rudder Open--R. Taylor, Allen, Sanders

Intermediate--Boal, Bertrand, Jackson

Multi--Dunham, Bonner, Deans, Good, Martin

Pylon--Hershberger, Bonner, Keck

Scale--Bertrand, Anter, Wischer

Please bear in mind these were only the unofficial listings and are quite easily subject to change. We are giving them to you merely to indicate trends of top men.

The Pylon, Scale and Intermediate events attracted the least number of competitors. This follows the trend established in previous years.

The first top men in the Multi event were all flying Astro Hogs equipped with Orbit equipment. The next two were flying MultiBugs with WAG TTPW systems.

Red Costlow reports that the servo used by Martin and shown in this issue seemed to him to be one of the easiest to make and also top performer. Martin had ailerons connected to his rudder.

According to Bud Atkinson there were many more pulse jobs in Rudder only than in years past and that performance was terrific--so much so that Bud and Max Boal are building pulse ships.

If the points for multi seem lower than in years past bear in mind that this is for acrobatics only. The points normally included for the pattern were not with the eliminations.

Howard McEntee was flying his Deltron transistor equipped small shoulder job on pulse in the fun flying sessions of the evening and also has quite a few of the boys building in this direction. This was an .020 job with real performance. Max Boal is making some 100 ohm actuators to use with his TR and thus eliminate the relay and actuator. Incidentally, Max was flying the TR 4.5 in the Intermediate.

Astro Hogs were everywhere. This popular design by

Fred Dunn of the West Coast apparently really is a performer according to the reports. Not only is it a good ship, but as Max Boal says, "You've got to hand it to those West Coast boys--They're hot pilots!" The first three places in Multi seem to bear him out.

According to Red Costlow, the flier showing great promise is Jim Martin, who by forgetting his vertical dive loused up into 5 place in Multi with his Bug. Red says; "Martin uses a Torp RC35, B & S Converter, 800 ma Voltablocks, Mighty Midget servos, (see elsewhere in this issue) and a DeBolt servo for motor. I think he also had about the fastest ship on the field, although the Astros move right along, too." The picture at the bottom of the front is of Jim and his ship.

Other pictures: Top--shows the gang around Bob Dunham, who with his Orbit equipment has been a consistent Nats as well as West Coast winner. Middle photo shows one of the Astro Hogs at Glen View.

Radio equipment functioned the best of any year according to Max Boal. Only a few flaws. Remember when flyaways were quite common? Some servo and actuator trouble was encountered resulting in clobbers but here again the incidences were minor.

Cars didn't get hit as they did at Willow Grove,

and this should make the AMA insurance program quite happy. Can be expensive when you clobber a car!

All sorts of new gadgets were floating around, according to reports. Some new servos, new actuating devices and Vernon MacNabb was successfully demonstrating his new servo with highly successful flying.

Bramco had their new 10 channel reed outfit to show. This will be a custom made to order only job.

To the best of their knowledge none of the new triple proportional rigs was present--at least our correspondents didn't spot any. As listed elsewhere CG will have a triple proportional rig out. Rockwood is also getting back into the act with all transistor triple proportional. And rumor has it that Bramco is also considering getting into the field. Frank Hoover says of this though, that you must really learn to fly since you are piloting all the time.

Ailerons were in evidence just stitched on, without elaborate hinge systems and seemed to perform O.K.

And so the 1958 Nationals is history. Improvements in equipment and flying are reported from year to year, with equipment getting increasingly complex--and expensive as the ultra systems are developed.

As Merrill McCoy of Des Moines comment last year, "I can remember when R/C was a hobby!"



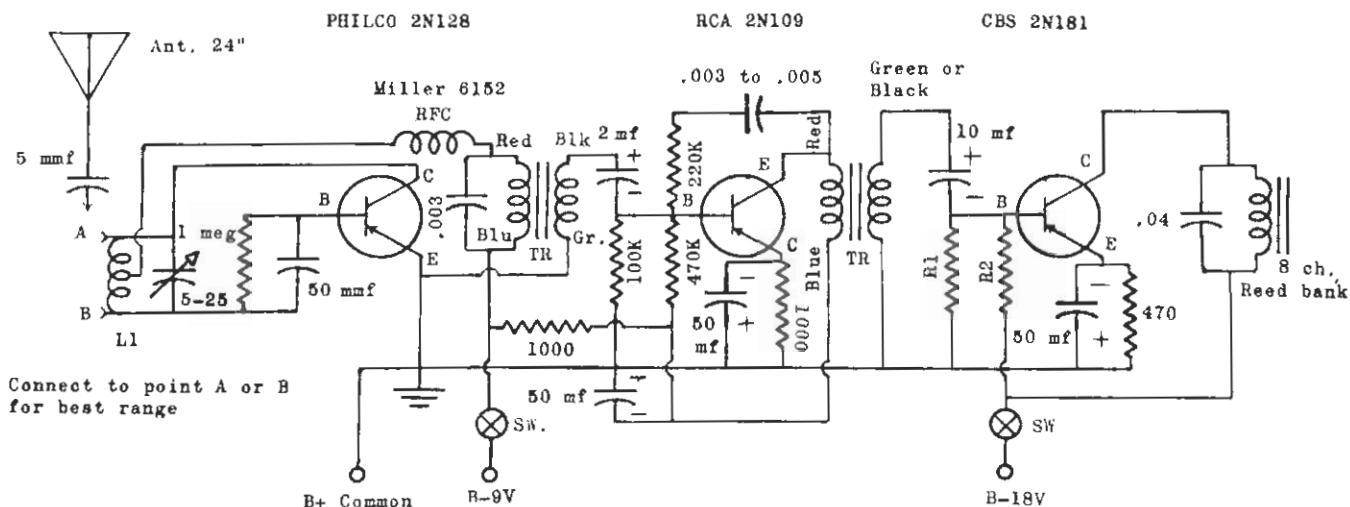
DALE ROOT AND HIS LOW ENDER



"READY LINE" AT THE '58 NATIONALS

All Transistor Reed Receiver

AN RC EXPERIMENTERS CIRCUIT BY NEIL DELAFIELD

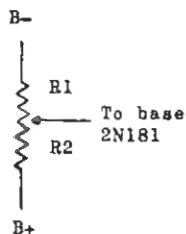


L1-L1 turns B&W #300 1/2" diameter center tapped

Transformers--AR109 or Thordarson TR14

Use two 9 volt batteries for voltage supply.

If oscillation occurs reverse connection to second transformer.



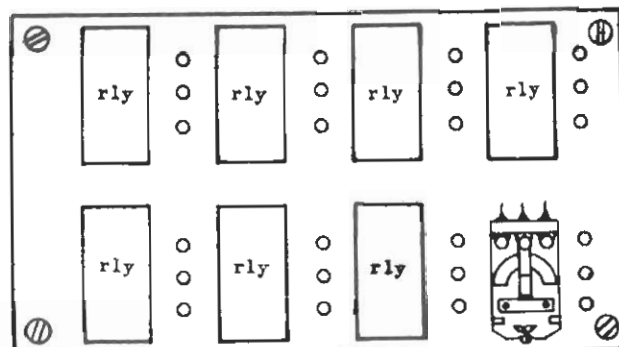
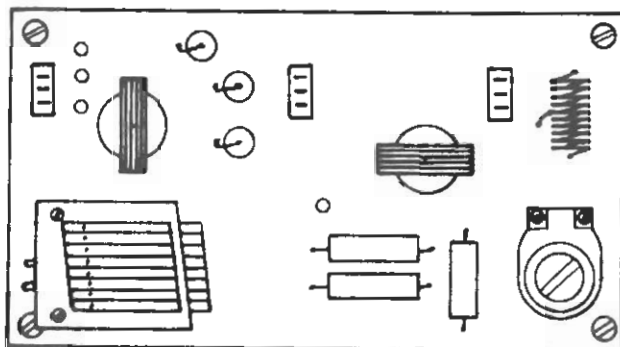
R1 and R2 values are determined by substituting a 500K pot in circuit and adjusting for maximum gain, then measure each side and substitute fixed resistors. Connect phones in series with .01 condenser across reed bank, and listen for the loudest tone.

Commercial all transistorized reed receivers have made successful appearance during the past year but little if anything has been published on this since it appears that most circuits need individual tailoring for optimum performance.

The circuit shown above is strictly an R/C experimenter's circuit as developed by Neil Delafield of Beaumont, Texas, who has successfully flown the system using a special modulator which is published in this issue of Grid Leaks. Neil's rig is temperature stable and has a very low drain, and to the serious R/C fan has very much to recommend it. No step by step instructions are given since this is not designed for the beginner in R/C.

Shown below is a suggested layout used by Neil with the becoming popular twin deck type of construction. This may be housed in a specially built aluminum can and the dimensions are not critical. The layout shown is only a suggested layout and no dimensions are given.

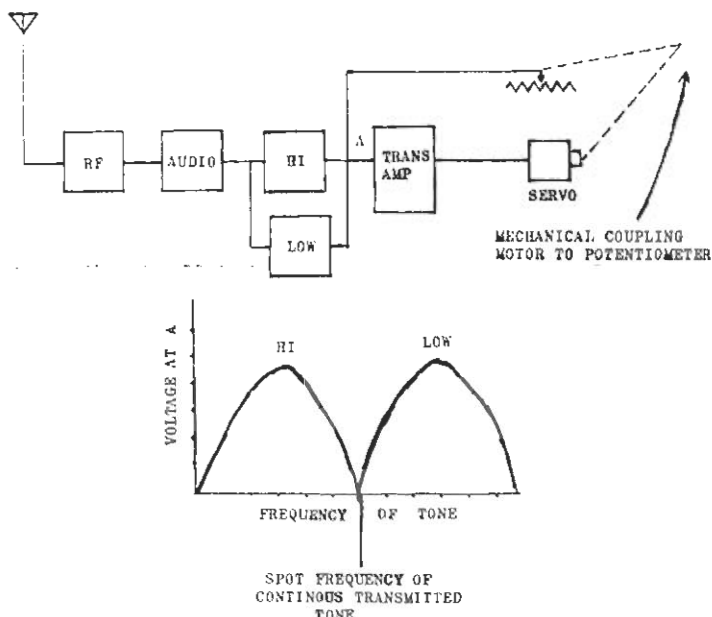
This is another Grid Leaks first in presenting a circuit of this type for the serious R/C experimenter as a springboard from which more R/C ideas may be taken and developed, improved, and perfected--the main reason for a publication of this type.



CANADIAN RC CAPERS

"This type of publication fills a needed gap in the model field and most of us look forward to the news of the field. Last winter the Toronto Radio Control Club went into limited production on 8-channel reed receivers for its members and other interested parties. We silk screened our circuit boards, had boxes punched out, provided the hardware, made our own reed units and each member assembled his own receiver. In addition we did a co-op job on hand held simultaneous transmitters. Most of them have had plenty of fine flying and our group has taken a large percentage of the trophies up here so far—touch wood.

"Last fall some of our members started bench work on a truly proportional system of transistor driven servo motors using tone discriminators with feedback to produce a signal voltage null. As many as three or more simultaneous, proportional servos can be driven this way. However it was shelved while we got on with our 8-channel units. We since heard from one of our members who was in Los Angeles, that the same system has been tested and flown down there. The Bramco people are also working on something similar. We'd like to hear the first data on this system as soon as you hear of anything. I fancy the MarcyTone front end and discriminators could be adapted to this use. In case your readers haven't heard about it, I have roughed out a block diagram of the system with some notes,



"Each servo would require a tone to be continuously transmitted and each servo would require a high and low discriminator—one above and one below the transmitted tone frequency. When the tone sits down in the crest between the two response curves the signal voltage at A is zero and no current flows in the transistor amplifier to drive the motor. When tone is increased or decreased (by movement of stick or trim pot) voltage at A becomes either positive or negative according to direction of tone frequency shift. This causes current to flow one or other way in the complementary symmetry circuit and drives the motor to right or left. Motor drives slide on pot which feeds back voltage to cancel out signal voltage at A and so motor is stopped in a position depending how far stick is moved. By releasing stick motor returns to neutral due to feedback voltage.

"Six discriminators and three transistor amplifier systems would be required for a proportional three servo system. Additional channels could be used with reeds for such things as motor, brakes, flaps, etc.

"A tone would be required for each proportional channel and could be left running. Additional tones for supplementary reed channels would be handled in the usual manner.

Best regards,

A. G. Roberts
Toronto, Ont., Canada

Thanks for your very interesting letter regarding the Toronto Radio Control club work. It sounds like you have had a ball with the 8 channel reed receiver and like you are going to have another one with the transistor driven servos using tone discriminators with feedbacks. We would be very interested in seeing more about this are are sure that our readers would too.

Not only is Bramco working on this but CG also and Rockwood is also getting back into the act.

This, of course, is the ultimate in control and it does us good to see a lot of die-hard reed fans going to proportional.

We have been accused of being pro-proportional at Grid Leaks but our honest opinion has been that, while we present all types of circuits, proportional provides the easiest and best method of aircraft control.

When you have more information and time we would appreciate hearing more from you on this.

BEGINNERS LUCK?

"I am enclosing my contest gift certificate which entitles me to ten issues of Grid Leaks. I have every one of these magazines since they were first published. It's the best R/C magazine I've ever read.

"I started R/C about two months ago and have had fantastic performance from my first transmitter and receiver. They are an Ace Commander Transmitter and an Ace Two Tube Lorenz Receiver. This was my first contest and I won first prize with my first R/C plane."

Sincerely,

Donald C. Erickson
St. James, Minnesota

You are certainly to be congratulated, Donald. Many old timers will blink in envy when they read your letter because it is not everybody that in a few short months that can win first prize with their first R/C plane with no previous experience. Keep it up and you may be a top contender at the Nationals one of these years.

COOPERATION PLEA

"As I have told a number of people in our industry, we should worry less about competing with each other and more about co-operating to get more customers for all of us, and it looks as if your Grid Leaks can do a wonderful job in this regard."

William L. Effinger
Berkeley Models, Inc.
West Hempstead, L.I., N.Y.

Good to get your comment, Bill. That is one we have endorsed here in the five year history of Ace R/C and the five issue history of Grid Leaks. We feel R/C is big enough to overcome any feeling of dog eat dog competition. We believe this will result in better R/C for the R/C fan and is the creed on which we have been operating. Welcome to the club!

THIS RIG BY NEIL DELAFIELD IS SIMPLE AND STABLE

From Neil's comments it would seem that this modulator works equally well with single tube transmitters as well as MOPA types. The circuit diagram shows a 3V4 tube pin connection. However, a 3A4 tube may be used to provide somewhat greater percentage of modulation where required but the pin connections need to be changed.

SHORT CIRCUITS

A REGULAR FEATURE OF GRID LEAKS, THIS PAGE PRESENTS SHORT NOTES OF IMPROVEMENTS DEVELOPED BY OUR READERS. SEND US YOUR BRAIN CHILD!

PULSE BOAT INSTALLATION

"The drive motor uses the full six volt with one side connected through one of the leaf switches.

"The servo uses one cell for each direction with a common minus-plus (regular pulse servo wiring method) to the armature of the relay.

"The side of the servo controlled by NC also goes through a leaf switch.

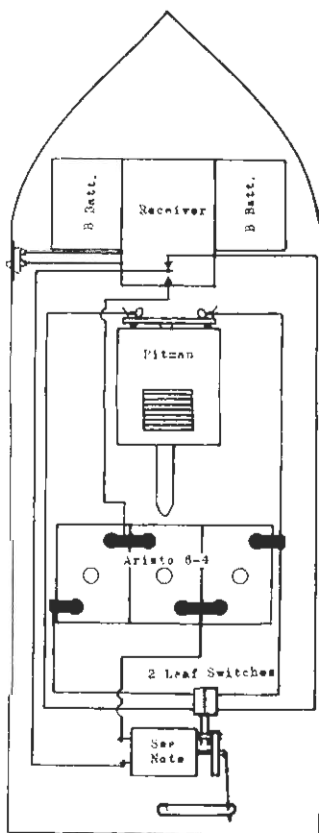
"Both leaf switches are actuated by the servo motor as it reaches the limit of the direction of travels with no signal.

"Thus a no signal condition causes both the servo current and the drive motor current to be shut off.

"To start the boat just turn on the transmitter, pulsed, to stop turn same off. While the boat is stopped no current is flowing except receiver.

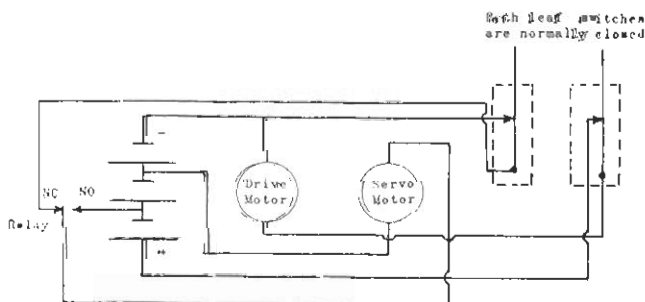
"Any type of signal failure automatically turns the boat off.

"I think this is one of the most simple fool proof systems I've ever seen." Ted VanTassel

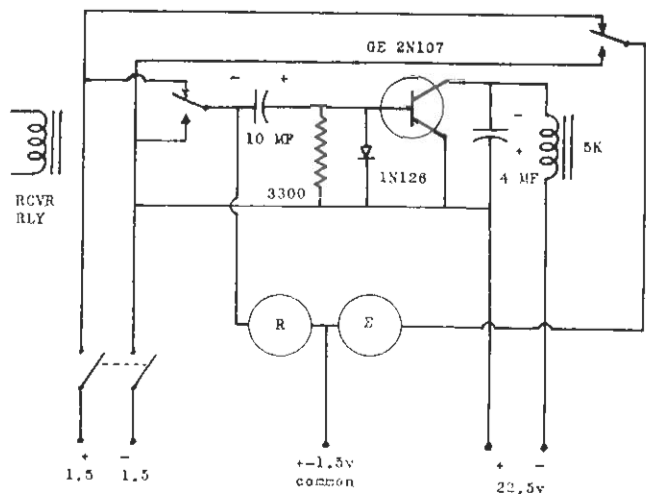


Notes: Servo may be old DeBolt (or any geared motor) Original switches are not used.

Leaf switches may be obtained from an old pgm ball machine.



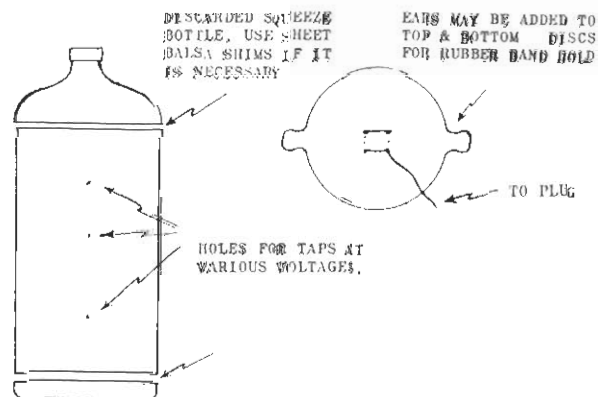
KROAMER DUAL



R and E = Mighty Midget

Even with Simpl-Simul and Stick-Trol many dual proportional fans are finding increasing good results with the so-called inductive kick systems and transistorized dual proportionals. These are all very simple, require a little bit of experimenting and we present here one sent to us by Bob Lyons of Westinghouse as developed by Vern Kroamer. This is essentially a transistorized version dual proportional of the Trainer system, which appeared in the 1957 Air Trails Model Annual. We believe the serious R/C experimenter will find this circuit to be of extreme interest.

VOLTABLOCK HOLDER



"Thank you for the much appreciated tip on the MarcyTone temperature problem. I replaced the first T0037 with CK722 and this made it stable to 110 degrees plus.

"I have found that excellent economical holders for Voltablocks can be made from plastic squeeze bottles. By cutting off the top a cylinder of the proper length is made. Contacts are made by weaving wire through holes in bakelite or wooden discs. Your new flexible wire is certainly wonderful wherever much used lead outs are needed. Rubber bands hold the assembly together. Cells should not be overloaded in these holders because heat dissipation is retarded. This caused several of my cells to go bad when they were used to drive a boat. The cells expanded and cut the hermetic seals. This caused a short at this point."

Yours sincerely,
Fred L. Baer

Trimmable Control Added to TTPW or Single Pulse Systems

BY LOUIS J. IANDOLI

Here is my contribution to Grid Leaks--(R/C Data Service). It is another circuit for obtaining trimmable engine control when using Doc Good's TTPW system.

Although one circuit for this was already presented by Grid Leaks through the courtesy of Gene Britz and Russ Tobey (Volume 1, Number 1), I feel this one is a little simpler to put into operation. It has a few advantages over the one already presented since it does not require any modifications to the receiver circuit and it will work with any of the WAG TTPW receivers. Also, the fail safe circuit, in addition to retaining its original fail safe function, can now be used to actuate an additional control such as wing flaps, etc.

The only precautionary measure with this circuit is that the rudder relay does not stop pulsing in any stick position. The lack of pulse in the rudder circuit is what gives us the trimmable engine control feature.

Now for a little technical explanation of what happens during operation of the circuit. As can be seen by the enclosed schematic (Number 1) the three TTPW receiver relays (rudder-elevator-fail safe) are wired differently from the original WAG circuit. Also two additional relays are present marked (1) and (2). These are designated control and selector relays respectively. Relay (1) controls relay (2), which selects either the rudder motor or the trimmable engine servo by its armature. As long as the receiver rudder relay is pulsing, normal proportional rudder control is had. A look at the schematic will show that while the receiver rudder relay is pulsing, relay (1) (low voltage type) is also pulsing. Now then, each time relay (1) contacts its normally closed (NC) point it charges the capacitor placed across the coil of relay (2) because of the 22.5 volt battery, as shown on the schematic. This constant charging of this capacitor and its subsequent discharging through the relay coil, keeps relay (2) in a pulled in configuration as long as pulsing is present. As long as relay (2) remains pulled in normal proportional rudder control is had. This is illustrated on the schematic by noting that one side of the rudder motor (A) is wired to the NO contact of relay (2). The other side of the rudder motor is wired to the common battery voltage through the fail safe relay.

Now let's see what happens when rudder pulsing stops either by sending full on signal or full off signal. We'll take full off signal first. With full off signal (500 cycle note) the receiver rudder relay drops out. This completes the circuit to the low voltage relay (1) causing it to pull in. When relay (1) pulls in, it breaks the circuit to relay (2) causing it to drop out after a short delay caused by the capacitor across it. When relay (2) drops out it now connects the engine servo (B) to the rudder relay. The engine servo will now be driven in one direction depending on battery polarity. With full on signal (100 cycle note) the exact same action occurs except that the engine servo will be driven in the opposite direction. This is more clearly understood by a look at the schematic.

It is now apparent that as long as pulsing is present, normal proportional rudder action is had. When pulsing stops we have our engine control feature. Full on signal drives the engine servo in one direction while full off signal drives it in the opposite direction. Elevator action remains the same during all of the above.

Rudder will also return to neutral through spring or rubber band centering devices when actuating the engine servo.

The fail safe circuit still retains its original function whereby it will remove the common battery voltage from all three actuating devices (rudder, elevator and engine) allowing them to center, with the exception of the engine servo, when the fail safe panic button is pressed on the transmitter.

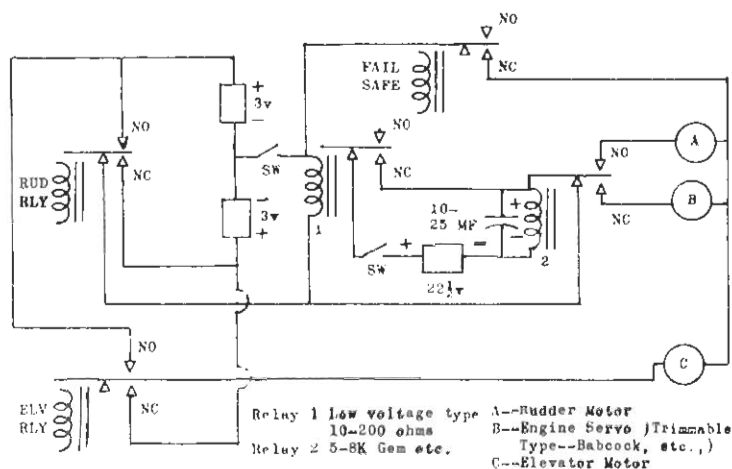


FIGURE 1

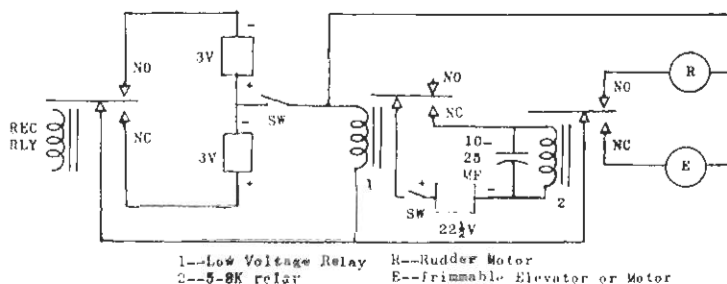


FIGURE 2

If it is desired an additional circuit can be tied into the NO contact of the fail safe relay to control wing flaps or what have you. This could be obtained through a DeBolt 3P or like servo.

Construction of the system is straight forward and there are no hidden bugs that will pop up. The only variable in the entire circuit is the 10-25 mfd electrolytic capacitor across the coil of relay (2). This is selected to give the least possible delay for engine servo operation while still retaining normal proportional rudder action. I have found that a 15 mfd capacitor across an 8K relay gave good results.

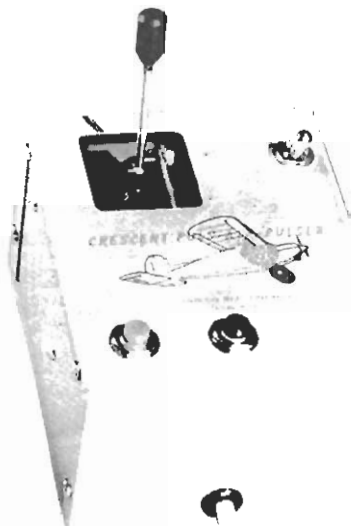
Relays (1) and (2), a 22.5 volt hearing aid battery and the capacitor are the only extra items needed to wire this circuit. Relay (1) can be any of the low voltage types from 10 to 200 ohm. Relay (2) is any 5 to 8K type. I use an 8K although a 5K will work just as well with a different value capacitor across it.

This circuit can also be used to obtain trimmable engine control or elevator control with a single channel rudder ship. This is shown on schematic II.

Well there it is. It's a simple circuit, and I have found it to work very well with never a miss.

Trade Notes

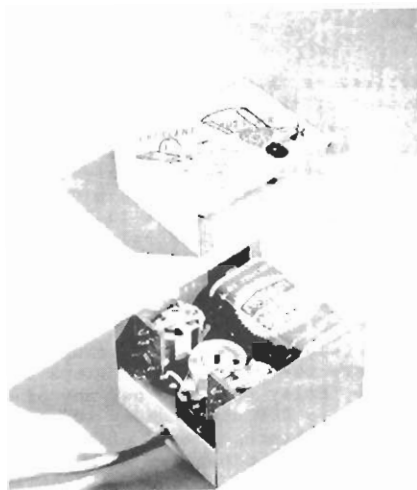
PULS-AIR PRODUCTS



One of the first motorized commercial pulse boxes that we have seen came to us through the courtesy of Glass City Model Electronics, 726 Sherman Street, Toledo, Ohio.

As readers of Grid Leaks know, a pulse box is designed to replace the key at your transmitter to give proportional control. The Glass City Crescent Puls-Air pulser can be used for rudder only, Galloping Ghost, or dual simultaneous proportional control when used with the Crescent Puls-Air dual simultaneous unit.

We found on checking that the linearity over the entire speed range was good, it didn't drift, it was completely adjustable from 60-40 ratio to solid on and off signals. The pulse rate was adjustable from 3 to 13 pulses per second, controlled by 45 degrees of the control stick movement. Pulse width is also adjustable. Two regular size D flashlight are required. It is housed in a durable gold anodized 3 x 4 x 5 case. At \$29.95, it represents an R/C best buy.



The Puls-Air dual simultaneous proportional single channel R/C equipment simply tacks on to your present receiver. It is a self contained transistorized rate sensitive control unit which discriminates between pulse width for rudder and pulse rate for elevator. It can be used with any type of actuator.

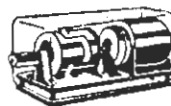
It comes complete with transistor, relay and battery box and may also be had with fail safe and motor control at an additional price.

This is one of the easiest ways of getting into dual proportional that we know of besides Simpl-Simul. The protective gold anodized aluminum case offers crash resistance. It is \$19.95. With fail safe and motor control another \$9.95 is required.

To match the Puls-Air units, Glass City also manufactures a Crescent Pulse Proportional Actuator. They are very powerful, have 14 ohm coils for fairly reasonable battery drain with good power and come available in two models. The heavy duty model is \$6.95 and the extra heavy duty is \$7.95.

The foregoing material is available directly from Glass City Model Electronics at 726 Sherman Street, Toledo, Ohio and all inquiries should be directed to them.

ARISTO COMPOUND



After a year of field testing, under all modeler conditions, Aristo-Craft announces the first of a series of radio control servos...Compact "A" Compound Actuator.

Engineered to withstand the strains and stresses encountered in the radio control of aircraft, this servo is also ideally suited for boats, cars, etc., Small in size: 1 3/16" x 1 3/8" x 2 3/4", the Compact "A" is easily installed, requires no shock mounting. It has a low battery drain of only 200 M.A., allows more flight time with less battery changes. The high torque motor delivers power to move even the largest control surface through a quiet running, long-life gear train. All electrical contacts are self-adjusting for trouble-free operation. There are no adjustments to make!

The Compact "A" Actuator is sealed in a clear plastic dust cover; all wires are color coded; complete instructions are included. Price is \$10.95.

QUICK'S TTPW ACTUATOR

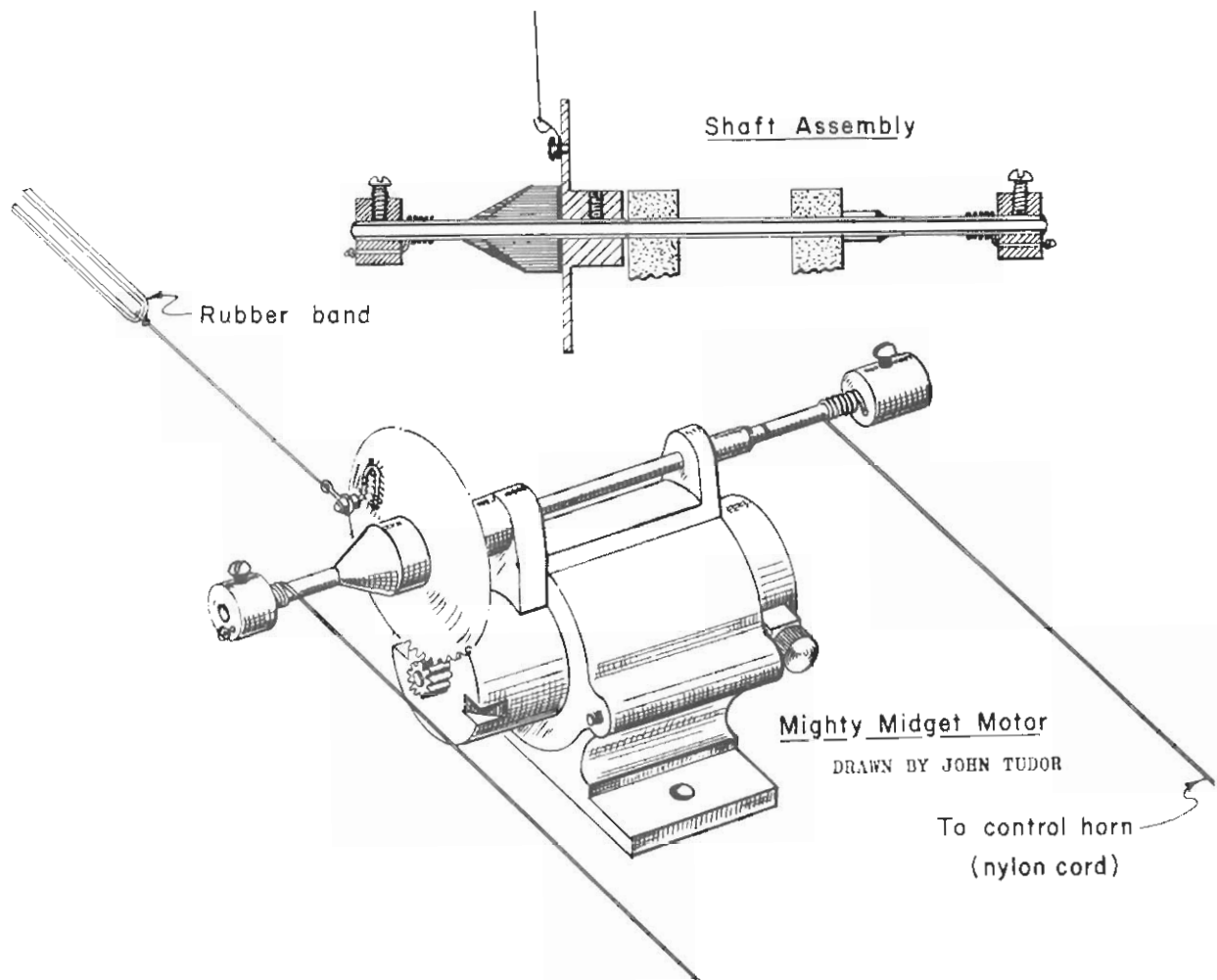
One of the big draw backs for the TTPW system has been that many of the builders are reluctant to make up an actuator or lack the equipment to make the actuators, which are generally double geared Mighty Midget motors. Bob Quick of Orange Blossom Hobby Shop in Miami has decided to do something about it and is marketing a really unique and high torque job as shown in our picture which will answer the need for the TTPW field.

Based around the familiar Mighty Midget motor the unit nevertheless has been customized and provides push pull action to the control surfaces. The unique phenolic screw drive provides the answer to almost wiggles surfaces.

Available in two models the standard is \$10.95 and the deluxe is \$14.95.

Easy To Make Actuator

FOR SINGLE AND DUAL SYSTEMS



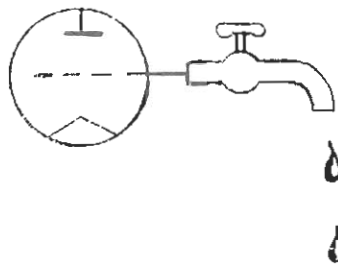
"I am enclosing the drawing that you requested. No dimensions are shown, but the shaft is about three inches long.

"Two methods of coupling the centering system to the large gear are shown. The one with the rivet and bent wire has proven to be the best and the easiest to build.

"The centering pulley (tapered) is made from a strip of masking tape cut on an angle. Probably this could be made from some of the aluminum putty also."

Best regards,
Jim Martin

Grid Leaks At Play



Radio Control is one of the fastest changing industries today. There is nothing static to designs. All-transistorized receivers are appearing more and more. Some eliminate the relay and operate the actuator directly.

In this issue you will see an all transistorized reed unit used very successfully down Texas way. You will also find a proportional circuit relay eliminator. Up to now these have been complex, but this one appears simple and apparently is quite dependable.

What does all this change mean? Does it mean the elimination of simple radio control? The doing away with receivers that have been standbys in the almost six years of R/C with an examination free spot?

We don't think so. Nor do we feel that the relay will be completely eliminated for some time. We feel there will be much use for vacuum tubes for some time to come. Reason we feel this way is because tube receivers have proven themselves, both gas and hard, and these provide an economical approach to the fun which R/C can provide. With these we will still need relays. There are many in this hobby who are quite content with the simplest rudder only and don't mind the 45 volts and $1\frac{1}{2}$ volts battery complement. They are in this for the simplest type of fun. For them circuits like the Lorenz and the Commander, the Hill THT and others will provide many hundreds of hours of fun with a minimum of investment in money!

For the Cadillac crowd and those in between there are exciting things in the picture. The triple proportional deals sound exciting, and will be, although in terms of expanse their prices will be much higher. Some of the complex systems, the TTPW, 8 and 10 channel reeds, triple proportional will cost more than many makes of good television sets!

About flying--will reeds replace the proportional systems? With 10 channels coming up think of the unlimited potentials. We don't think so, we believe there is room for all types of flying and that different types of flying will be done with the flyer always seeking to improve his technique.

For the serious R/C fan who knows his way around electronics even a little bit it is quite easy to get more out of the systems in use today. See the proportional motor control added to the TTPW in this issue. Also for simpler proportional systems there is a circuit to provide auxiliary control.

The Galloping Ghost system, too, will continue. It is being proven constantly and those who use it like it better than cascaded escapements. Although there are many cascaded escapement systems, and now come in selector switches which with beep boxes can provide quite complex and multi type of control.

Considering the rather short history of R/C, it is fabulous to look back on it and see how far we have come. What system for you? There's the rub and we wouldn't know how to advise you.

Proportional is gaining, judging by the amount of contributions coming our way at Grid Leaks. We've been accused of being pro-proportional, but sincerely feel that this system of flying offers fun economically and dependably, now that radio gear is getting so it is dependable. So you pay your money and takes your choice. The important thing is--have fun!

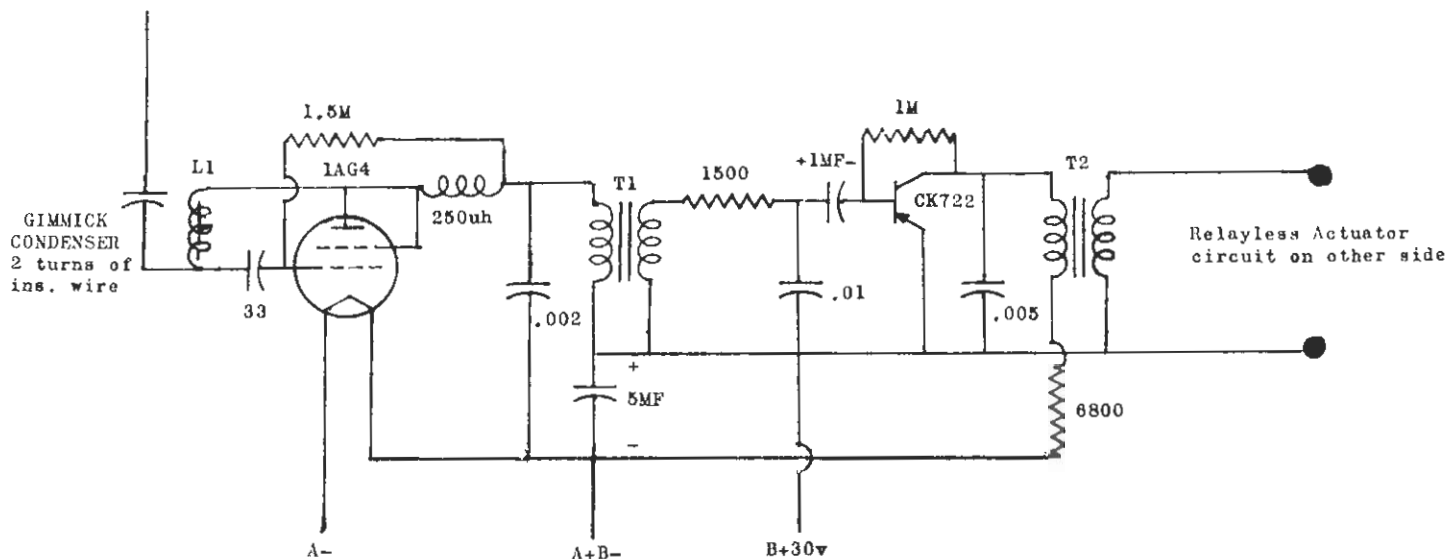
We were pleasantly visited within the past month by Dr. F. Deis of Buenos Aires, Argentina and were quite pleased to hear that American equipment is going over big. He reports that only German equipment can equal it both in price and dependability. In the Buenos Aires area there are dozens of transistorized Commanders flying as per Grid Leaks a few issues ago.

Dale Springsted, who does R/C service, writes to ask us to be sure to point up the fact that on the Commander and also most receivers, it is fatal to run the antenna wire out with the battery wires. This is particularly true of hard tubers. It is just better practice to completely isolate the antenna wire from battery wires. If you've been having troubles, check your installation.

We've sorta rambled, gazed in the crystal ball this issue, and would like your comments. We'd also welcome pictures and your circuits. Remember this is your magazine.

Yours sincerely,

Paul F. Runge



L1=13t #28 enamel on CTC SPC2
 T1=Chicago UM-113
 T2=Telex T-43
 Would suggest CR60 or SSS07
 as economical substitutes

Antenna Approx 30"
 B drain=Approx 1.3 MA with or
 without signal
 Receiver has a broad maximum
 response at 1500 cps

Editor's Note:

On the foregoing page, Donald mentions the "south" end of his 50 mc receiver. We felt that GL readers would like to see his circuit and so we wrote to him asking to share it with you. The circuit and his reply are below.

"Your letter of July 7 received today. Am enclosing the circuit of my 50 mc tone receiver per your request. As I mentioned in my previous letter the receiver is pretty much conventional and not particularly "hot" though it does the job O.K. If I were doing it again I would make some changes (that's the experimenter for you!). The final form of the receiver is the result of weeks of cut and try experimenting and as such is not very well laid out nor very photogenic to say the least so therefore am not enclosing layout or photos. Perhaps at a later date I will be able to furnish you with a "cleaned up" version of this receiver with constructional details, but for the present would suggest just the schematic as shown be published with emphasis being

placed on the relayless actuator portion of the circuit rather than a full construction article.

"Incidentally, one of my near future projects will be an attempt to adapt the Marcyfone circuitry for simultaneous operation. Will let you know if I have any success. Have also been toying with the idea of a full proportional set up using servos equipped with pot followers, possibly Marcy filters could be used to provide the different channels. This is just merely in the "think" stage now, though I understand one of the fellows in California has a working system of this nature but have not heard any details.

"Thanks again for your interest in my circuit and will be looking for it in Grid Leaks.

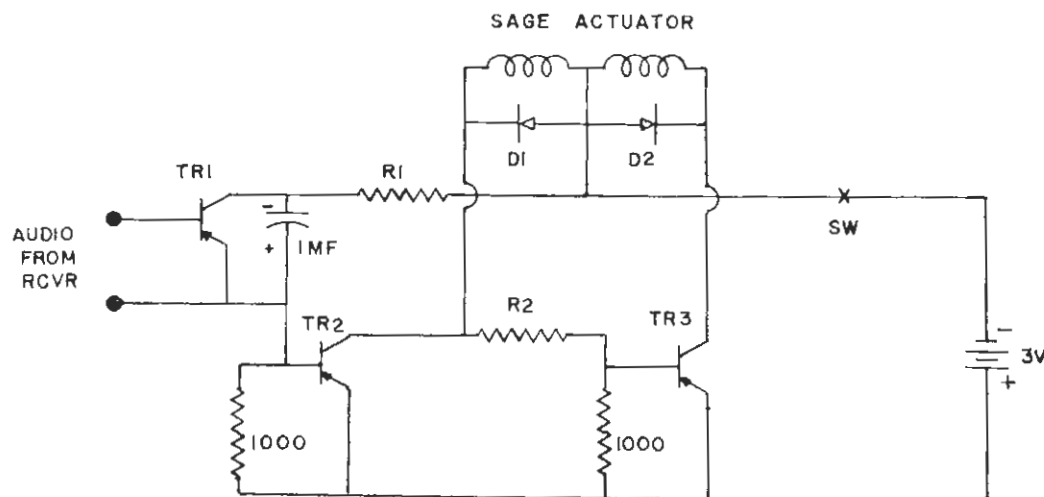
"I will be happy to answer any questions from the fellows regarding methods of adapting the relayless circuit to their particular receivers."

Yours truly,

Donald Borges
 Orlando, Florida

Proportional Relay Eliminator

DONALD B. BORGES, W4DUA, PRESENTS SOUGHT AFTER CIRCUIT



D1, D2 = High Conductance Diodes
1N56, 1N91, 1N96, etc.

R1, R2 = 560 ohms for 3V/100 MA.
operation. For higher
currents values lower
proportionally

TR1 = GE 2N188 or 2N188A
TR2, TR3 = GE 2N188A

TR1 should preferably be
coupled from receiver
through a transformer.

Wish to congratulate you on the wonderful job you are doing. Just received the July-August issue and was greatly pleased to see the TR 4.5 receiver. Have had that idea in mind for some time but have not had the time to work on it, congratulations to Costlow and Kamm! I am relatively a newcomer to R/C but have been a ham since 1935 and therefore am keenly interested in every new development in the art radio-wise.

Enclosed is a circuit which I have intended to send you before but with the advent of the TR 4.5 it should be doubly interesting. I started my R/C career using pulse proportional but after innumerable failures resulting in splintered balsa I decided to go escapement. But I soon tired of winding rubber, worrying about it breaking, etc., and came to the conclusion that after all pulse was the thing if it could be made more reliable. I further felt that elimination of the relay would be a big step in the right direction.

About that time the Sage actuator came out. I eagerly procured one and installed it in my modified Trixter Beam (rudder only). I had seen a number of transistor "relayless" circuits in the magazines but none were just what I wanted and usually required additional batteries.

Being a simple sort of person I came up with the simple circuit shown, attached it to the "south" end of my hybrid (tube-transistors) 50 mc receiver (all of my radio equipment is home made) and have been flying happily ever since! It should be readily adaptable to the MarcyTone and TR 4.5 receivers, in the latter case only one 4.5 volt source required

for the whole kaboodle, and pulse yet! With NO RELAY!

As the circuit stands it is adaptable for use only with double winding magnetic actuators such as the Sage, Southwestern, etc. requiring 200 ma or less current. It can be pulsed as fast as you wish (the arm of my Sage actuator merely a blur, estimated approximately 18 cycles per second).

The only receiver requirement is that TR1 be driven to 3 ma or more with signal and cut off to negligible current with no signal. TR3 "slaves" from TR2; when TR2 is conducting the voltage at the base of TR3 is practically zero due to the low resistance shunt presented by the collector-emitter of TR2. When TR2 is not conducting (signal off) its collector-emitter assumes a very high resistance thereby removing the shunt effect from the base of TR3 allowing it to conduct to saturation.

My Sage actuator draws about 92 ma at 3 volts, by using four pencils in series-parallel the drain per pencil is 46 ma resulting in hours of operation from a set of batteries. Although no attempt has been made to add fail safe/engine control it should be quite possible and no doubt several methods will be apparent to the experimentally inclined readers.

An extra bonus in the case of hybrid receivers is that "B" drain is limited to idle only as current otherwise supplied to the relay is eliminated and all DC amplifiers furnished by actuator battery. In adapting to the MarcyTone or TR 4.5 receivers TR1 would actually be the old relay transistor, the remainder of the circuit replacing the relay.

This circuit has worked fabulously for me, hope some of the fellows can make use of it.

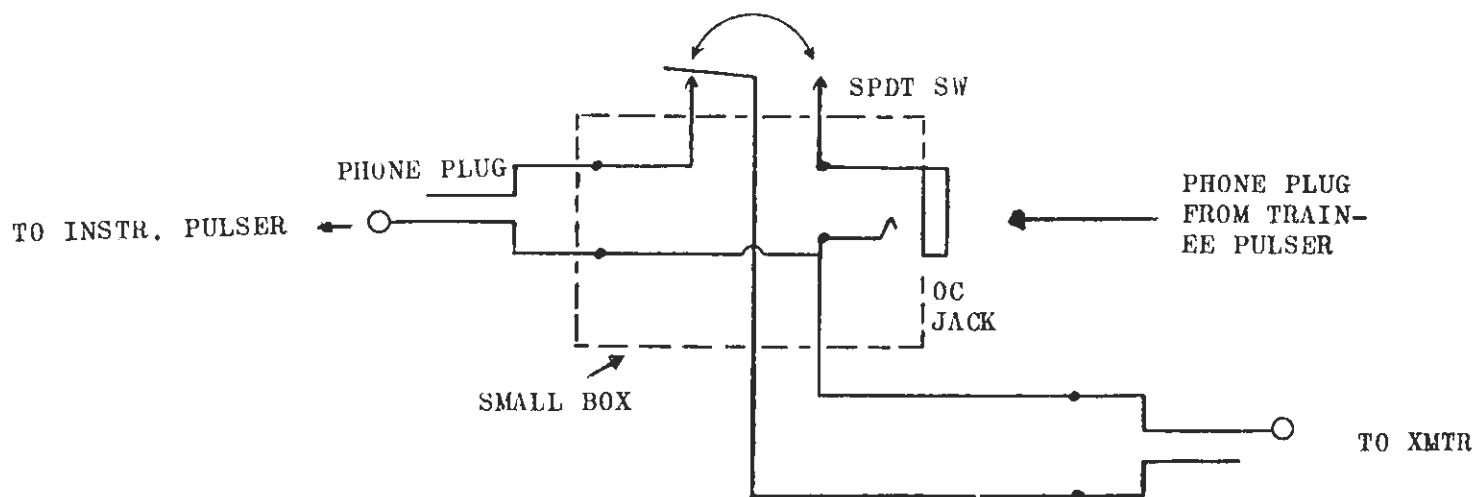
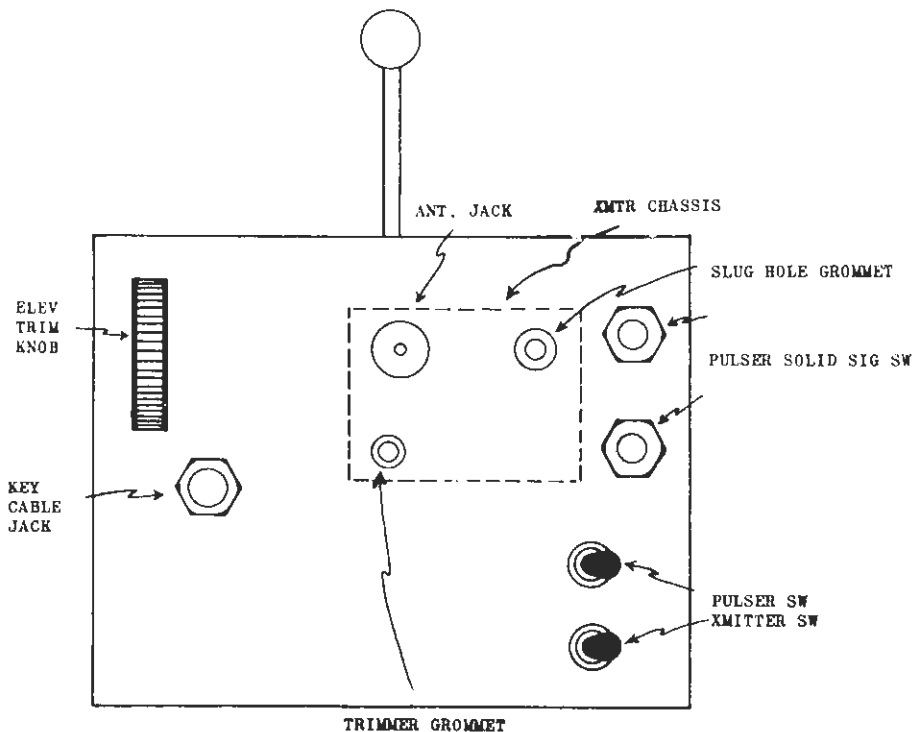
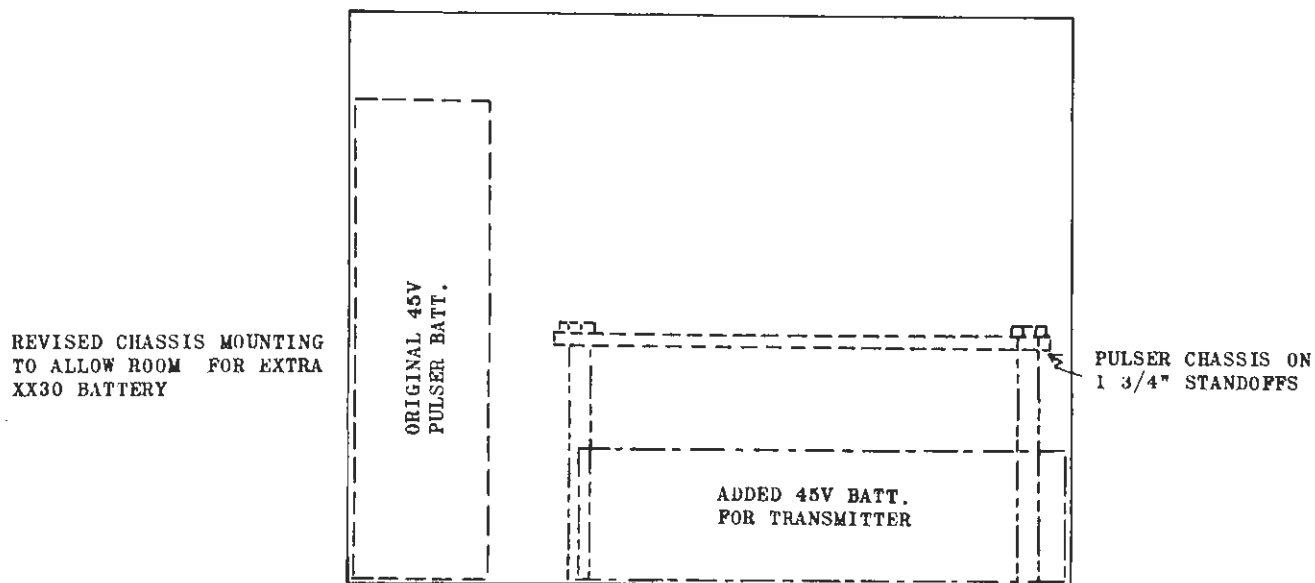


FIGURE A



FRONT VIEW

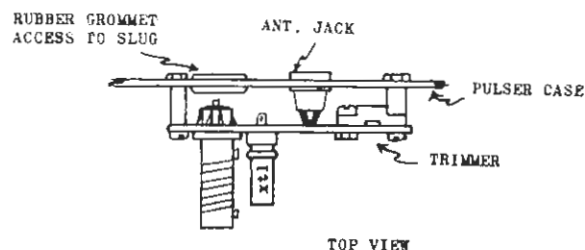
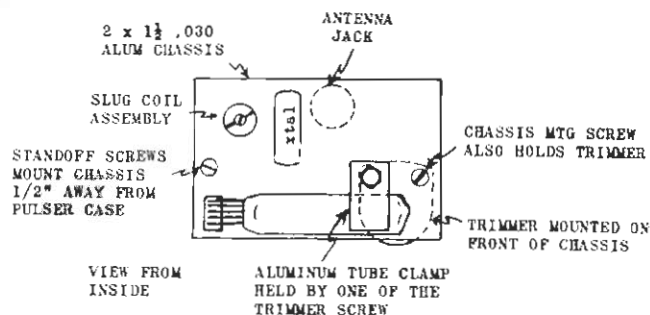
SIMPL-SIMUL PULSER WITH MINI TRANSMITTER

Designer John Worth, of the Simpl-Simul fame, saw Ted Strader's Mini Transmitter in Flying Models and became enamored with the idea of putting the transmitter into the Simpl-Simul case. For all practical purposes he says it works fine. So far he hasn't encountered range difficulty and has a complete unit with the Simpl-Simul and Mini antenna simply extending from the special case. In actual practice John leaves the big five watt transmitter he has plugged in so that if range problems do present themselves he can plug in his five watt and make recovery without any sweat.

We felt this was a novel approach and appreciate Johnny's interest in sending it to us.

Simpl-Simul has caught on like wild fire. At the recent Hampton Southeast Virginia R/C meet more consistent flying was done with Simpl-Simul than any other. It certainly beats many of the cascaded jobs for economy and for utmost performance. Check the drawings. We believe you will find them of interest.

Also in circuit A John shows a Simpl-Simul Trainer system. This will allow two Simpl-Simul systems to be operated on one transmitter with the Trainer being able to cut in at will if the beginner shows any tendency to make pilot error. This looks to us like a very practical approach to teaching dual proportional operation to beginners.



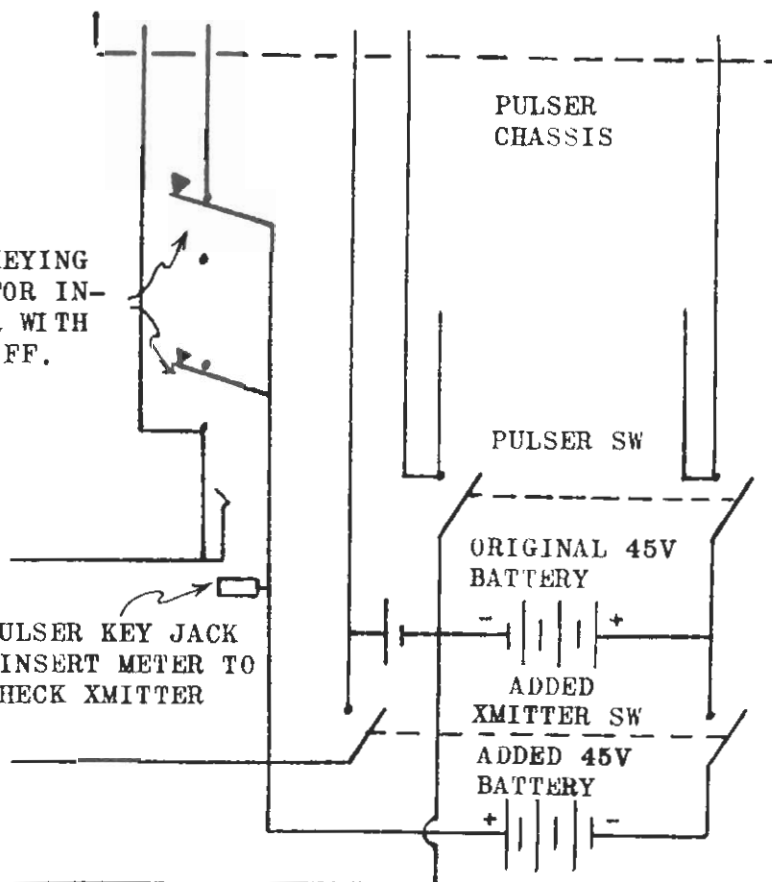
SOLID SIGNAL KEYING SWITCH. USE FOR INTERNAL XMITTER WITH PULSER ON OR OFF.

90+ TO TRANSMITTER

PULSER KEY JACK (INSERT METER TO CHECK XMITTER)

1.5V+ TO XMITTER

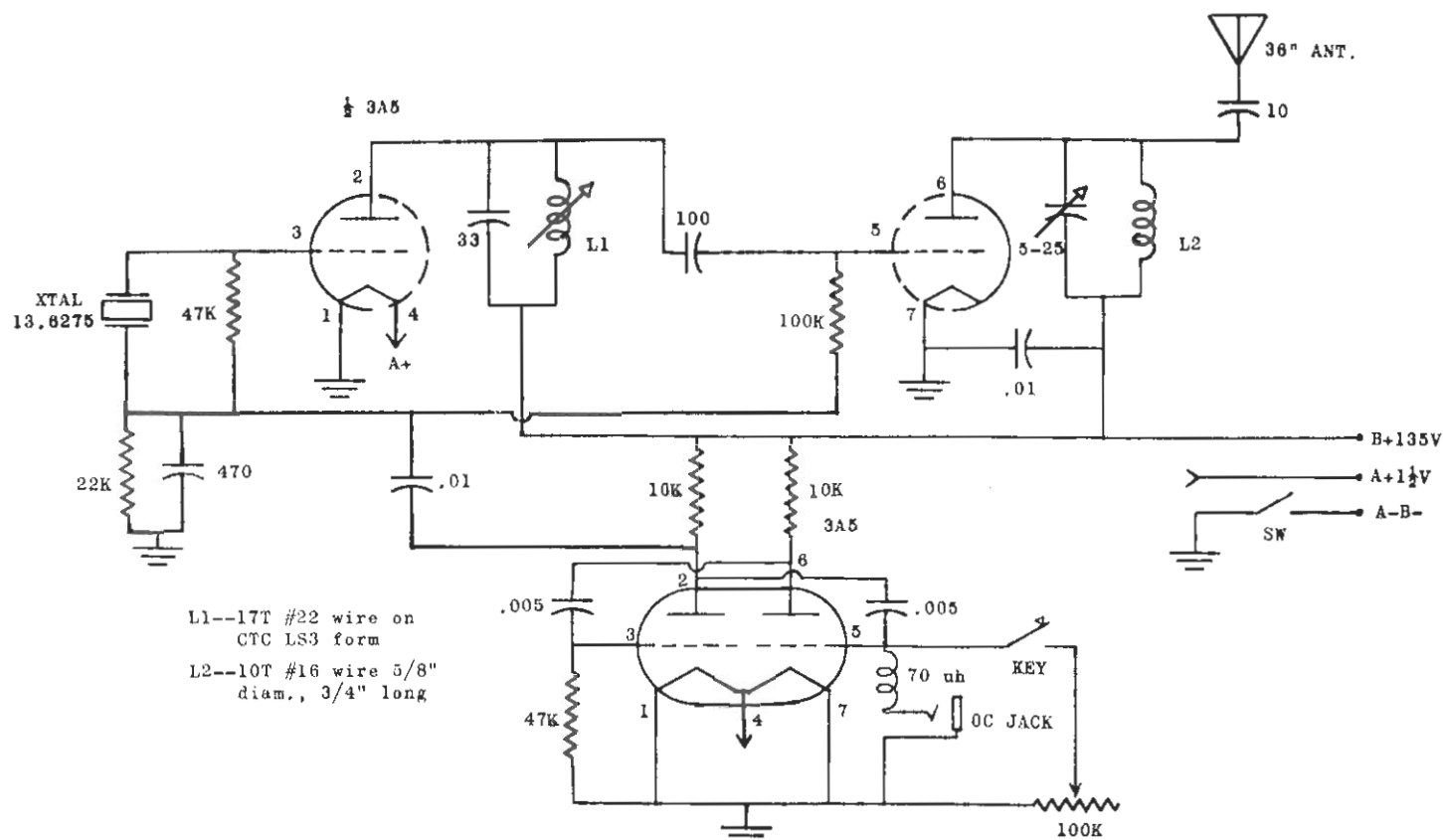
AB- TO XMITTER



REVISED SCHEMATIC FOR MINI WITH SIMPL SIMUL PULSER.

VFO AUDIO TRANSMITTER

200 TO 7,000 CPS AT 100 PER CENT MODULATION ON 27



In figuring a transmitter design for the MarcyTone Single and Multi Channel Receiver it was felt that a much more versatile unit could be had if the transmitter could be made adaptable for any of the single channel audio receivers on the market. Therefore a VFO (Variable Frequency Oscillator) modulator is included which will allow with changes a continuous shift in cps from 300 to 7000 cycles.

Since many of the single channel require 85% and others 100%, it was felt that a 100% modulated transmitter would be the least that should be worked up. To do this an MOPA type of RF section was desired.

By making this a VFO transmitter it would operate receivers which require 400 cps, others requiring 600 cps and the Marcytone requiring a range from 1900 to 3400 cps.

The 3A5 dual triode tube was chosen with a 13.6275 crystal oscillator section to be doubled in the amplifier stage to 27,255 mc. In this way many of the inherent disadvantages of a 27 1/2 mc oscillator-amplifier section would be eliminated. In other transmitters of this type there has been a tendency for the 27 1/2 CW from the master oscillator section to "leak" and cause a so called swamping near the transmitter since audio just is not heavy enough to penetrate through this "leak".

Another 3A5 multi-vibrator is used for the audio oscillator. This is of the variable frequency type so that it may be tuned not only to any of the MarcyTone filters but to any of the other commercially available audio receiver designs.

As shown the transmitter has a workable range of from 1700 to 7000 cycles per second. To obtain a lower audio it is only necessary to change the .005 condensers in the multi-vibrator to .01 and the resistor to an 82K. The range will then come from approximately 200 cycles to 4000 cycles for use with these other systems.

To convert single channel equipment it was felt desirable to have a simple plug in affair. Since drift was no problem with the MarcyTone system this could be the simplest pot/switch type. Configuration for a push switch type box is shown. This is a 2 x 3 x 5 aluminum box. From 2 to 6 pots and switches may be used. If desired lever action switches may be substituted for the push type.

Another factor in the design was so that power sup-

plies either of the 2 or 6 volt type might be used to replace batteries for more economical operation. In the 3 x 5 1/2 x 8 cabinet there is ample room to hold some of the smaller types. This means, of course, that the battery must be placed outside the case but this is felt to be an advantage in that there is no trouble from acid fumes which can wreak havoc.

Also just around the corner are the power converters, DC to DC, which will allow 6 and 12 volt DC to be converted to the required 135 volts with a minimum of fuss and feathers and new batteries are also appearing on the horizon which will make compact hand held units available which will effect an economy of operation never before possible. Grid Leaks is on the trail of a 12 volt power converter, which has a fantastic input output ratio using 12 volt DC and which overcomes many of the objections inherent in vibrator supplies. Keep eyes peeled.

Tuning equipment of this type is relatively simple if a few simple steps are taken. First double check wiring since a fault here can blow tubes or crystal or both. The case will hold two Burgess XX43 67 1/2 volt batteries or equivalent and one Burgess F4F 1 1/2 volt. Insert a three foot section of music wire into the pin jack for the antenna on the chassis. Plug the two tubes and crystal into their respective sockets.

Insert a 0-50 ma milliammeter in series with the red lead from the B battery. Turn filament switch ON and milliammeter should indicate a reading of 20-22 ma. Turn the slug in L1 until a slight dip of approximately 2 ma is indicated. This will be about at the center of the slug travel. Lock the slug in this position with the lock nut. Now tune the 5-25 mmf ceramic trimmer with an insulated screwdriver until the output lamp burns brightest. If the lamp does not burn very brightly increase the coupling between the one turn link on the lamp and the tank coil by placing link closer to tank coil. Press the key down and lamp brilliance should decrease somewhat to indicate signal is being modulated.

Frequency of the audio signal is set by varying the pot. In the case of either the single channel transmitter or of the control box little or no readjustment is necessary since the MarcyTone receivers are singularly free of drift problems and lowering battery voltages little trouble.

PROPORTIONAL TIP

"I am writing this letter to show what results I have gotten from my proportional control and since I am a newcomer other newcomers may learn something too.

"When I first started in R.C. a few years ago I looked for the cheapest setup I could find. I knew of no one else around that had any R.C. experience so I could get their advice so I bought the cheapest I could find. After spending more than many higher priced sets to get it fixed I decided to get a reliable one and from that time on I had no trouble. When I got all set up I still wasn't satisfied.

"Then I found out about proportional control and I knew I had found the simplest, cheapest, and most worry free control. The simplicity of it all and the comparatively low price I had to pay compared to servos and escapements was unbelievable. I got my first plane set up with both rudder and elevator control. Some changes I made were first of all not putting a rubber band centering spring on the inside of the plane but to have a steel wire spring on the elevator to keep it down which could be bent to the correct tension. A plywood square was placed below where it rubbed to keep it from going through the wood.

"The reason for this is that I found it very hard to get at the rubber band and I had a hard time finding the correct size. I also found out that I had a hard time trying to get up elevator from my Stick-Trol pulser. Not knowing much about electronics I did some experimenting and found that if I put a 67½ volt battery in for the 45 volt one I had full control again.

"Another thing I found helpful is to scratch the wiring diagram, the plane circuit, and other information on the plastic receiver case, best on the inside. This way I will always have that information if I lose the instructions or need them in the field."

Sincerely yours,

Robert Werner
Windom, Minnesota

You have certainly had an interesting experience with your proportional control and we are glad to share the spring centering idea with the rest of our readers.

SOME QUESTIONS AND ANSWERS

"I hate to distract you from writing "Grid Leaks" and getting all the goodies together for your excellent kits, but a number of questions have no available answers.

1. What about the battery operated Grid Dip Oscillator kit that was planned?

2. How well do various receivers respond to proportional pulsing, particularly by the MarcyTone and the TR 4.5. Perhaps a short description of results for each type might be published in Grid Leaks and then just include a comment in the description of each new kit or schematic.

3. What became of the proportional actuator based on the Minitone Motor? A kit with the light gears and drilled and bend brackets would be dandy!

"I've made two servos out of Mighty Midget motors ala Grid Leaks Number 3. How about nylon or brass etc. tighter fitting bushings? The Minitone motor with two identical mounting and counter shaft brackets and four matching gears would be a real fine kit.

4. Perhaps simultaneous operation with the Marcy filter circuits could be achieved by using Max Beal's receiver circuit in Grid Leaks Number 4 which I assume doesn't clip the audio as was mentioned about the Marcy-Tone receiver.

5. Issue Number 10 or 12 should include an index to previous issues.

"What have I been doing? I just finished the TTPW Receiver, Ace kit of course. This will be tried in a Smog Wire Senior, a chubby Live Wire Senior with some dimensions altered to line up with the Smog Hog and Hog wing.

"This will fly when I get the transmitter (junk box mostly) and the plane finished.

"I'm also rebuilding a L.W. Trainer for the third time. I HATE BEAM ENGINE MOUNTS!! Mangle too many bulkheads.

"A wife, twin baby boys, and SAC have severely limited my activity.

Keep up the good work,

Capt. Leo J. Corbalis
Pease AFB, N. H.

We will try to take your answers one by one Captain. Good to hear from you.

1. The battery operated Grid Dip Oscillator just feel by the wayside since there didn't seem to be any particular demand for it.

2. MarcyTone and TR 4.5 both respond to fast pulsing. We will bear it in mind and may publish at a later date an exact report on this.

3. We just couldn't get together with the Minitone people on price. They were their own worst competition. You can buy the Minitone directly from Minitone cheaper than we could sell it to you.

4. We would be interested in hearing any experiments any readers do on this.

5. We do plan an Annual occasionally of Grid Leaks based on demands from the field and we appreciate your idea of an index. This sounds very good.

Good luck to you on your TTPW system. After you learn to fly it we believe you will really enjoy it.

You don't sound like you have been too severely limited in your activities and we hope you will keep on keeping us posted.

MISSSES GL

"I just received my fifth issue of Grid Leaks. Very fine--tops, etc. Biggest disappointment of my R/C life to find I haven't received the fourth issue--where is it? If you think waiting two months for the next issue to come out causes more eagerness for the R/C facts, tell the boys they ought to miss an issue. I want to know what's in the fourth issue and have to wait till you send it. Guess my moving around has upset the apple cart.

"Went to the fourth NC/RC get together last week. Big fun--Flew my Ace kit TTPW. Did fine--very good range. Guess there will be some TTPW activity in the Raleigh-Durham area now. Overheard a tone man saying as I flew inverted--"Gotta have that outfit" and then three nice loops later and "Where can I get one", then a flared landing and "Did you say Box 301". That's the way it goes.

"How about putting out a nice compact geared stick box for TTPW. The 60 degree pots are too sensitive. I'd pay \$20.00 for a good one with internal spring returns.

"Send my fourth issue of Grid Leaks, please.

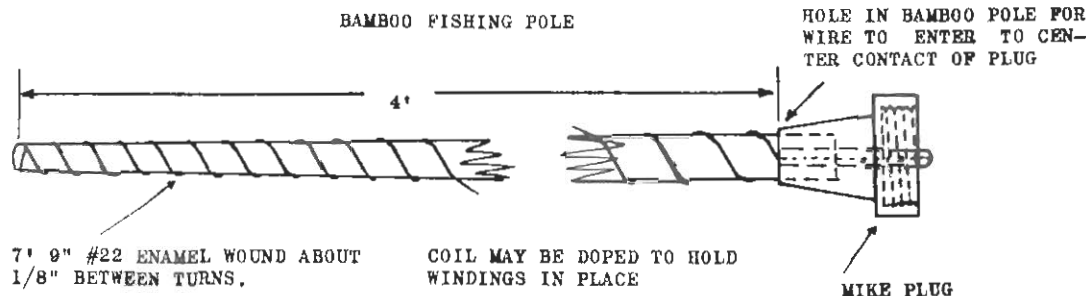
Yours sincerely,

Tom Caruthers
Raleigh, North Carolina

Good to hear from you and congratulations on your flying. I don't know what happened to your Grid Leaks Volume 1, Number 4 but we find occasionally they just don't get through the post office. Where they go to we don't know but I appreciate your comment on the fact that you don't mind waiting too much if your issues come every two months. It looks like that is all we will be able to do because time is of the essence.

Antenna Design Considerations

BY DONAL D. KAVANAUGH; W2OIZ



An antenna is really the same thing as a resonant circuit. Its inductance (coil effect) and capacitance (condenser effect), are determined by the length of the conductor used for the antenna. Just as the tuning of the coil in the superregen stage of the receiver determines the frequency that the receiver works on, so the length of your transmitter antenna determines the frequency that it radiates on best.

Actually the shortest conductor that will act as a resonant antenna is approximately one-half wave length long. Its length in feet can be determined from the simple formulae: (This includes end effects, etc.)

L (in feet) = $465/\text{Freq. (in mcs)}$

or, for 27.255 mcs:

$L = 465/27.255$

$L = 17.05$ feet

We can cut this length in half by using a trick. Since a half wave antenna as described above actually consists of two quarter wave length sections whose only difference is that they are electrically 180° out of phase with each other, and since ground, or earth if you wish, is an excellent reflector, we can let it act as one half of our antenna. This is the theory behind the quarter wave antenna, the type used almost universally for radio control transmitters.

While the radiation efficiency of a quarter wave antenna is theoretically the same as a half wave antenna, in practice it is affected by ground conductivity (you've probably noticed the increased signal on days when the ground is wet), feed point resistance and a few other variables. For our purposes however, the loss in efficiency is unimportant when compared to the advantages of cutting 8' 6" off of the antenna.

This still leaves us with an antenna length of 8' 6". For those who prefer hand held antennas even this length is too long and cumbersome. Here is where we get in trouble. If we cut the antenna length below that necessary to resonate on the frequency we wish to use it is almost impossible to make it accept any power from the transmitter using any normal coupling system. The loss in radiation efficiency is not too bothersome, the real nature of the problem is trying to get any power at all into the antenna. If we are going to get any RF in-

to the antenna it must look like a resonant circuit to the transmitter.

As I mentioned above, an antenna looks resonant because of the inductance of the conductor and its capacitance between elements. If we reduce the length of the conductor we reduce the inductance and hence it ceases to be resonant on the desired frequency. The obvious answer to this problem is to add lumped inductance in series with the antenna. This is what is done and is the purpose of that little coil of about 10 turns and $\frac{1}{4}$ " diameter between the pick up loop and the antenna in most commercial hand held transmitters.

All looks well and good at this point except for one point. We do not get something for nothing. That little coil does its job of acting like an inductance to make the transmitter think that the antenna is resonant all right, but it also acts like an RF choke, blocking some of the RF from the antenna. The RF that is blocked from the antenna is radiated by the choke, and not very efficiently at that, inside the transmitter case.

An old ham trick that has been used for many years to improve the efficiency of short antennas has worked very well in miniature on 27 $\frac{1}{2}$ mcs. Rather than use a lumped inductance in the form of a coil inside the transmitter, the inductance is distributed throughout the length of the antenna. In this manner the antenna becomes nearly a quarter of a wave length long, the needed loading inductance is very small, and yet the over all length of the antenna is only 4'.

I used the tip of a bamboo fly rod about 4' long and wound it with #22 enameled wire till it resonated. This came to 7' 9" in my case. However, this will vary with the style of transmitter case and should be checked for optimum results. However if a grid dipper is not available the Q is low enough so that the antenna will be broad enough to work well if anything from 7' 6" to 8' is used. The construction is as shown.

The improvement in radiated power using this antenna is very notable. Using a grid modulated 3A4 at 135 volts B+ I get within a few microamps of the same radiated power as a TTPW transmitter on the 9' vertical.

Arnold Profit
1413 John Avenue
Superior, Wisconsin

ACE R&M CONTROL

ORDER RECEIVED
AND SHIPPED
SAME DAY

