R/C DATA SERVICE

GRID LEAKS

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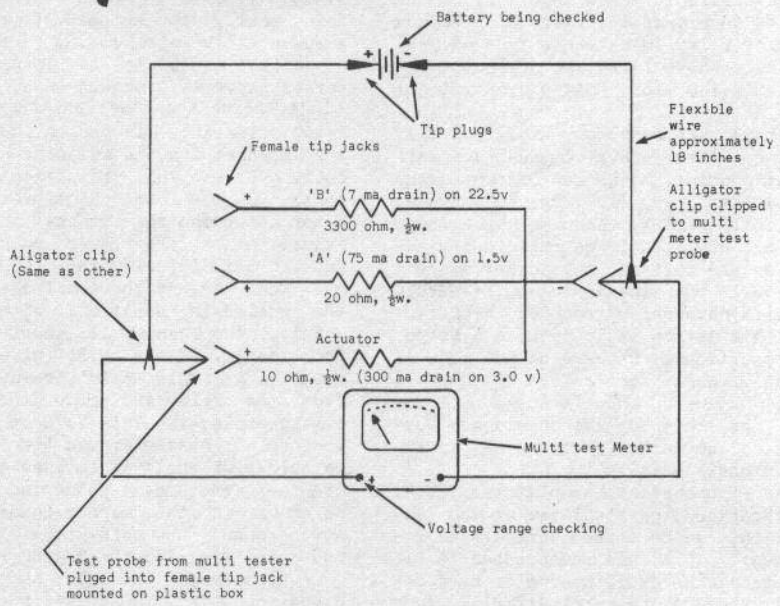
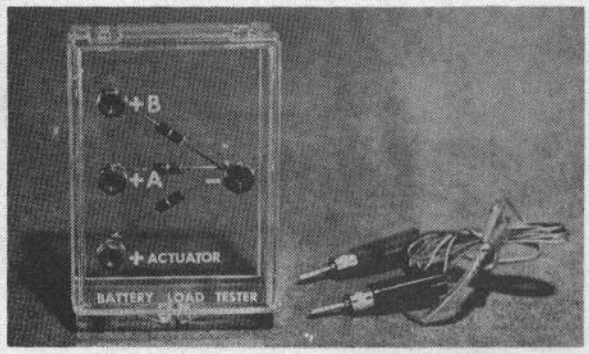
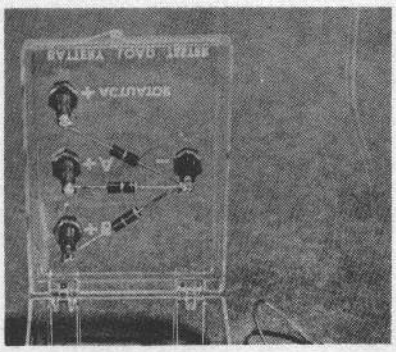
Load Battery Tester

BY STAN JOHN







A small project I use a lot is a resistor loading box for batteries which is used for testing them under load in or out of an installation. It is extremely simple and cheap and may prove to be of interest to your GRID LEAKS readers. I put decals on the cover of the plastic box which I used to install mine in.

You will notice along with the schematic I have included other values of resistors so that the unit can be customized to the needs of the individual. The values shown over each resistor is what is used in my box, which was built principally for the Kraft receiver and for pulse applications. I purposely made the current drain on both the "A" and "B" batteries somewhat higher than what is drawn in the ship so as to be able to be sure of my batteries.

Changes for desired current drains--$R=\frac{E}{I}$

"A"--20 ma @ 1.5 V--75 ohm
75 ma @ 1.5 V--20 ohm
100 ma @ 1.5 V--15 ohm

"B"-- 5 ma @ 22.5 V--4500 ohm
7 ma @ 22.5 V--3214 ohm (3300 stock value)
10 ma @ 22.5 V--2250 ohm (2200 stock value)
5 ma @ 30.0 V--6000 ohm (5600 stock value)
7 ma @ 30.0 V--4285 ohm (4300 stock value)
10 ma @ 30.0 V--3000 ohm
5 ma @ 45.0 V--9000 ohm (9100 stock)
7 ma @ 45.0 V--6428 ohm (6800 stock)
10 ma @ 45.0 V--4500 ohm (4700 stock)

Actuator--100 ma @ 3.0 V--30 ohm
200 ma @ 3.0 V--15 ohm
250 ma @ 3.0 V--12 ohm
300 ma @ 3.0 V--10 ohm

Proportional Relay Adjustment

THESE TIPS COME FROM PRO FLIERS

EDITOR'S NOTE: Dr. Bob Lien and Stan John of the Crescent City R/C Club of New Orleans, both proportional fliers of some note, pass on some tips to those who are in, or hope to be into, proportional flying.

It has long been apparent to us that many of the difficulties encountered in proportional systems could be traced directly to faulty relay adjustment. Type of receiver, actuator mechanics and pulsers are of course important, but 'c'est la relay for most proportional troubles.

Over the years there have been many hints on relay adjustment published, but these have not been adequate from a proportional standpoint. The New Orleans group (Crescent City RC Club) has gradually evolved a system for adjusting proportional relays, and we have found that relay troubles are obviated if we religiously adhere to the system. We are certain that other systems of adjustment do work well but in our hands, at least, this system seems to eliminate relay troubles entirely.

The basic aim of this method is to provide a "hard" relay, strictly for proportional use--we do not know if this system works equally well for relays not used in proportional systems, but we do know it works well for pulse applications. Now that we have unburdened ourselves of this burst of dogmatism, perhaps we can explain to you what the process entails.

We have found that occasional complaints of TTPW and Kickin' Duck interaction, particularly at the extremes of stick motion, can be traced directly to receiver relay malfunction. This has been cured in all instances not by recourse to an oscilloscope or by a new pulser, but by merely redoing the receiver relays to a more permanent and satisfactory setting. Vibration and positional troubles likewise seem to magically disappear once the relays are soundly adjusted.

The crux of the relay changes lies in the creation of the so-called "hard" relay mentioned earlier. The term indicates a relay which has been altered in such a way that it is no longer affected by the many variables besetting it. Most relays, we find, lack this quality of hardness and are more easily affected by vibration, position, minor current variations and all the rest.

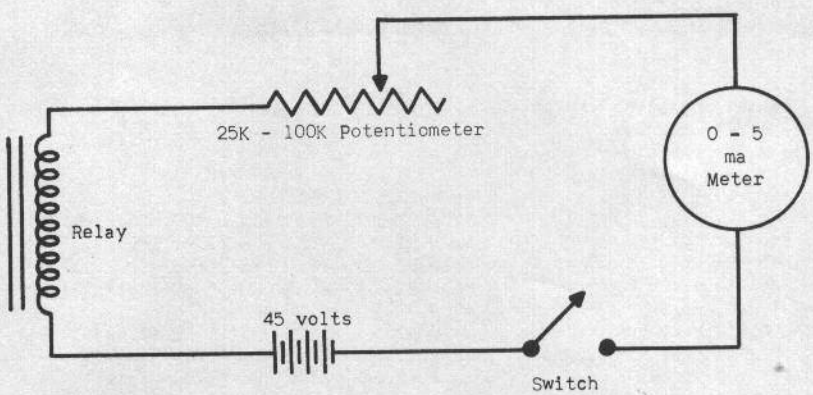
The Gem Micro has proven most useful to us and is utilized almost exclusively for receiver pulse operation. As the relay comes to you it will do a creditable job of pulsing, and one is tempted to leave well enough alone as long as it bangs away somewhat in concert with the transmitter. It is well at this time to reflect on the proportional credo--when in doubt, modify it. This pertains mostly to the ubiquitous Mighty Midget, but will serve equally well here.

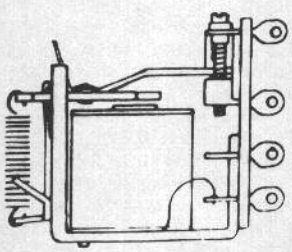
First step is to unscrew the point adjustment screws several turns. Now, using a small screwdriver blade, force the lower point bracket upwards until about 1/16" clearance is present between the undersurface of the bracket and the adjacent upper surface of the relay coil. Screw this adjustment screw in until it exerts tension on the lower point bracket--about one full turn after touching the bracket and seating properly. This assures that the lower point is adjusted under screw tension for minimal virbration trouble.

Now, adjust the armature-pole piece gap so that in the pulled-in position, with closure of the lower points, the gap will snugly grip a strip of ordinary bond paper. This will give a correct gap-spacing of .003". At this point, remove the spring and armature from the relay and solder the point arm solidly to the armature piece. This is best accomplished by filleting the solder neatly around the junction, taking care that no solder or rosin is allowed to flow onto the underside of the armature. Soldering the armature and moving point arm in this manner insures that the armature will never touch the pole-piece in the pulled-in position, and helps make for the "hard" relay desired.

Reassemble the relay and recheck the armature-pole piece gap for .003" clearance, using your bond paper gauge. The upper contact screw is now adjusted so that armature moves only about two bond paper thicknesses to contact upper and lower points.

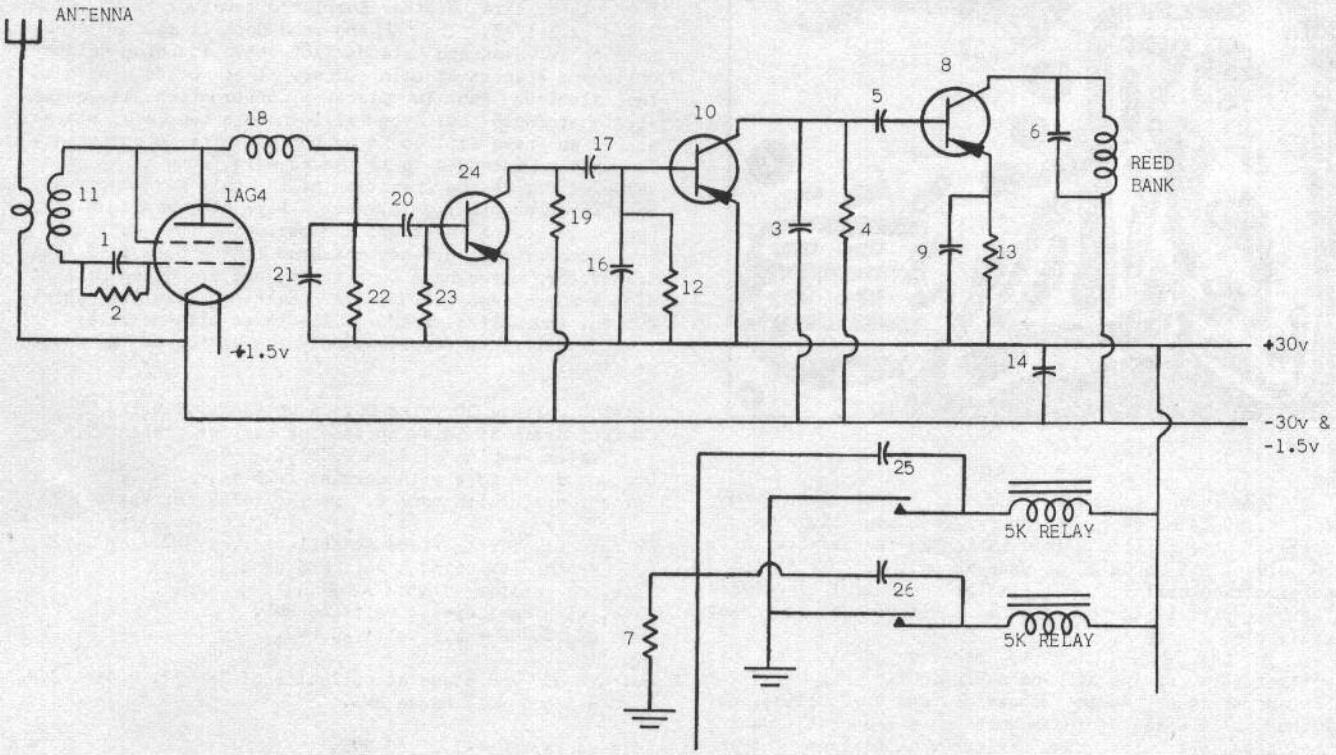
The relay coil is now placed in a conventional adjustment circuit consisting of a 25 to 100K pot, a 45 volt battery and a 0-5ma meter. Pull-in to drop-out is adjusted to 2.0 mils and 1.5 mils. To attain this setting it is usually necessary to trim a turn or two from the armature spring, after which it is soldered top and bottom for permanence. The actual relay adjustments are of course made using a combination of both point adjustment screws and spring tension.

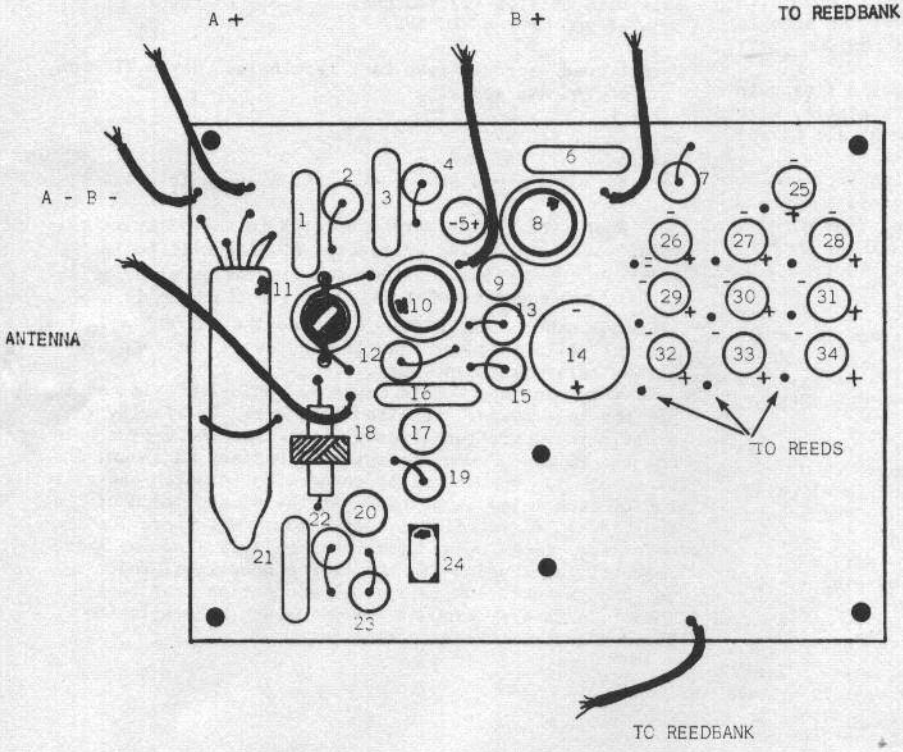




50 mc Reed Receiver

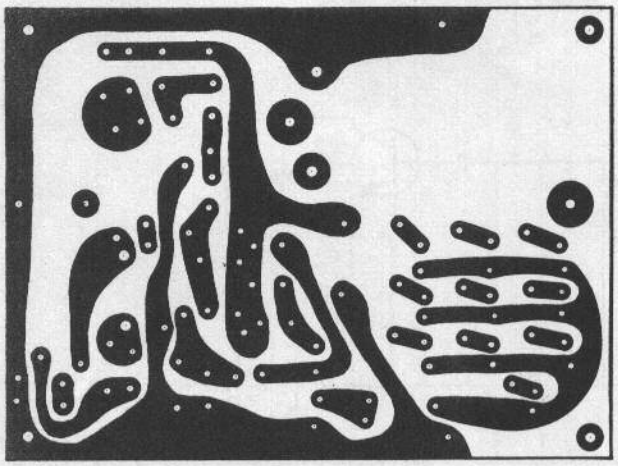
BY DALE SPRINGSTED





1- 100 mmfd silver mico
2- 2.2 meg
3- .01 disc
4- 120K
5- 1 mfd electrolytic
6- .04 - .05 disc
7- 10 ohm
8- 2N44 transistor
9- 4 mfd electrolytic
10- T0037 transistor (Gain 60-80)
11- Tank coil
12- 47K
13- 1.2K
14- 20 mfd electrolytic
15- 100K
16- .02 disc
17- 1 mfd electrolytic
18- 10 - 20 uhy RFC
19- 47K
20- 1 mfd electrolytic
21- .005 mfd
22- 10K
23- 220K
24- 2N217 - CK722
25 to 34- 4 mfd electrolytics

ANTENNA- 18 to 24 inches flexible wire insulated.
TANK COIL- 16 turns of #28 enamel on SPC2 coil form.
ANTENNA COUPLING COIL- 1 turn #22 insulated around the grid end of tank coil



Here is the schematic and printed circuit board for a 50-54 mc receiver for reedbank use. Even though most of the pertinent information on the receiver will be given, it should be understood that this is not a construction article. But similar successful receivers can be built, if the builder has a bit of test equipment available.

No one should try to make any unit like this without first having at hand a VTVM, Grid Dip Meter or RF Generator, an Audio Generator, and an Oscilloscope. Although several of these units have been built during the past year, each used various combinations of transistors, etc. pointing up the fact that although different combinitions will work, one MUST be able to intelligently vary the biasing to obtain maximum performance.

The set shown was the result of a year's flying in which this particular receiver proved to be stable, with excellent range and simultaneous operation at all normal summer temperatures, from 50 to 100 degrees F.

During the flying season no tuning problems or vibration problems arose. I might digress a bit and explain why the particular receiver was originally built. We had long wanted a reed unit with as much AC voltage drive to the reed bank as possible from a 30 volt source. Having had the opportunity to check many of the commercial units, some idea of the desired operation was envisioned, therefore an attempt to obtain the desired results originated around the MARCY circuit. A glance at the schematic will show that the tube and first two transistors stages are essentially Marcy with some biasing changes.

This circuit was chosen, since checks would give as much possible audio gain as any circuit tried. The audio output at the 2nd transistor is actually clipping, thus no more gain can be had at this point, and regardless of what wave form signal the front end is fed, the output at the collector of the T-0037 is always a square wave. Whether or not this is an ideal condition is open to question; however, the receiver does work. At the output of the last transistor, the 2N44, will be some distortion, which must be accepted, since the reed bank inductance kicks back a transient voltage. This may be damped by using a diode across the bank inductance with some loss of peak to peak ac voltage. Since we have not yet lost a transistor due to the transient, we have not seen fit to use the diode, preferring to have the advantage of increased drive.

The receiver was designed for double deck construction, with the RF Chassis and reed bank on one deck, with only the relays mounted on the second deck. The basic size of the completed receiver is 2 3/8" x 2 3/8" x 3 1/4". The RF and reed deck is mounted above the relay deck and stands 7/8" above it being held by bolts and spacers at each corner. These bolts also hold the aluminum can in place. Construction is quite straightforward but you will note a couple of places where we have drilled holes but call for no component. The parts intended to be placed were found to be of no value as far as the operation of the unit was concerned, thus were eventually left out. Part #19 would have been a 10 megohm resistor, and part #6 a 10k resistor.

Some of the voltages measured at the output of each transistor stage have been taken, and are given here to aid a home-brew builder in checking results. These current and voltage readings are taken with no relays in the circuit, thus represent only the action of the basic receiver.

Total B voltage 30 volts DC. A voltage 1.5 Volts DC.
Current drain at idle, no tone or carrier present 2.2 ma meter reading will be wobbly.
Current drain idle with carrier 1.25 ma.
Current drain with tone 2.7 ma (No relay current).

Output of first stage at collector of 2N217 or CK722, Heath VTVM using 5 volt RMS range.
Idle, no carrier--1 volt AC RMS.
Idle, with carrier--.4 volts AC RMS.
Tone of 300 CPS--1.5 volts AC RMS.

Output of 2nd stage at collector of T-0037, Heath VTVM using 5 volt Range RMS.

Idle no carrier--3.2 VAC RMS.
Idle with carrier--.7 VAC RMS.
Tone of 300 CPS--4 VAC RMS.

Output read across reed bank terminals. Heath VTVM on 50 VAC RMS scale.

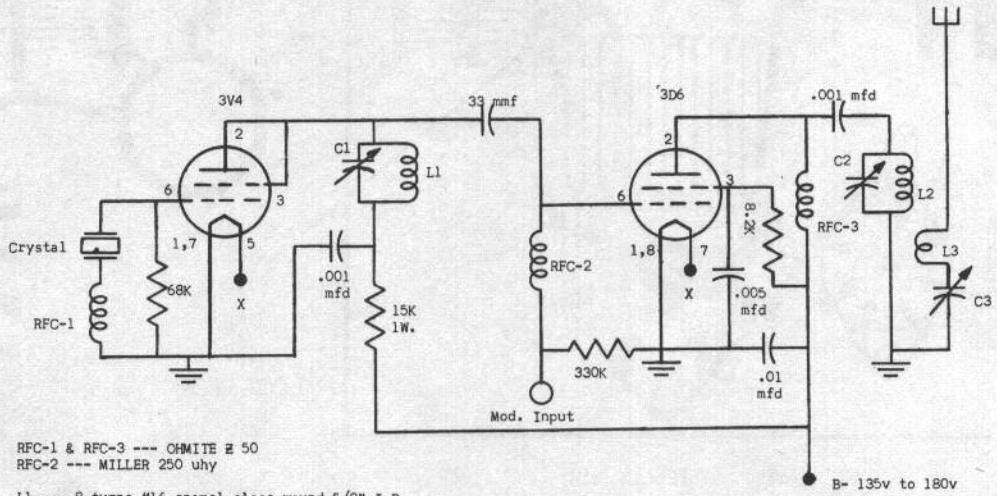
Idle 15-17 VAC RMS.
Carrier on--3 VAC RMS
Tone of 300--15 VAC RMS or 40 volts AC peak to peak.

When the relays are connected in the circuit, the total current drain on receipt of tone will be in the order of 6 ma, and on simul tone in the order of 10 to 12 ma, dependent on what relay coil resistance is used. If the usual 5k relays are used the current will be several mils higher than if 7.5k coils are employed. Either relay resistance is O.K.

Only in one place may some confusion exist as to how the two boards are wired together. To clarify this a bit, there are two leads brought from the B plus hole on the PC base. One goes to the battery as shown, the other to a common relay connection in which one coil lug of each relay is joined. At the side of each of the individual 4 mfd filter capacitors which provide the necessary time delay for the relays, two leads are brought, one going to the reed connections, the other to the associated relay coil connection that remains. These leads are brought down through a hole in the PC board and distributed to each relay.

MOPA Transmitter For 50 mc.

DALE SPRINGSTED UPDATES AN OLD STANDBY



RFC-1 & RFC-3 --- OHMITE Z 50
RFC-2 --- MILLER 250 uhy

L1 --- 8 turns #16 enamel close wound 5/8" I.D.
C1 --- 25 mmf APC

L2 --- 5 turns #14 enamel 3/4" I.D. 5/8" LONG
C2 --- 15 mmf APC

L3 --- 3 turns #18 Plastic insulated 3/4" I.D. close wound
C3 --- 35 mmf APC

Crystal --- Z 2 Type Case $\frac{8923 \times 6 - 53.538 \text{ mc}}{26.769}$

X --- -1½ v Filament

The 6 meter transmitter shown here, is simply a modification of the old standard Lorenz circuit, altered slightly to be more efficient at 50 mc operation. The oscillator is a triode connected tube changed to 3V4; but, in this transmitter, uses a fundamental ground crystal at 1/6 of the output frequency. The oscillator tank is tuned to 1/2 the output frequency which puts it in the 26.5 mc region (dependent on crystal frequency used). The 3D6 stage, although still shunt fed, uses the link coupled tank circuit with series tuned link, a combination which provides high output, plus harmonic suppression. If one examines various parts of the circuit, it will be noted that this is not a new transmitter, but one using some of the best features of old popular ones. The oscillator comes from Lorenz's well-known unit, the doubling feature from the WAG TTPW transmitter by Walt Good, the final tank and antenna loading from the famous Mac II. These have simply been combined in a new configuration, while trying to retain the most outstanding features of each.

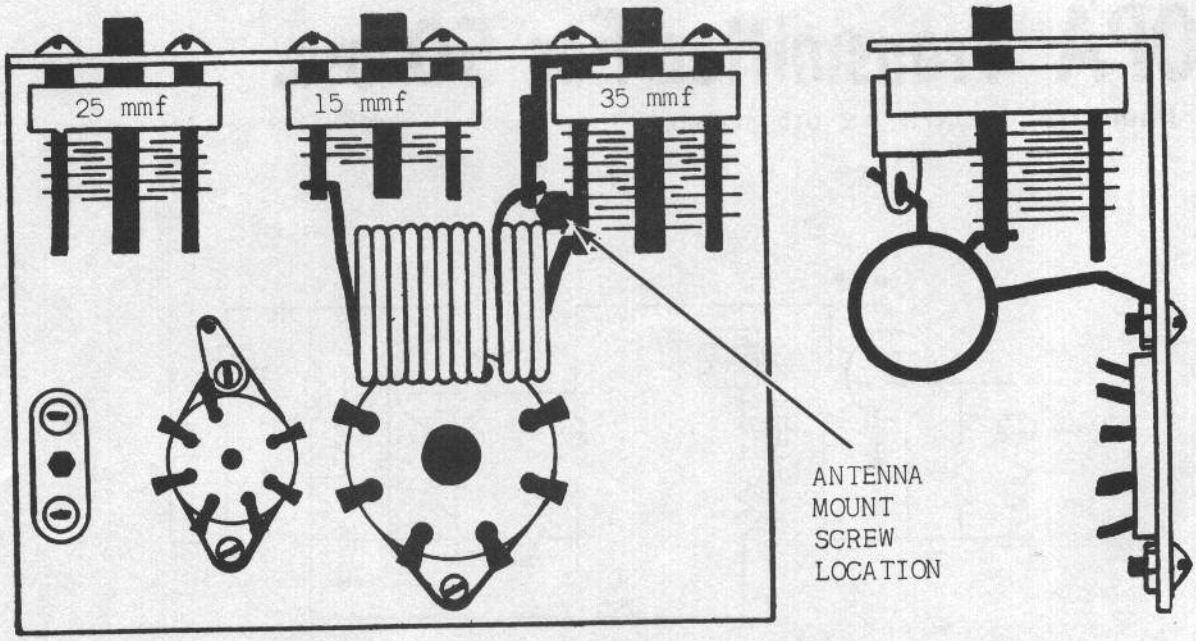
The oscillator was chosen primarily, since I had available several fundamental ground crystals at 8923 kcs, and not desiring to purchase new units, tried out various oscillator circuitry to find one which would start readily and give good output at the third harmonic. The Lorenz, which is a tuned grid tuned plate type circuit, proved to be the answer. My crystals all started readily and remained stable at voltages ranging from 40 to 135 volts DC on the plate of the tube. The frequency doubling idea was borrowed from the WAG transmitter since it relieves us from the necessity of bothersome neutralization adjustments, and results in a transmitter which, once tuned, tends to hold adjustment without further fuss, and has proven this during one whole summer of operation.

The final tank circuit uses the Mac II transmitter feature of a series tuned link to aid in matching the antenna to the tank, thus giving as much usable output as possible from the power available. In addition, this type tank circuit will be found to be about the best from the standpoint of harmonic suppression.

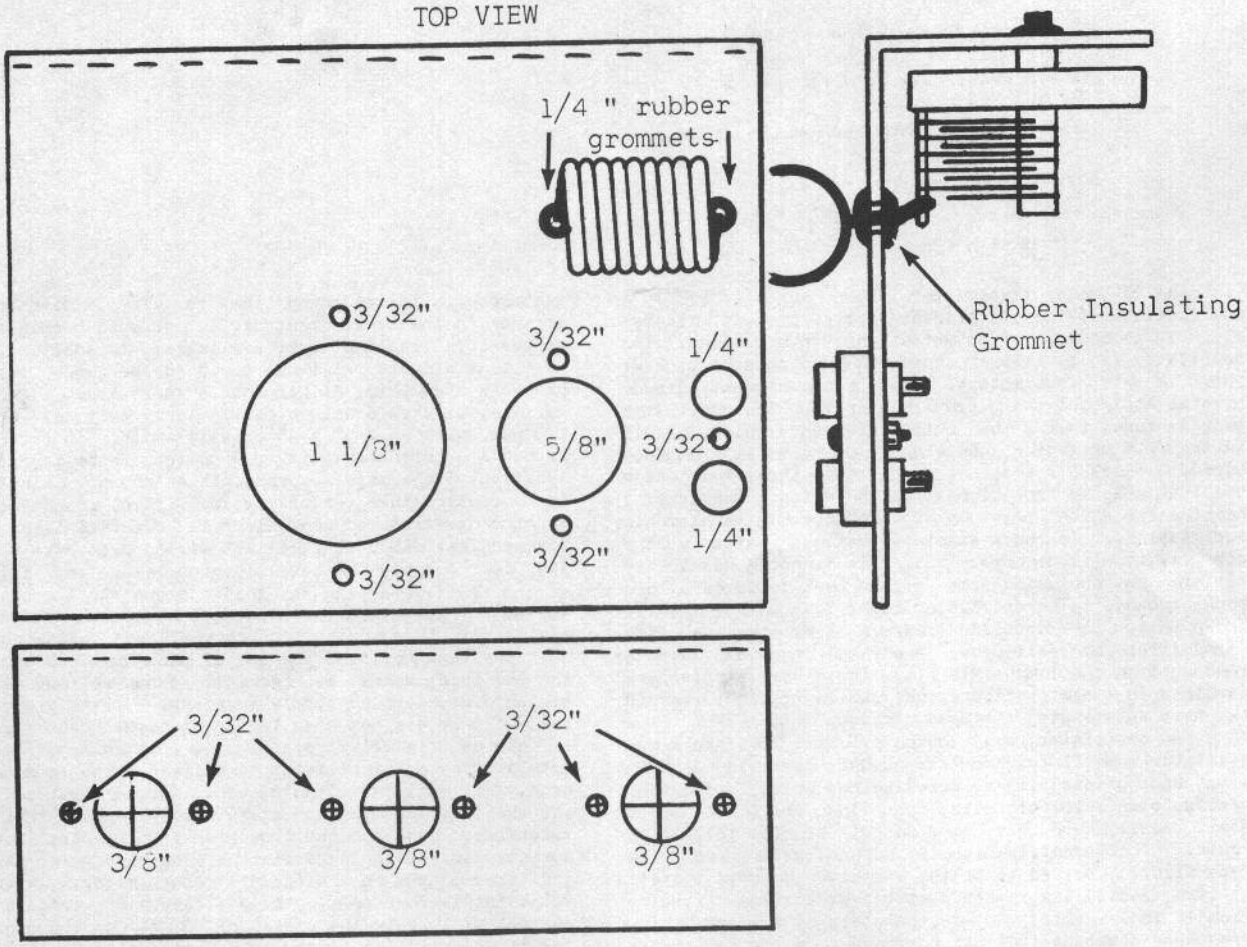
Layout should not be particularly critical, and the rig was built on a 3" x 4" chassis which, in fact, was an old Ace Lorenz chassis. A sketch of the layout and location of the major components is shown. Since this is compressed to a reasonably small size, component lead lengths are also reduced which is beneficial at 50 mc frequencies. About the easiest wiring procedure to follow is to apply the socket ground leads and filament wiring first, keeping the leads close to the chassis, following next with the bypass capacitors, and various resistors, then adding the chokes, and following last with the tank coils. The use of pins number 5 and 6 of the 3D6 tube socket as terminal points allows all the parts to be fastened firmly in place. (Pins 5 and 6 on the 3D6 tube are not used for any internal connections.)

Tune-up is relatively simple. It is handy to have both a 50 ma movement meter and field strength meter at hand. The oscillator tuning capacitor is first adjusted for the familiar dip in plate current which indicates resonance, and then the final tank tuning capacitor and antenna link tuning capacitor are adjusted for maximum indicated output on the field strength meter. With 135 volts for the B supply, the off resonance total B plus current will be in the order of 30 ma, as the oscillator is adjusted, this standing current drops to 16-18 ma. No appreciable dip can be seen when tuning the final tank, thus the FSM is of great use at this point. Checking the voltages at various points in the circuit after the unit was tuned indicated the following: plate supply voltage, 135 volts; dry battery source; oscillator plate voltage, 60 volts; 3D6 plate voltage, 135

BOTTOM VIEW



TOP VIEW



ABOVE DRAWINGS ARE ACTUAL SIZE

volts; 3D6 screen voltage, 120 volts; 3D6 grid voltage, minus 12.5 volts. Oscillator plate current at resonance measured 4 ma. This unit will also work with vibrator supply source at any voltage up to 180 volts DC without alternations of any component values.

Only the RF deck is shown. The transmitter was used with the Bramco modulator circuit that appeared in the 1959 Air Trails Model Annual. Any of the popular tone modulators of the 3A5 multivibrator type or the Kraft single channel modulator kit supplied by Ace will do nicely for single channel operation. Although they have not been used with this particular transmitter, these have been used with other similar units without trouble of any sort.

The antenna used was a collapsible one 56" long and simply screwed on the 6/32 screw fastened to the chassis and insulated from it with fibre washers.

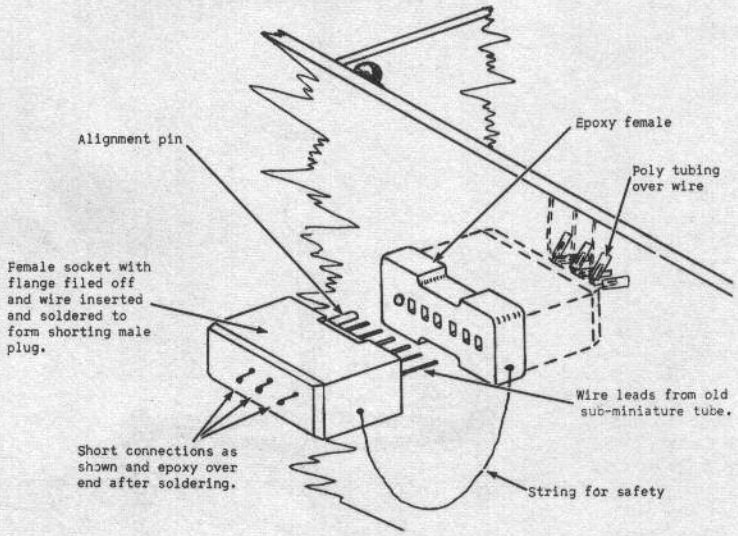
Reader's Write

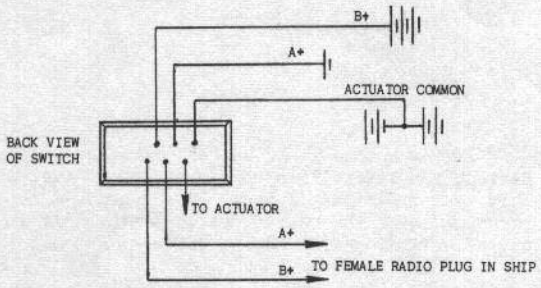
SET - UP FOR SMALL PLANES

Here is a set-up that was devised for 1/4A ships to help cut down on over-all weight. It not only fills the bill on that count, but also as a fool-proof type of switch.

Stan John
1205 Green Acres Road
Metairie, Louisiana

SOCKETS ARE CINCH-JONES SUB-MINATURE TUBE SOCKETS, TYPE 2H7, 7 CONTACTS.





PRINTED CIRCUIT TIPS

The weather here today is 31° below and naturally this is the time we start getting new models and equipment ready for spring. I have been building a few of the circuits from GRID LEAKS and the other magazines, etc.

The popularity of printed circuits has presented some problems insofar as the only practical way of reproducing the complex circuits accurately is to do it photographically and yet for a single, or only a few boards, the process is not warranted. Also, not too many of us have access to a darkroom with facilities for making negatives although exposing, developing, and etching the board can be done easily at home.

Here is a simple system for producing a negative that I have been using. I use a sheet of celluloid or other clear plastic and tape it over the circuit pattern and paint in all the unwanted portions of the pattern using an opaque paint such as photographic opaque or even poster paint. I find these easier to work with than dope or acid resistant paints.

When all the unwanted areas are painted and dry, remove the sheet of plastic and use it as you would a regular negative. Presensitized copper laminate is readily obtainable or you could use the system of preparing your own as outlined in an earlier GRID LEAKS. This system is not as perfect as a true negative but is quite good and serves where only one or two boards are needed.

Cliff Swartz
764 Ash Street
Winnipeg 9, Manitoba, Canada

CONVERTS CONVERTER

Recently assembled the Kraft Converter for use with the CitizenShip relayless equipment and found that the converter must be modified. The output must be isolated from the input so that -4.8 and +30 can be tied together. This places the 4.8 volt power supply in series with the output voltage as before but puts it about 30 volts above ground. I see no disadvantage at present. Hope above information will be useful.

E. R. Eisenhauer
2433 Seymour Avenue
Union, New Jersey

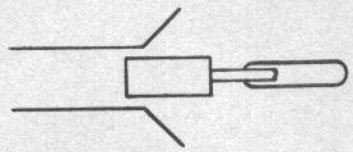
COMMENT ON CONTENTS

Don't change Grid Leaks. I wouldn't miss an issue for anything and many of us who form the hard core of the Viceroy smoking group in our club feel as I do. Johnny Barrett, .WA2EOZ in our club has done a terrific job giving code lessons in our bunch and we now have nearly 10 new ham tickets coming up. All these people are mainly do-it-yourself and your sheet does a tremendous job for this clan. No doubt it has introduced many in the fine art of rolling their own, but even if it didn't, there are enough experimenters around, including me, to find it indispensable. The form it has taken in content has been excellent and, to me, should remain as it does, catering to the more advanced people or the "probers".

Jim Moynihan, WA2FST
297 Ashford Avenue
Tonawanda, New York

KRAFT TRIPLE BITS

On my Kraft Triple Ten, lever switches had to be adjusted to keep from sticking in position when pushed. All I did was to bend the flat spring next to the nylon straight, that is,



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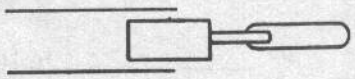


TO THIS

I flew the gear in an Explorer bipe yesterday with perfect results. Flew up a gallon of fuel with a 35. This is a lot of flying! Everyone down here is very impressed with the Kraft gear. I think it is the best overall of any gear I have ever seen.

I had one problem with the reed bank, in this respect: If I drove, say the rudder low reed and then snapped the lever to the high reed quickly, they would both drive at the same time. I contributed this to the high driving voltage of the receiver. This would happen on every pair. To correct, I pushed all the reeds way up from the armature. They are not hard to drive this way, and the unit triples solidly.

All in all, I am very pleased with the gear. The data here may help someone else from trouble.

Jack W. Strickland
3911 Gordendale Drive
Houston 25, Texas

HAS CIRCUIT - WILL SHARE !

"For the past several months, I have been very successfully flying with a small intermediate (R. E. M.) receiver pulse systems package. It is just a mite larger than the Kraft Receiver box, and uses the Kraft circuit--with a few different values and a different PC layout -- a pulse ommission detector, and an elevator-rate circuit, all integrated into one PC layout measuring 2 x 2 7/8 x 1 and houses in a plastic box the size of your PB #2.

The relays used are the new Jaico Tini Mite Gems and weight is comparatively light for a system of this type.

Installation in the aircraft is quite a bit simpler since a lot of headaches of the wiring and circuitry are now interwired on the PC board. Believe this combo may be a big help to those who are looking for a simple way of going from rudder only to an intermediate system using pulse. Have a set of prints on the system, and feel it might offer a boost to this type of intermediate, if GL would publish it.

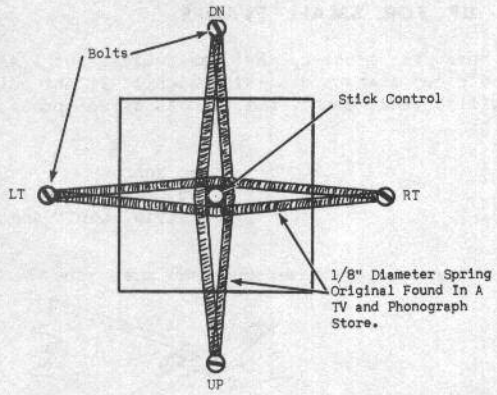
If you are interested let me know and I'll send you the details.

E. Reuther
59 Anderson Parkway
Cedar Grove, N. J.

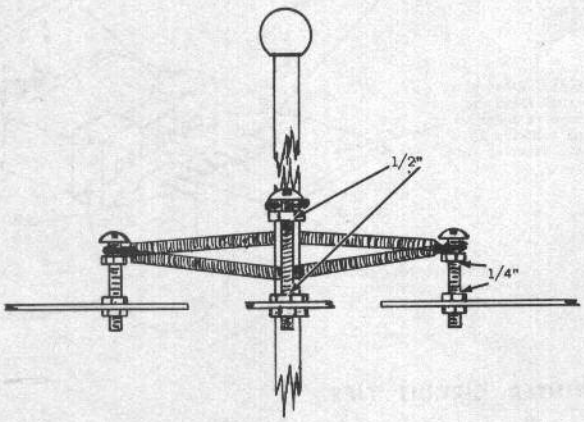
EDITOR'S NOTE: You bet we're interested, Ernie! And judging from the way our mail has been reading lately, so would a lot of GL readers. Can't tell but it might be a future kit item. We'll look forward to getting it from you.

STICK CENTERING

On Marcytone Twin Simul Pulsers, I wanted to get good centering and still be able to feel where right and left and up and down are. I came up with this:



TOP VIEW



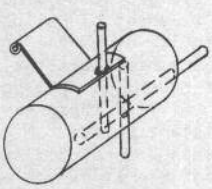
SIDE VIEW

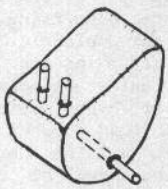
Now with a good proportional servo that centers 100%, I have all the advantage of proportional and good "hands off" flying.

I call the springs - "Center-Tracking". They give me good centering and track right and left and up and down.

Ronald G. Bergold
2408 North 69th St.
Wauwatosa 13, Wis.

MAKE YOUR FUEL TANKS





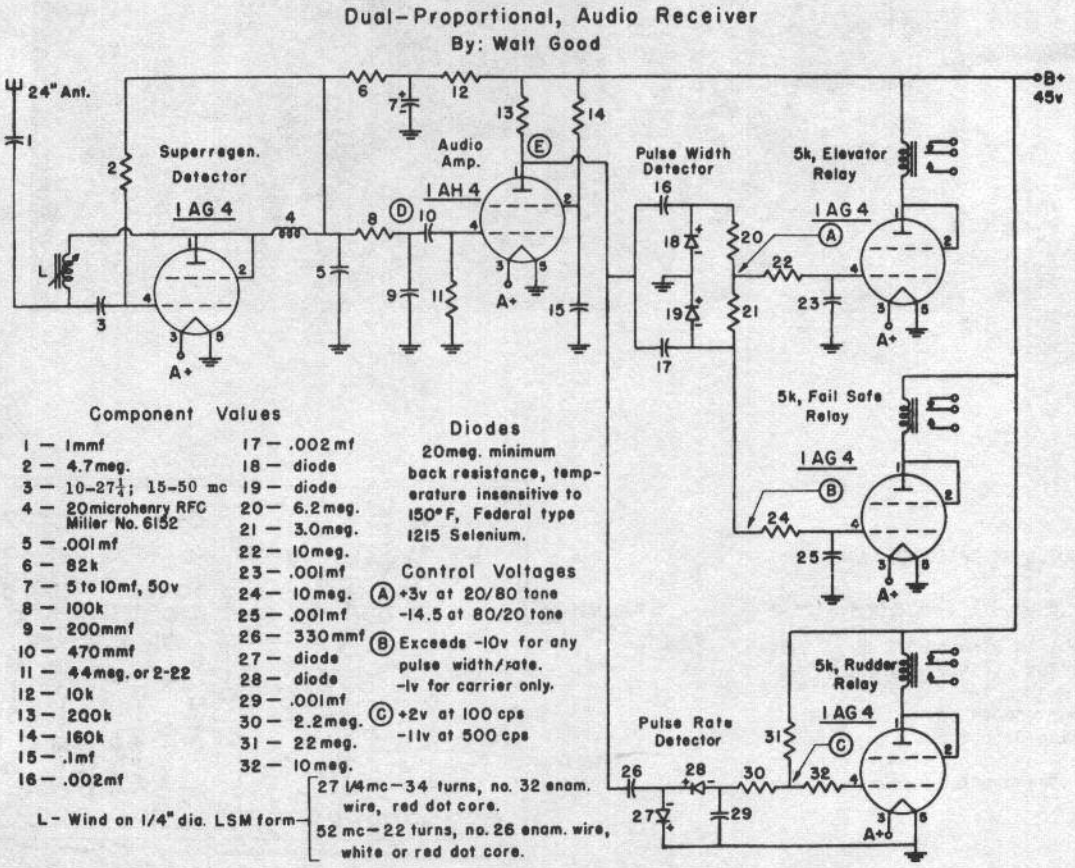
Original Mounting May Sometimes be Used.

Fuel tanks for R/C models can be made from old carburetor floats, which may be had from many garages free, for only the asking. They generally are available in a wide variety of sizes and shapes. Choose the size to fit your engine capacity, and solder in the fuel line, vents, and fillers depending on the mounting to be used.

R. A. Konkle
1216 Kingsley Circle, N. E.
Atlanta, Georgia

PC Board For Wag Receiver

BY JACK CAMPBELL



EDITOR'S NOTE: THIS IS THE ORIGINAL CIRCUIT AND IS COPYRIGHT BY DR. WALTER A. GOOD.

One of the most interesting items on the horizon in the R/C field, particularly to the proportional fan is any thing which makes Walt Good's TTPW (two tone-pulse width) a bit easier for the home brew builder.

From Jack Campbell of Roanoake, Virginia, comes the version of Dr. Good's receiver which features a complete printed circuit layout. Essentially this changes virtually no components from the original as used by Walt, but because of its printed circuit base allows considerably easier assembly and allows the builder his choice of any three of a number of different kinds of 4,000 or 5,000 ohm relays.

The photograph which shows the physical layout of the component side of the printed PC version of the TTPW receiver shows the placement of the gem Tini-Mite relay. The subminiature OS relay, the Dean's relay, or the RBM relay all may be used.

Because it has been a little over four years since the circuit originally appeared as copyrighted by Dr. Walter A. Good, it is being reproduced with the printed circuit board to show exactly where what parts are placed.

Jack Campbell designer of the board also suggests that if desired, the board can be entirely cut down on the left end and relays mounted away from the receiver. At the time the material was forwarded to us Jack reported that he was using the Price or RBM type relays having them mounted separately from the receiver itself.

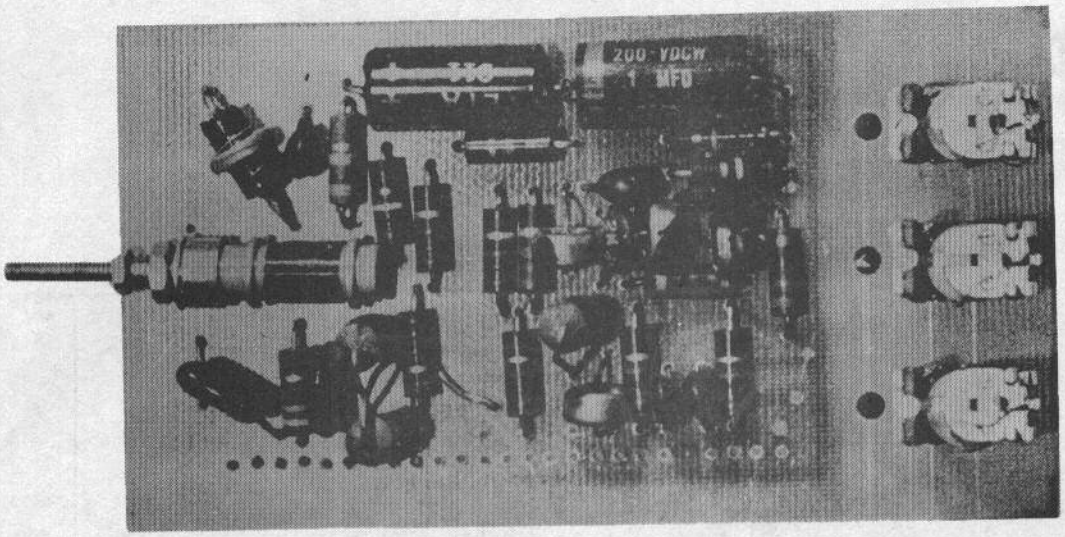
Jack further states "There is still quite a bit of work to be done on this receiver, in order for a beginner to be able to build it. However, I think any one that will build this receiver will want to choose the relays he wants and also decide on which type of mounting he desires."

A study of the component values, the schematic, the parts placement and the base diagram, and the printed circuit boards will allow our more experienced readers to duplicate this receiver on their own.

It is important to note that the components mount on the plain side of the PC board while the tubes are mounted on the etched side of the board. This type of construction allows for a much thinner sandwich and a much smaller can to house the entire unit.

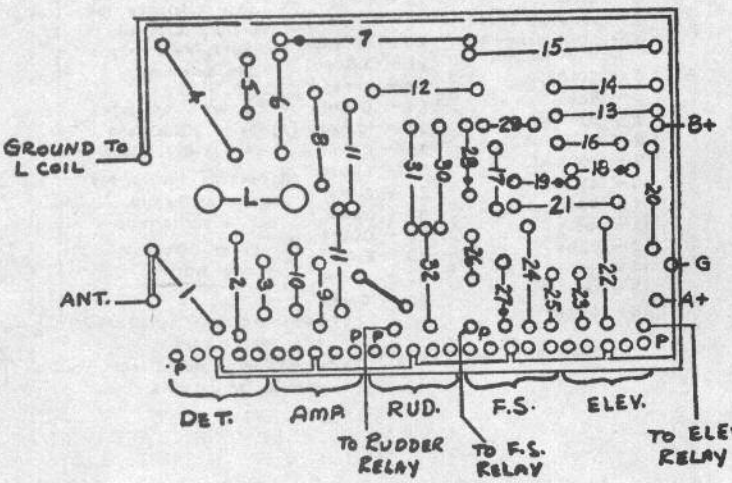
While there have been successful attempts to completely transistorize the Wag Dual receiver, experience indicates that still the most reliable from most points of view is still the vacuum tube from the front end through the relay stage. Because the PC version of Jack Campbell's approach, is new and different it is being presented in this issue of Grid Leaks.

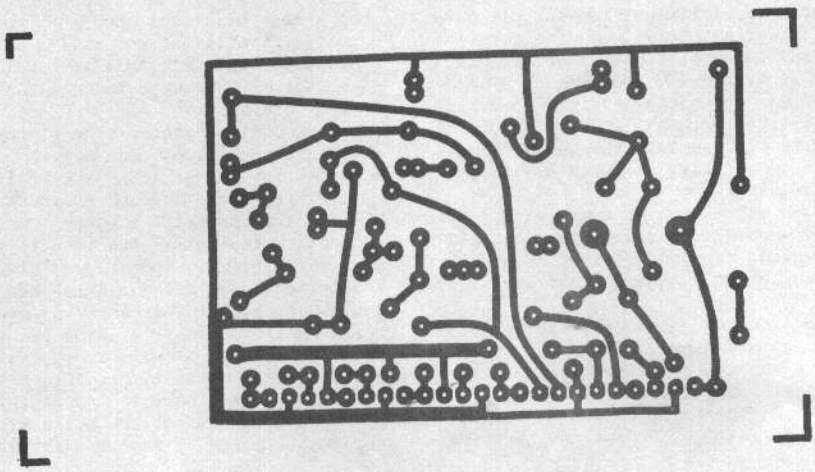
For further details as to availibility of the PC board, please write to Grid Leaks requesting information and price. If there is enough interest, our staff will proceed with having the board etched and drilled at as reasonable price as possible for the experimenters.



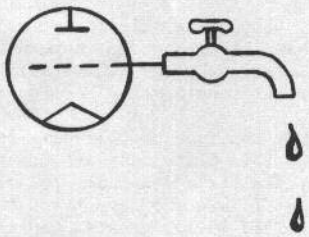
PC NOTES BY DESIGNER CAMPBELL:

1. Change Resistor #30 to 1.2M.
2. Dot in line on PC Board indicates positive polarity.
3. Components mount on plain side of board.
4. Tubes mount on etched side.





Grid Leaks At Play



Dear R/C Fan:

This issue of Grid Leaks is usually placid and calm--except this year! We've probably exchanged more correspondence and seen more flying in a fairly short space of time this summer than any other. We've also been hosts to a greater variety of model enthusiasts than at any time before. All this has resulted--as it does in a lot of us--merely a confirmation and a solidifying of our own pet ideas--at least that's the way it may well seem to those of you who are more than just casual readers of this issue and have been with us for some time.

Foremost in our mind as these lines are being written, were the pleasant hours we spent at the Nationals at the Naval Air Station in Willow Grove, Pennsylvania, just a few short weeks ago. The impressions we garnered while we were there, are also still freshest in our minds and so we'll hit them first, and leave the other subjects and delve into them as space will allow.

Once again the modellers who attended, and the literally thousands who do not attend, but do nevertheless derive benefits from it, owe the Navy, its personnel, the AMA officials and all of the many volunteers who gave of their time and talents, a whopping big vote of thanks. This year's NATS was a success, and the orchids simply couldn't be passed out fast enough--far enough to thank all those who made it so.

As far as R/C was concerned, this year's event was one of the largest ever held--over 350 fliers had registered to fly at deadline time of July 2. How many actually flew, or made it, we'll leave to the magazines in the field who are capable of more fully covering the event to report. To them, too, we'll leave the final reporting of the results of all classes, since we only were able to stay a limited amount of time and the results we did obtain were unofficial.

Flying performance and piloting ability seems to get better with each NATS we attend. There does seem once again, however, to be developing a trend toward airplanes which travel at reasonable speeds through the sky, and whose maneuvers can therefore be confined to smaller chunks of sky and can also in a degree be a bit more recognizable than they have been. This, it is to be hoped, is a trend which will continue. The development of lighter weight R/C equipment which still has the performance of larger equipment will do much to help it along.

While on this point, we'd like very much to add a hearty "AMEN" to the comments of old time R/C flier William Winter in the September 1961 American Modeller. For some thought provoking words, simply turn to page 31 of that issue and read carefully the comments, that probably should have been said by somebody long before now. Some of brother Bill's gutsy words: "over-powered under-sized bombs"; "You cannot really watch a multi job fly. The good ones are not pretty to watch--they don't sit still long enough." "Rudder only and Intermediate classes both deserve greater respect." These and many other comments we feel are worthy of the serious attention of those now in R/C, or those about to get into R/C.

Meanwhile, back at the NATS, we saw a lot of flying being done legally on 50-54 mc. This is a trend which we believe will continue. As the Citizens Band becomes increasingly crowded, not only with the two way voice of Class D, but a record breaking number of entrants into R/C flying using Class C spots more and more--this will continue to grow. Getting a Ham Ticket via the Novice route is not tough, and many clubs throughout the country tackled it last winter, and we've heard of many more planning to in the months ahead.

One observation here, that is a purely personal reaction, and one that will surely be bombed by friends and foes alike--Personally, we do not believe Superhets to be the answer to the problem of interference. The numbers of people going to two way voice via Class D, and the numbers of new R/Cers in Class C, make this almost impossible. If there was only one or the other, it might be tolerable, but with both services in the spots allowed, it just doesn't make numerical sense. Then, too, superhets cost bucks--we're still not sure that a superhet kit would be practical--we've seen many butchered kits of far simpler jobs. And some of these supposedly were built by guys who think they know! We'll repeat a statement we've made hundreds of times. Kits are fine, but they are not automatic. There's still one intangible with a kit--and that's the guy who holds the soldering iron!

The congestion means this for R/Cer's right now: If interference is causing you trouble consider going to the ham band, or going superhet. BUT STAY LEGAL. Any chance we have of ever getting any further consideration by the FCC is nullified everytime somebody starts bootlegging. And to say that we have no further consideration coming from the FCC is foolish, too.

One further observation that came to us forcefully at the NATS is that the old rules--which almost were changed by this Class bit--are pretty darned good! Watch the letters on that comment, and from some of our closest friends, too! The Class bit, although passed over for this year, is far from gone, but we hope that fliers who have tried them in local competitions will realize that the proposed rules could have resulted in far greater confusion than the conditions they hoped to correct. We say this in the full knowledge of the fact that had the new rules gone into effect they might have boosted the sales of Ace R/C's 4 and 6 channel reed equipment. But, honestly, we're forced to come out flat footedly --and possibly a bit bulldoggish--and say a lot of the boys we talked to like the set up as it is. One comment in a club paper--and to protect its editor we'll leave out his name and location--said this after his club's contest which tried the proposed rules on for size at their contest: "Can't speak for the group's feeling, but after our experiment with 'Class II' as R & E: While it was fun, it still didn't add anything really to the contest. (Seemed more a makeshift.)" Our observations and conversations at this year's NATS make us agree that this editor's got something there.

For another subject, but still related to this year's NATS, our opinion after watching flights carefully there, and at an adjoining site used for testing, is Proportional is the coming way to fly! There are many, many rigs which are being kept tightly under wraps, but which are getting there. And they are much, much beyond the drawing board stage--some of them are flying like mad and could make competition look sick. No, let's change that statement: We predict the day is not too far off when these new systems WILL make competition look sick! (How many want to cancel their subscriptions to Grid Leaks right now?)

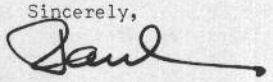
We're in the midst of two of these, as, and related to a third, and hope to bring you further details in future issues. When all the kidding is put aside, we simply mean to re-emphasize a statement you'll find in previous issues of GL--To say that there is only ONE way to fly is foolish. There are many ways to fly and have fun in this hobby.

One final bit of observation of the NATS, and well close this letter by bringing you a preview of some of the things to come in GL. This observation has to do with a growing concern we have felt for the increasing group of newcomers entering R/C as a hobby. With his mind's eye seeing himself at the controls, he sees himself manipulating the controls of the airplane he's observed at the NATS or some local event. Although he's never even cranked a glow plug engine before, he wants in on this hobby and he wants to start with a multi engined aircraft operating multi channel radio, with every-surface movable, blinking lights, sirens, flaps, and all. Somehow, those of us now in the hobby have to encourage this guy to come in and get his feet wet, and keep his dreams while we lead him through some of the simpler steps first. He should log as many hours as possible, we feel, with a rudder-only ship, to which he might add motor control a bit later. To have him have a satisfactory experience, we should avoid the disaster of failure. And the disaster of multi failure --either bang bang or pro-- is just that--and possibly fatal to his future interest. Rudder only disaster is bad enough, but at least this can, as a rule be survived by a beginner, and walked away from. Any of our readers having an approach on how best to handle this situation, we'd sure like to hear from you.

Now for our preview: Beginning in the next issue will be a series of articles having to do with rudder only proportional flying. This will be almost an ABC approach, but one of the hottest rudder only fliers in the country today--Jim Shows of St. Louis. This we believe will be the beginning of a very worthwhile series.

And so, we've run out of paper. Anyhow, it's your turn. Let's have your letters!

Sincerely,



Trimmable Throttle for TTPW

ART MORGAN ADDS REEDS TO WAG UNITS

The usual TTPW proportional control system employs a stepped escapement as the means of obtaining engine speed control. While this arrangement is very satisfactory and its speed of operation and fixed control positions are valuable assets, the recent trend toward more powerful engines for the competitive multi model would seem to justify serious consideration of trimmable type throttle control arrangement. The reversible feature and the infinite number of positions obtainable would offer improved performance for both ground and flight maneuvers.

Trimmable throttle control is not entirely new to the TTPW system as several good methods have been offered in the past. The plan presented here functions by adapting the receiver to limited reed operation. This is permissable because of the tolerance exhibited by the dual proportional receiver to frequency of the tone received. Thus, the Left Rudder (High Frequency) tone may be varied from 500 cps to 600 cps with negligible effect on the rudder position. Choosing resonant reed frequencies of 500 cps and 600 cps permits normal flying with a Left Rudder tone of 550 cps and results in no reed operation, changing this to 500 cps energizes the low frequency reed and retards the throttle, while offering simultaneous control of the rudder position. Upon switching to 600 cps the high frequency reed vibrates and the throttle advances.

In order to avoid reworking the receiver layout extensively the best approach seemed to be to remove the fail safe circuitry and use the fail safe tube to drive the two reed bank.

The essential changes in the transmitter involve a switching arrangement, available at the control box, to permit selection of the reed tones and a regulating circuit to improve the frequency stability of the tone generator. Measurements made on two unmodified transmitters reveal that a 45 volt decrease in the supply voltage results in a tone generator frequency change approaching 15 cps. While this is better than anticipated and is, no doubt, due to Dr. Good's unique multivibrator circuit, it appears that, in the interest of dependable operation of the reed bank, that some method of voltage-frequency stabilization is desirable. Taking advantage of the inherent frequency stability characteristics of the pentode circuit, and partially regulating the plate voltage, results in considerable improvement. While this method is satisfactory only for a given set of tubes, and therefore requires an adjustment or component selection for each unit, it works well and, if reasonable care is taken in adjustment, the modulator frequency stability will be adequate for this application.

It is suggested that the modulator be changed in accordance with the circuit diagram shown in Figure 1. Pots may be wired into the circuit for R2 and R3 while making initial tests. Typical values of R2 may range from 80K to 140K while R3 varies from 10K to 40K. R2 determines the degree of regulation while R3 is effective in establishing the high tone frequency. The two controls will interact to some extent and should be adjusted with care. Select the modulator tubes for balance and a high tone of 545 cps to 555 cps. Choose the NE2 for proper regulation. The selections should be made with component values reasonably close to those shown in the circuit diagram.

Balance is important and the frequency generated must remain within the range of the appropriate reed as the elevator relay armature is switched from one contact to the other. After the resistance values have been determined, the pots may be replaced by equal value fixed resistors or, if space is no problem, they may be left in the circuit. When completed, the high tone should vary no more than a few cps as the supply voltage lead is moved from the 180 volt battery terminal to the 135 volt tap.

Switches SW1 and SW2 are mounted in the control box

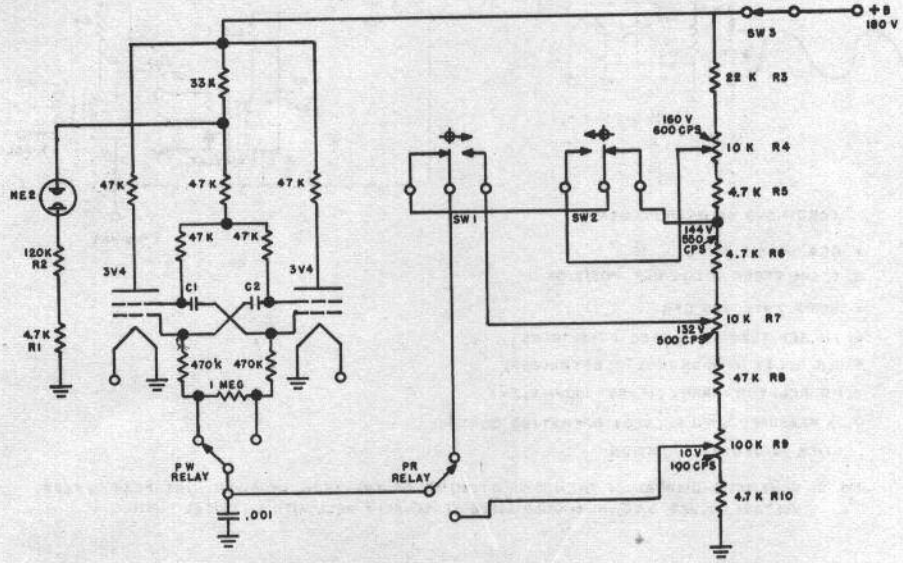


FIG. 1– SCHEMATIC DIAGRAM OF MODIFIED TONE OSCILLATOR. THE VOLTAGES SHOWN MAY BE USED AS A GUIDE. THE EXACT VALUES ARE VALID FOR THE ORIGINAL UNIT ONLY.

along with R3, R4, R5, R6, and R7. The cable connecting the box to the transmitter is six pair intercom cable and paired wires should connect to the pulser symmetry control pots. This minimizes interaction between the rudder and elevator pulsers. Another method that works well and reduces the lead length of the modulator grid return is to leave the frequency control pots and the voltage divider network on the modulator chasses. Mount relays on this chassis to do the switching and energize the relays by switches in the control box.

By relocating elevator and rudder relays space is made available for the reed bank, additional relays and circuitry required for the trimmable throttle. It appears worthwhile to mount the reed bank in such a manner that the "G" loading and engine vibration are least likely to result in accidental operation. The 500 cps reed vibrates more readily than the other and it therefore seems best to use it to drive the throttle servo to the retard position. This reed is the least likely to fail and the most likely to make contact due to a vibration problem. Both conditions would result in a retarded throttle, seemingly a desirable situation.

Figure 2 shows the necessary circuit changes for the receiver. While the schematic diagram prescribes relay servo control, limited experience obtained with a home-made transistor switcher indicates that this may be a good method, in that it is somewhat lighter and results in reduced reed contact power dissipation.

The only bias voltage provided for the reed tube, results from grid rectification of the detected tone. This produces a rather high value of plate current for this tube at any time it is placed in operation with the transmitter "off". In the interest of battery economy it is worthwhile to develop an operational sequence of transmitter "on" first and "off" last.

An arrangement using fixed bias for the reed tube was connected up on the bench and performed satisfactorily. It is likely that the servo batteries, with a proper decoupling circuit, could be used as fixed bias and reduce the plate current during no signal conditions. Should the receiver B supply come from a DC to DC converter, this may present a problem as some converters connect the servo batteries in series with the converter output voltage to obtain B plus. The manner of connection dictates that the negative side of the servo batteries be grounded and would therefore prevent their use as a bias battery.

Some thought was given to selecting a reed bank which had a greater number of vibrating contacts in order to obtain additional control possibilities. Closer examination reveals that the harmonic content of the pulsed square wave does not permit the reed to distinguish as readily between wanted and unwanted tones and therefore creates a need for greater frequency separation than accepted practice permits for sine wave operation.

Operational speed of the throttle control servo is influenced by the control stick position. The greatest speed occurs in "full left" and decreases with a reduction in the amount of "left" until approaching "half right" the average amount of high tone power in the reed bank is insufficient to excite the reed and throttle control is unobtainable. At first thought this appears to be a serious disadvantage and yet, flying experience doesn't bear this out. Other than a trend to left taxi turns and landing patterns, flying seems very natural.

The author thanks Dr. Walter A. Good for suggesting the basic scheme presented here.

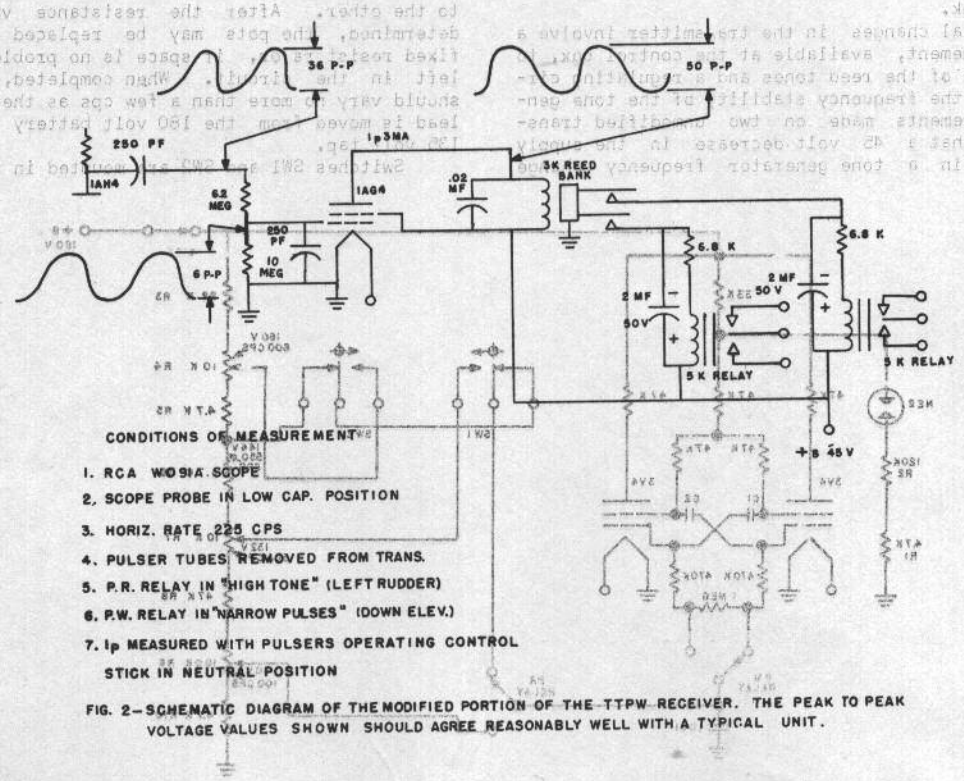
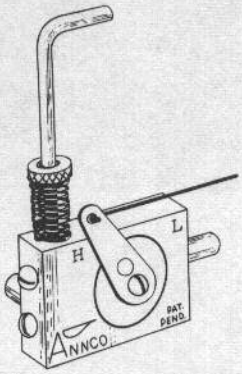


FIG. 2—SCHEMATIC DIAGRAM OF THE MODIFIED PORTION OF THE TTPW RECEIVER. THE PEAK TO PEAK VOLTAGE VALUES SHOWN SHOULD AGREE REASONABLY WELL WITH A TYPICAL UNIT.

What's New

ANNCO THROTTLES



Annco Engineering re-introduces a two speed valve for high speed, low speed and complete shut-off engine operation from any single speed needle valve glow engine-- .049 to .60. This is a considerably improved version which a lot of modelers found very acceptable. Now made to much greater precision, and offers mounting on either side of the engine. May be operated from any single self neutralizing escapement or servo for R/C, or third line for Control Line. Comes complete with extra needle valve is only 5/8 x 7/8 x 1/4". Weight is less than 1/2 oz. Only $4.95. Available from Ace R/C.

NEW ECKTRONICS TRANSMITTER

From Ecktronics, licensed to manufacture the finished Kraft R/C gear comes the anouncement of the new DUAL SIMUL TEN Transmitter.

Features: Simultaneous operation of elevator or of trim with rudder, ailerons, or motor. Same transistorized circuitry as is used in TRIPLE TEN Units. Low, low battery drain. HI-LO switch. Quality components used throughout. Detachable chrome-plated antenna telescopes-less than 10 inches. Temperature compensated - stays on frequency even on the hottest days. Toggle switches, sub miniature pots, high-Q toroids, plus many outstanding design firsts.

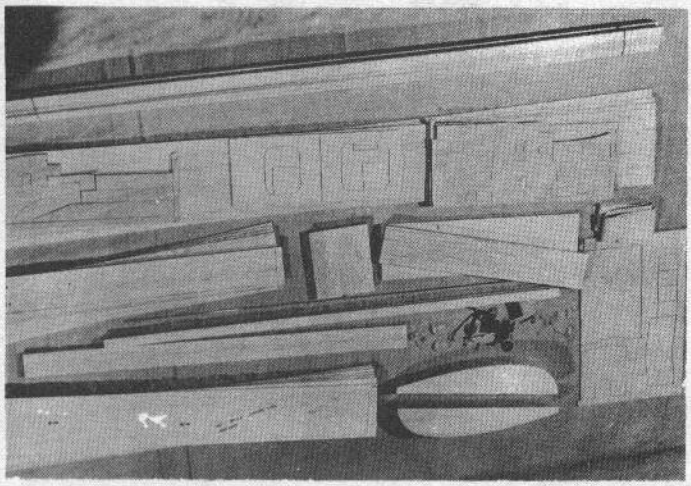
A first quality contest ten channel transmitter at a low, low price for only $109.95. Completely assembled, tested and guaranteed. Available from Ace R/C.

G L SPECIALS

The 1/8" I. D. ball bearing that has been such a hot item in our regular catalog at $1.50 is now a special one time GRID LEAKS SPECIAL. A fortunate buy let us snap all of the source of supply available from one outlet at a ridiculous price--50¢ each. Cost the government many more times this small amount. Brand new condition. On a first come-first served basis from Ace R/C.

Two articles cover new ideas for Walt Good's TTPW units. One is a PC board for the receiver construction, the other is a special two channel reed bank, which will be made especially by Bramco for the cps required. These are special frequency reeds, not just any cps will do. If there is enough interest in either or both of these units Ace will make them available. Neither are stock items -- they must be made especially for these purposes. If you are interested write to GL, and ask about them. We will offer you tentative quotes on them -- THESE WILL BE ONLY AVAILABLE FROM GRID LEAKS DIRECT. They will not be items included in our catalog. Write for TTPW GL specials.

ORION WING KIT



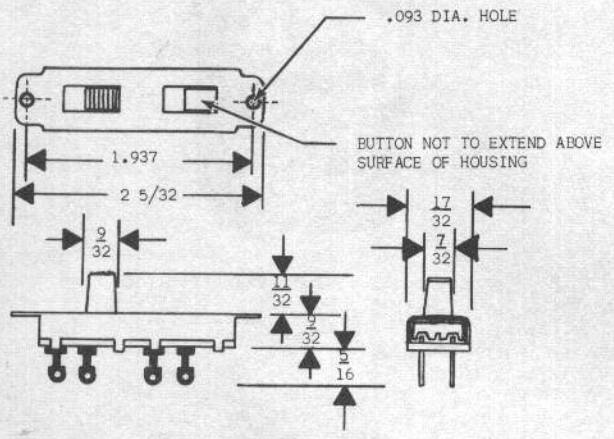
Since the introduction of the Top Flite Orion kit, a lot of demands have been made that the kit for the wing be made available on a separate basis.

To meet this demand, Top Flite has released a kit of the wing only, which is complete with nylon bell crank and aileron hinges, and all other parts needed, including plans.

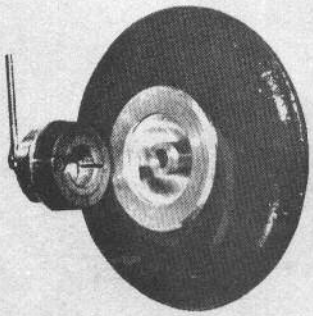
Order RCW. Only $10.95

4PST SLIDE SWITCH

Many modellers have asked for a dependable four pole single throw switch for use in relayless receiver and in other R/C uses. The Muter Company of Chicago, who make the slide type which has been found to be the only kind that is successful in R/C--the sliding knife contact type which is also self cleaning, have been approached and are going to make a tandem type which will be used with only one button for on and off action, and announce its price will be 65¢. This is a bit more than some of the other, slide type, but is the only kind our tests indicate which will be satisfactory under vibration conditions. At 65¢ this will be a boon to the R/C fan. Available from Ace.



WHEEL BRAKE



Space Control's Wheel Brake, designed by Chuck Boyer, utilizes proven automotive engineering principles.

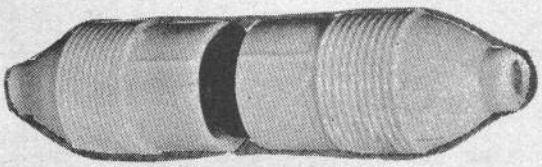
Features a one piece, cam actuated, self equalizing--internal expanding brake shoe.

Thoroughly tested in actual flight and landing conditions. The specially designed tires are sufficiently broad shouldered to afford ample braking surface, yet are streamlined enough to offer minimum wind resistance.

Brake lever arm is reversible, permitting either a left or right hand installation, and the application of either push or pull motion, make them ideal for single or dual wheel operation.. Choice of 2½ or 3 inch sponge tire manufactured expressly for this assembly. A101, $4.95. Available from Ace R/C.

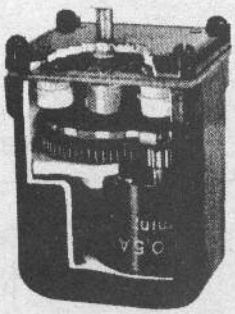
Extra Tire $1.00. Extra Brake Shoe .95.

S C CABLE CONNECTORS



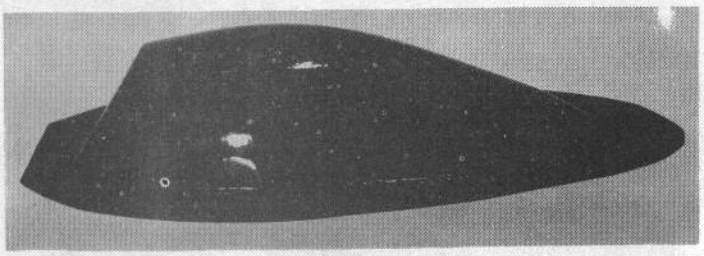
Space Control's Cable Connector features numbered terminals, tight electrical connections that stay tight, extremely efficient, shake proof. Provision for mechanically fastening, and plenty of room to solder. 6 prong units - plastic snap on covers. Only $1.49 per set. Available at your dealer through Ace R/C. Dealer display cards hold 10 see-thru packs.

S C PROPORTIONAL SERVO



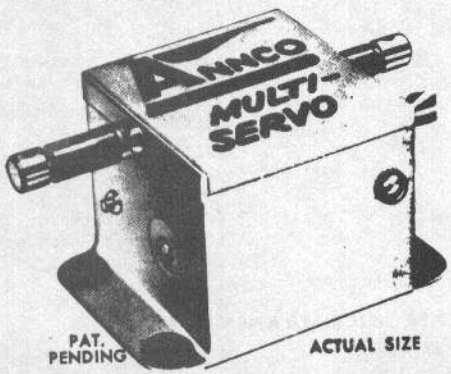
Many proportional control experimenters have asked that the Space Control Servo be made available on a separate basis. While the Space Control production is running far behind on the production of their completed outfits — Ace is able to offer in limited quantities, the servo that is used in these units. Each uses 5 transistors, completely housed in own case with gear train and centering pot built in. Only $39.95

BLACKWELL PLASTIC CANOPY



From Blackwell, manufacturer of the Hurricane comes word that the plastic canopy used in it, will be sold as a separate item. Measures 7", 2 1/8" x 1½" tall. Made of .015 plastic. Only 80¢.

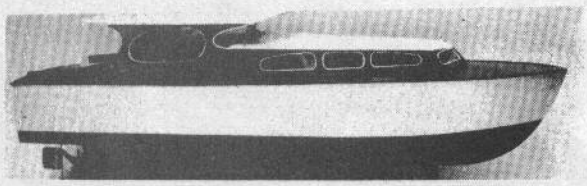
ANNCO MULTI-SERVO



One of the hottest items for the multi fan, is the Annco Engineering Multi-Servo. Demand is high, since it is the smallest servo commercially available. Look at all these features.

Smallest-- 1 3/16 x 1 3/15 x 1"; Lightest-- weight is only 1.2 ounces; most powerful for its weight and its size-- 3¼ pounds of thrust; developes a ½ inch travel in a push rod, giving true straight line motion. Drain is 150 to 300 ma., using 1 to 4 volts. For use with relay systems. Demand is high and production is limited, so get your order in, we will ship on a first come basis. Price is only $12.95.

COBB CRUISER



To introduce their new Air-O-Sheet, Cobb Hobby Manufacturing announces their Air-O-Cruiser R/C Boat.

Built of their new extruded resin sheet material, it offers builders an opportunity to see this boon to R/C -- in a practial form.

Length of the Air-O-Cruiser is 27½", Beam 9".

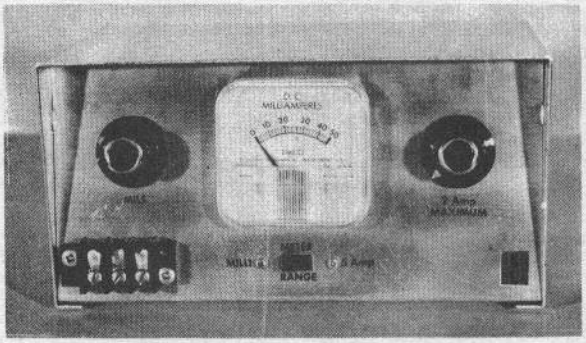
Heavy Die Cut Air-O-Sheet Hull sides and bottom. Veneer deck of Mahogany. Fuel Proof, walter proof, has high gloss finisy. Complete information for single and multi-installations. Easy Assembly in 3 to 4 hours. $14.95.

PRICE INCREASE

Technical Model Products, manufacturers of the very popular Wildfire Bipe, have recently announced an increase in the price due to many rises in costs of production. Effective immediately the price will be $7.95.

What's New, Continued

KLINETRONICS NICKEL CADMIUM CHARGER



The charger pictured above, manufactured by Klinetronics, is for the discriminating modeller who wants to keep his nickel cadmium and VO batteries in tip top condition. It features two outputs simultaneously, and may be used for the smallest and largest units at the same time. Has a charging rate of 50 milliamps for the batteries used in the aircraft, and up to 2 amps for large types used in the transmitter or for glow plug starting.

Meter may be switched in either charging circuit, is of American manufacture. This charger is designed for the nickel cadmium type and circuitry has been engineered for this purpose.

Housed in heavy aluminum case, unit is ventilated to provide heat dissipation. Cabinet has distinctive slant front panel. Price is only $18.95.

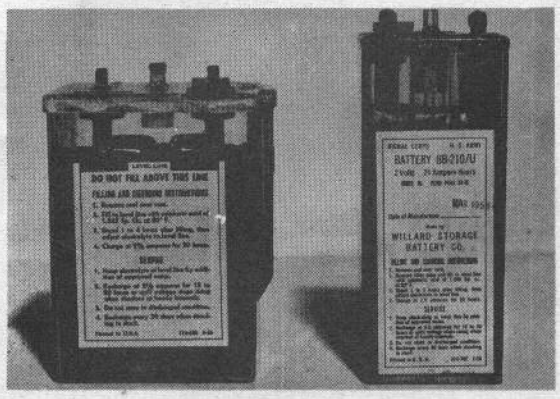
7.2 AMPERE BATTERY

Here is a hefty type of nickel cadmium battery for those demanding applications. Conservatively rated at 7 amperes, measures only 4 1/16" high x 2 5/8" wide, and 3/4 inch thick.

Unit comes completely filled and ready to go. Has 1.2 volts output--no droop or sag under temperature extremes.

Original cost to the government was many times our low price. Like new, unused condition. While the limited supply lasts, our price is $5.95.

NEW SURPLUS WILLARD WET CELL



Our supplier of the surplus Willard BB54A, 2 volt 28 ampere hour battery, states when our present stock is exhausted--that's all! But Ace has succeeded in locating another Willard type, known as the BB-210. This is a 24 AH job at 2 volts. Brand new unused condition. Comes dry charged, and must be filled with electrolyte available at most large battery shops, since it is the same type that is used in car batteries.

The BB-210 measures 2 1/2 x 2 1/2 x 6 1/2" tall. Has three indicators to show the charge level at any time.

Priced the same as the old BB54A, it is of more recent manufacture, to insure longer life. Only $5.95.

COMPAC BATTERY PACK

The Compac battery flat pack, is something really new in the battery box field. Here is a flat type of holder that is so versatile, it may be used for six pen cells or 2 pen cells, 2 U15 type B's, or 4 pens and 1 type U15 B.

Comes with the spring loaded battery connectors unmounted to let you make any adaptation out of it you need for versatility. Dozens of combinations will suggest themselves. Battery clips are easy to mount and solder.

Also features slip in plastic pieces, which may be removed to allow box to be used with larger diameter nickel cadmium type, and also an auxiliary set that allows use of the still larger mercury cells.

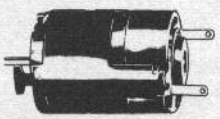
Made of high impact plastic, the Compac has a sliding cover. Available soon from Ace. Only 95¢ each.

ACE ADDS G M IMPORTS

By arrangements with GM Hobby Specialties, Ace is proud to announce that many of the high quality items imported from West Germany by GM, will be added to the Ace R/C line. The listing below will show only a few of the items which are in stock now, or will be shortly. More of the GM line will be added, as quickly as possible. If you know of a GM import, and it is not listed below, we can get it for you.

ESCAP--amazing servo motor. Ultra-precision, light weight--only 32 grams. Rugged and reliable, range more than 2,000 hours on bench test! 1 to 4.5 volts. Idles--only 7 milliamps. Self-oiling sintered bronze bearings, with oil reservoir. 5 to 1 gear reduction. Shaft speed-approximately 350 RPM per volt. Ideal for servo or drive for boats or cars. Only $7.95.

MICROPERM. Low drain, rugged, long life. 1-4 volts. 3-12 volts operation. 6000 RPM per volt up to 3 volts; up to 6000 RPM 3 volts--. 11/16" diameter, 1" long. Weight is 1/2 ounce. $3.95



MILLIPERM. Another size just a bit larger than the one shown for the Microperm. 1-4 volts--4500 RPM per volt -- 3-12 volts 1500 RPM per volt. Size 7/8" diameter, 1 1/8 inch long. Weight 3/4 ounce. $3.95.

SN ESCAPEMENT with bell crank. Ideal for motor control--has push pull action. May also be used for rudder. Ruggedly built, free acting. Operates 3-4 volts. 1.1" x 1.4" x 1.25". Weight: 1.4 ounce. $4.95

MINICOMBO II. Compact, light-weight single channel rudder actuator. Self neutralizing, positive positioning -- provides compound action (2PN). Rugged -- crash resistant. Uses two pen cells and requires NO rubber bands.

Size is 1 3/8" x 1 1/2" x 2". Weight 1.2 ounces. Only $7.95.

PROPOMATIC

A really fine single channel actuator; performing 4 selective proportional functions on a single channel. Excellent for airplanes, boats or cars. Strongly built and extremely reliable. Low drain, only 100 ma. Two 3 or 4 1/2 battery packs. Fail safe features gives neutral rudder--and turns motor on low. Easily adapted to Simpl-Simul or Galloping Ghost, giving Rudder Elevator and Motor proportionally. Size 2 1/2" long x 1 3/4" diameter. Weight: 4 1/2 ounces. $15.95.

Watch for more GM imports--coming soon!

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If you have ideas you would like to share with other R/C fans throughout the world, we welcome them. All ideas are given careful consideration from the point of view of trying to help R/C by sharing experimental--and sometimes not fully developed--ideas among a growing subscription list.

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