GRID LEAKS

R/C DATA SERVICE

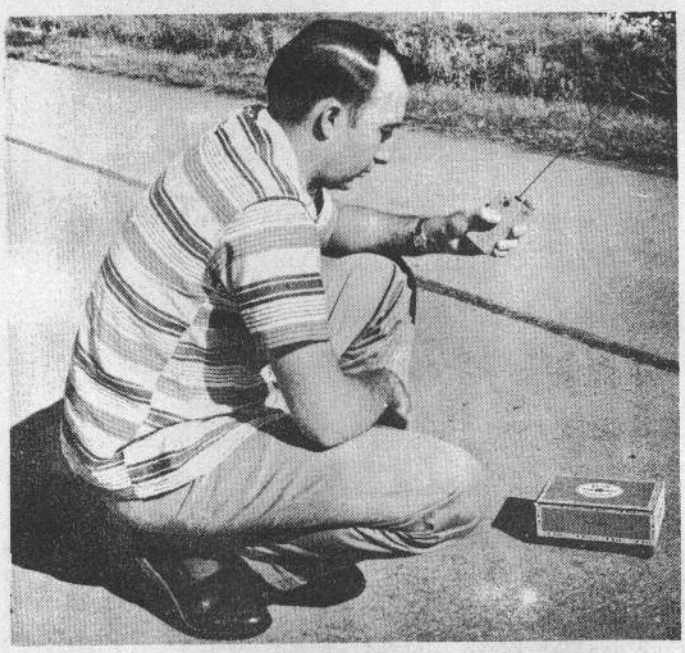
VOLUME 1 NUMBER 8

JANUARY FEBRUARY 1959

25C

PUBLISHED BI-MONTHLY AT HIGGINSVILLE, MO

Radio Controlled Cigar Box!



Jerry Tucker of Higginsville operates the Radio Controlled Cigar Box.

The idea for this article was born several years ago at a KCRC contest which was to be built around radio controlled vehicles.

Almost every type of vehicle showed up at the contest, but the most unusual was one by Dick Stamm, a member of the Kansas City R/C association and this was a motorized radio control cigar box.

Feeling that many of our readers would have an interest in such an affair, the staff of Grid Leaks spent a few enjoyable hours building the unit and many enjoyable hours running it on some wide concrete pavement nearby.

Basically, the unit consists of a Commander Receiver, a Hillcrest battery box containing 2 pencells and two U15's, an Aristo 64 for the drive, a Dmeco 2PN for the servo, an Aristo #3 motor using a Mighty Midget large gear on the shaft to drive a 3" air type wheel.

The front wheels are linked together by the rod as can be seen by the photograph and are directly actuated by the 2PN.

It was felt advisable to have one wheel drive and two wheels steering. This makes a tricycle arrangement which is fairly stable except at fast speeds and sharp turns. Two toggle switches are mounted at the rear, one for the motor, and one for the servo. In their "on" position they slant rearwards so that they act as outriggers in the event of a sharp turn.

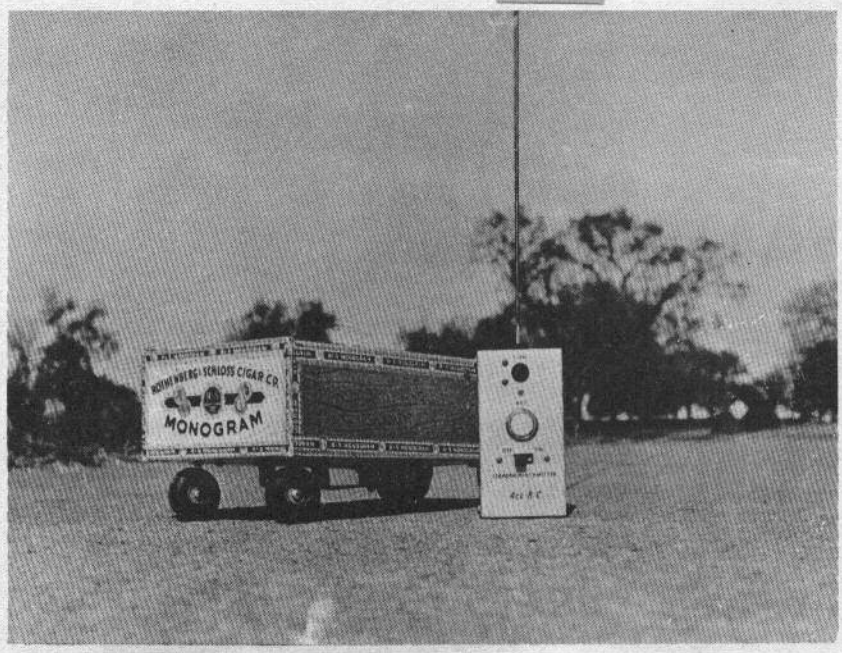
No detailed instructions will be given for building since the photograph is fairly self-explanatory and a wide choice on the mounting components is available.

A 2 volt section of the Aristo 64 is used for the servo requiring no other servo batteries in the installation.

It is important in making the unit that balance be kept as evenly as possible to provide the balanced unit laterally.

Almost any type of radio gear may be used in the installation and response with the installation shown is effective and quite adequate.

It would also be possible to use a Mighty Midget actuator or the B. Paul Flyball Actuator to steer the wheels to provide proportional control if pulsing is to be used on the transmitter. This would provide the smoothest approach, of course, since with the servo it's



With Mini Transmitter you have minimum of fuss and emphasis on fun. Transmitter is only four inches tall.

all or nothing in the turn.

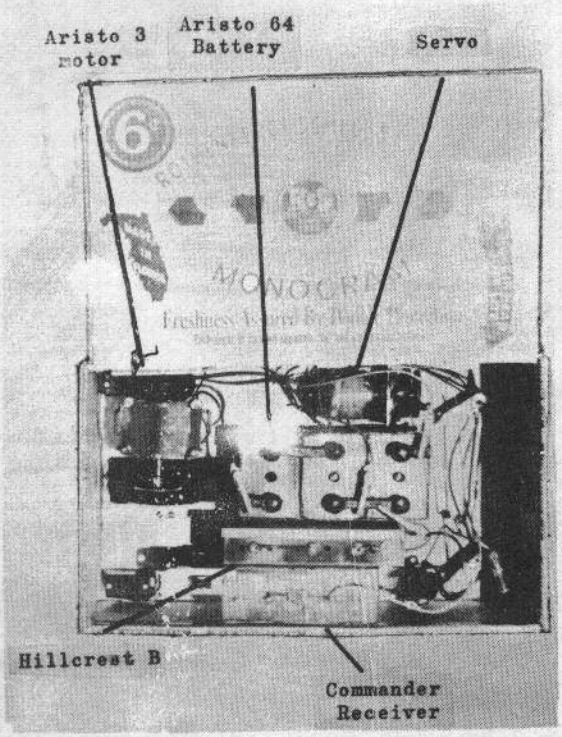
Coupled with the palm-sized Strader Mini Transmitter, this unit provides hours of fun for the simplest building time of any unit we have so far found.

The cigar box has proved to be a show stopper a number of times since it is driven on a not too busy street will invariably stop the traffic with people gawking and making demands to have the cigar box come in their direction.

We invite you to try your hand at radio controlled cars by building the cigar box, thereby gaining a lot of valuable experience should you decide to go to other vehicles.

It would also probably be perfectly feasible to have two rear wheels with one front wheel being steered. We found the unit to be very uncritical as to installation and assembly time was very little.

The antenna may be seen at the front of the installation being just merely zigzagged hook-up wire so that there is no external protrudance of this wire.



Meters, Internal Resistance, Shunts

BY JERRY MCGEORGE

Many of us in R/C have microammeters which would be more useful at times if we could increase their current range. For instance, if we have a 0-1 milliameter we can connect a "shunt" resistor across it and change it's range to 0-10 mil. Or by using another resistor change it's range to 0-100 mils. These examples are rather simple because we are multiplying by 10 or 100 and retaining the basic scale pattern. Any low range current meter, regardless of its stated maximum reading can be raised to any new and perhaps more desirable maximum current reading if we know the internal resistance of the meter (R_m) in ohms.

There's a bit of simple arithmetic involved in what follows but stick along here because you'll have some fun with it and learn how to put those low range current meters to work.

If we have a 0-1 milliameter, for example, and would like to raise it's range to 1-10 mils, then we solve for n, where

(1) $n = \frac{\text{Our desired full scale reading}}{\text{Full scale reading of our meter}}$

n, then = $\frac{10 \text{ mils,}}{1 \text{ mil}}$ or $\frac{.010 \text{ amps}}{.001 \text{ amps}} = 10$ (and we use it in the next equation.)

The value R of the all-important shunt resistor required to change the range of our meter from 0-1 mil to 0-10 mils is found by solving this next simple equation.

(2) $R = \frac{\text{Internal resistance of the meter in ohms}}{n - 1} = \frac{R_m}{n - 1}$

Let's assume, for example, that the internal resistance of our meter is 27 ohms.

Then the proper size resistor to connect across our milliameter to raise it's range from 0-1 mil to 0-10 mils would be

$$R = \frac{27}{10 - 1} = \frac{27}{9} = 3 \text{ ohms}$$

So, all we have to do is put a 3 ohm resistor across our 0-1 ma meter and it will have a new range of 0-10 ma. Very simple.

In a similar manner, for further example, a 0-5 milliameter (.005 amps)--or, a 0-50 microammeter (.000050 amps) could be "up-ranged" by any reasonable scale multiplier (n).

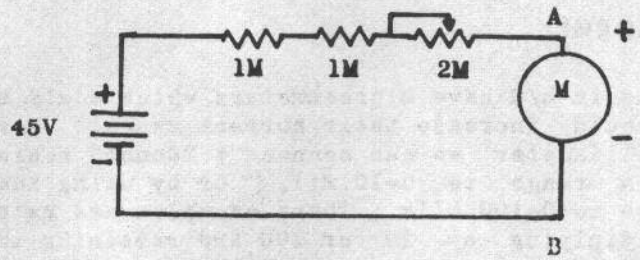
But did you notice in the example above that we assumed a meter resistance R_m of 27 ohms when we calculated the meter shunt resistor value?

This was necessary to demonstrate the simple arithmetic required to extend the range of a current meter.

The internal resistance R_m of a small current meter is not always shown on its face plates yet it is necessary to know this value if we wish to extend the range.

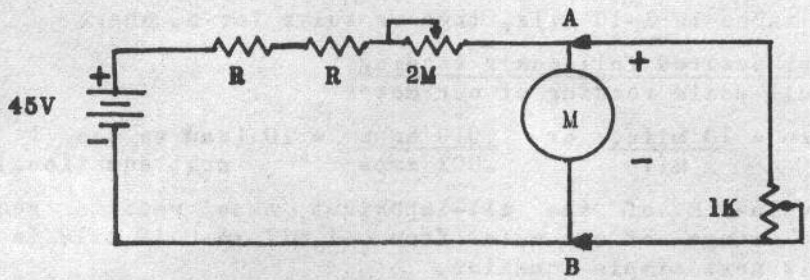
Here is a method for measuring meter resistance R_m which is rather simple and harmless if done correctly. Harmless? Yep--because if you try to measure the internal resistance of a sensitive current meter with a standard ohm meter you're gonna "blow" a nice instrument. Don't try it.

Connect the meter in question in series with several megohms of resistance across a 45 volt battery. One of the resistors should be a 2 meg pot.



Adjust the pot to give full scale reading of the meter. If you can't get full scale then remove one of the 1 meg resistors and try again. Continue to reduce the resistance of the series until the full scale reading is found on the pot. Remember, this is supposed to be a "harmless" procedure so use care.

Now, with the needle at maximum reading connect a 1K pot across the meter at A and B.



Adjust the 1K pot to the point where the meter reads exactly HALF scale. Remove this pot carefully from the circuit and measure its resistance with an accurate ohm meter. This measured resistance will be <u>equal</u> to the internal resistance of the meter R_m.

Now use formula (2) to calculate the value of the shunt resistor R to give the new full scale reading you desire.

This procedure is based on the theory that when the meter reading is reduced from full scale to half scale the current flowing between A and B is dividing equally between the meter and the "found" resistance of the 1K pot therefore the "found" resistance is equal to the meter resistance R_m."

Ordinary copper magnet wire can be used to make a meter shunt resistor. The copper-wire table in the ARRL Handbook shows the resistance in ohms per 1000 feet for wire sizes 1 through 40.

Example: Suppose you have some #34 wire and want to know how many feet of it will be required to offer a resistance of, say, 5.32 ohms as calculated by formula (2).

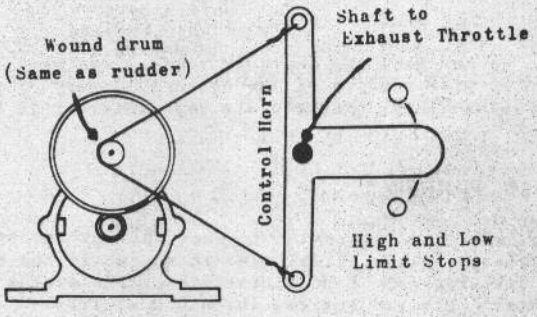
#34 wire has a stated resistance of 266 ohms per 1000 feet, or .266 ohms per foot.

$$\frac{5.32 \text{ ohms}}{.266 \text{ ohms/ft.}} = 20 \text{ feet}$$

Now cut a 22 foot length of #34 insulated wire and measure it's resistance on an accurate ohm meter. The measured resistance will probably be higher than your 5.32 ohm target, so cut off a bit at a time until you hit it on the nose. Scramble wind the final length on a little dowel pin and connect it across your meter.

SIMPLE SERVO FOR MARCYTONE 6

APPEARS SUITABLE FOR OTHER MULTI JOBS



Motor Control Servo
(Not Neutralized)

Here is a report on my six channel MarcyTone which I built from your kit.

I think it's great!! Test flights with the receiver installed in a Live Wire Cub and using my own servo set-up were completed Sunday. I'm very happy to say that the equipment worked perfectly from the very first flight.

No trouble whatever was had with range, engine vibration, or noise. I used my old transmitter with the addition of a modulator built from the schematic of your transmitter. Never have I had such luck with new R/C gear!!

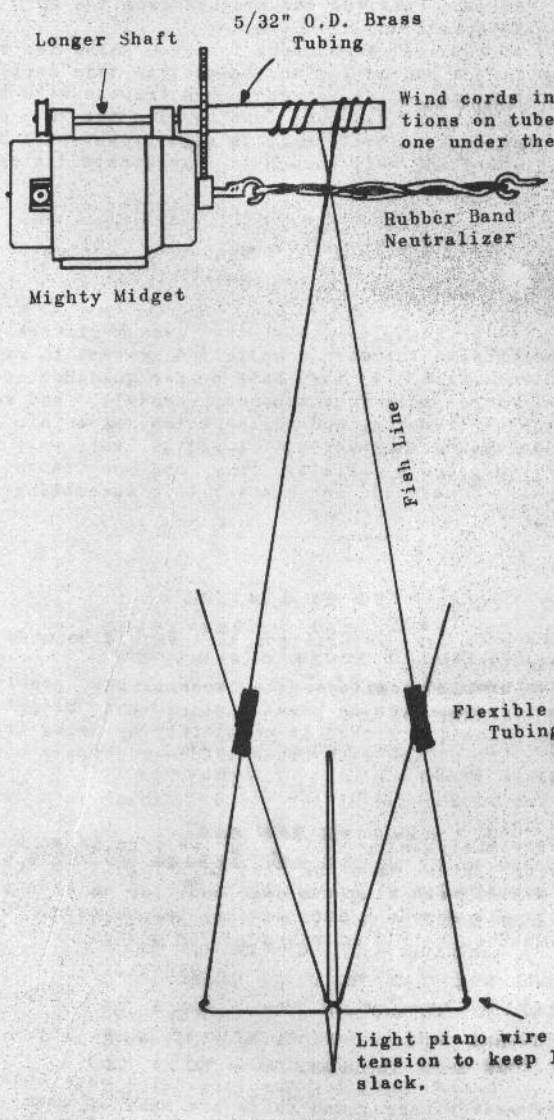
My servo arrangement might be of interest to your readers since it is practically fool proof and cost a fraction of the price of commercial servos. Reliability is due to lack of contacts which get dirty and out of adjustment.

With this arrangement, six channel operation can be had for $86 including $5 to convert an old transmitter for modulation.

I am "sold" on the MarcyTone.

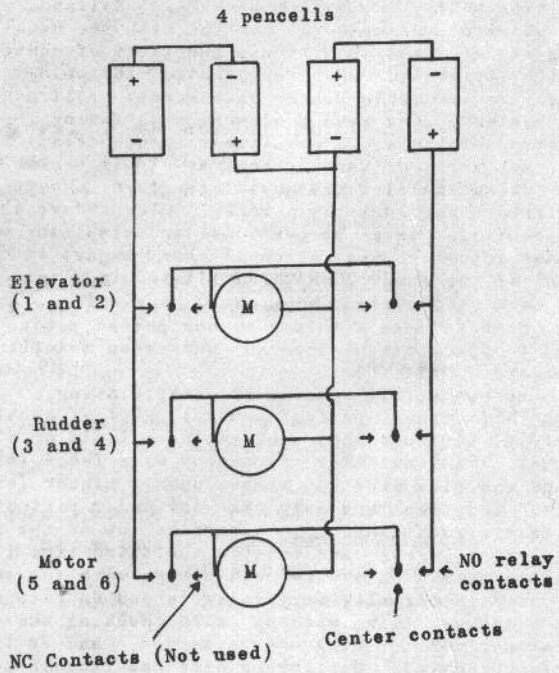
Sincerely,

Edward F. Pagel
Great Falls, Montana



(Elevator arrangement identical)

On full command, the rubber band will effectively neutralize rudder and elevator due to armature inertia. Trim is accomplished by "tapping" the control button. Friction causes control to hold slightly in direction desired.



CONTINENTAL CONTEST

Here very briefly are a few details of some of the equipment used in the King of the Belgians Cup Contest, Germany, September 20-21, 1958 as a contribution to help "Grid Leaks" on its way. I hope readers will appreciate that it was not possible to interview every competitor, since my job was primarily that of a competitor, and secondly, I wanted to get as much happiness as possible out of the money I was spending. Apart from my flying, which will be referred to later, I could not have had a much better time.

Karlheinz Stegmaier, Germany, the winner of the multi-control category used his pneumatic controls, which have served him well for some years. Jean-Pierre Gobeaux, Belgium, who was second used his low wing model with a wing very similar to his previous models. Control used reeds again. Many people argued among themselves as to which was the better of these two, which can be understood since the judges gave the first man 3247 points, and the second 3245 points. The first was a straight dihedral shoulder wing, and the second polyhedral low wing.

My own opinion, which was shared by some of the Swiss team was that Chris Olsen's (England) model was the most advanced aerobatically, and that Chris only needed more practice flying. His model is his own design and his equipment all his own construction, the radio being similar to the Orbit. Chris has built and crashed eight models in ten months, but he reckons to build a model in a week. The models break up in a crash leaving the radio unharmed. He says it takes longer to build a radio and get it working properly than to build a new model. Stewart Uwins uses a similar model and radio, but his engine does not give as much power for some reason he has not yet discovered. Jon Veenhoven used pneumatic controls but more interesting was his D. C. converter for his transmitter H. T. using a pair of power transistors.

Winner of the single control was Eric Berglund, Sweden, with the most beautiful model there, a low wing with rudder control. All his equipment was home constructed, the receiver being similar to the Wright with a transformer of his own design. The actuator worked on the governor principle, and was built into a tube. Similar equipment was used by Rolt Dilot, Sweden, in another low wing model. C. Willem Schoorel, Holland, who came second used proportional control with the usual type of ring magnet actuator with his own ideas of construction. Capt. Strickland who represented the U.S.A. used a Breezy Senior with Bonner escapement. Alfred Bickel, Switzerland, used reed equipment with tuning fork stabilization of the audio oscillator frequencies. Max Hetzel, Switzerland, used a receiver of his own design with one valve and eleven transistors giving two tuned audio amplifiers each driving a relay. The rudder and elevator controls were proportional and simultaneous. The rudder actuator was a small bar magnet stuck to the front of the rudder, which oscillated in a coil stuck to the back of the fin. What could be simpler? The elevator actuator was a thirty to one geared motor. He did well to place sixth since he has been modelling only a year and a half.

My own effort was most disappointing. The model took off under perfect control, but at about fifteen feet it turned right, indicating a fault or a spurious signal. It went over a nearby wire fence into a compound and flew about in a most unruly manner for a short time, and then suddenly came out under perfect control to make a good landing. Along the top of the fence was a telephone wire, and this is the third time I have had trouble near such a wire, not always with the same radio. My radio is normally very reliable and on returning home the model was flown without even checking the tuning or relay nor yet touching the batteries, and it flew under perfect control. Has anyone else had trouble near telephone wires and fences?

A very interesting model not connected with the contest put in a few flights one lunch time. It was 26½ inches span, weighed about one pound, and had a .8 cc Webra Piccalo engine. Elevator and rudder controls were operated from a four reed unit via four relays. The receiver used one valve and three transistors. Engine and elevator gave just enough power for loops.

Well, best of luck to "Grid Leaks".

Howard Boys
Rugby, England

Howard: We are sure our American readers are very interested in your rundown of the contest. Sorry you had such tough luck. Appreciate your interest in GL.

TTPW FORD WINNER

You will be interested to know that my Industrial Arts student, Nelson Heidel came in second in the electronics division of Ford Industrial Arts awards this past summer. His project was the WAG Dual TTPW.

After the judging at Ford the project, along with others, was sent to a press show in New York for several weeks. We just received the project from New York several days ago.

I am enclosing an order for some parts for the rf section of the WAG as I plan to rebuild this section of the transmitter. My student had trouble with the rf section. He also did some fussing with the rest of the unit also but I believe it is significant that he got the rig operating well enough to demonstrate its principle.

Yours truly,

Wendell Hostetler
Seville, Ohio

It's good to know that even beginners can come up with the more complicated systems in radio control kits if they have proper guidance and I feel sure that your student, Wendell, had some guidance from you and advice which helped him to place second. However, it speaks very well for the yound man's ability, too, and he is to be highly commended on his skill in assembling the WAG TTPW.

CURING NOISE

Here is soms information that should be made public in Grid Leaks.

We have had quite a noise sensitivity problem with Wavemaster Receiver on puise using Mighty Midget actuators. Finally licked it completely by using iron core chokes in series with brush leads--no bypass condensor necessary.

For 27.255 use Miller #4626. This is a 24 microhenry unit.

Wavemaster also wo[illegible]ery well on 52 mc by simply removing turns from the coil to bring it to frequency. Grid dip it with slug in same position as when tuned to 27.255. Then reduce antenna coil to one turn. Use Miller #4822 choke (10 microhenry) for noise.

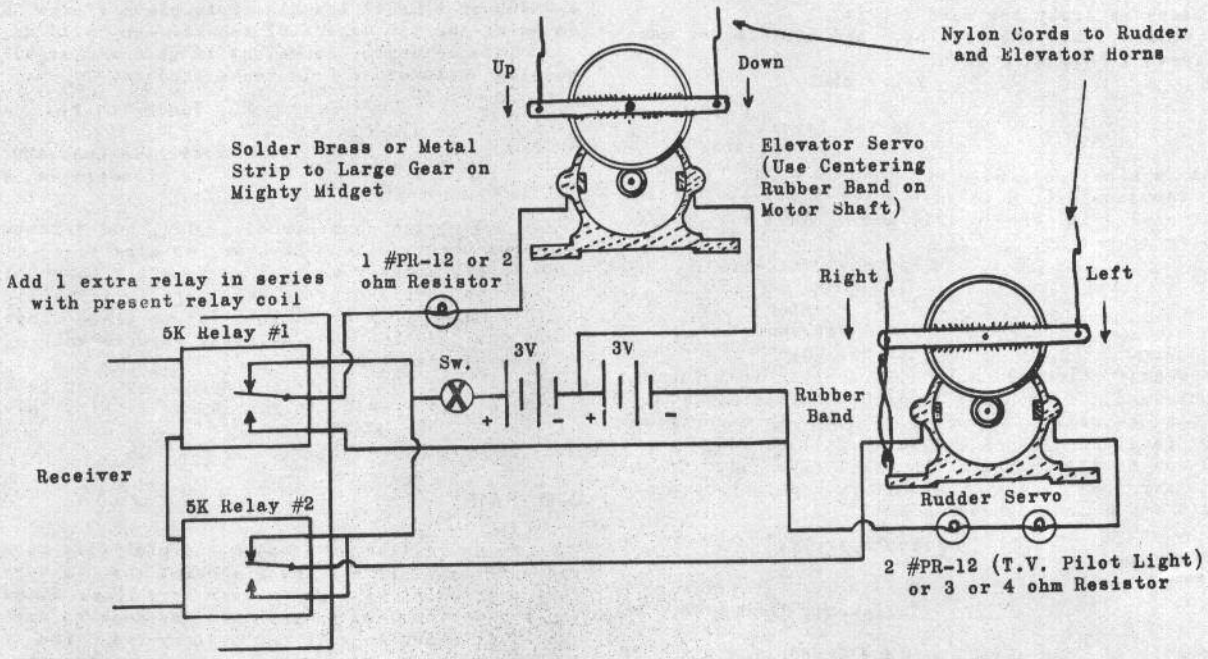
Sincerely,

Don Brown
Pitman, New Jersey

Thanks, Don, for the tips. I'm sure that the Wavemaster users, and there are many of them, will be very glad to find out these excellent suggestions.

Delafield Dual Proportional System

NEIL'S SERVOES ARE ULTRA SIMPLE



Here is a switch from Neal Delafield of Beaumont, Texas on the Galloping Ghost system. Instead of using pulse rate for elevator, pulse rate here is used for rudder. When using the Mighty Midget for regular servo as shown in the sketch, the slow rate of pulsing allows the rubber band to pull down, thus giving proportional right rudder. Faster pulsing overcomes the pull of the rubber band and gives neutral. Still faster pulsing gives left rudder. Pulse width is used for the elevator withoug any apparent interaction.

In wiring the Mighty Midgets, the correct battery polarity is that in fail safe or no signal condition, elevator servo will give full up and rudder to full left.

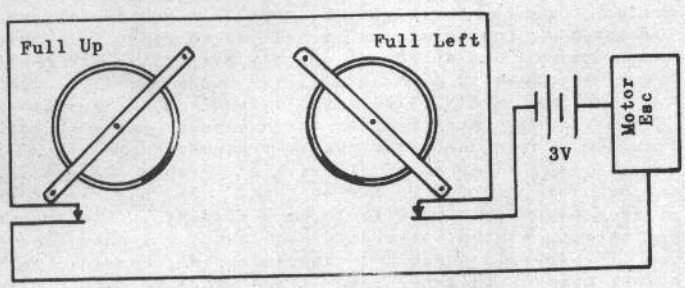
Neal says the boys who are using the Galloping Ghost system are using their control boxes as is. Anyone else would need only to assemble the control box add one relay to their receiver and connect up two Mighty Midgets or two Sage Actuators in their planes. A Brayton Paul Flyball Actuator could also be used for the rudder servo very nicely.

A normally closed switch in the control box to give a momentary full off signal with the motor control if two leaf type switches are added as shown in the sketch.

When using Mighty Midget motors as the actuators, the motors are used as is with the exception that brass or metal strips are soldered to a large gear. For the elevator servo, it is necessary to use a neutralizing rubber band on the motor shaft.

This is a very unique approach and we feel our readers will like it very much. Let us know of your results.

Wire the Mighty Midgets with correct battery polarity so that in fail safe, (No Signal) Elevator Servo will go to Full Up and Rudder to Left.



A normally closed switch in control box to give a momentarily full off signal will give motor control if two leaf type switches are added as shown.

TR COMMENT

Received a new TR 4.5 and after seeing the kit couldn't wait and just had to put it together the same day.

Went together real easy for even a dub like I am, and works to absolute perfection.

Fabulous is truly the word for it.

The design, kit engineering, and performance make it the finest I have ever seen.

Yours truly,

Ted Van Tassel
Centralia, Illinois

Just a short note with one thought - The TR 4.5 is actually fabulous!!!! Have just built this receiver for test purposes - it should sell hot. Why not design transmitter to match?

Yours sincerely,

J. W. Preston
J & J Hobbyhouse
Attica, Ohio

I recently purchased a TR 4.5 receiver from you and am very pleased. I am using 3 mercury batteries (1.34V) of 3600 mah capacity for power. Range is exceptional and the receiver responds equally well to audio tones from 220 cps to 635 cps using an Orbit type audio transmitter. Expected life of the battery-receiver combination would run over 100 hours - WOW!

Yours truly,

Chester M. Tuthill, Jr.
Tullahoma, Tennessee

Recently I purchased a TR 4.5 receiver kit. In general, I have been very satisfied with it, however, there are some things that might be of some interest to you. One of the main ones is that of cold weather operation. Up here most of our flying is done in the winter time as then the lakes are frozen and we have a reasonable place to fly. Upon testing the completed TR 4.5 in about 15° weather, I found that it was quite temperature sensitive below 20°. This has been cured by the use of a common CK722 transistor in place of the supplied T0037 transistor in the second audio stage (TR 3). I have checked the modified model at 40° below zero and it still was functioning reliably. All temperature checks were made with the aid of a new General Cement product called Circuit Cooler (G. C. #8667) which is designed for locating intermittents in television circuits. This when sprayed on an object quickly evaporates and cools the object down to a maximum of 40° below zero.

If you would like I shall send you the results I have on 50 mc. when I get the necessary parts up here from the states and the receiver converted to six. I have already flown on 27.255 with a 26" span plane using an .020 for power. So far so good. Well that is about it from here. On myself I am a student in Electronic Engineering at the University of Alaska. I have been a Ham for several years and done some radio control work before using both tubes and transistors in common circuits, but all transistor circuits were just beginning to interest me a few months before the TR 4.5 came out. Hoping that I can be of some help to you in the future in any cold weather tests or information if you ever need any.

Sincerely yours,

Gail A. Graham
Spenard, Alaska

Thank you, gentlemen, for your comments on the TR 4.5. We've had many fabulous reports on this from others other than yourselves who were highly pleased with the TR.

SIMPLE MONITOR

Here is a little gadget that we have been using for a while and find it nice to have while flying tone. You can hear your tones--Drift or Sigh! No tones--Crunch!

'Tis a simple addition to the Ace PSM kit. Just omit meter and insert small radio speaker and use either a 2N109 or a 2N217 transistor in place of the CK722. I am using the 1½" Argone 61 speaker--any will do fine.

This is worth its weight in gold and might be worth passing on to other Grid Leaks readers.

Yours truly,

William Luscombe
Ft. Lauderdale, Florida

We tried your circuit, Bill, and find that it works beautifully. However, we also tried it with a larger speaker and got quite a bit more volume.

We're planning to develop a fuller article on this and present it in a future issue since this is one of the most painless ways we know of getting a monitor for audio signals and it works nicely for CW signals since a loud pop is heard. And as you said in your other letter, "Hi-Fi on 27.255, WOW, MAN!"

GLO PAINT

We would like to pass a helpful idea along to the radio flyers. It's a day glo paint that is very bright, fuel proof, and will go on over Aero Gloss without causing a reaction. To be safe let the dope be dry a day or two. It comes in a 16 ounce spray can. The trade name is Sunbonded Day Glo Spray Paint made by the Switzer Brothers Inc. of Cleveland, Ohio. We obtained ours at a local hardware store.

Yours truly,

Charles G. Hirsch
Houston, Texas

TRIPLE TREAT

I recently obtained, through Steve's Hobby Shop here in San Leandro, three of the MarcyTone filters, and my experiments with them confirm my hope that they are the answer to the audio selection problems in a system I have been working on for quite a while.

This system is a triple proportional, triple simultaneous, multi-tone rig, and is based on simple circuitry, with no electronic trickery. So far it seems that its only disadvantage is that it does require a lot of parts, but you just don't get something for nothing.

The transmitter is in an advanced "bread board stage" now.

I would be happy to share the final circuits with you when the bugs are all gone. Some of the features are, no servo drain at the center positions, electric self-centering, fail-safe by nature without special fail safe circuits, and adaptable to many existing transmitters of the MOPA type.

Grid Leaks is excellent as is--Don't change it!

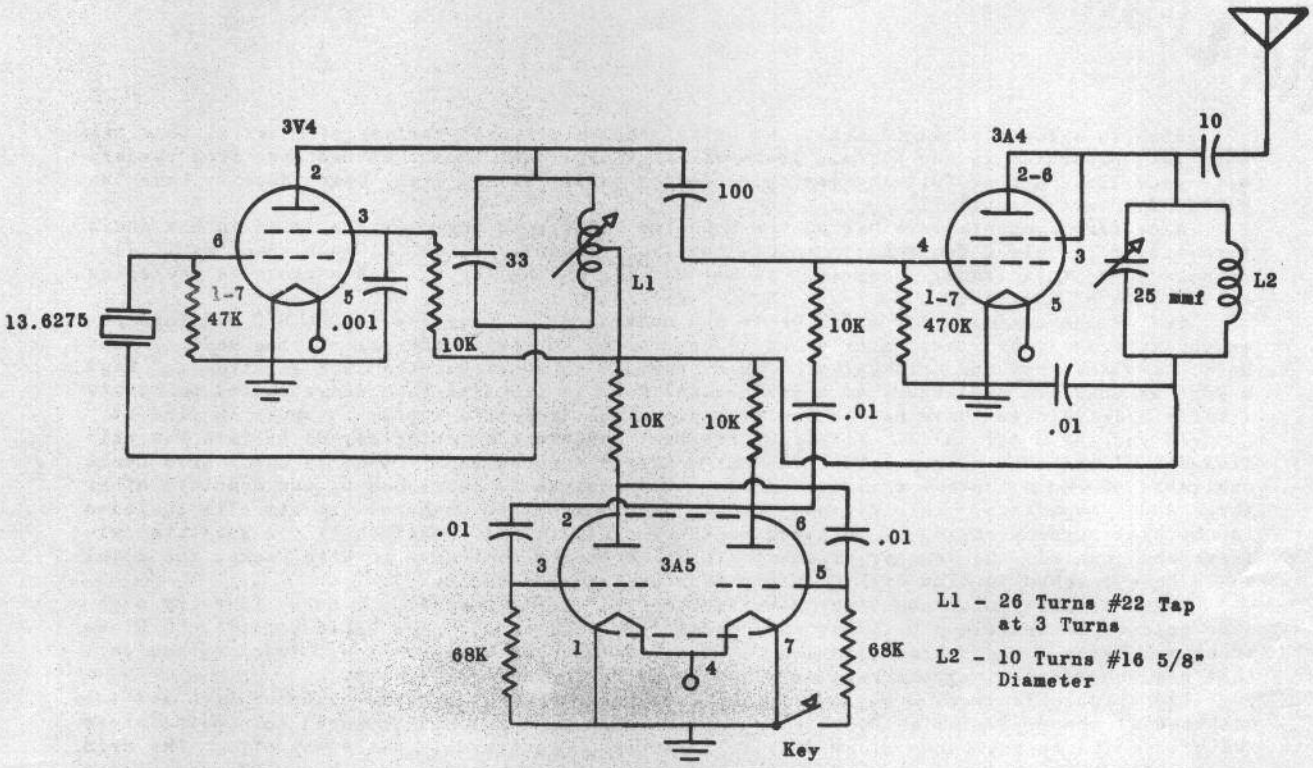
Sincerely,

Herbert E. Newell
San Leandro, California

Herb, please keep us posted on the multi-tone rig. This sounds very good. It's something that we know our readers would be delighted to have more on because more interest is being evinced in this type of circuitry.

Audio MOPA Transmitter

DESIGNED FOR TR BY DALE SPRINGSTED



With the advent of the TR 4.5, and its instant acceptance and popularity among the R/C fans, there arose a need to develop a transmitter for this particular unit. The existing MarcyTone could be adapted to [illegible]erate by changing three components, however many [illegible]ders requested a special transmitter designed for the TR 4.5 which they might build from scratch.

Commercially available transmitters such as CG's T-12, Deltron T109, and the Bramco Regent all fill the bill for commercially operated units.

However, much of the fun of R/C lies in building such units. We asked Dale Springsted of Schenectady, New York to see what he could come up with a simple circuit that would do the trick. The circuit that you see at the top of the page is the result.

A simple 3V4 crystal master oscillator using a 13 mc crystal which means there is no danger of over-driving and therefore within the tolerance requirements under the FCC regulations feeds into a 3A4 power amplifier for stability. This is modulated by a 3A5 multi-vibrator with a fixed tone.

Tone could be made variable quite readily by changing one of the 68K resistors to a 100K variable pot.

It was felt advisable to use the 3V4-3A4 combinations instead of a single 3A5 to achieve a greater power still modulating 100% at about 500 cycles per second.

No particular construction ideas will be given since the layout is straight forward and may be done on a metal chassis with the 3V4 and the 3A4 on one end of the chassis and the 3A5 set off to one side of the 3A4.

Selection of components is not critical, however, 13 mc crystals must be used which will double then to the frequency. Incidentally, it is not required that all transmitters under the FCC regulations must be MOPA.

Checks with the Wright engineers show that the new Commander circuit is legal and will continue to be legal since it is under 3 watts and has more than the .005 tolerance.

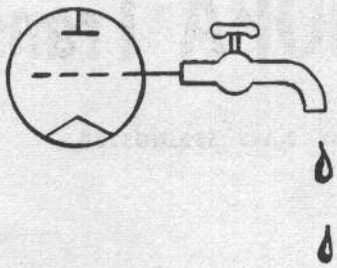
We note with interest, too, that Citizen-Ship's one-tube transmitter and Babcock's one-tube transmitter have also been declared perfectly legal.

The Springsted TR transmitter may be housed in a hand-held cabinet or may be built into a larger ground based unit and up to [illegible]lts or more may be applied for optimum power. It may also be used with a vibrator power supply which is well filtered.

If enough interest is evinced in this particular circuit, we shall entertain the idea of offering a kit for this particular unit. Won't you please advise us of your interest in this circuit?

With the coming of transistorized receivers, audio is going to see increasing use. Also, if we're going to have selective circuits and incidentally there are rumors of several that are in the works, tone will probably be the answer since CW doesn't look like it will be capable of handling it. So tone, during 1959, we feel, will make marked strives forward. We believe Dale's transmitter is one that will find warm reception with the modelling public.

Grid Leaks At Play



With this issue of Grid Leaks we bring you the greatest variety of material that has ever been presented in our pages. There was an exceptional amount of response from readers with good ideas and we felt it wise to reproduce their letters with their ideas to take the place of "Short Circuits".

Many fine comments were had on the McGeorge article in the previous issue on his audio transmitter. Only a few seemed to dislike that the article took as much space as it did. To make up in this issue, however, we are working on the theory that variety is the spice of the life of a magazine.

One of the articles for which we've had considerable requests is the R/C Bibliography which lists articles that detailed radio control in American Modeler, Flying Models, and Model Airplane News and Grid Leaks. This provides an index for the 1958 magazines. Most R/Cers we know are collectors of magazines and many is the time when we've wanted to locate a certain article and have had to leaf through almost a year's supply in order to find it.

If you leave off model airplane and boat construction articles, we believe you will find one of the reasons why Grid Leaks has achieved the popularity that it has. Grid Leaks published 45 radio control articles during 1958 against 39 published by the combined other three model magazines. This did not include Short Circuits. Some of the circuits included in the bibliography could be classed as short circuits and therefore if you use this criteria and counted the number of short circuit articles that were in Grid Leaks, the total would have reached 74 bits of R/C information as compared to 39.

There is much furor about the new frequencies. Craft, Model, & Hobby Industry magazine printed an article containing statements from CitizenShip, Ace Radio Control, CG Electronics, Essco, and Babcock Models. Of the five manufacturers polled, four of them felt that new equipment along the receiver line would be forthcoming shortly.

The Wright Electronics engineers, who have been working on a pre-selector, are not too enthused at the present time because every time they get selectivity down to a point where the extremely narrow band allowed us is effective, sensitivity falls way off. The Grid Leaks contest which was announced in the last issue still stands and a WAG TTPW transmitter and receiver is available to the designer who will offer Grid Leaks a selective circuit.

On the new frequencies, it is well to note that a transmitter need not be an MOPA provided certain circuit design qualifications are met. CitizenShip and Babcock and Ace's Commander all meet the new FCC requirements of falling within the .01 tolerance for under three watt operation.

Because of the variety of ideas presented in this issue, the trade notes page was omitted. However, many new items have appeared that are worthy of mention. Orange Blossom's TTPW Actuator at $10.95 is seeing increasing use daily. Jaidinger Manufacturing Company has released a contact point burnisher at 70¢. Flat box covers for the Hillcrest flat battery boxes are available at 25 [illegible]ach. Hoffman's HB2 silicon diode is available at 95¢. Duramite capacitors have come out with Silver Micas in 50 and 75 mmf.

We've been fortunate in a special buy on 1-0-1 meters that are made by General Electric and are just the ticket for pulse work. You can stick these in the relay of the pulser or the relay of the receiver. It allows you to line up [illegible]%. At $4.95, the stock won't last long.

Also surplus, but still a good buy, are some BB54A 28 ampere hour batteries at a Grid Leaks special of $4.95. This is a Grid Leaks special and should be so designated in your order.

Some Sigma 5F relays containing two 8,000 ohm coils which might be hooked up as a 4,000 ohm, 8,000 ohm, or 16,000 ohm relay have begun to show up in bran[illegible] surplus unused which are just the ticket for pulsers and other applications where weight is no factor. They may be adjusted for a drop-in and pull-out of less than 1 ma and list for $5.95.

Other items are the E. D. Clock-work Escapement for boat work which provides left, neutral, right with a strong spring motor at $11.95. Also the E. D. Compact A 2PN type servo at $10.95. Cobb 2P and 3P escapements have also been added at $5.95, the tail wheel and brake assembly manufactured by Cobb at $1.85.

As Grid Leaks continues to grow and the subscribers increase, it looks like the ideas coming from our readers increase. We feel this issue is evidence of that fact. We want you to realize this is your magazine. We invite your comments or your criticisms in order to help us improve it and thus serve you better. Won't you share that pet circuit of yours with other R/C experimenters throughout the world? We'll be waiting to hear from you.

Yours very sincerely,

Paul

Paul F. Runge
ACE RADIO CONTROL

New Multi Hookup for Bonner Servo

BY DONAL D. KAVANAGH, W2OIZ

Have some information on the wiring of Bonner servos which you might pass on to the clan via "Grid Leaks". It is not the least original with me, as a matter of fact, it is just using the same wiring system on Bonner's that the new CitizenShip servo uses.

As you know, there are several hazards attendant on the use of the Bonner Servo, i.e.:

(1) A dead short due to a stuck relay. Due to the rather heavy stall current of the Bonner motor there are frequent arcs at the relays. This has, on several instances in my experience, resulted in a relay sticking closed. If this happens in flight the natural reaction of the pilot is to give the opposite command, which in turn closes the other relay in the servo circuit. With the recommended system of wiring, this causes a dead short across the two relays and if you're using high current batteries, such as Nicads or Silvercels, the two relays will fuse together, making a permanent short which will probably ruin the batteries before you can get to the wreck, and in any case will prevent any other command from operating, such as low speed motor.

(2) If a relay does stick, you're stuck...Even if you don't fuse the two relays closed, you must stand helplessly as the model comes in with a surface locked in a full position. If this happens to be down elevator or an aileron, you're dead.

(3) With the present set-up there are many instances of momentary shorts. For instance if your transmitter is a bit off tune two adjacent relays will close together momentarily. After this has happened a few times the contacts are badly pitted and the spring, on the older Gem's anyway, lose their temper and a stuck relay is imminent.

(4) The present system requires 8 wires. Unfortunately, most of us use 7 pin plugs, so where are you?

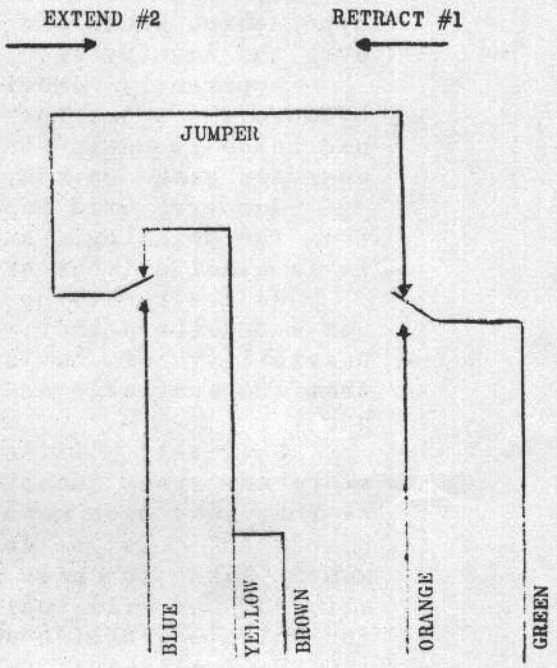
The CitizenShip system gets around all these problems. It can only be used on type of Bonner, however. As you know, The Bonner Servos have come out with several types of printed circuit boards. I believe that it is the newer series which are the ones we can use. If your servo has the old printed circuit board, I'm sure that Howard Bonner can supply the one needed for a nominal fee. The one we need is the one with the double, L shaped printed contacts and the staggered wipers. If you wire to the servo as per the attached drawing you get the following advantages:

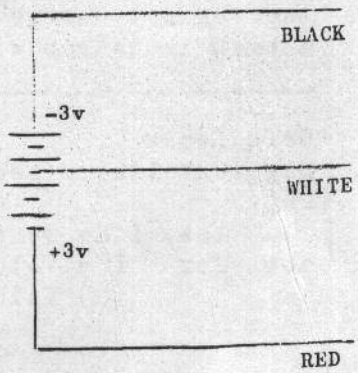
(1) Under no conditions do you get a short through the relays, even momentarily. This greatly increases the life of the relays and reduces the probability of one sticking in the first place.

(2) Even if a relay sticks you've got a 50-50 fighting chance. If relay #2 sticks closed, which we'll say is the full down condition, giving the opposite command, i.e., closing #1, will make the servo drive to the opposite limit, that is, full up. Hence if you lock in full down you can send pulses of up and bring the plane in with some semblance of control. Also the batteries are not shorted so that other controls function normally.

(3) Only 7 wires are needed.

By reversing the orange and blue leads you can change which direction you have override in. Normally of course, you would make up override down and select override against the direction of any normal turn tendency of the airplane for the rudder. On rudder and aileron it at least increases your chances by 50%.





RERUN BACK ISSUES OF GL?

The reception that readers have given Grid Leaks has been most heart-warming. The birth of our original idea was several years ago and we felt at that time that a magazine of this type which would share technical information with readers all over the country should find a ready field.

Apparently America's and the World's R/C'ers are ready because the subscription list is now far in excess of what we had hoped it would be by this time just a little bit over a year ago since we started.

However, Grid Leaks is only a self-sustaining proposition from the printing standpoint and all the work that goes into it is still a labor of love.

We are receiving so many requests for back issues from new subscribers that we feel it is advisable to consider the possibility of having a re-run made. Currently only issues that are available are Volume I, Number 6 and Volume I, Number 7.

Obviously, it is understandable that room is required to store any great quantities of back issues and, therefore, no re-runs have been made and no re-runs in large volume are contemplated. But we do desire to accommodate those of you who would like to have back issues and so if enough interest is evinced, we will pool the plates and run the required copies for which we receive orders.

We feel that, in view of the shorter press-run involved and in view of the fact that a lot of this work will have to be more time-consuming than a normal length run would be, we will be compelled to ask 35¢ per back issue of Volume I, Numbers 1 through 5.

If you desire back copies, won't you please indicate on the coupon below or if you don't care to deface your copy of Grid Leaks by using the coupon, give us the information on a separate sheet of paper and enclose 35¢ per issue desired.

It will be announced in the next issue of Grid Leaks whether or not enough back issue orders have come in, and if such a back issue run will be made.

Grid Leaks
Higginsville, Missouri

Yes, I do want back issues of Grid Leaks. Please put me down for ( ) Volume I, Number 1 ( ) Volume I, Number 2
( ) Volume I, Number 3 ( ) Volume I, Number 4
( ) Volume I, Number 5

I understand these are 35¢ each and enclosed herewith is my check, money order, or cash.

Name_____

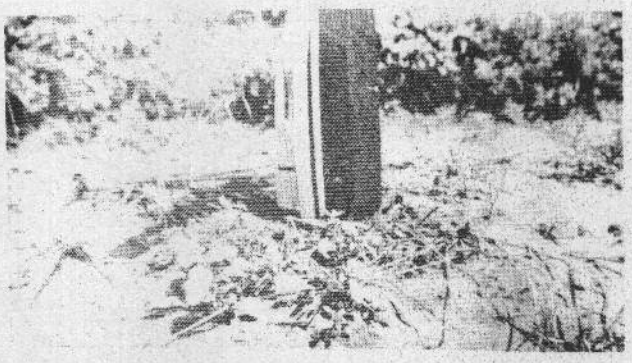
Address_____

City_____ Zone_____ State_____

MORE ON UPOMA

When Grid Leaks, Volume I, Number 7 printed UPOMA, we did so with a little bit of tongue in cheek because humor sometimes isn't fully appreciated. However, from the comments we've received from readers, they really did appreciate the UPOMA article and while the author must remain anonymous I'm sure he, too, is appreciative of the comments that were made.

We present a picture and some of the letters we've received on this interesting aspect of model aircraft radio control.



I thought I would throw in a picture of a real good crack up.

This is one of DMECO'S Live Wire Trainers. A really good model to built and fly. I have one of Ace Radio Control's two tube receivers in the R/C gear. Everything was working fine, but when I did a loop, the wing came off when it pulled out of the dive.

This plane was up about 150 ft. You see how it went in the ground. And it really rolled up the R/C gear. The cause---just not enough rubber bands on the wing. And what hurts the most is that I have 1/4 lb of these bands.

I just wonder how often this has happened across the country. I know it cost me about $12.00 for a little mistake on my part. Most mishaps with flying are me instead of the plane or the R/C gear.

Sincerely yours,

James Leroy Hubbard
Kingfisher, Oklahoma

A CASE HISTORY OF---UPOMA

(Written in an effort to collaborate and substantiate certain theories set down by an anonymous writer in the last issue of Grid Leaks.)

According to the UPOMA mathematical formula advanced in issue 7, my rig sported a UPOMA factor of 576 since it consisted of a TTPW receiver with the output tubes driving 19 transistors.

Everything was perfect on the ground - full dual proportional control of elevator and rudder, three engine speeds, and instantaneous electronic neutralization of control surfaces on fail safe with the motor control also going to a low fail safe speed. Distance checking showed no signs of UPOMA, running engine at each of its three speeds disclosed nary a sign of UPOMA. Why should they? Hadn't the set up shown perfect scope pictures? Hadn't bench test upon bench test proved valid? Hadn't each of the 19 transistors been "hand picked" and painstakingly checked for leakage and gain? Hadn't all circuits been carefully temperature compensated? Hadn't multiplicity of meters been used to insure saturation of all stages? Hadn't -- oh well, time for the take off.

Clear day, no wind, final checks, and no UPOMA present. The moment has arrived. The button is jabbed and the idling Fox 59 roars to a full throated mighty roar. Down the runway the 7 foot, 11 pound, Cub flashed, and shortly is airborne. What? A left ground loop tendency? Oh well, nothing to it with proportional - a little right and a touch of up smoothly applied takes care of that. UPOMA is defeated!

Next, a few climbing turns. Whew, relax a bit, and enjoy it.

Say it's getting down field a bit - give it right and head it back. Hey, right, not left - not left. And up - now down - up. What's going on here anyway? Oh well "fail safe" will soon fix that. We'll outsmart UPOMA yet. Oh NO - the motor control is oscillating, the surfaces aren't neutralizing, and it's coming DOWN in a tight spiral dive - down, down, and down.

What a delicious wreck - a real complete "total". As it is wrapped up in a sack, the sad truth slowly dawns---UPOMA wins again.

Please extend my congratulations to the author of the enlightened and well researched article on the subject UPOMA.

My past experiences have given me incentive to study this phenomenon and to speak with a bit of authority on the subject.

It is my considered opinion that UPOMA is but a specialized manifestation of a phenomenon I find extending throughout all human activities. It perhaps can be best expressed by a definition from some poor hard luck soul from the distant past which I know as "Murphy's Axiom". The definition follows:

> "Murphy's Axiom": The contradictory of a welcome probability will assert itself whenever such an eventuality is likely to be most frustrating.

It may also be stated: The outcome of a given desired probability will be inverse to the degree of desireability.

Or in brief laymen's language: If it can happen--it will.

Hoping I have contributed a bit to this field of knowledge, I am

Very truly yours,

E. C. Spann
Address Misplaced

PRINTER ERROR IN MCGEORGE ARTICLE

There is one error which occurs three times that you may or may not want to issue a correction on -- It is first shown in the last paragraph of the 2nd page:

"They are: Condenser (10) for adjustment of rf excitation of the control grid, etc.

That should read:

"They are: Condenser (19) for adjustment, etc.

It appears again at the very top of page 3 and again at the very bottom of that same column.

McGeorge
Highland, Indiana

VIBRATION TIP

From Joe Curtis of MC Manufacturing & Sales comes this timely tip.

" Loose slugs in all internally threaded coil forms may be made 'good as new' by the insertion of a strip or two of polyethelene, similar to plastic bags available, placed along side of the slug on one or both sides of the coil. Cut the strip long enough so one end remains out of the coil. Then screw the slug into the coil in normal fashion and cut off excess 'poly'. This works every time."

DOIG'S TRIPLE

I read with interest a letter on proportional control in Volume I, Number 6 of Grid Leaks by A. G. Roberts, Toronto, Ontario, Canada. I wonder if you could furnish his address. I am the West Coast flyer working on the triple proportional radio and thought he might be interested in some of the results.

I am currently working up an article for one of the model magazines and it should be published before long. The system is exactly like the one described by Mr. Roberts and works quite well. We had one triple system in Howard Bonner's Smog Hog for some time but a transistor fell out of a socket in mid-air and as Howard says, "The field tipped up and he ran right into the side of it." That washed out our flying platform and taught me to solder transistors in. I am currently flying a single channel version in a Champion and am having a ball. One control axis is about all my ability can handle at present. I have the triple in a Cruiser but I flop around the sky like a loose tooth with too many controls to worry about.

Frank Hoover has been working with my system for some months with good success. I have a 4 channel finished for Bonner's Astro Hog but we are waiting a new development in servos he is working on. Sanders of the LARKS had a single channel job at the NATS but had transmitter trouble and didn't fly. As far as I know only Hoover and myself are doing much flying with the system but as soon as the article comes out I expect quite a few. The system has some advantage over the WAG because of the number of controls possible. The controls also do not dither but stay quiet until moved. The accuracy is about one degree at present and the control is very linear. The 4 channel receiver weighs 7 oz. and the single 4 oz. Slightly modified Bonner servos are used for control power and the system has no relays or contacts other than the motor brushes and servo limit switches. The stick control is quite clever (Bonner design) it will return all controls to within 1 degree of fixed neutral when released. The centering is really positive. Fore and aft is up and down. Side to side is ailerons and rotating the stick gives rudder. Tow push buttons give fast or slow motor trim. As to size, the 4 channel receiver fits into an Orbit Receiver can and the transmitter is in an Orbit Transmitter can also.

The system has been in operation about a year and seems quite reliable although not enough field time has been put on it to make any wild statements.

If you could furnish Mr. Robert's address or foreward this letter to him for contact I would appreciate it.

Regards,

Alfred Doig, Jr.
Culver City, California

Al, thanks for your run-down on your new system--we know our readers will look forward to seeing a copy of the circuit which you mention as coming--we enjoyed our preview. Believe many of the advanced R/Cer's will have a ball with it.

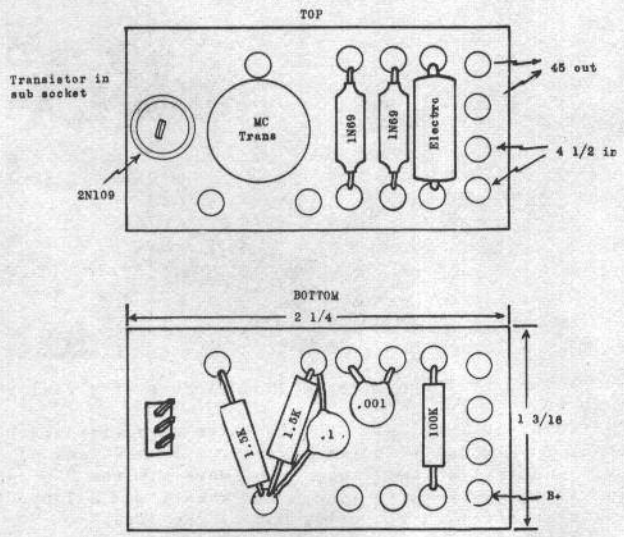
POWER CONVERTER BASE

Here is a rough illustration of my hook up of the MC transformer without the PC base. This is much smaller and just fits in one of those plastic boxes that you find at the hardware stores with bolts and screws in them. I didn't make any attempt to show the wiring for it is so simple. After the board has been cut and your socket put in place the round holes on the sides are 3/32 brass eyelets. The high and low connections I didn't bother because I intend to operate only on the high so I soldered it in permanent. With this set up which is so easy to construct and protect, using the 1N69 diodes and a 2N109 transistor, I am not going to tell you the output because you wouldn't believe it, but it is many times the ma that your specifications show and I can't find any signs of heating.

Thanks for your past favors, I am

Art Beckman
Indianapolis, Indiana

Schematic appeared in GL Volume 1, Number 4



SIMPLE PC BASES

Each issue of Grid Leaks gets better - no hog wash, I really mean it!

Notice that you are going to have an article on PC and so am offering a technique that I learned from Sid Berwick of our club. Have made three different boards using this method and it works out real swell.

1. Cover board with regular masking tape.
2. Trace or draw pattern using carbon paper.
3. Cut out island areas with a sharp knife and peel island tape away.
4. Press remaining lands down firmly.
5. Soak in strong feric chloride solution until exposed copper is dissolved (no certain percentage solution - heat solution to hasten action)
6. Rinse well with cold, clear water.
7. Peel off remaining tape, center punch holes, and drill.
8. Lightly sand and clean land areas and you're ready to mount parts.

That's about it - only to let you know of 4 mags and 12 newsletters I receive each month, I value Grid Leaks the most.

Yours for R/C fun,

Doug Borowick
Hayward, California

Our thanks, Doug. Had hoped to have an article on PC this issue, but just didn't make connections on copy. Your system should help out--very simple. Also have used some 1/16" Scotch tape available at large office supply stores. Not as flexible as your system, tho.

RC Bibliography for 1958

INDEX COVERS RC IN MODEL MAGS

1958 saw many items of radio control interest published in the various model magazines and in order to make these more valuable as reference material, Grid Leaks is performing a service by compiling a bibliography of these articles. Look under the appropriate heading to find the articles that you want to locate.

While every attempt was made to include most of the major articles and schematics, no guarantee is made that all were included. Nor is the accuracy of this list to be 100%. It has been checked and double checked and is as infallible as human frailties can make it.

R/C PLANES

Aeronca "K", by Doris and Ed Yulke
.15 Powered Scale
AM 5-58, p. 12

Astro Hog, by Fred Dunn
.35 Powered Multi
MAN 4-58, p. 15

Coon's Team Racer
Installation only
MAN 2-58, p. 26

Duet, by Ted Strader
.15 Powered Bipe
FM 5-58, p. 15

Flying Razor, by S. Calhoun Smith
.19 Powered Fokker D8
AM 3-58, p. 28

Goucho, by Jose'Iriorte
.35 Reversible Dihedral
MAN 11-58, p. 16

Great Lakes Trainer, by wm. C. Northrup, Jr.
.09 Powered Bipe
AM 6-58, p. 14

Guided Mite, by Bob Coon
.020 All Balsa Job
FM 4-58, p. 15

Mac's Minnie, by Howard G. McEntee
.020 Shoulder Wing
AM 7-58, p. 30

N3N Yellow Peril, by Bob Coon
.06 Bipe Navy Trainer
FM 1-58, p. 9

1/4A R/C
Strader's Droopy, Willard's Breathless
GL Vol. I, No. 3

P51 Mustang, by Ted Strader
.09 Low Wing Scale
FM 2-58, p. 9

Radio Roger, by Frank Ehling
Diesel .075 For the Novice
AM 4-58, p. 26

Tandem Bomber, by Walter L. Eckmeier
2 .049 Engines, Semi Scale
FM 10-58, p. 15

Twin PB1, by Walter Eckmeier
2 .049 Engines Sea Plane
AM 1-58, p. 22

The Victor, by Robert Drews
.15-.19 Engine Beginner's Model
MAN 2-58, p. 20

R/C RECEIVERS

All Transistor Reed Receiver, by Neil Delafield
GL Vol. I, No. 6

*Borger 50 mc Gas and Transistor Receiver
FM 2-58, p. 28

Converting the Tech Two to 27
GL Vol. I, No. 2

Everyone's In On The Act, by Howard McEntee
Tech Two on 27 and 220 mc
AM 1-58, p. 20

*Grogan Audio Receiver
AM 8-58, p. 37

Lorenz Two Tube 1958 Model
MAN 5-58, p. 24

*Lorenz Transistorized
MAN 7-58, p. 19

*Lorenz Transistorized Relayless
MAN 8-58, p. 17

MarcyTone Single Channel System, by Marcy Inkman
GL Vol. I, No. 4

MarcyTone Multi Channel System, by Marcy Inkman
GL Vol. I, No. 4
GL Vol. I, No. 5

Multi or Single Channel Audio Receiver, by Max Boal
GL Vol. I, No. 4

PC Boards for Transistorized WAG, by Bill Bertrand
GL Vol. I, No. 5

PC Boards for Herzog Transistorized WAG, by L.D. McMulkin
GL Vol. I, No. 3

*Page Audio Receiver
MAN 5-58, p. 24

Pearce Reed Receiver, by George Pearce, Jr.
MAN 1-58, p. 32

*Pullen All Transistor Receiver
AM 8-58, p. 37

*Rockwood Audio Receiver
MAN 5-58, p. 24
MAN 7-58, p. 42

Transistorized Commander Receiver
GL Vol. I, No. 2

Transistorizing Hard Tubers
GL Vol. I, No. 7

TR 4.5, by Don Kamm and Red Costlow
GL Vol. I, No. 5

TR 4.5 Tips, by Red Costlow
GL Vol. I, No. 7

WAG Dual Tests with Simple Equipment, by Walt Good
GL Vol. I, No. 2

We Try Aeromodeller Transistor Receiver
GL Vol. I, No. 1

*Schematics only

R/C TRANSMITTERS

Antenna Design Considerations, by Donal D. Kavanaugh
GL Vol. I, No. 6

8 Channel Simultaneous Transmitter, by Max Boal
GL Vol. I, No. 4

Mini Transmitter, by Ted Strader
FM 4-58, p. 18

Springsted's Versatile X, by Dale Springsted
GL Vol. I, No. 3

Twenty Reasons Why Your Transmitter Won't Work
by Howard McEntee
AM 6-58, p. 26

VFO Audio Transmitter
GL Vol. I, No. 6

R/C BOATS

3 B'Air Boats
32" Air Boats Powered with .075
AM 3-58, p. 14

Boom in R/C Boats
Installation in North Star Trawler
GL Vol. I, No. 4

Coast Guard Picket Boat, by Bill Baugham
.099 Marine Engine, 28½" Long
AM 2-58, p. 24

Fast I
.049 Air Power Swamp Buggy
GL Vol. I, No. 1

Forrestal, by Frank Loshek and S. Calhoun Smith
52" Aircraft Carrier
AM 8-58, p. 12

Great Lakes Freighter, by Robert Nelson
Pittman Powered 45" Long
AM 11-58, p. 24

Jersey Coast Kingfisher, by Robert W. Nelson
Pittman Powered Scale
AM 5-58, p. 16

Torpedo Boat, by Herb Lozier
Pittman Powered .40¼" Replica
FM 9-58, p. 23

CONTROL INFO

Aileron Hookup - Slimline
MAN 11-58, p. 58

Cascaded Babcocks, by C. L. Lincicum
MAN 10-58, p. 25

Centering Servoes
AM 4-58, p. 29

*Diems Mighty Midget Actuator
AM 2-58, p. 29

Easy to Make Actuator, by Jim Martin
GL Vol. I, No. 6

Galloping Ghost in a Small Hog, by Don Meador
GL Vol. I, No. 5

*"Hardbottomed" Multivibrator
MAN 6-58, p. 29

Make Your Own Control Box
For Sticktrol Pulser
GL Vol. I, No. 2

Poor Man's "Multi" Control, by Ken Willard
Modified Mark II
AM 3-58, p. 32

Proportional Motor Control for TTPW,
by Gene Britzius and Russ Tobey
GL Vol. I, No. 1

Proportional Relay Eliminator, by Donald B. Borges
GL Vol. I, No. 6

Semi Dual Proportional Actuator, by Neil Delafield
GL Vol. I, No. 4

Simple Double Geared Mighty Midget Actuator,
by Bill Davis and Bob Scott
GL Vol. I, No. 3

Simple Dual Proportional With Sticktrol, by Bernard Fox
GL Vol. I, No. 2

Simpl-Simul, by John Worth
Part 1, MAN 7-58, p. 26
Part 2, MAN 8-58, p. 22
Part 3, MAN 9-58, p. 20
Part 4, MAN 10-58, p. 25

Simpl-Simul Link, by John Worth
MAN 11-58, p. 58

Simpl-Simul with Mini Transmitter, by John Worth
GL Vol. I, No. 6

*Transistorized Servo Circuit, by Howard Van Jepmond
MAN 8-58, p. 18

Transistorized Pulser, by Lt. Col. H. M. Bourgeois
GL Vol. I, No. 2

Trimmable Control Added to TTPW or Single Pulse Systems,
by Louis J. Iandoli
GL Vol. I, No. 6

WAG Dual Servo Design Considerations,
by Lt. Col. H. M. Bourgeois
GL Vol. I, No. 1

What is Proportional Control
GL Vol. I, No. 1

*Denotes Schematic only.

GENERAL

Approximeter, by Ted Strader
Simple Multitester
FM 7-58, p. 27

*Automatic Transmitter Keyer
MAN 4-58, p. 25

Balance That Prop, by Ed Yulke
MAN 10-58, p. 20

Bug Hunting, by Howard G. McEntee
AM 9-58, p. 18

Color Code Primer
GL Vol. I, No. 2

*Day Reed Modulator
4 Tube Schematic
MAN 4-58, p. 26

*DC Power Converter
AM 7-58, p. 31

Develop a Preflight Countdown
GL Vol. I, No. 4

FSM-Valuable, Versatile Test Instrument,
by Gerald McGeorge
GL Vol. I, No. 3

5 Hours, 29 Minutes, by Ken Willard
MAN 9-58, p. 18

Flight to Catalina, by Ken Willard
Part 1, MAN 1-58, p. 14
Part 2, MAN 2-58, p. 15

Here Now - Inexpensive Rechargeable Batteries
Describes Voltablocks and Simple Charger
GL Vol. I, No. 2

*Logarithmic FSM, by John Gauge
MAN 9-58, p. 28

*Leininger Timer for Speed
MAN 4-58, p. 26

Notes on Wet Cell Care
GL Vol. I, No. 5

*Push Button Control, by J. L. McLarty
Not R/C But Looks Like Fun
MAN 2-58, p. 12

Proportional Relay Eliminator, by Donald B. Borges
GL Vol. I, No. 6

Quarter-A R/C, by Howard G. McEntee
Run Down on Weights and Actuating Devices
AM 7-58, p. 18

*Quick Blipper, by Ted Van Tassel
Automatic Quick Keyer
FM 7-58, p. 32

*Relay Adjustment Box
AM 1-58, p. 57

Relays - Their Adjustment and Care
GL Vol. I, No. 4

R/C Glossary
GL Vol. I, No. 1

Servicing R/C Equipment, by Dale Springsted
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