GRID LEAKS

R/C DATA SERVICE

VOLUME 2 NUMBER 7

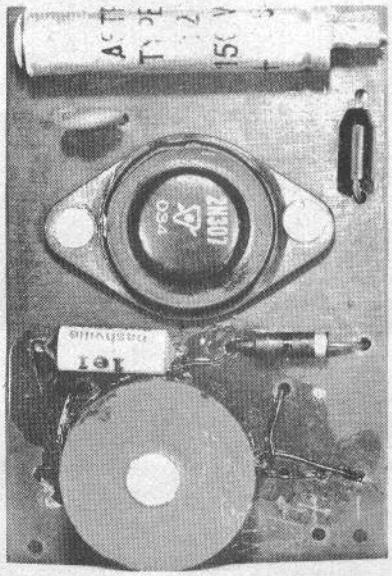
JULY AUGUST 1960

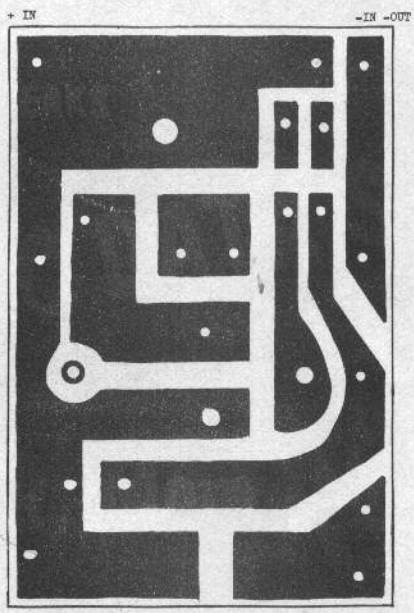
25C

PUBLISHED BI-MONTHLY AT HIGGINSVILLE, MO.

Look, Mom-No More Batteries!

WELL, ALMOST, BY USING POWER CONVERTER





There is a trend showing up in the contest field, it seems, toward the use of smaller hand-held transmitters, particularly among the multi boys.

This trend is being pushed by the appearance of some very excellent transistorized power converters which operate from the now very readily available nickle cadmium type of batteries and make for simple, self-contained hand-held units at far less eventual expense than would be had with the use of dry batteries.

At the outset, of course, the cost is rather high because it will require a minimum of 5 nickle cadmium cells of either 2, 4, or 5 ampere hour types whichever is available and whichever will readily fit into your cabinet plus the power converter itself.

Among the power converters coming on the market, there is one being manufactured by MC Manufacturing & Sales. It is the MC135-15. This model is primarily intended for small CW and audio transmitters of the single channel type. It was designed by Bill Webb, an ardent R/C'er.

The MC 135-15 is just what the title implies. It has 135 volts output at a 15 mil full capacity load. There is very little noticeable ripple, very little sag on the voltage at full output, and it will do a terrifically good job very efficiently from a battery input.

Another feature which makes it very feasible for hand-held transmitters is the fact that it may be used either with 4.8 volts input or 5.8 volts input so that it may be used with four nickle cadmium cells for 4.8 volts or one lantern type battery of the dry cell variety for far greater economy than use of two 67½ volt of the dry battery type.

Very small in size, this unit is of the printed circuit board type, full size pattern for which is shown as well as a top view showing the parts placement. The schematic is also shown to enable the home constructor to build one if he so desires. However, MC's price for a completely built up and tested unit is very reasonable and will definitely be of interest to those who have not the experience or the technical "know-how" to wind the Ferroxcube cup core transformer and do the necessary wiring of this particular unit.

The photograph in this article shows this unit installed in the Kraft transmitter using five 2 ampere hour ABC nickle cadmium batteries. Four of the batteries supply the power converter while the fifth battery is used as a filament supply. Each of the nickle cad-

mium cells, of course, has a 1.2 volt output even under load and this means that you have a potential input of 1.2 to the filament and 4.8 to the power converter.

It is also perfectly feasible, in this particular case, to use five of the 5 ampere hour types in the #2 size. They will fit readily in the case but a different mounting will have to be used for the power converter since the bottom of the case will largely be used for batteries.

Having a drain of about 500 mils, depending upon the type of transmitter with which it is used, the power converter is extremely easy on batteries of any type. With the 2 ampere hours as illustrated in the photograph, almost four hours of continuous operation can be had. This is a lot of flying or boating in anyone's language.

Another strong point to recommend the MC 135-15 is that it can be used with a 6 volt type of lantern battery. In this event, of course, the 5.8 volt tap must be used. (This is not shown on the schematic.) If the transmitter is of the Kraft type requiring a 1.5 volt filament, a separate 1½ volt battery must, of course, be used for the filament supply. In this instance, again, as with the 5 ampere hour #2 ABC types, the power converter will need to be mounted elsewhere in the cabinet other than that shown in the photograph.

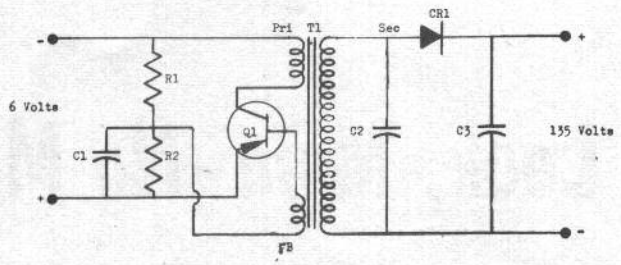
In the event that it is used with a 6 volt type transmitter such as the MC250T tone transmitter, only one battery is required of the 6 volt type since the 6 volts may be used for both the power converter and for the filament. However, in the interest of ultimate economy and transmitter case balance, two of the 6 volt type lantern batteries may be used--one for the filament and one for the power converter--with exceptional long life. It has been found by members of the R/C club that pilot tested this model that one lantern battery (approximately 90¢) will last in excess of two 67½ volt transmitter B supply batteries which cost considerably more even at the "consumer net" prices as obtained at many of the radio wholesale houses.

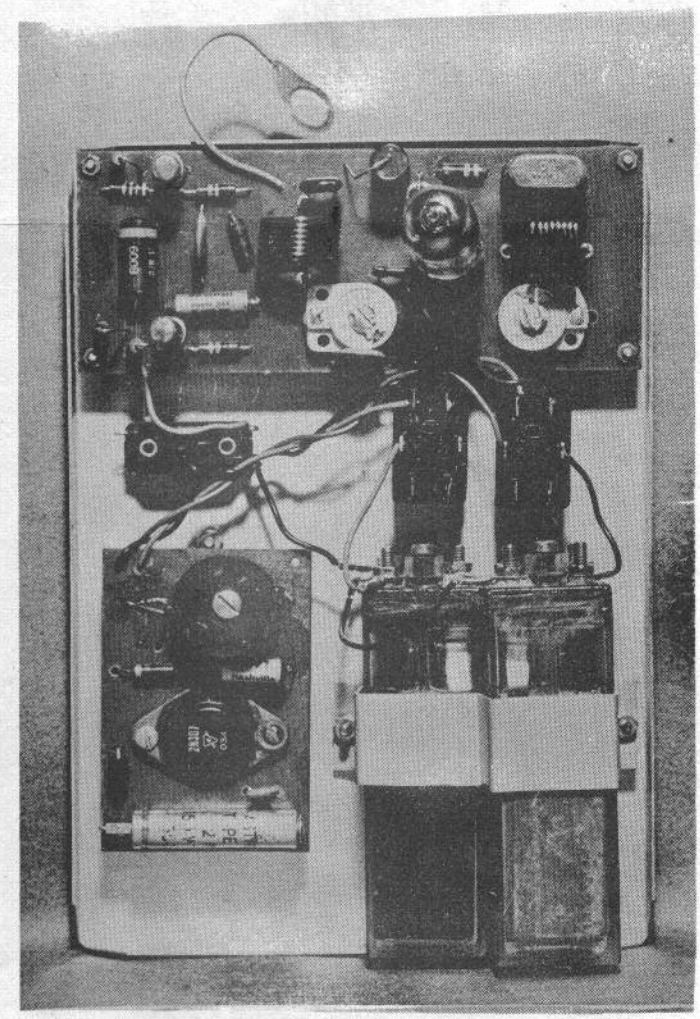
While the MC 135-15 power converter is intended primarily for single channel CW and audio equipment, MC is busy working on a huskier unit which has been extensively used by the multi channel boys in their Orbit and similar 8 and 10 channel equipment and which will perform a beautiful job with the Kraft 8 and 10 channel dual and triple simultaneous units when they become available. This unit will be known as the MC 135-30 power converter and, while not yet available, will appear on the market soon. It will command a somewhat higher price but will give excellent regulation and very little ripple and, since it has been so successfully tested with existing multi-channel equipment, will find a ready market among the multi boys. With simpler single channel and CW equipment, where this drain is not required, the MC 135-15 is a best buy.

So, Grid Leaks presents this circuit, printed circuit board outline, and wiring data as a service for those do-it-yourself builders who wish to build this unit without waiting for the commercial supply to become available.

DC TO DC TRANSISTOR POWER CONVERTER

6V input @ 560 ma
136V out @ 16 ma
Frequency 2100 cps
Efficiency 64%
Ripple less than 1%



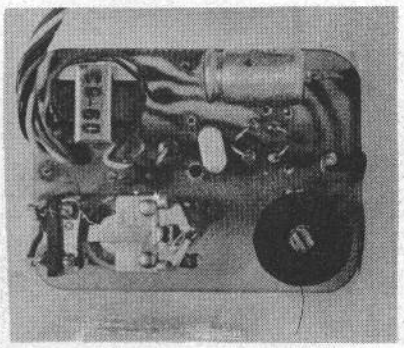


Parts List

R1	1000 ohms
R2	33 ohms
C1	2 mfd 50V IEI
C2	1000 uuf - 300V minimum
C3	8 mfd - 250-300V
Q1	2N307 Sylvania
CR1	Silicon diode
T1	Ferroxcube cup core (56-580-40/3B2)
	Pri. - 60T #28
	FB - 28T #28 to #34
	Sec. - 1540T #38

"P O D" -- Pulse Omission Detector

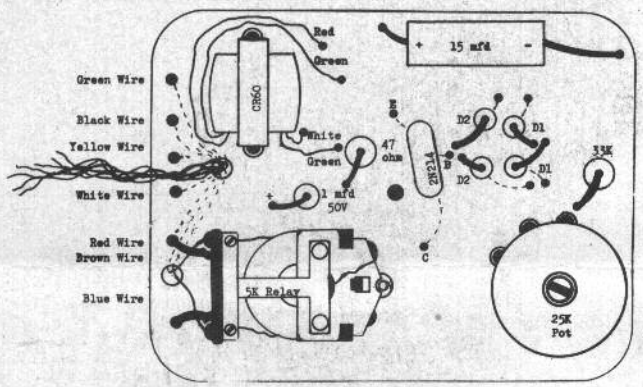
(EDITOR'S NOTE: This addition to any proportional - TTPW, Marcy Twin, or rudder only, gives added benefits. It placed second with TTPW system at the Greater St. Louis Area contest in a field with a number of 8 and 10 channel jobs. It provides simultaneous elevator with motor control with this system. Is also being flown intermediate with rudder only--motor added, in an enlarged Charger. We believe this circuit will prove a valuable addition to the R/Cer's.)



CIRCUIT APPLICATIONS

1. General

Here are three pulse omission detectors that provide trimmable engine control for pulse type proportional systems. The great advantage of this circuit over those devised thus far is that it operates with half the delay usually associated with pulse omission detectors, due to the use of a full wave rectifier for pulse rectification in lieu of the usual half-wave rectifier. The minimum practical time delay possible is $\frac{1}{\text{Pulse Rate cps}}$ while the minimum delay possible with other pulse omission detectors is about $\frac{2}{\text{Pulse Rate cps}}$. For all the systems described below, the mechanical hookup from the engine control servo to the engine should be arranged such that steady signal "off" causes the engine to return to low speed. Thus, in the event of transmitter failure, the control surface will neutralize and the engine will return to low speed. Note that in any of these circuits, a fixed resistor may be used in lieu of R1 and R2. The size can be determined by trial and error or by using a potentiometer and then measuring correct resistance.



D1 - 1N34, 1N34A, 1N66, or 1N48 - Cathode away from base
D2 - 1N34, 1N34A, 1N66, or 1N48 - Cathode next to base

2. Rudder Only

The circuit shown by the solid lines of Fig. 1 and 2 is used. The polarity applied to the engine control servo is determined by whether pulsing is stopped by sending steady signal "on" or steady signal "off".

3. Full House TTPW

Addition of the circuitry shown in the dashed line gives fully trimmable motor control and permits the N.C. contact of the TTPW receiver fail-safe to be used for some auxiliary control such as flaps. Note that the motor control servo may be returned to the battery center tap by connecting from point A to C, or (not both) from point A to B. The former will cause the engine to return to low speed upon any signal "off" failure, but has the disadvantage in that the engine will also move toward low-speed whenever the failsafe relay is deliberately energized for operation of some auxiliary control. The latter arrangement permits independent use of the fail safe relay without affecting engine speed, but, the engine will not return to low speed in the event of a transmitter failure.

Only pulsing of the rudder channel of the TTPW transmitter need be interrupted with this hookup; therefore, full use of the elevator is retained during engine speed change. See Figure 5 for transmitter control box hookup.

Board shown above uses the circuit as shown in Figure 3. It is very easily adapted to most all pulse systems.

4. TTPW System Utilizing Present Failsafe Tube

Fig. 4 illustrates a method for converting the fail

PULSE OMISSION DETECTOR FOR PROPORTIONAL SYSTEMS--FOR MOTOR CONTROL AND FAIL SAFE

TUBE TYPE

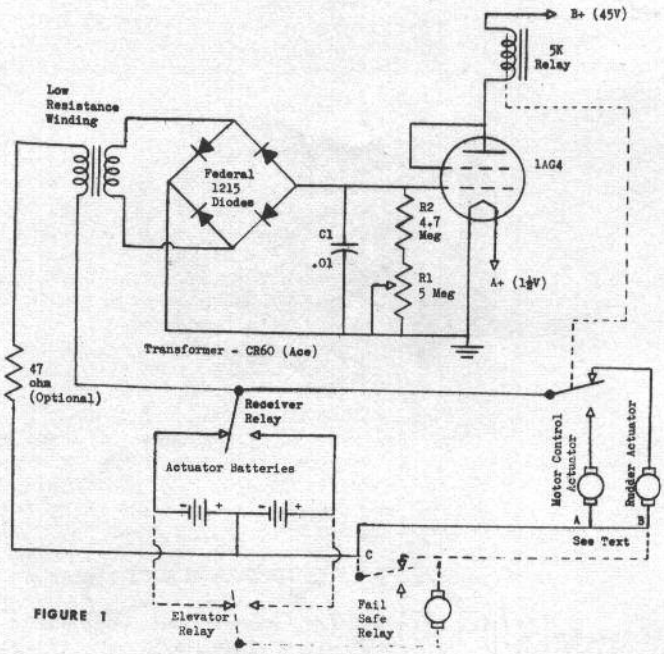


FIGURE 1

TRANSISTORIZED PULSE OMISSION DETECTOR FOR PROPORTIONAL SYSTEMS--FOR MOTOR CONTROL AND FAIL SAFE

LOW VOLTAGE

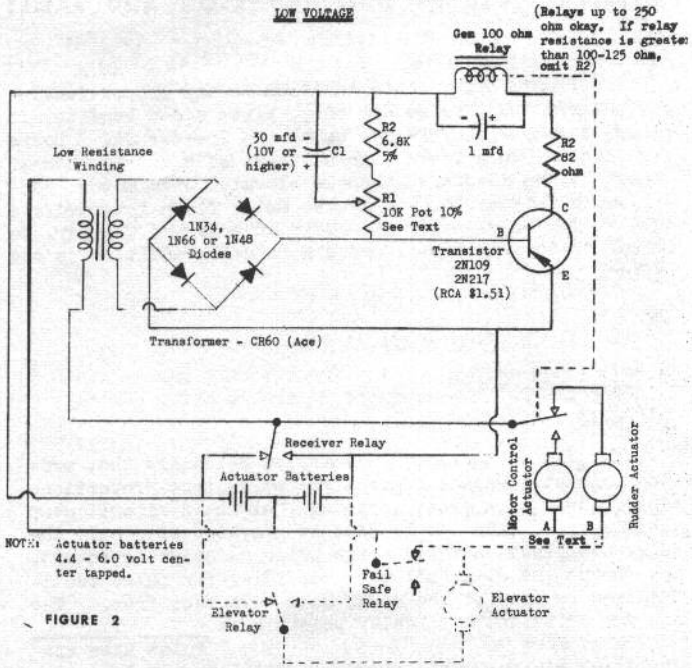
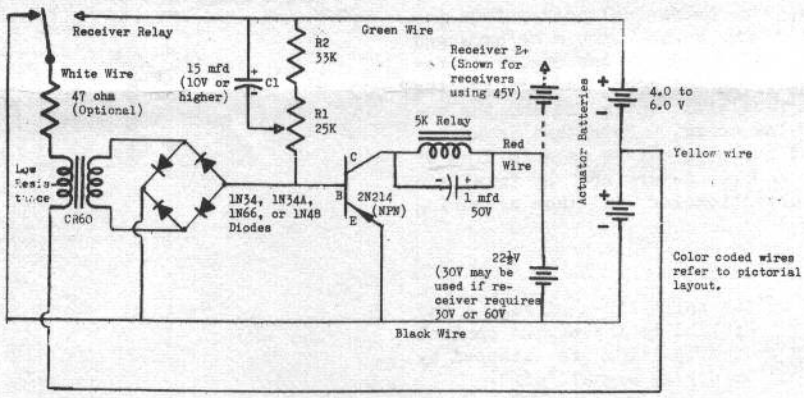


FIGURE 2

TRANSISTORIZED PULSE OMISSION DETECTOR--FOR PROPORTIONAL SYSTEMS

HIGH VOLTAGE



NOTE: Actuator hookup is same as that of Figure 2. This circuit will adjust to any pulse rate from 2-3 ops up.

FIGURE 3

This circuit draws approximately 12 ma from actuator batteries at all times, 4 to 4.5 ma from 22½V receiver batteries when actuating motor control, and 0 ma at other times. A separate 22½V battery may be used if desired. To adjust, simply set R1 to give shortest time delay possible without incurring relay chatter.

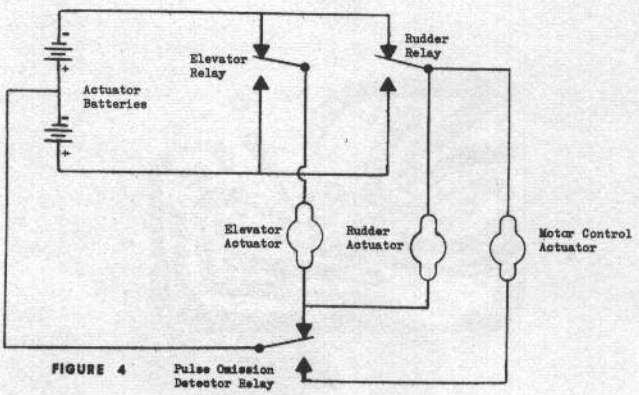
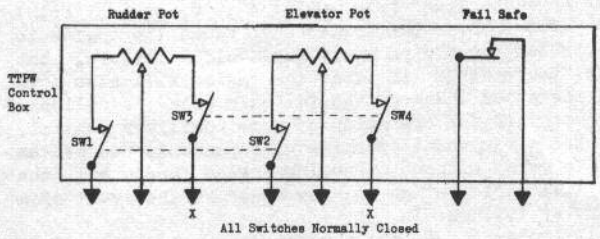


FIGURE 4



Omit SW2 and SW4 for system described in paragraph 4 "Circuit Applications".

NOTE: "X-X" to grids of pulser tubes containing the pulser relays in their plate loads. (i.e. tube grids are opened in like "pairs")

FIGURE 5

safe tube in the existing TTPW receiver for trimmable motor actuator control with a minimum of fuss. The .01 capacitor and 10 meg ohm resistor connected to the grid of the failsafe tube of the original TTPW circuit are removed and the POD circuit of Fig. 1 is added to the same failsafe tube. Note that pulsing of both elevator and rudder must be interrupted simultaneously and in the same direction (i.e., rudder and elevator relays must drop out or pull in together) to actuate the motor control servo in this circuit. Independent operation of the elevator can be obtained by returning the elevator servo to the battery center tap through the center pole of the pulse omission detector relay rather than through the N.C. contact. WARNING: There is no failsafe feature (for the elevator) if the elevator servo is returned directly to the battery center tap.

5. Marcy Simul Application

One of the POD circuits may be added to the Marcy Simul receiver for trimmable motor control, failsafe plus additional controls.

Follow the hookup described for the TTPW to add trim motor control. If auxiliary controls are desired completely independent of motor control, a second POD can be used with the elevator circuit.

OPERATION

1. Operation of Tube Version (See Fig. 1)

Hook up circuit as shown. With no pulsing, the 1AG4 plate current should be about 4.5 ma with the 5,000 ohm relay, and 3.0 ma with the 7,500 ohm relay. When the receiver is pulsed, the current should go to zero and remain there at all pulser stick positions. If the relay chatters, increase R1; if the time delay required for the relay to pull in after ceasing pulsing is too great, reduce R1. The idea is to make R1 as small as possible without incurring a chattering relay at any stick position.

2. Operation of the Low-Voltage Transistor Version (See Fig. 2)

Hook up circuit as shown. With no pulsing, a 0-50 ma meter in the transistor collector lead will indicate approximately 20-25 ma. (Relay should be adjusted to pull in a 15-16 ma by reducing the spring tension). When the receiver is pulsed at 5 cps or above, the current through the relay will go to zero, and should remain there at extreme stick position. With stick held at extreme position, reduce R1 across capacitor to point that the relay just begins to chatter and then increase just a bit. Circuit is now adjusted.

3. High Voltage Transistor Version

Hook up the circuit as shown in Fig. 3. With no pulsing, a 0-10 ma meter in the transistor collector lead should indicate approximately 4.0 - 4.5 ma. With the receiver being pulsed, R1 should be adjusted to give the fastest possible response time without incurring relay chatter.

4. Trouble Shooting

Before firing up the POD, make sure that the unit is wired correctly. The two most likely wiring errors are diodes wired in backwards and transposed transformer windings. The former is characterized by relay current that does not drop and possibly even increases when pulsing begins and the latter by a chattering POD relay even though the pulse rate is high and maximum resistance is across C1. The remaining trouble shooting detailed below is based on the assumption that the unit is correctly wired with the specified values of parts and that no parts are defective.

A. Relay buzzes and chatters whenever pulsing is interrupted to actuate the motor control servo. This condition may occur whenever dry batteries are used for actuator power and the motor control servo is a high drain type such as the Hillcrest. The condition is caused by modulation of the battery voltage as the combined result of high internal resistance of the batteries and commutation of the servo motor which causes a DC ripple voltage to appear across the time delay circuit (C1 and R1 and R2) resulting in cyclic conduction of the transistor or tube. The cure is to use a low drain servo motor (5 ohms or more) and fresh batteries of adequate capacity. However, the best solution is to use Nicads or Silvercells for actuator power.

B. The POD relay chatters at extreme stick positions and cannot be made to hold in even with maximum resistance across C1 or the chatter can be adjusted out but time delay then becomes excessive. This condition is caused by the receiver relay armature not striking both relay contacts at extreme stick positions, in which case the POD circuit reverts to half-wave rectification of the input pulse. It is essential that the relay center pole strike both the contacts at all stick positions during pulsing. If the receiver is deficient in this respect, improvement may be had by the following procedure:

a.) Examine transmitter pulser and make certain that pulser relay definitely strikes both of its contacts at all stick positions. If not, make appropriate mechanical and/or electrical corrections. A small contact spacing (about .005" to .010") is recommended. Pulse proportion should not exceed 90% - 10% on either side.

b.) Use small contact gap spacing on receiver relay (.0 5" to .010").

c.) Some types of receivers do not pulse very well and "warp" the pulses such that the relay favors either the "pulled-in" condition or the "dropped-out" side. The TTPW and WAG receivers can be improved by reducing the .001 mfd filter capacitor connected from grid to ground of the relay tube to a lower value, about 820 mfd for the TTPW and 470 mfd for the WAG. Experiments have not been made on other receivers so no further instructions can be given. (This is not to imply that WAG or TTPW receivers pulse badly--they are excellent, of course.)

d.) Reduce the pulse rate. For most pulse systems, 4 to 6 cps is perfectly ample and most receivers will pulse satisfactorily at this rate. We normally pulse the TTPW at 6 to 8 cps on the rudder with no difficulty.

e.) In case of a real stinker of a receiver that is not sufficiently improved by the above, the only thing left to do is to deliberately "warp" the transmitter pulser by mechanically restricting the stick movement on the offending side. Or more preferably, by electrical means. This is not so bad as it sounds since the resulting receiver relay action can be quite symmetrical.

C. TTPW Only

With rudder pulsing interrupted and continuous high tone being transmitted, and with elevator pulsing with the stick in the extreme up or down position, the rudder relay "pings" causing the POD relay to chatter. This condition is caused by too extreme a pulse width ratio in the elevator pulser at the transmitter and can be cured by using 200K resistors in place of the 100K resistors presently between the tube grids and the 1 meg control pot.

Bits and Pieces

A SHORT SHIRT STORY

Gordon Gabbert of Dallas, and Dr. Clark of Omaha, exchange views at the recent KC/RC meet at Lamar. Gordon's shirt is embroidered with an apt "message".

GOLD PLATING

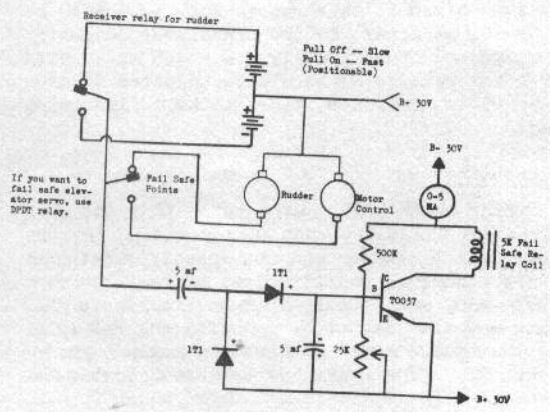
An item of interest to R/C'ers comes from Peter Kacoure of Jamaica, New York. This is a bottled liquid called "Liqua-Gold" made available through Lafayette Radio Company in Jamaica. It appears that here is a very easy way of plating gold on switch contacts, etc., without electricity and that is by taking this 24 karat gold which is suspended in a special chemical solution and just adding water to it for further dilution and heating it to just under 212° (boiling) and dipping the part to be plated into this liquid for about 5 to 15 minutes. The part, according to Pete, is actually gold plated and does not suffer any tarnishing.

A check from the spec sheets of Lafayette's catalog shows that this is available to plate all common metals, copper, brass, bronze, nickle, iron, steel, tin, puter, cadmium, solder, zinc, etc., printed circuits, connectors, terminals, sockets, plugs, switches, relays.

Comes with complete instructions. The smaller size will plate 300 square inches. Weight is 4 oz. Lafayette's catalog number is HD-686 and net price is $2.25. A larger size, enough to plate 600 square inches, shipping weight 8 oz. Lafayette's catalog number HD-687 with a net of $4.10 is also available.

POSITIONABLE MOTOR CONTROL

We had the pleasure of visiting with Marcy Inkmann in Racine, Wisconsin on our recent trip to Chicago where we took in the Trade Show. We happened to spot in Marcy's plane a rather unique electronic motor control system. We aksed Marcy to furnish this to us for inclusion in Grid Leaks. Here is the circuit



INDOOR RC DESIGN

PART TWO OF AN ARTICLE BY FRANCIS PLESSIER

No light actuator was available on the market and I had to build one. This was not a problem since I build nearly all of my actuators for proportional jobs anyway. An escapement might be lighter but I felt that piloting accuracy would be worse.

The figure shows an exploded view of this tiny actuator which is made around a French magnet which is 19 mm in diameter and 4 mm thick. Any magnet of fairly similar size will do but the dimensions on your particular unit will have to be adapted to fit the magnet that you can find.

The coil must be made first. It must be done on a piece of iron tubing 3 mm diameter inside and 5 mm outside of 20 mm length. Two bakelite washers were glued to it. On this spool are wound together two 14/100 mm wires until the coil is full. (EDITOR'S NOTE: For experimentation, we would recommend the American standards of #34 or #36 wire be tried for best results of power vs. battery economy). The two pole pieces are cut out of 1 mm sheet iron and then curved to have the shape of the magnet. Two bars are cut in brass of 1 mm with a hole of 2 mm in the middle. The magnet is soldered to the axis made of 2 mm brass tubing. Assembly is a bit tricky. The two pole pieces are fixed to the core of the coil by 3 mm screw and knot. Then, the inner brass bar is soldered at 1 or 2 mm of the coil. The hole must be in the center. This may be verified by putting the magnet in place which must fall in place with no more than ½ mm play between the magnet and the pole pieces. The pole pieces are adjusted with pliers until the magnet can rotate freely between them. The problem is not to have any iron dust coming on the magnet as it will block the whole system.

Once adjusted, insert four thin pins between the magnet and pole pieces to hold it in place. The upper brass bar is held in place by a rubber band and soldered to the iron pieces. The pins are removed and the actuator is finished if the magnet will turn freely without friction or without too much loose play.

A small piece of Bakelite or cardboard is cemented to the coil with three twisted loops of ½ mm copper wire. On these three pins are soldered the four ends of the coil. The beginning of a coil and the end of the other to the center pin makes a center-tapped coil, quickly wound, with equal coils. A small bell crank made of thin brass sheet is soldered to the axis of the actuator. It will hold the nylon wires going to the wooden bar on the rudder.

With two 1.2 volt nicads, current drain is about 80 milliamps on each coil which is quite enough to move the rudder strongly. The actuator is cemented in the fuselage with a vertical axis and balsa blocks to hold it. The bell crank, about 50 mm long, protrudes on each side of the fuselage and a thin nylon cord runs from each side to the rudder bar. Rudder throw is approximately 20° each side.

RECEIVER

It is perhaps possible to find a light receiver on the U. S. Market--it was not in France and there is so much fun in developing one. Weight is the big problem. The receiver described here is light with its special 5V battery but not too sensitive. Actually, it is possible to fly with a powerful transmitter and the range is easily 300 meters and what about a Mosquito at 300 meters?

The front end has been stolen from a CG schematic. It is very sensitive but it is often blocked at short range by a pure carrier. A CR60 transformer is used for the liaison to the second stage where a carefully selected 2N217 is used (very high gain) in a reflex type circuit. The relay is a special French built subminiature UGON relay with a 160 ohm coil, 6 ma sensitivity. It is 8 mm in diameter, 25 mm long, weight is 4 grams. This item is widely used in missiles or military uses. Its drawback is retail price which is more than $12.00.

A subminiature variable resistor (Justohm MATERA) is used to adjust the biasing of the final transistor in order to have the maximum sensitivity. Actually, it could be replaced with a fixed resistor but it will be perhaps useful if there are high temperature changes.

Resistors are of the 1/10 watt type, the 1.6 mfd capacitors are tiny TANTALITICS, the choke coil is a small honeycomb choke as in a TR 4.5 receiver, tank coil is of the same type as the TR 4.5.

It is good to build this receiver first on the working bench with variable resistors here and there to adjust everything. Then build it very small and condensed.

Mine measures 25 x 40 x 15 mm and weighs 28 grams. The battery used is a very tiny AGLO cell, made of 4 nicads "button type" of 20 milliamp hour each. I had to use two different batteries in order to avoid interaction.

Some adjustments are necessary. First, with a tiny earphone in point A, you must check that the first stage is superregenerating with the usual rushing noise. If not, increase the capacitor C until it does. This capacitor has to be decreased to its minimum value which still gives the superregen operation. It will then give the maximum sensitivity. Generally, it is between 10 and 30 mmf. A milliammeter is then inserted in point B and the current checked. Without noise coming from the first stage (A01 taken off), you can check that the current is a function of the biasing (variable 100 ohm resistor) and varies from 2 ma to more than 20 ma approximately. Adjust it to 3 ma for instance and insert the A01. If it is oscillating correctly, you will hear the noise and the current will step up lightly, to approximately 3.5 ma. If the capacitor C is small enough, the current gain is small but when receiving a modulated 27 mc signal, current gain will be high--up to 15 or 20 ma. Some adjustments may be necessary, depending on the component used. The antenna is a piece of Bonner #24 hookup wire with 3 turns around the tank coil, approximately 25 inches long.

It is not necessary to build a receiver too small because you could not make any adjustment and there is enough room in the Mosquito.

The receiver is inserted in a hole in the side of the fuselage covered with foam rubber. The dust core and variable resistor are easily accessible. The antena goes through a hole in the other side of the fuselage just hanging down.

Many checks are necessary so that the whole system works okay. Any good 100% modulated transmitter will work, pulsed only in width with a rather slow rate. The listed battery of 20 ma gives about 2 hours of continuous operation, the two 100 ma nicads for the actuator about one hour.

No earphone, no milliampmeter, no switch are used--just a tiny 4 prong plug. Adjustments before flying are simple. Transmitter off, plug in the receiver. For instance, the rudder goes right (relay open as it should be). Turn the resistor until it goes left. Then, back a little to the right again. Your sensitivity is maximum. Turn transmitter on at 100 meter and adjust the dust core in the middle of the region where it is pulsing okay. These adjustments, familiar to every "hard-tuber", are good for a long time.

NOTE: The plane used is described in GL, Vol 2 No. 6.

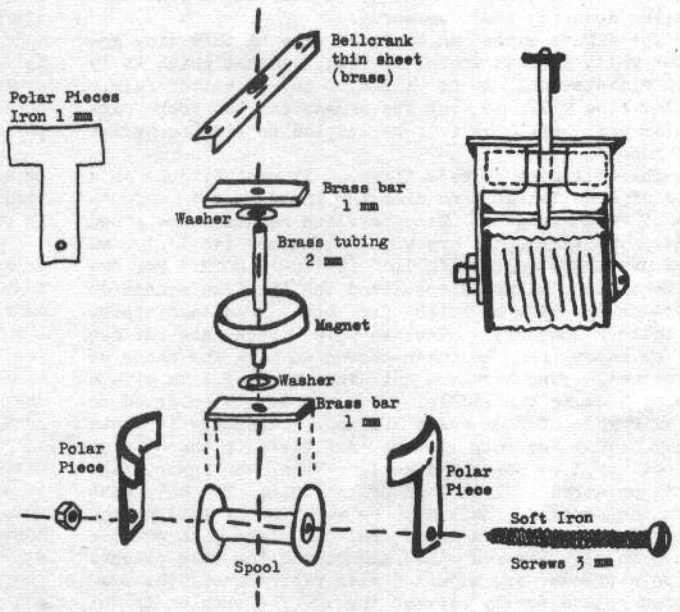
FLYING

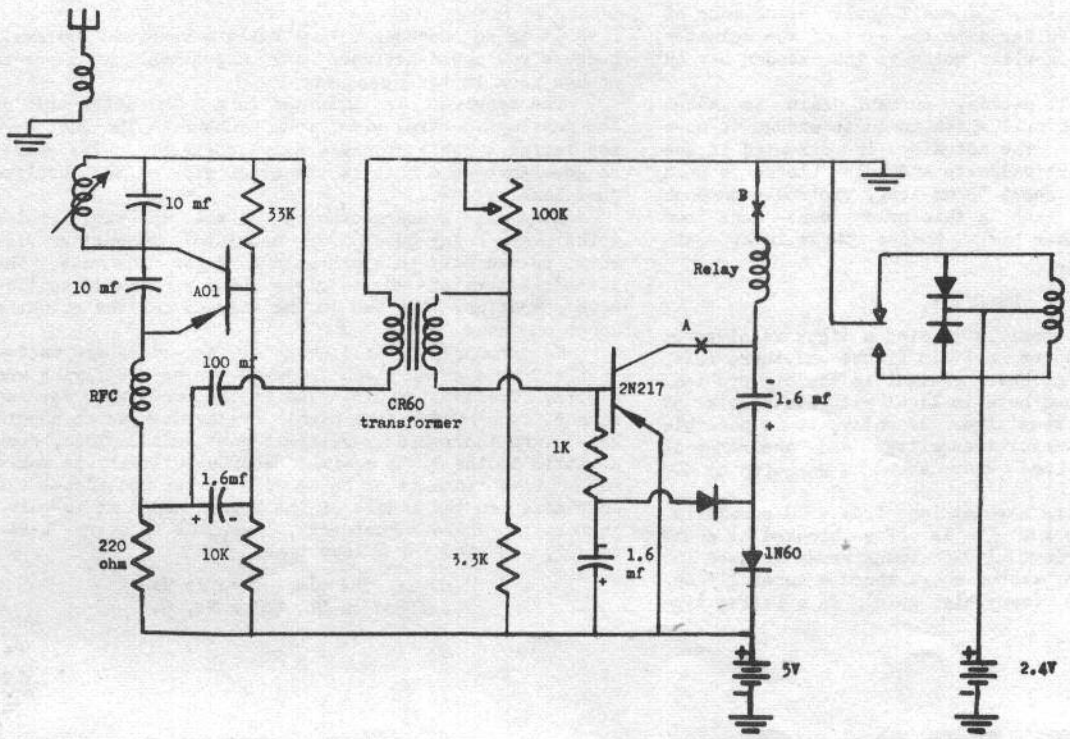
First, balancing has to be adjusted, somewhere around the aft wing dowel seems okay. Glide tests do not indicate too-many things. It has to be trimmed with a lot of "climb" on the tail plane. Then try powered flights to be done with the radio on--and working, if possible.

Do not fly indoor first but outdoors in a perfectly calm day (very early or very late in the day). Adjust your Pee Wee rather rich and throw your Mosquito with a very gentle push. If you launched the prop in the right direction and if you are lucky, it will stay in the air. The model could have a tendency to climb and stall under power. This will be cured by reducing the angular difference between wing and tail and moving the CG slightly back. Directional trim is easy, the rudder is efficient enough, but it is far from a hot job, dihedral can be adjusted by the length of the wing struts.

Longitudinal trim is more difficult and it needs some adjustments to have a very slow and hovering flight. At that time, reduce the area of the rudder because else the model will be too acrobatic and difficult to handle. With full stick, the model must turn slowly and dive in very slowly and then will not nose up too much in the recovery. After some practice, you will be ready for indoor flying. I suggest a small block of light foam plastic to protect the nose of the model, held in place by rubber bands. Choose a big hall, 100 x 100 feet at least, and high enough and without too many things on the floor or too many glass windows. The big problem flying indoors is that you cannot allow your model tc climb so you are obliged to turns. The model spiral dives and makes unwanted acrobatics on the recovery. That is why I insisted on trimming the model not too acrobatic (small dihedral, aft CG). A good point is that after many flights, you will realize that the model is almost indestructible. It has not enough inertia and speed to get momentum and construction is very strong with all parts--even the engine--held by rubber bands.

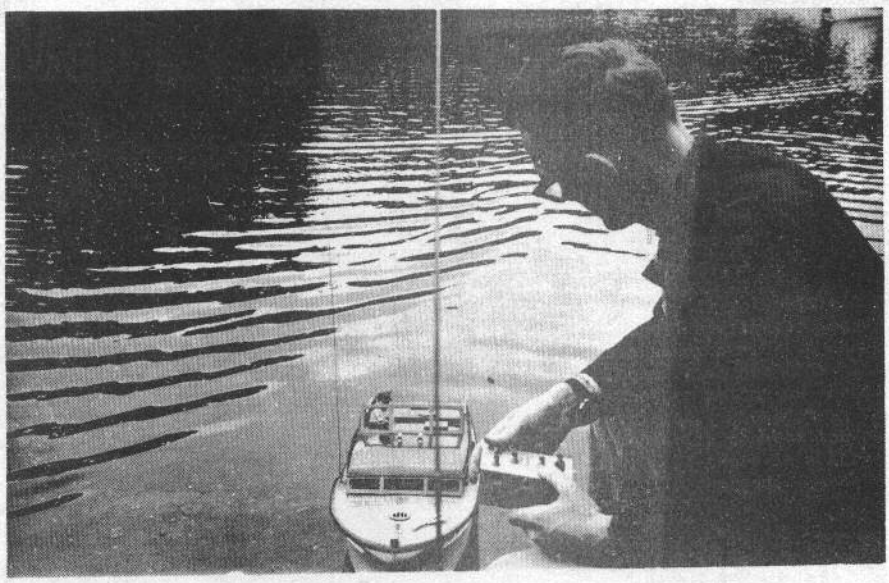
I hope this description will invite you to try this indoor model. It is actually a lot of fun but, after, what else? Rubber driven model, or with the new German motors electric driven, or why not try a Jetex on such an R/C model?

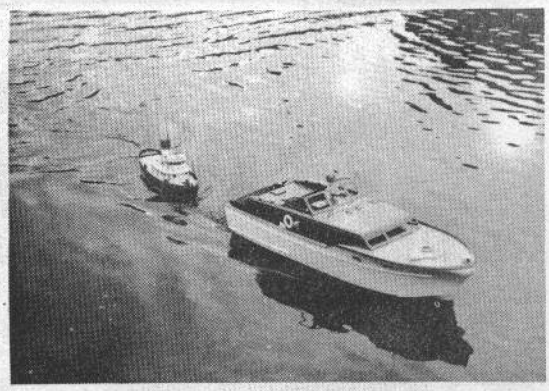


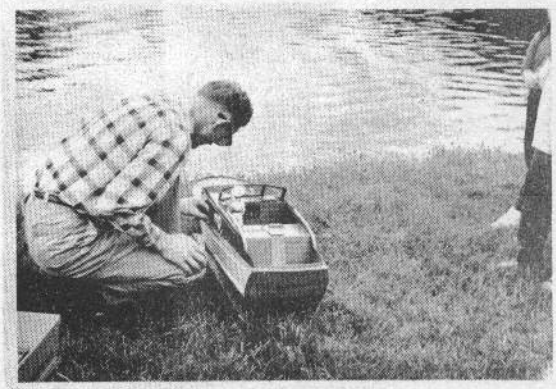


Lazy Man's RC

TRY RED COSTLOW'S IDEAS FOR BOATING FUN







Are you nervous, jumpy, biting your nails? Did you just stack in that multi job? Then why not take a crack at R/C boats? They may not be as spectacular as airplanes, but they are easier on the nerves.

The following ideas and information are passed on for what they are worth. They are being used in my four year old Sterling Corvette. It is equipped with a Marcy 6 channel receiver. Fig. 1 shows a stuffing box and drive shaft that I like. The shaft is made up of telescoped brass tubing arranged so that only the ends of the shaft touch the stuffing box. The threaded stub shaft is for a Sterling nylon prop. The easiest way to assemble the shaft is to tin the ends of the tubing, put on some "Sal-Met" (or other flux) and slip the tubing together. Hold a hot soldering iron on the joints until the solder flows. When installing the shafts, put on a little Vaseline or a light grease for lubrication. After four years of use, these drive shafts are still in perfect shape. For universal joints, try the K & O units. They work nicely and are easy to install.

Fig. 2 shows a battery modification that prolongs the life of wet cells. One of the big problems of wet cells is spilled acid on the terminals and leads. Cut some half inch lengths of half inch plastic tubing. (I used the vials that GE transistors come in.) Cement these over the filler holes on each cell. Next to the filler hole, drill or punch a 1/16" hole for a breather hole. This makes it easier to fill the cells. A handy gadget for filling wet cells is a K & B plastic glue gun. On charging wet cells, I have found that the batteries stand up better if you confine the charging rate to 250 ma or less. This is not critical but a slow charge is preferred. A small hydrometer (see Grid Leaks Volume I, Number 5) is a handy device to check the cells. Ideal Models has a commercial job for those that can't make their own. Another method of checking wet cells is a 5 ohm 10 watt resistor. Connect a voltmeter to the battery, and momentarily connect the resistor across the 6 volt terminals. If there is a large voltage drop, the cell is not fully charged. A defective battery will

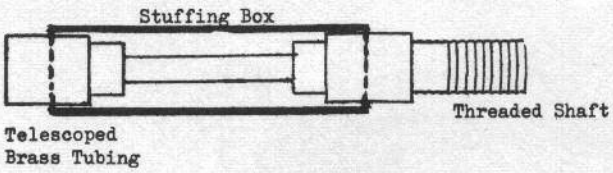


Figure 1

give this indication too. Distilled water can be gotten at a drug store or, if you have a de-humidifier, you can use the water from it, provided it is caught in a glass or plastic container.

Fig. 3 is a reversing switch for the drive motor(s). This is nothing more than a double pole double throw switch with center off, done up in printed circuit form. The wipers are attached to an insulated plate which is, in turn, fastened to the pushrod on a servo. If you use a rotary servo such as Dmeco, CitizenShip, Cobb, etc., see Grid Leaks Volume II, Number 3. The important thing is to make sure the wipers and PC strips are heavy enough to handle the large amount of current. 3/16" or 1/4" seems adequate. A dropping resistor could be included to give half speed but the difference between half and full speed doesn't seem to justify the extra work. This switcher handles two Panthers and two Aristo 64's nicely.

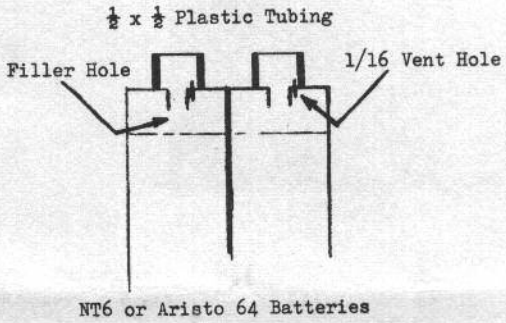
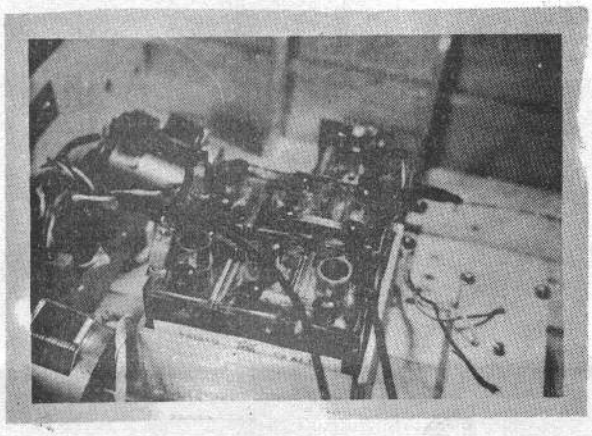


Figure 2



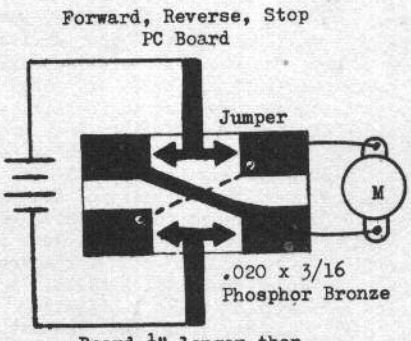
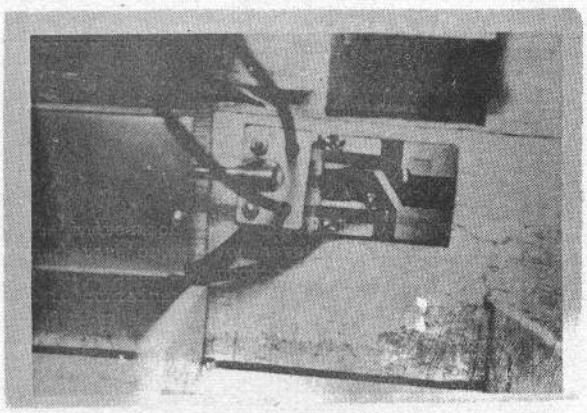


Figure 3



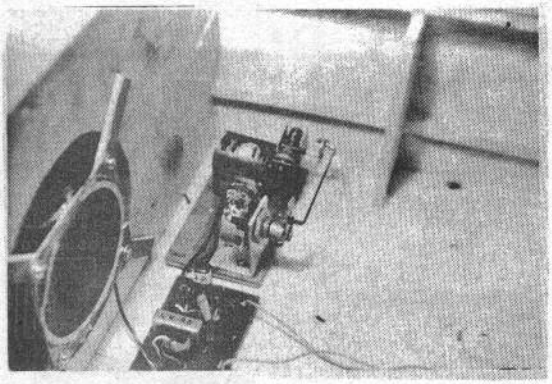
Figures 4, 5, and 6 show the circuit and mechanics for a siren or horn. This adds a lot to the operation of a boat and will amuse those who see it. The relay keys the horn and the pot controls the frequency. A 1 meg pot will bring the tone down to slow "putt, putt". A 100K pot is more suitable if a siren is intended, giving a smoother rise and fall in the tone. Speed of the gear box and motor will determine the rate of the rise and fall. Once the linkage is set up, rotate the pot in its bracket to get the frequency range you want. This particular linkage arrangement permits the tone to "hold" on the highs and lows for added realism. Any general purpose transistor can be used if its ratings are observed. The transformer is a Calrad CR80, but any similar transformer may be used. A 3" speaker out of an old dictating machine was used on the finished unit. Other sizes were tried with little difference. For those who want to jazz the unit up, Figure 5 shows the PC board used.

One final thought for those looking for a little huskier 30 volt battery. Take apart a Burgess XX30 (or equivalent) and carefully cut it so you have 20 of the individual cells in a stack. Tape contact plates on the ends and you have a nice 30 volt battery. Two 45 volt batteries will give you 3-30 volt cells. You may want to leave on an extra cell to give 31½ volts on the 30 volt receivers. Other type batteries can be treated in the same manner.

(EDITOR'S NOTE: We queried Red about the R/C equipment used by him in his boat and this was his response.)

"The radio gear in the boat is a Marcy 6 channel receiver. Works real slick. Channels 1 and 2 are rudder, channel 3 is horn and channels 4 and 5 are motors. Channel 6 is not used currently. Use 31½ volts on receiver B (penlight and 30V). Stands up very well. Servo pack is four VO.500's in an Ace holder. Motors are Pittman 9003, two Aristo 64 batteries. The switches work like a charm and when I back away from shore and then charge off, the crowd laps it up.

"I get a real bang out of racing canoes. In fact, all of us are on different frequencies so we race around. Quite a sight!"



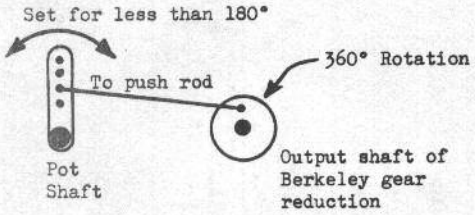
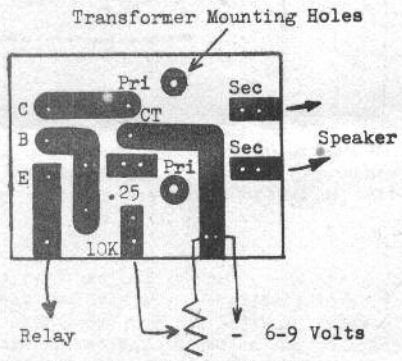


Figure 4



PC Board for Horn - 1½ x 2
(Not to Scale)

Figure 5

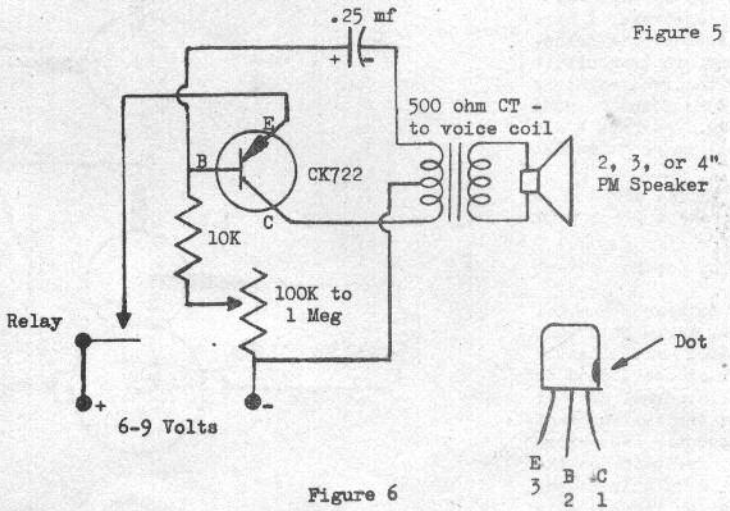
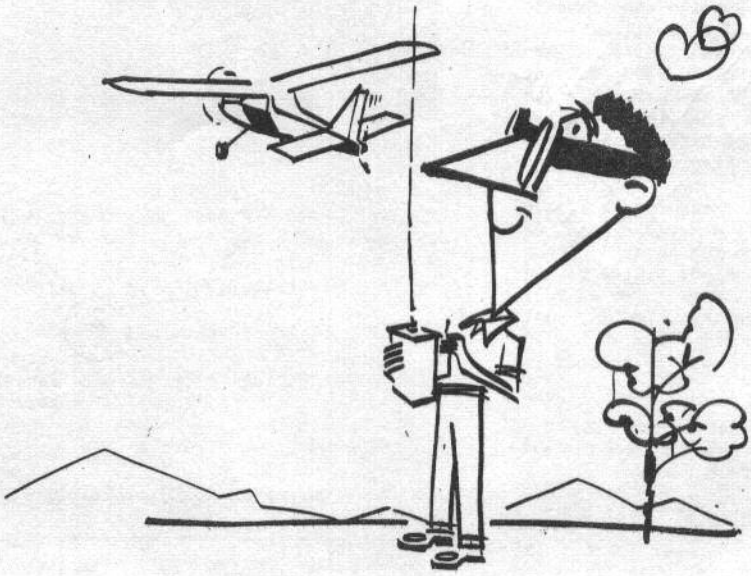


Figure 6

More Bits & Pieces



"Just finishing building, installing and flying the Kraft Receiver and Transmitter (added Dave Gershberg's Pulser from May DC/RC News). So chalk up one more 'Kraft Happy' fan. Give a gold star to Kraft for his contribution to the RC'ers."

-- Dick McNeil, DC/RC

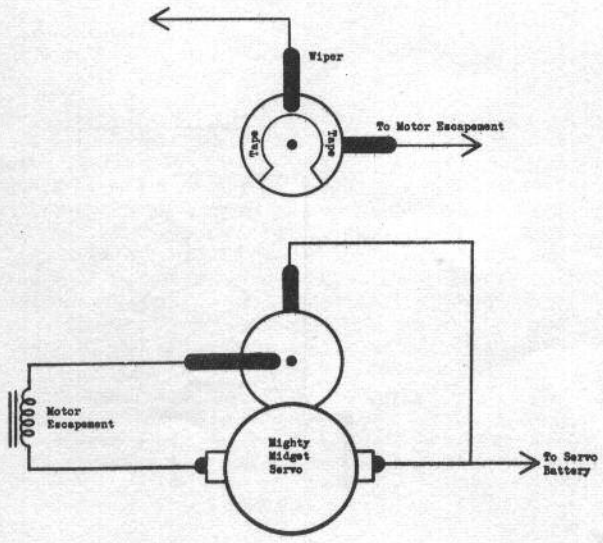
MARCY TIPS

"We here are using the Marcy dual system and have a few comments that may be of some value. We have put the Marcy receiver in a metal L.M.B. box and brought the shorting plugs for checking out on top of the box. This certainly simplifies mounting and checking. The receiver is shock mounted in the box. Then the box can be securely lashed down on tray in ship. To use the Marcy dual transmitter for flying other tone receivers, I have built up one half of tone generator with single transformer and transistor and mounted same in transmitter case with push switch and, by changing the two resistors connected to base of transistor, the tone can be used to cover TR 4.5 and most other receivers. Perhaps a kit for this could be built and market would be good enough to warrant this.

"Here are the changes: From base to ground use 10K in place of the 2K; from base to collector use a 39K instead of a 10K."

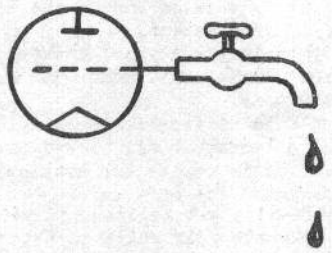
"A very simple motor control device for Marcy dual is the system shown.

"By merely placing a wiper from one brush terminal to shaft of large gear on Mighty Midget servo motor and a wiper on large gear which is insulated with plastic tape on the face of gear. The tape is positioned to cover all but the extreme of rotation in normal use but solid on or off will rotate motor so wiper will contact the bare spot on gear operating escapement. No extra batteries are necessary. Of course, the drain on the batteries is considerable but the drain is only momentary and using "D" cells or Nicads on servo, this doesn't bother. Both servos in dual system can be utilized in this manner for two extra operations--one with solid on signal--the other off."



Jack Milligan
Lewiston, Idaho

Grid Leaks At Play



FLASH NEWS!

From Gordon Gabbert, one of the host committee of the Nats to be held July 25 through 31 at Dallas, comes word of the motel which will be used by most of the R/C'ers. This is the Hinton Guest Center and Motor Lodge. It is located at Highway 183 at Loop 12, Irving, Texas. For reservations, contact Bob Jarvis, manager.

A look at the map on the back of the sheet that all AMA members are to retain from their official entry blanks for the Nationals will show where this is. Rates for twin accommodations vary from $9.00 to $12.00 per day. These have two double beds in them and roll-aways can be had for these at an additional $1.00 per roll-away. Singles are $7.00 to $8.00 per day. They have one double bed and roll-aways are again available for additional occupants at $1.00 per.

The Hinton Guest Center will automatically shuffle overflows when they begin to be filled up to the closest two motels.

Late arrivals should specify "late arrival" when requesting reservations and should ask for a confirmation. The motel does not require that an advance deposit be made, however, they do request that the fellows all play ball with them in the event of a delay in arrival or a cancellation of plans would necessitate cancelling out so they could make space available to someone else.

Any persons arriving by private plane may contact the motel on 122.8 megacycles. They will be met at the airport at which they land.

If you are flying in by commercial airline, it is desirable to give the motel this information as quickly as possible as to what line, what flight number you are arriving on, and at which field you will arrive. You will also be met.

The Hinton Motor Lodge has facilities available for car rentals at the lodge.

Nearby is a Howard Johnson restaurant which is open from 7 A.M. until midnight.

The Guest Center also has a swimming pool and a meeting room which will be made available for meetings, bull sessions, etc.

The motel is about seven miles from the Naval Air Station where the Nats will be held.

We feel that Gordon Gabbert and the host committee are entitled to a sincere vote of thanks by all R/C'ers who are planning to attend the Nats for securing such an excellent set of accommodations. It would be wise to make your reservations as early as possible. We'll look forward to seeing many of you there.

It was our pleasure to attend the Third Annual DC/RC Symposium held at the Washingtonian Motel near Washington the weekend of May 7 and 8. It was hosted by the DC/RC with Don Clark acting as master of ceremonies. Among the papers presented were Aero-Dynamic Problems for R/C Models by Norman Walker, Etched Wiring for Radio Control by E. J. Lorenz, Reed "Know-How" by George Vaughn substituting for Dick Branstner, Selective R/C Receivers by R. W. Ketchledge of Bell Laboratories, Control Surface Hinge Moments by Dr. W. A. Good, and some Perambulations on the CAR System by Maynard Hill.

The attendance was the largest in the history of this type of Symposium held by the DC/RC group and we felt, from sitting in and listening to the many excellent presentations, that it was an extremely worthwhile effort. Our hats are off to the DC/RC committees because it did demonstrate a terrific lot of work. The papers, as presented, were exceptionally well received by the large crowd.

These Symposium type of get togethers are being sponsored in more sections of the country as R/C gains emphasis in all sections and we feel they present an excellent opportunity for exchanging ideas on all levels of radio control. Not only are the formal sessions of this type of thing very valuable but the informal groups that gather at the con-

clusion of every session and in the motel rooms far, far, far into the night, present a great deal of information.

The Symposium this year, however, was plagued again by bad weather and, when Sunday morning didn't dawn but came up gray with some precipitation, only a few demonstration flights were made.

It would be difficult to single out any one of the papers presented and say that it was a highlight because all showed intensive research, good development, and excellent presentation. Extra copies are available. Contact Don Clark at 4202 Brookfield Drive, Kensington. Maryland for more info.

If there is a get together in your area similar to the DC/RC shindig, we feel it would certainly be worth your while to attend. It was an enjoyable weekend for both Bobbie and your editor since these affairs are generally family affairs.

So, a tip of the hat to the DC/RC for their Symposium and best of luck to all who have and will venture into this new field of knowledge dissemination.

Dr. Walter A. Good and his brother, Bill, appeared in the Smithsonian Institute on May 10th to present them the first model radio controlled plane that Walt and Bill had developed and flown. This plane is to be hung, along with the other historical relics in the Smithsonian and will be seen by numbers of sightseers in the future as one of the first attempts to establish radio control as a hobby. This is a signal honor for Walt and Bill and one which they deserve.

At the beginning of this "Grid Leaks at Play", we presented Gordon Gabbert. We had the pleasure of seeing Gordon Gabbert at the KC/RC contest the weekend of June 4 and 5 and also having him visit Grid Leaks on June 6. As always, Gordon is a stimulating companion, an excellent fellow to know, and an all-round R/C fan. Gordon, at the KC/RC was flying a low-wing version of the plane he's been using for a number of years equipped with his Orbit 10 channel equipment.

A quick glance at the "Bits and Pieces" page of this issue will show the shirt that Gordon was sporting at the KC/RC meet and we hope that the words are legible in the photograph. While it does show a rear view of Gordon, maybe the message embroidered on his shirt will get across.

The KC/RC meet, in spite of windy weather on Saturday and rainy weather Sunday morning, was very well attended by fliers from Nebraska, Iowa, Kansas, Oklahoma, Arkansas, and Missouri. There was all sorts of equipment in use and the Multi and Intermediate boys were having considerably better luck because of the high winds than were the rudder only boys.

We would venture a prediction based on our own personal observation at this contest and words that we've had from contests in the St. Louis area, and that is that the Intermediate boys are, at last, surging forward. There are many of the R/C fliers who have been beating their breasts these last few years urging Intermediate to not become a forgotten art in R/C and for more of the "experts" to get into this field. At the KC/RC meet, this was very much in evidence with a number of multi fliers--not only entering into the multi--but also entering ships in the Intermediate category.

From word we can get, there will be some proportional entries also at the Nats in the Intermediate using the POD circuits (see elsewhere this issue) or circuits of a similar nature. We look for POD to do a lot to stimulate interest in single channel proportional control as well as adding an extra bit for the TTPW and MarcyTone dual boys.

Next issue of Grid Leaks, we feel, will contain many worthwhile items. Among them, (we'll only mention two) will be a single channel proportional rudder only box mechanically operated and developed by Don Baisden of Atlanta, Georgia. This is an ultra-simple box with very few parts to go haywire and relatively inexpensive to build. The other is one which should please the boys in multi reeds, and those planning to get into reeds. This is by Phil Kraft. Until next issue--

Yours very sincerely,

Paul

Paul F. Runge, Editor
GRID LEAKS

PC BOARDS FOR WAG DUAL RECEIVER

Here is a printed circuit board for the WAG TTPW receiver developed by members of the West Jersey R/C Club. This board has been designed to replace the one which was originally used by Dr. Good in his parts placement and it is compatible with exactly the same parts layout and instructions as used in the original article which appeared in American Modeler.

On the opposite side of the page will be found two printed circuit relay layouts for the WAG TTPW receiver. One is for use with three Gem relays, the other with one Gem and two RBM relays. These, also, are designed to be compatible with the parts layout and instructions in the original article.

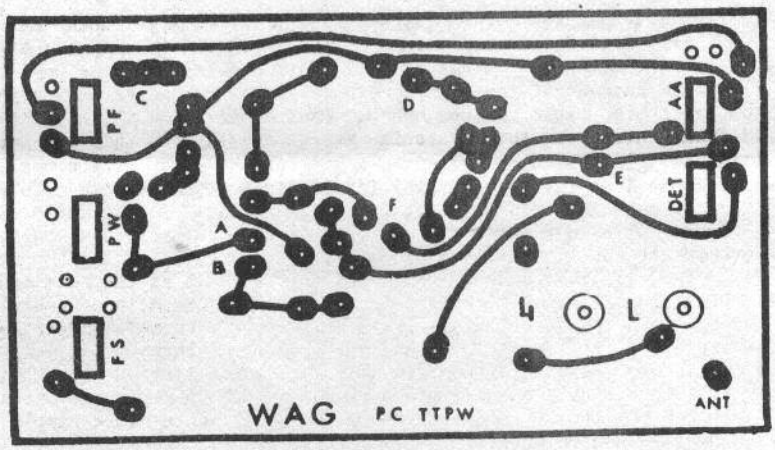
These are companion boards and have been proven by more than 10 members of the West Jersey R/C Club who have used the WAG system with them.

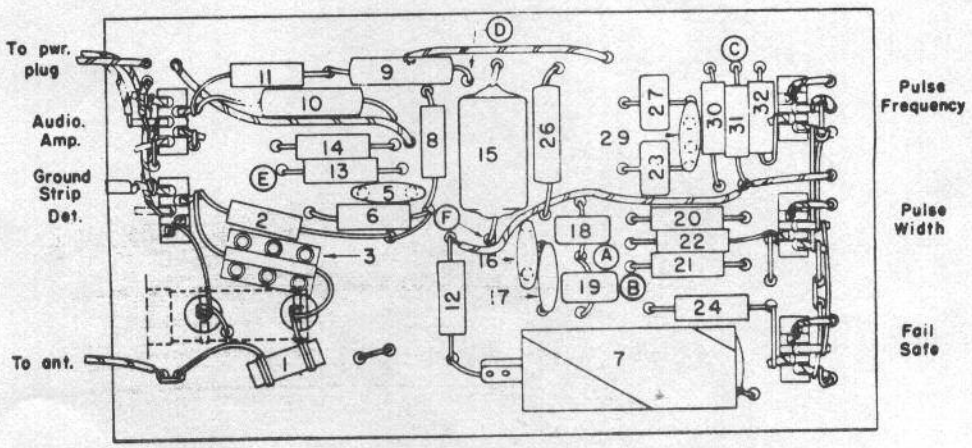
With the RBM relays--rudder and elevator--in place of Gems, the weight is somewhat heavier but the WJRC boys feel that they offer superior contact design and are available inexpensively.

Herewith also are reproductions of the parts placements as presented in the original article and copyrighted by Dr. Good and reproduced by permission in Grid Leaks. The use of printed circuitry with the WAG TTPW system has done a lot to promote the system among those who feel that they are a little reluctant to go ahead and wire up the five-tube unit on their own.

While at the DC/RC Symposium in May at Washington, D.C., we saw another printed circuit board which was developed by William Grogan being used by Austin Leftwich of Roanoke, Virginia on a much smaller configuration and utilizing the Deans subminiature relays. Austin had been flying this system and did fly it at the DC/RC Symposium with considerable luck utilizing his own servos. This unit, however, requires an entirely different approach as to parts placement than the unit shown with this article and we are on the track of it and hope to have the permission to present it to you in a subsequent issue.

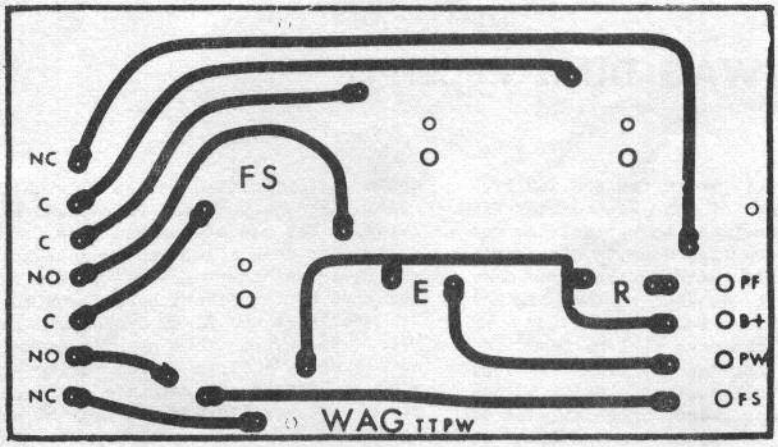
We are grateful to George L. Esler of Levittown, New Jersey for sharing with us the PC boards as shown in this article.



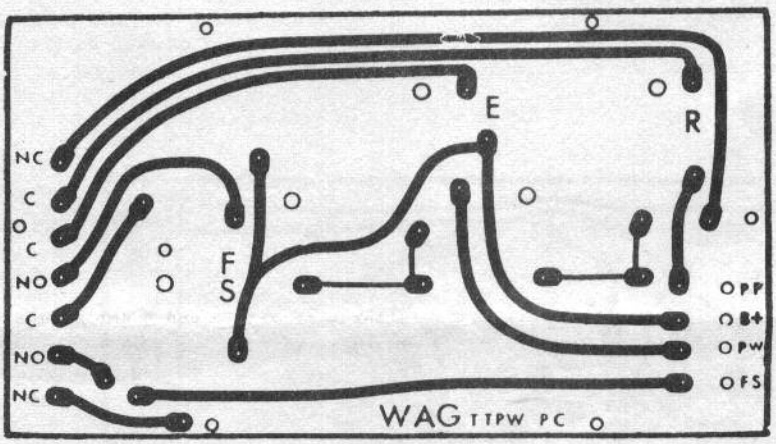


Component Side

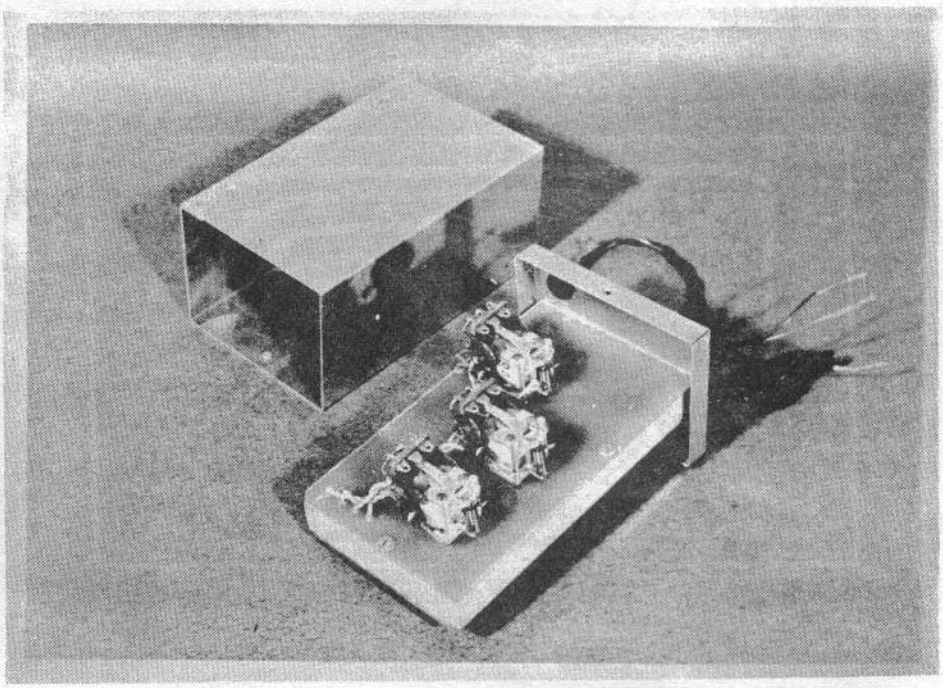
Components No's. 5, 16, 17, 23, 25, and 29 are disc capacitors standing on edge with leads protruding through holes beneath them.



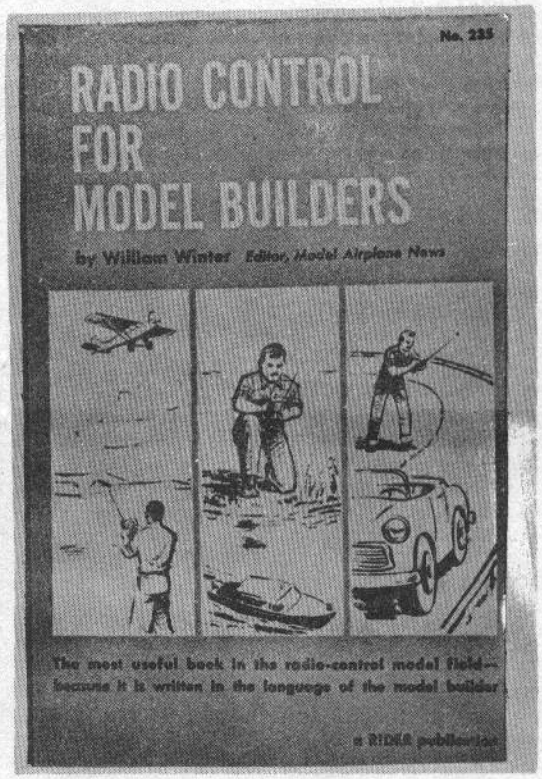
Relay Board for 3 Gem Relays



Relay Board for 2 RBM and 1 Gem



WHAT'S NEW?



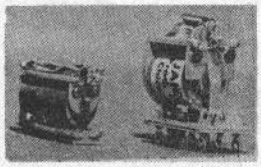
Here is a book written in the language of the model builder by a man who knows the field--who has had tremendous experience in model building. Radio-control systems for planes, boats, cars and other "objects" are made completely understandable--even if you do not have any electronic background. Now, you can build a remote control system to operate any type of model. This book is 100% practical--its value lies in its complete usefulness. Every fact applies in practical fashion if you wish to understand, build and operate something by remote control without having to distinguish between complex, or impractical dream stuff, and what is proven and practical. It provides a time-and-money-saving guide for the model builder who is selecting a kit or parts for kits. It details the procedure for equipping and operating all kinds of radio controlled models. Truly, it covers the subject of radio-control of models from A to Z including FCC regulations. 232 pages. Soft cover. John F. Rider publication #235. Only $4.25!

POD KIT

To help facilitate the building of the POD (pulse omission detector) unit featured in this issue by Jim Shows and Don Dickerson, Ace R/C is making available kits including the printed circuit board and all parts required for the unit including a reprint of the article as contained in this issue and parts placement instructions for $13.95.

This is the high voltage transistorized unit and is complete with relay and transistor, electrolytic, plastic box, and all other components. May be used with single proportional units and dual proportional units of the WAG and Marcy types.

SUBMINI RELAY



Jaidinger Manufacturing Company, the producers of the little Gem relay which has won such a firm place in the R/C field, have now announced their much smaller subminiature size Gem relay which will be available some time this fall. The samples received looked very good and latest word from John Jaidinger is that considerable numbers of improvements will be made on the units before production. The samples, as received, were pre-production samples and work on tooling up for production runs has been begun.

The units measure 5/16" wide, 23/32" high, and are 5/8" deep. They are intended for multi channel receivers or other receivers where a high current change is available up to 4 or 5 mils. The relay will be in various ohmages however, 5,000 ohms will be the first to be produced. The normal sensitivity setting is around 30 MW (the standard Gem is set at 12 MW). The price is $4.25 in the 5,000 ohm size. For a comparison of size with the regular standard Gems, refer to the photo.

MC POWER CONVERTERS

NOW! Transistor converters for transmitters! Flight tested for single channel and multi. Made by MC Manufacturing & Sales, units are completely wired and tested and come in two models. (May be used with 90¢ lantern battery, or with 2 and 5 amp nicads.)

MC135T-15--135 volt output at full 15 mils--primarily for single channel equipment either CW or audio. Measures 2 x 3 x 1 overall. Accepts 5 or 6 volts. Only $15.95.

MC135T-30--135 volt output at full 30 mils--tested under multi conditions. Measures 2 x 4½ x 1¼ overall. 5 or 6 volts in. $19.95.

Wildfire by Technical Model Products. The Compact Bipe. Just right to throw in your trunk assembled for a Sunday's flying, yet with plenty of area to handle regular engines with standard R/C gear. For rudder only, or Simpl-Simul or other intermediate gear. Safe and sane with an .09 for relaxed fliers - Red Hot with a .15 for Razzle-dazzle!

Area--445 square inches; upper span--36"; lower span--30"; length--29"; power--.09 mild and .15 hot; empty weight--21 ounces; radio--single or intermediate; radio capacity--up to 20 ounces.

Features Ultra-Struct simplified construction; flat lower wing for ease in building; Micro-Cision die cut select balsa; Super-Flex landing gear--absorbs the jolt better; Quick-Change Knock out engine mount plate; radio room for even multi gear; Compact Stressed--modest dimensions for area, means crackup resistance; Fiber-Glass reinforcing supplied. No liquids or covering.

$6.95

ENERGIZER CELLS

From Union Carbide Corporation, manufacturers of the Eveready batteries, comes word of their new alkaline energizer batteries in a variety of sizes. It is claimed by Union Carbide that in such service as R/C demands, energizer batteries will give from 5 to 10 times the life of conventional carbon zinc type batteries of equal size. These are hermetically sealed, completely encased in a metal container and will not leak or corrode. Of special interest to hobbyists is the exceptional performance of these batteries in extremely low and high temperatures.

The E91 1½ volt "AA" penlite size battery is ideally suited for powering receivers in radio controlled aircraft because of the dependable long life and light weight. The E95 1½ volt, "D" size, is designed for powering boats, automobiles, and trains, where weight is no problem but long continuous operation is the dominating factor. The E94 1½ volt, ½ "D" size, may be used by any container using D size cells where double voltage is required. The E97S, ½ volt "G" size is finding a ready market for glow-plug ignition use. These four sizes of energizers, Union Carbide feels, provide a line of 1½ volt batteries for practically all hobby requirements. Their prices are, of course, higher than conventional cells but, by the time you read this, they should be available in some of the larger radio houses.

"MOST" PULSER

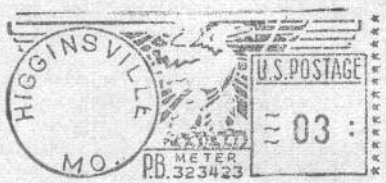
The "Most" in pulsers. Here is a pulser that has no interaction because it has no critical electronic circuits, no expensive batteries, requires only 2 "C" cells. A true centering stick controls rate and width. Can be used for Galloping Ghost, inductive kick, or with rudder only proportional systems. Factory guaranteed in a 3 x 5 x 2 anodized two-tone case. Priced at $27.50. Distributed by Gyro Electronics Company.

VR-135 PS

Gyro Electronics Company has just released their new Model VR-135 regulated A and B power supply for all multi, single channel, tone or CW transmitters such as MarcyTone, Orbit, Bramco, CG, CitizenShip, etc. It features a fully regulated and filtered output of 150 volts up to 40 ma, an adjustable filament supply, and a 2 volt output for starting glow plug engines. The unit includes a rechargeable 2 volt wet cell BB54A, built-in charger, separate meters for measuring plate current and plate voltage, 6 ft. connecting cable, AC line cord, etc. It is fully enclosed in a sturdy metal cabinet and sells completely wired and tested at $49.95.

GRID LEAKS--R/C DATA SERVICE is published bi-monthly by Ace Radio Control, Box 301, Higginsville, Missouri. It is entered at the Post Office at Higginsville, Mo., and is copyright 1960 by Grid Leaks and Ace Radio Control.. Please advise if you change address. Postal regulation does not permit forwarding of copies at your old address. Subscription $2.00 for 10 issues.

Grid Leaks
HIGGINSVILLE, MISSOURI



C. A. DEGS, JR.
4002 MONITOR DRIVE
HAMPTON, VIRGINIA