GRID LEAKS

R/C DATA SERVICE

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25C

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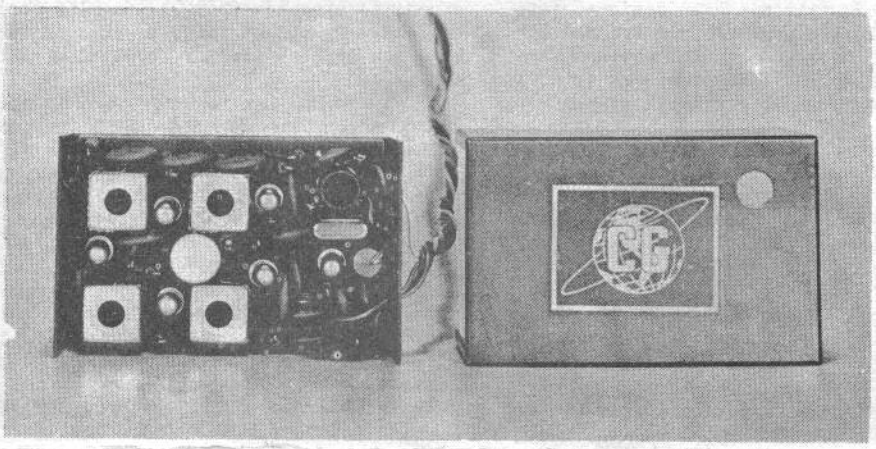
WE TEST THE CG NIKE CONVERTER



In September, 1958, the FCC made effective docket #11994. Up until that time, there had been only a 27.255 frequency available for R/C enthusiasts. With the advent of this docket, five additional frequencies were made available to R/C'ers and the docket was a step in the right direction.

But there was a ringer in this new docket which was not immediately apparent. However, it didn't take long to come to the foreground.

For the time being, the R/C'ers were enthused, however, because they began to envision flying several R/C planes--all on the Citizen's Band spot in the 27.255 neighborhood. It soon became apparent that the superregenerative detectors which were then the only thing available in the receiver line would not discriminate between the frequencies because they were too broad in their tuning and a transmitter putting out at 26.995 would operate a superregen receiver at 27.255 just as well. They tuned that broadly.

Conjecture arose in various sections of the country as to the feasibility of the design of a converter. Theoretically, this was perfectly feasible and possible and many experiments were launched all over the country on this.

One of the major model magazines published a circuit of this type and it was met with mixed reception because the circuit was far from simple. Major manufacturers completed superhet receivers and they, too, met with mixed reception because, in many instances, they were bulky; they were all expensive.

As months rolled by, it became apparent that, with the new docket #11994 which not only gave the R/C'er additional spots but also established the Citizen's Band Class D telephony stations, that the Class C boys in radio control were having problems because of interference. At first the interference was spotty but, with the growing Class D telephony stations, interference became a general problem.

More superhet receivers appeared and more came in use. However, up until a few short months ago, no converter that was commercially feasible had appeared on the market.

A chance phone conversation with Frank Hoover, prexy of F & M Electronics who took over the manufacture of the well-known CG radio control equipment from Gulton Industries several months ago, revealed that he was working on the converter. Actually, this was a superheterodyne which was designed to work with existing superregenerative receivers.

We prevailed upon Frank to furnish us one of the initial production samples before the unit was ready to be marketed. It arrived and was immediately subjected to numbers of tests.

Any evaluation of this unit must be first preceeded by a run-down of the physical appearance. It is one of the neatest appearing jobs of all receivers we have seen. It carries one of the most unique printed circuit boards in the R/C field. After rather extensive tests, we feel it safe to say that it will offer a rather unique approach to those who have a lot of existing equipment they don't wish to scrap and yet wish to make more selective due to interference or other reasons.

As to physical specifications, weight is only two ounces, length of 2 3/8", width is 1 1/2", and it is 1" tall and is housed in a typical CG aluminum 030 blue anodized case. Printed circuit board which is employed is photo etched and bonded to glass epoxi. It is claimed to be temperature-stable from 0 to 130° F. and

will respond to virtually any audio from 30 to 2000 cycles per second.

Basically, the Nike is a complete receiver. However, it is less the audio and relay stages normally associated with such receiver. The output of the Nike produces approximately the same amount of signal as that produced by the normal superregen detector. By using the Nike in place of this superregen detector, you supply the audio and relay stages completing a superheterodyne receiver. The statement is made that "the Nike can be used for a front end for experimental or home-built designs."

Here was something we felt we could get our teeth into and experimentation began in earnest. Tests were run with all the audio receivers we had in the house at the time since audio was what it had been designed for. It came furnished with a 27.145 crystal so a transmitter with a 27.145 crystal was employed and the nearest frequency in another transmitter emitting the same type of audio signal at 27.095 was provided for tests as well as transmitters operating at 26.995 and 27.255.

All transmitters were checked against a frequency standard to assure on-frequency operation.

Among the receivers tried were the Kraft single and multi channel audio receivers, the TR 4.5, the WAG TTPW, Min-X single and multi channel, the MC100T, Alpha Tech R300 and, of course, the CG Saturn and Pioneer receivers.

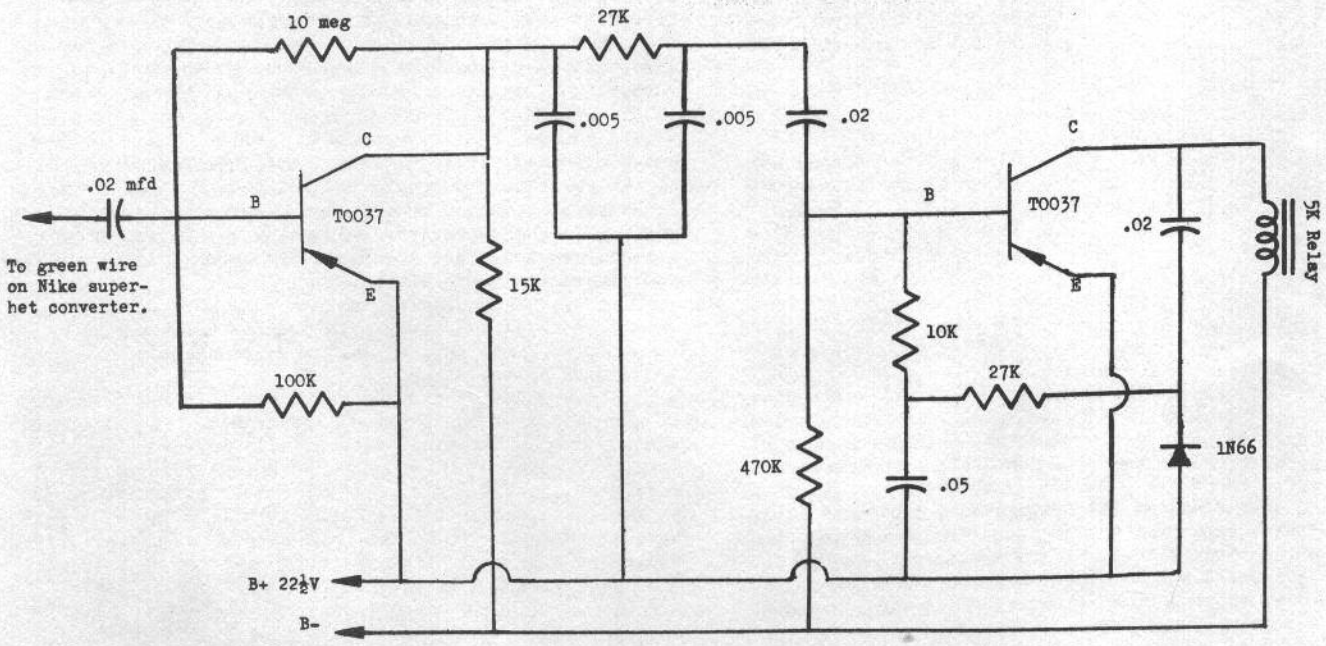
It worked wonderfully well with all of them. Selectivity was all the designer stated and the sensitivity was up to par for all of the units. It provided absolute discrimination against RF signals only 50 kc away and further tests led us to believe that the statement that voice communications only 10 kc away would also be rejected was also true.

The instructions also carried a statement that the Nike would not work with carrier type receivers. However, in a previous issue of Grid Leaks, there had appeared an article by Neil Delafield of a receiver which was based on the principle of noise-detection, depending upon the quieting of the superregen hiss upon receipt of a CW or carrier signal to hold down the relay. By wiring in a breadboard of the amplification stages as employed in this particular receiver, we found that a very satisfactory type of CW operation could also be had using the Nike front end. The Nike was wired in as the instructions called for. Further experimentation showed that this circuit could also be considerably changed to operate at lower than 22½ volts as shown on the schematic but we leave this for other experimenters.

So, the R/C fraternity, we feel, has a valuable addition in the Nike converter. It offers a fairly inexpensive approach ($39.95) to the serious R/C fan who has audio equipment which he does not wish to scrap and in which he has already invested considerable amount of bucks.

The unit, we believe, can be used with audio receivers of almost any type that are proving satisfactory in the field regardless of whether we were able to test them or not, so fabulous was its performance on the units with which it was tested. It may be used in receivers employing a tube front end or transistor detectors. The hookup is extremely simple and you completely bypass the original tube or the original transistor used in the former detector stage. The operating voltage of the Nike is 3 volts maximum with 1½ volts minimum at reduced sensitivity. The Nike itself draws about 2 mils of current, regardless of the amount drawn by audio and relay stages of the receiver. It may be had with crystals for all spots--26.995 through 27.195.

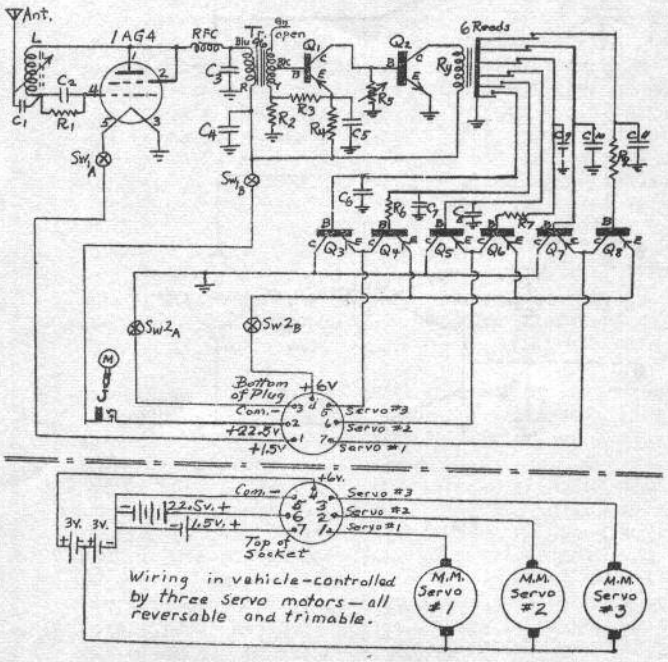
We think F & M Electronics deserves a big pat on the back for the introduction of their Nike and we hope that other R/C'ers will be enthused about its production as we are.

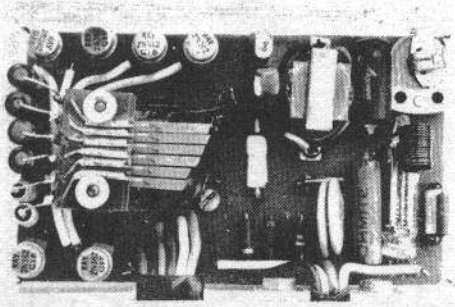


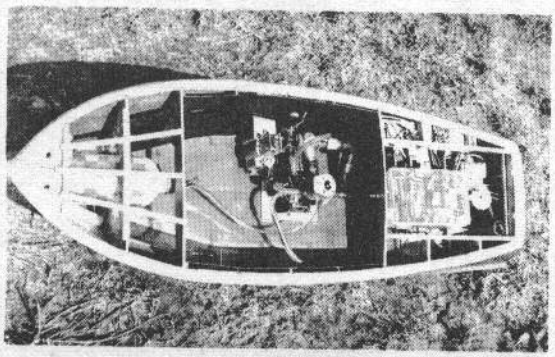
SIMPLE AUDIO AND RELAY STAGES CONVERT TO CW RECEIVER

2.6.2

ELIMINATING RELAYS IN REED CIRCUITS







Through our very good friend, Edward Soltis, whose R/C camera boat was shown in a recent issue of American Modeler, we heard about a relay-less reed receiver which had been seeing exceptionally good service in an R/C boat operating on 50 megacycles. The circuit was felt to be of interest so we queried Ed to put us in touch with the user of this circuit who is George Thompson, Sr. (W2JJI).

The original circuit was received with Mr. Thompson's reply:

"In reply to your letter, I am enclosing a circuit diagram and pix of the R/C receiver you asked about. The receiver has been used for two years in the Century Sea Maid speed boat shown in the photos. The 2N362 transistors shown in the photos have been replaced with 2N291's which have higher dissipation ratings. Power transistors are not required if the servo motors used present a high enough load resistance. The Mighty Midget is suitable but the Distler is superior if its coasting can be tolerated. The industry could use a better servo for this purpose.

"The transmitter used with this receiver is also original. It consists of a single tube used as a modulated oscillator and two power transistors in a DC converter circuit. Part of the output is rectified and filtered to provide DC for the carrier supply and part is used to 100% modulate the carrier with a square wave whose frequency is varied by altering the loading on this part of the circuit. The tones are produced by changing the capacitor load with switches in a hand-held joy stick. The circuit makes use of a home wound transformer for the combined power supply-modulator. No diagram is available for this at the present time. The battery requirement is 6 volts at 1.2 amps. I use a motor cycle storage battery. Operation is on 50 mc. Both transmitter and receiver are much simpler than commercial jobs I have seen using relays, vibration, and the like."

George Thompson, Sr.
Asbury Park, New Jersey

Further correspondence ensued. We expressed the desire to have this circuit broken down just a little more as to component values and application which we felt would be of greater interest to a greater number of readers. Mr. Thompson was again good enough to give the benefit of experience and share this with the Grid Leaks readers:

"Nearly everyone in this area has shown considerable interest in the circuits and servo equipment. Most of those using a full proportional system eventually get tired of wasting battery power when no signal is being received and most do not have as good control of the model because of the slower response to a signal. The receiver should also be ideal for a plane because, having no relays, it is much lighter than other receivers and insensitive to vibration. Other advantages are lower initial cost, lower maintenance cost and greater reliability.

"This paper describes a method of increasing the reliability while reducing the weight and cost of multichannel reed receivers. This may be accomplished by replacing costly, heavy relays whose contacts get dirty, with cheap, light weight transistors with no moving contacts to produce identical results.

"The circuit will depend upon the type of actuator used and upon the job to be done by it. If the job can be done by a motor always running in the same direction, the motor can be started and stopped with the circuit shown in Fig. 1 or Fig. 2.

"Rudders, elevators, etc. are best controlled by a motor which is instantly reversible and trimmable to any desired degree without regard to any particular sequence. Fig. 3 and Fig. 4 show two ways of accomplishing this

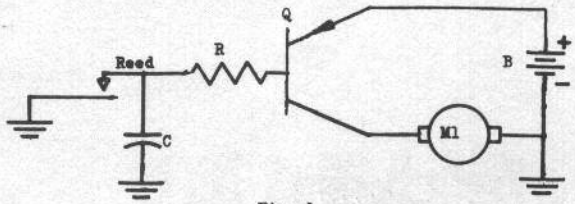


Fig. 1

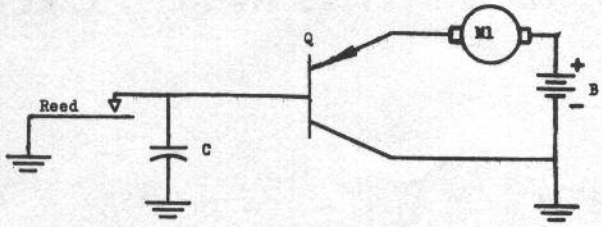


Fig. 2

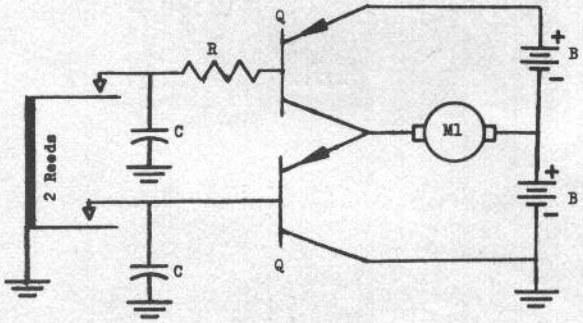


Fig. 3

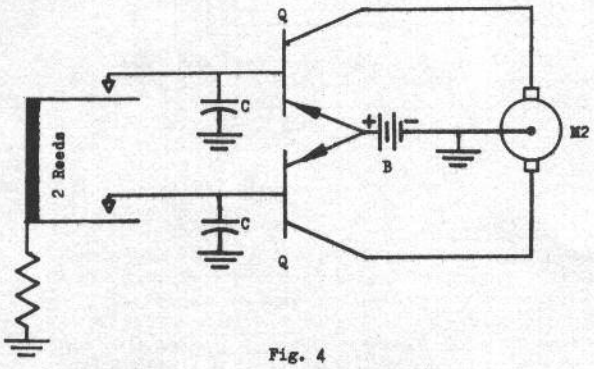


Fig. 4

without relays. Fig. 4 is to be preferred but requires the use of a motor with a center tapped armature or a Sage type actuator. Easily obtainable motors may be used in Fig. 3 by using a center tapped battery of twice the voltage required by the circuit of Fig. 4.

"As many actuators as necessary may be used in a model by providing the required number of reeds. The same battery may be used to power all the actuators. Any tone receiver front end and amplifier may be used ahead of the reed relay.

"An actuator for controlling rudders, elevators, etc. can easily be made from a Cobb Hobby Microdyne motor by grinding or filing off half of the teeth in the last large gear of the gear train so it can make but one-half of a revolution, and attaching a crank to the end of the shaft. Spring loading must be provided to keep the gear teeth in mesh at the end of a stroke so the gears may be reversed. To accomplish this, a projection is soldered to the top surface of the gear so that it will strike a light steel wire spring fastened to the gear housing just before the gear reaches the limit of its stroke in either direction as shown in Fig. 5.

COMPONENTS

Q - Small PNP audio output transistors with high power dissipation and collector current ratings such as T.I. 2N291 or G.E. 2N188A.

M_1 - Small P.M. motor with low current consumption such as Cobb Hobby Microdyne. Do not use a motor that requires over 200 ma on 3 volts.

M_2 - Low current motor with center tapped armature, or actuator of the Sage type.

C - Midget electrolytic capacitors rated at any value over 3 volts and with any capacity from about 8 to 25 microfarads.

R - Resistor of about 400 ohms. The value required will vary somewhat with different transistors. The best value is the highest one that permits maximum voltage across the actuator as measured by a voltmeter while in operation. This voltage will be about 0.1 volt lower than that of the battery (B) when (R) is the optimum value. Note that no resistor should be used when the load is in the emitter circuit of the transistor.

B - Battery of 2 - 4 volts. Two nicad cells (2.4 volts) with a rating of 225 mah or higher would be satisfactory for each battery.

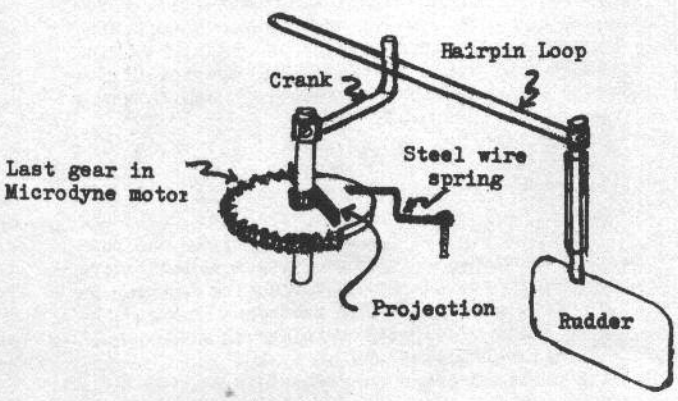
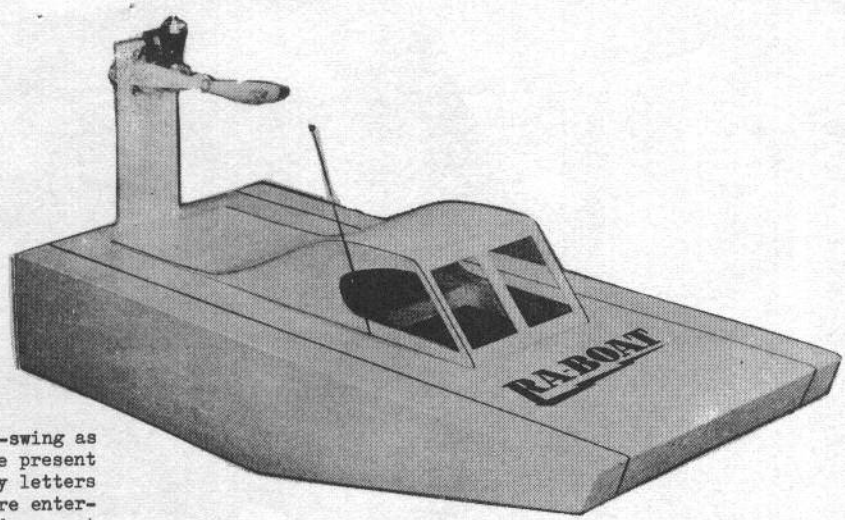


Fig. 5

WE BUILD THE RA-BOAT



Interest in R/C is definitely on the up-swing as indicated by the various manufacturers who were present at the Trade Show in Chicago and from the many letters we have received from others. Many newcomers are entering this fascinating field of radio control and a great number of these are casting about for the simplest approach. Quite a few have never been in any type of modeling before to say nothing of any phase of radio construction or theory or otherwise.

Many old timers have, unhesitatingly, recommended boats as the first step for the tyro or rank beginner in R/C because, even if something should go wrong, it's not nearly as expensive as with an airplane and less can go wrong. Even if utter failure does arise, the most that can happen is that the boat will float a little further or run ashore. All of this is extremely important where the beginner is just starting to feel his way in the proper operation of radio gear.

Not only must he master the installation of the completed radio into the radio controlled device, but he must also learn to effectively use it. This includes the essential tuning, range-checking, battery checks, and the thousand and one other items which become second nature to the old-timer but, to the beginner, can assume very alarming proportions.

Manufacturers have been aware of the fact that some type of extremely simple radio control boat was required --one that was very easy to assemble by people who had little or no assembly experience with the type of construction used in model aircraft and boats and in which almost any type of radio gear could be installed.

They recognized the fact that, while electric power is probably the cleanest and easiest to use because you merely have to turn an on-off switch, it was not necessarily the best for the beginner in terms of ultra-simplicity and fast performance.

They also recognized the fact that this beginner did not want to sacrifice the thrill of speed if it can be achieved fairly easily--so an air boat with a glow fuel engine serves as a good approach.

Air boats are nothing new as far as radio control is concerned but the appearance of a kit which is specifically designed for beginners is.

Introduced within recent months by Stanton Specialties of Chicago, Illinois is the RA-BOAT. This is designed for .02 to .074 engines and for radio control free run and tether. All parts are ready cut. It features super speed construction and, if built according to the manufacturer's instructions, is virtually unsinkable.

Upon opening the RA-BOAT kit, one is immediately impressed with the quality of balsa wood contained therein. It is beautiful to look at and delightful to feel because it is sanded ultra-smooth. According to the manufacturer, this is the best quality balsa available from the supplier, Sig Manufacturing Company, one of the old-time suppliers.

All parts have been completely cut out and the formers and planking and sides and keel and pylon etc. are all identified with numbers or with the actual name of the part that they are to play in the construction of the boat. There is a large assembly plan featuring full size drawing and a comprehensive instruction manual which is mimeographed and which covers three pages.

The interesting beginning on the instructions reads thus:

"Do not read this--unless you are interested in successfully assembling this kit."

From this intriguing beginning, the instructions carry through construction in detail and, if they are followed along in conjunction with the drawings, it is hard to realize how the beginner could go wrong.

It is possible, in this reviewer's opinion, that the instructions could be enhanced somewhat if actual photographs had been included of various construction phases but this is not, in any way, a detraction from this particular kit.

We found the construction following the manufacturer's directions to be simple and straightforward and, using a good quality of cement, found that it was also very rapid and easy to do.

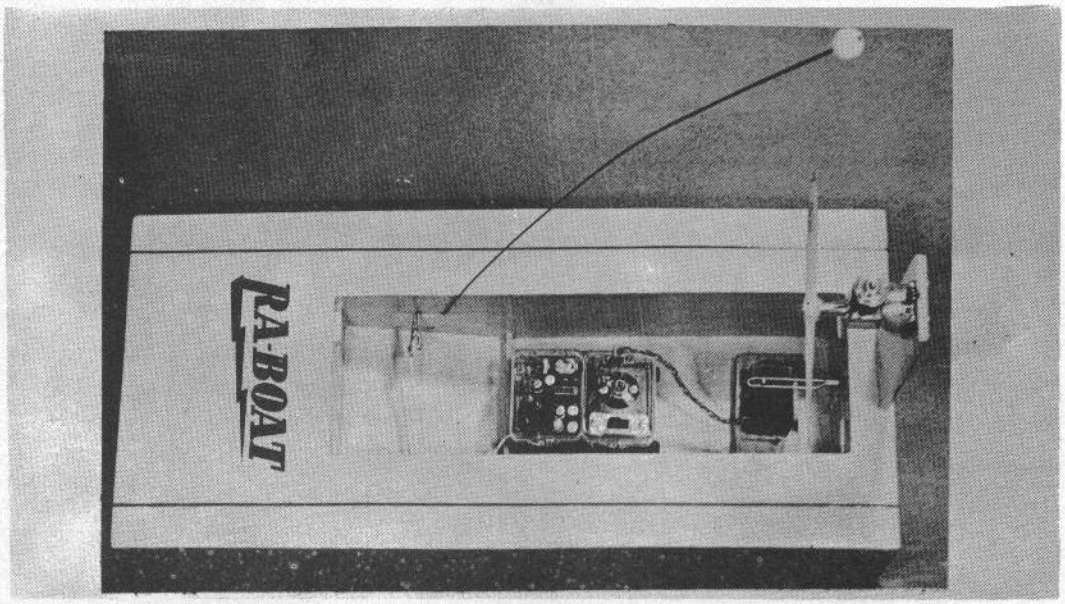
The construction is unique in that it contains several air-tight compartments which make the unit virtually unsinkable.

Quoting from the manufacturer's letter, he states: "This is a kit which we feel has been needed for some time in the hobby. Several years ago, a kit similar to this was on the market but we, honestly, feel that it was about five years too early. (EDITOR'S NOTE: This boat carries a strong resemblance to the old Sea Scotter which made its appearance originally as a plan in Air Trails and was, subsequently, kitted but has since disappeared from the market.) Now is when R/C is very popular and popularly priced for the average modeler can now afford to get into it. By using a Commander transmitter and receiver, one can have this boat, complete with motor, operating for less than $50.00. This includes all batteries, all dopes and fuel and everything else you will need.

"A costly and high-quality rig is not nearly as necessary for a boat as it is for an airplane and, of course, much less can go wrong with it. Just stop to think how many youngsters and older people too have an .049 engine lying around which would readily be installed on a boat if they had a boat designed for it. The boat doesn't have to be made radio-controlled right of way because it can provide a lot of fun when run free or tether."

We would hasten to point out to people building the RA-BOAT from a kit, that the manufacturer's instructions should be followed extremely closely, even if you've had experience.

The top and bottom planking is 1/16" stock. At first, this may seem to be flimsy construction but, when it is covered with the silk span tissue which is provided in the kit and doped as the instructions call for,



the result is a structure which is surprisingly rigid and extremely resilient as far as bounce-offs on pool walls etc. is concerned.

The variety of radio installations immediately come to mind which could be afforded for this particular unit and we show two with this article.

One utilizes the Commander receiver for CW or carrier wave operation going into a Cobb Micro SN servo. This approach is probably the least expensive which can be had and has only this as a distracting factor. This boat really moves when it is placed on the water and the all or nothing that a servo provides, or an escapement would provide if it were used, makes for sometimes rather violent maneuvers when the boat is on the water. However, this adds to the thrill and can make for a large charge.

The other installation uses a Kraft receiver utilizing a Hillcrest battery box and a Southwestern actuator to provide proportional control. Of course, this device means that a pulser of some type, either mechanical or electronic, must be employed at the transmitter to achieve evenness of left-right action.

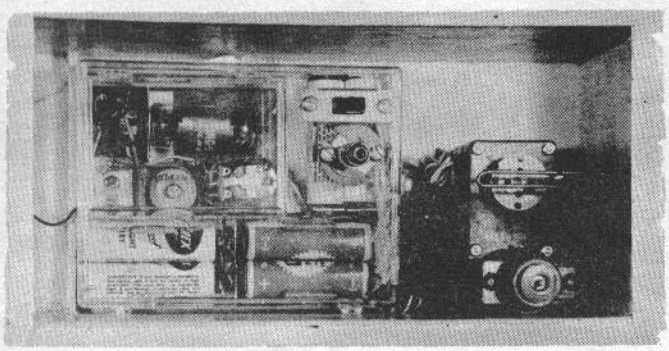
It is possible, of course, to pulse the transmitter off and on rapidly enough to get straight line action out of the unit when on the water but the thumb soon tires and, while full on would provide left and full off would provide right rudder under such an installation if wired as per the photograph shown, a much more satisfactory operation is had when the pulser is used at the transmitter to provide proportional or varying rudder to the left or right as desired. Only the simplest type of pulser is required since only the pulse width needs to be changed.

The R/C installation in the boat should be made as far back as possible to provide a rapidly planing boat. With an .049 engine and an integral tank such as the Cox Babee or any of the others, installation is considerably simplified.

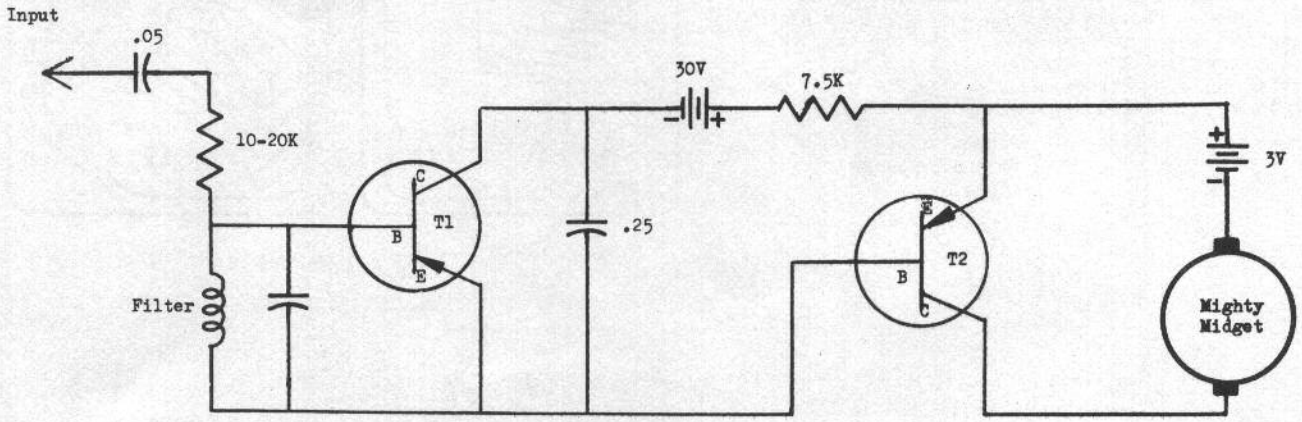
So, beginners, here is a boat that can be recommended for you very highly. Priced at $4.95, the price, we feel, is reasonable considering the quality of material provided and the ease with which it may be assembled. We have spent far more on boats which shall be nameless which were frustrating because they didn't go together nearly as nicely or as easily as the RA-BOAT. We think Stanton Specialties of Chicago is making a step in the right direction and we venture a prediction that the RA-BOAT will make a happy debut on many ponds and lakes and streams in the U. S. in this and coming R/C seasons.

The illustration above shows the Kraft single channel receiver mounted on a Hillcrest Battery Box, Type D. Another plastic box, the same size as the one holding the receiver is used to mount the On Off Switch, the RCA type meter jack and plug, and the Crescent 3 pin Connector for the Southwestern Actuator. This connector is also used to turn on and off the actuator, by merely connecting or disconnecting. The D box holds 1 22½ V B battery and 4 pencells--one of these is used for filament since the Kraft receiver uses only 13 ma filament. The remaining 3 pencells are used for the Southwestern actuator, using the single battery hookup as shown on the SW instructions... The receiver and extra plastic box are cemented to the battery box using Elmer's Glue-All or similar cement. The Southwestern actuator is linked by drilling a hole in the arm and installing a 2/56 x 3/4" bolt and nut, using a spacer of brass tubing. This hooks into the rudder arm. A block of wood of the required thickness is used to mount the actuator. Cement the actuator to it, and then when the correct throw is had on the arm cement block to boat.

Commander receiver is installed in a Commander Insta Kit. Meter Jack and switch are mounted on the cover. Since it is quite simple to remove the cabin, switches and jacks are mounted inside in both installations shown. This is a simpler type of wiring than to run to the deck with the extra leads required and presents no problem in this type of installation. The Cobb Hobby Micro SN servo is used on installation shown below. Follow the manufacturer's directions for hookup, except use only 1½ volts per side on the boat instead of the 3 volts instructions call for. It still responds fast enough. Connection from the InstaKit is made by a 7 prong plug and socket.



ROUNDUP OF MARCY TIPS



T1 - T0037
2N406
2N217
2N138A

T2 - 2N270
2N224

PAGEL'S MARCY RELAY ELIMINATOR CIRCUIT (Only one channel is shown. Duplicate circuitry and reverse polarity on servo for opposite rotation.)

Ed Pagel will be well-remembered for the servo design which appeared in Grid Leaks Volume I, Number 8 (January-February, 1959) for use with the MarcyTone system. This achieved ultra-simplicity and those who have tried it have given high praise of the particular system. The following is a communication and circuit from Ed:

"I have just completed tests on a circuit to eliminate the relay and replace it with a servo amplifier for MarcyTone multi systems. This circuit complements my servo design. Since the servos are mechanically neutralized, the reverse contact of a relay is not needed. This makes possible a much lighter multi channel plane--possibly ½A. Also, the B battery drain is less--about 3 to 4 ma on signal per channel. I used the 2N270 in the final stage and noted a .2 to .3 volt loss in the transistor which isn't bad efficiency-wise. Perhaps a transistor with higher current rating would be even better. All transistors shown cost less than $2.00 which is cheaper than a relay.

"One possibility which I haven't had time to try is a proportional arrangement using two filters with audio frequency just out of range of each other and one pot with a stick attached at the transmitter. Moving the stick to either side would gradually increase the current in the servo causing it to wind the neutralizing band in proportion to stick movement. This would eliminate a feedback circuit. Perhaps a dither voltage would be necessary to overcome servo friction and provide better neutralizing. The possibilities are obvious and the system is dirt cheap. Hope your readers find this of interest."

Edward L. Pagel
San Francisco, California

"Enclosed are a few sketches which may be of interest to Grid Leaks readers. . .

"Fig. 1. This is a printed circuit layout for the Marcy 6 front end which can also be used for the front end of the Twin Simul by comparing the schematics and substituting component values. Printed circuits are a bit of trouble but once you get the board etched, it's hard to go wrong and it makes a very neat package.

"Fig. 2. This may leave you hanging a bit, it's the stick box circuit for Simul 6. The points marked 'input 1 and 2' tie in and replace the tone adjustment pots in the Twin Tone generator. I also have a printed circuit for the tone generator (1½ x 2½). If you're interested let me know. This unit with its 9 volt battery and balance pot fits very nicely into a 2 x 3 x 5 box along with all the adjustment pots and a stick unit of either the Marcy or Springsted type.

"Fig. 3. Here is the printed circuit board for one Marcy channel which may be used in a number of different ways. First, if you're a diddler like myself and like one reliable front end for a number of applications, then this is a good single channel rig to use with the Marcy 6 front end. This is also good for expanding existing Marcy single units and adding a third channel for motor to Twin Simul units. As you'll notice, the arc suppression is built on and the outfit as the one in Fig. 1 will fit in one of your PB #1's.

"Fig. 4. This is a little limit switcher which I use to get proportional rudder and selective elevator on larger ships. This does the same thing that the Delafield servo (presented a few issues back) does but switches a servo (multi type) for strong elevator action instead of using the rudder Mighty Midget to trip the elevators up or down. A simple-simul type of crank must be used at the tail of the ship to allow the Mighty Mid-

get to rotate 180 degrees either way from its normal neutral position to activate the switch. This leaves the rudder in neutral during full on or full off signal conditions which operate the elevator. The wire colors shown are for a Bonner Duramite servo.

"Talking to R. A. Konkle, he asked me to mention that on the parts placement diagram of his PC relay eliminator (Volume II, Number 3), the receiver polarity is reversed. Dick says that he's received several requests for finished boards and asks that you pass along the information to the fellows that these are available as well as a much smaller version (1 x 1 x 1½) on a special order basis. Prices--$11.00 for the completed units and $3.00 for the boards alone."

Don Baisden
2221 Bolton Drive NW
Atlanta, Georgia

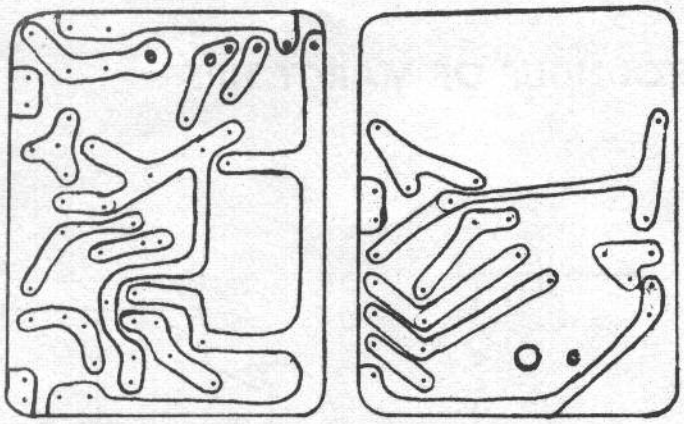


FIGURE 1 FIGURE 3

PRINTED CIRCUIT BOARDS

(Full Size)

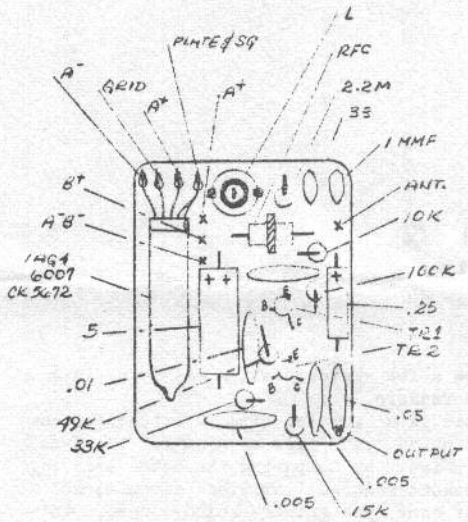


FIG 1

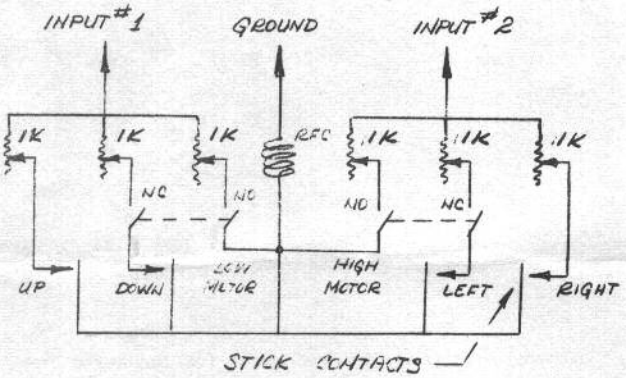


FIG 2

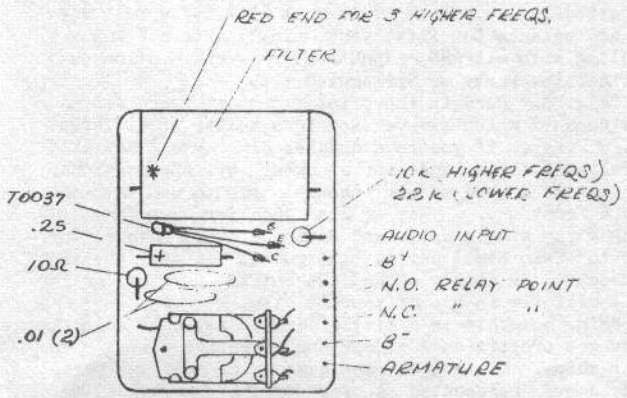


FIG 3

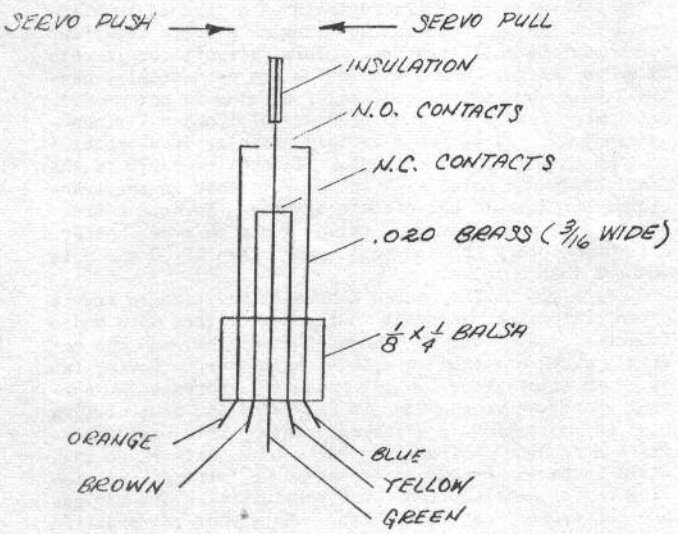


FIG 4

KRAFT MULTI RECEIVERS

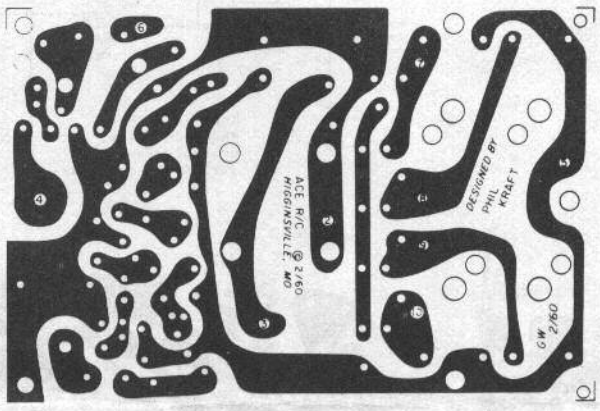
2-6-5

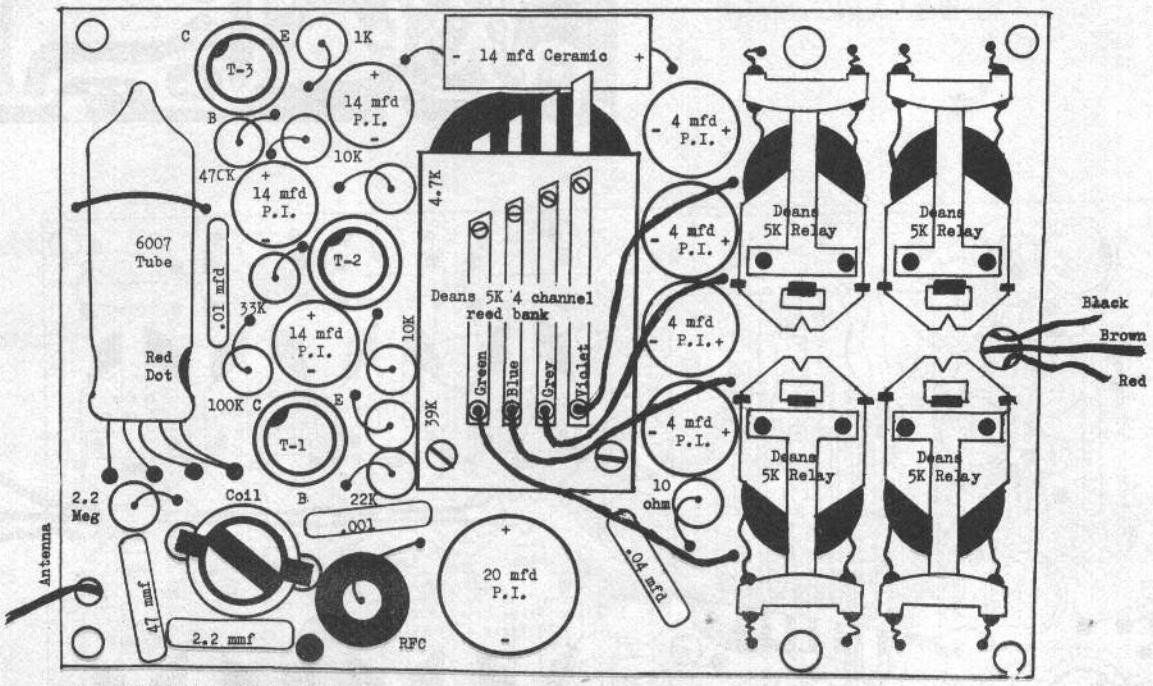
In the last issue of Grid Leaks, we presented the Kraft multi-channel receiver. Unfortunately, we goofed in several respects in this presentation. First off, instead of picturing the 8 channel base along with the 8 channel pictorial and photograph, we showed the 10 channel.

Accordingly, in view of the fact that there have been several other design changes, we're running a recap of the Kraft multi-channel receiver article and showing you, herewith, the 4 and 8 channel circuits, bases, and pictorial layouts.

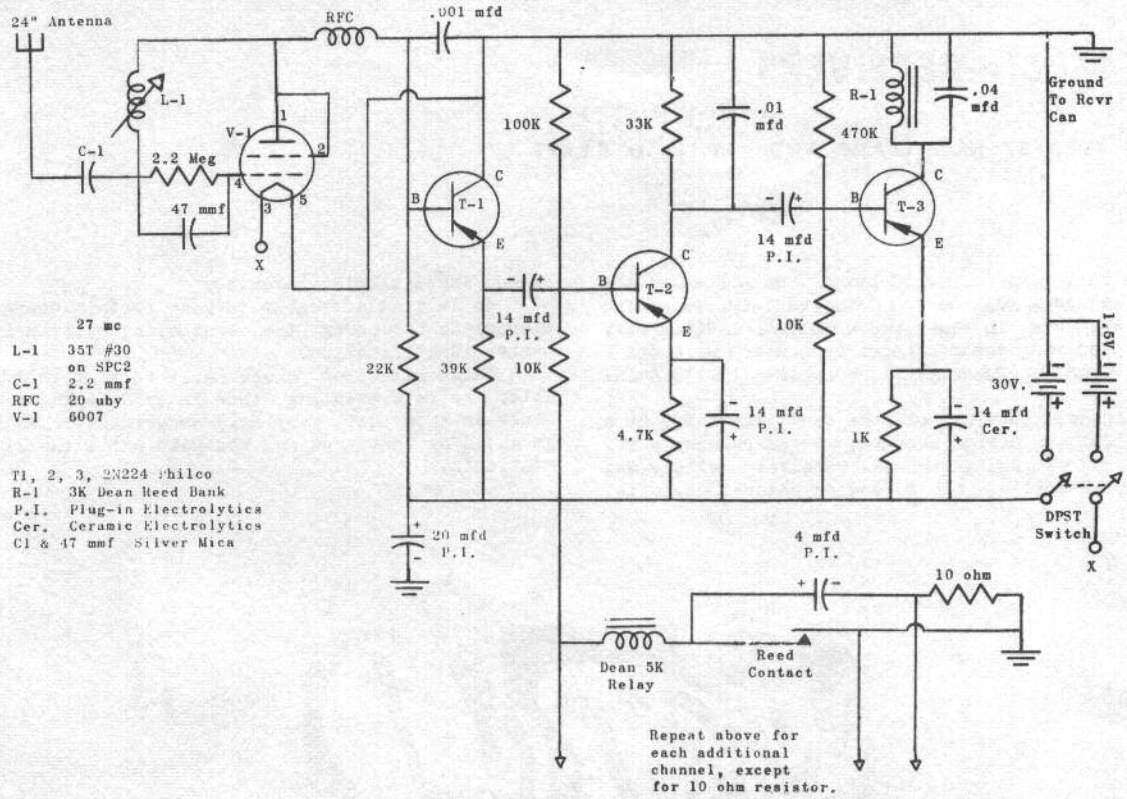
We felt it advisable to make certain changes in the pictorials including the renumbering of transistors for easier identification.

While kits for these will be very shortly available, we're presenting this in Grid Leaks as a service since we know that many avid experimenters will want to go ahead on their own and not wait until the kits become available.





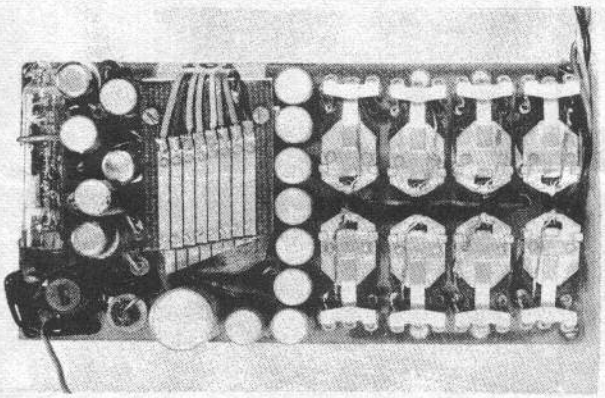
Tube is held in place by a wire going through two holes with a small piece of foam rubber under the tube for shock mounting.

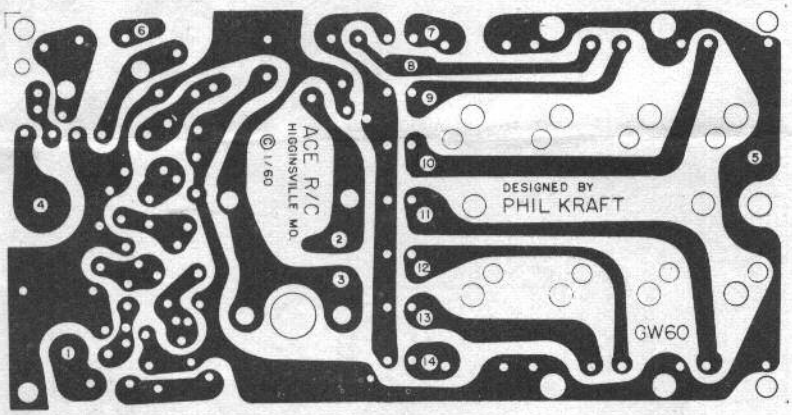


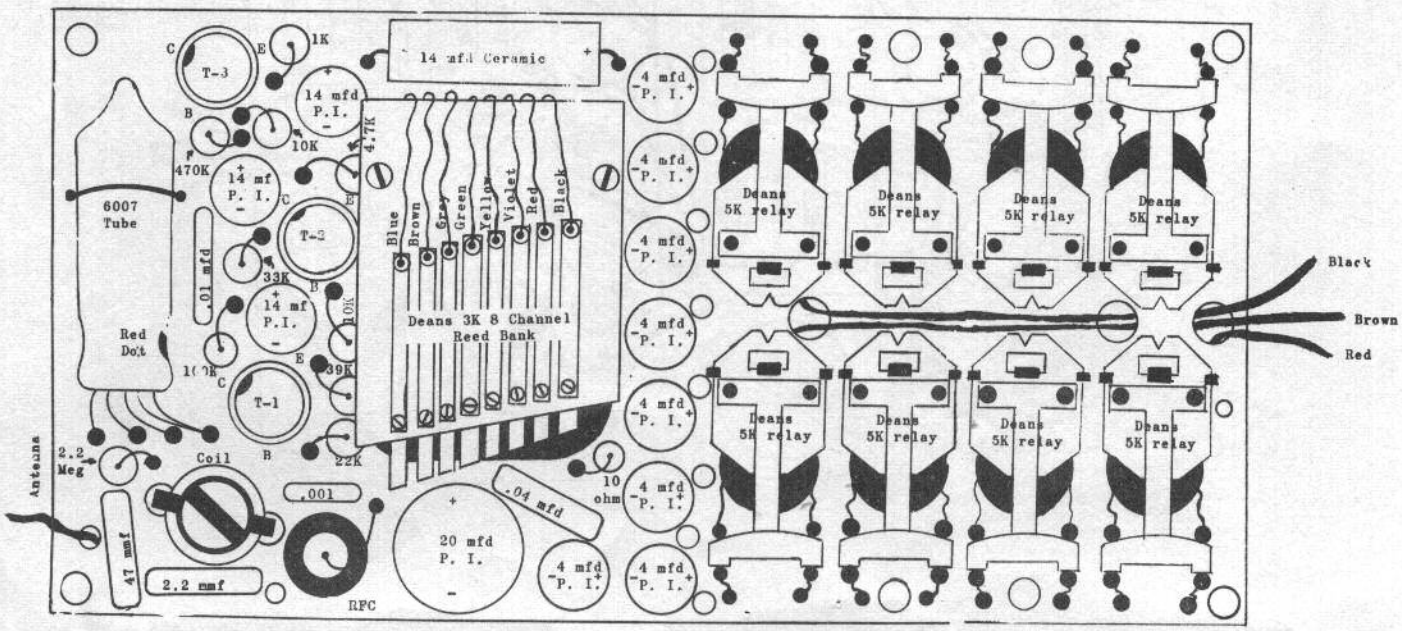
27 mc

L-1 35T #30 on SPC2
C-1 2.2 mmf
RFC 20 uhy
V-1 6007

T1, 2, 3, 2N224 Philco
R-1 3K Dean Reed Bank
P.I. Plug-in Electrolytics
Cer. Ceramic Electrolytics
C1 & 47 mmf Silver Mica







Tube is held in place by a wire going through two holes with a small piece of foam rubber under the tube for shock mounting.

2-6-6

KRAFT MULTI-FLI 6-4 TRANSMITTER

The Kraft single channel transmitter was presented in Volume II, Number 4 and it has met with such instantaneous response as far as single channel transmitters are concerned that, rather than wait and bring you a super-duper article on the Kraft simultaneous 8 or 10 channel transmitter (which may also be used as a triple simultaneous as Phil Kraft says "for three-handed fliers"), we are bringing you the Kraft Multi-Fli which is a non-simultaneous transmitter to be used for 4 and 6 channel receivers.

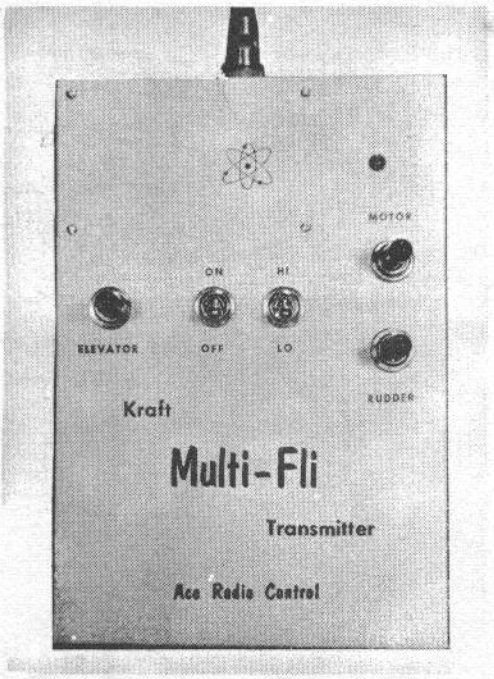
Essentially, it is a refinement of the single channel circuit using the same MOPA section. It features low drain which is making the Kraft such an ultra-popular transmitter with all fans since it has the lowest A and B drain of any transmitter currently on the market.

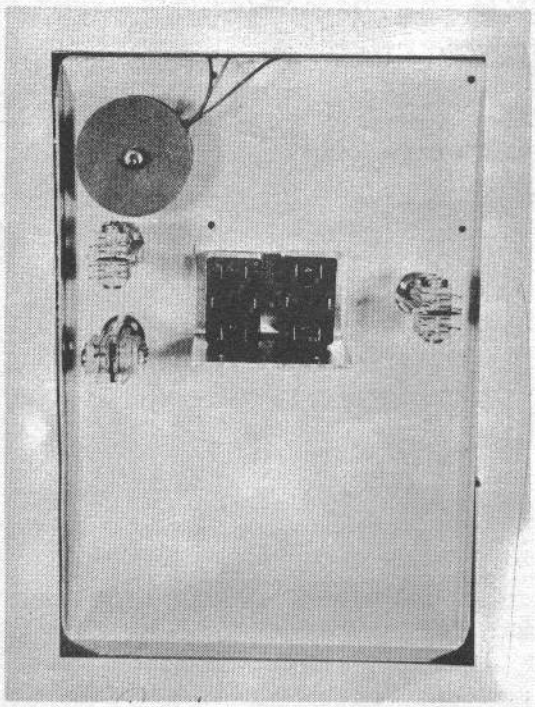
In spite of the low drain, it packs more power than virtually any other except the 30 watt jobs which are allowable on 27.255.

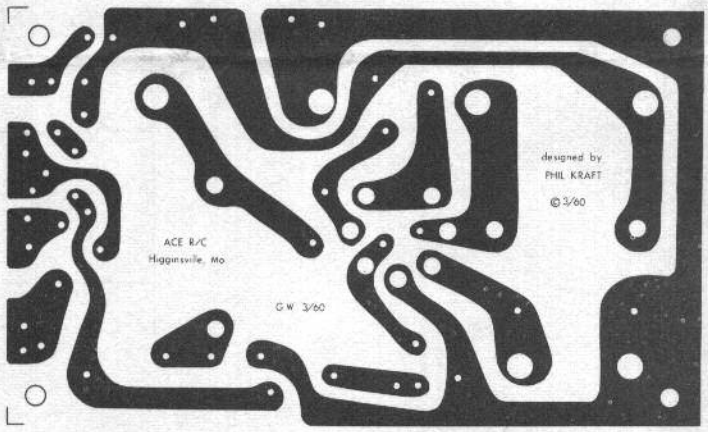
While the unit shown is non-simultaneous, it will provide an economical approach to those who desire to get into multi-control in an wasy way and, for 4 or 6 channel, simultaneous has proven not to be necessary or particularly desirable.

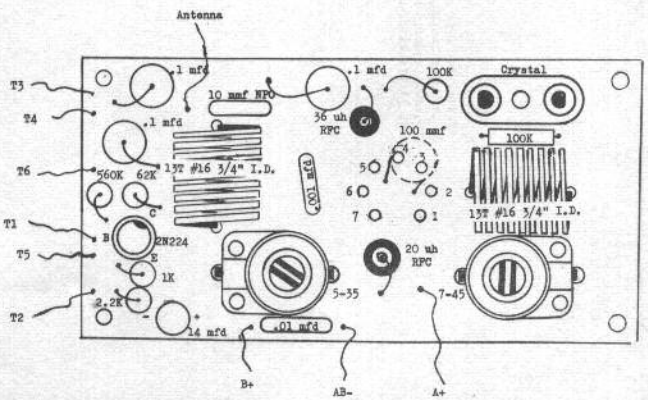
The 8 and 10 channel simultaneous rigs follow this same pattern to a degree using the same transistor oscillator for each of the simultaneous sides but they do employ another transistor as a mixer. This will be presented in greater detail in a subsequent issue.

Meantime, this Multi-Fli 6-4 is being presented to meet the demands of many builders who are ready to go multi and don't want the simul feature.

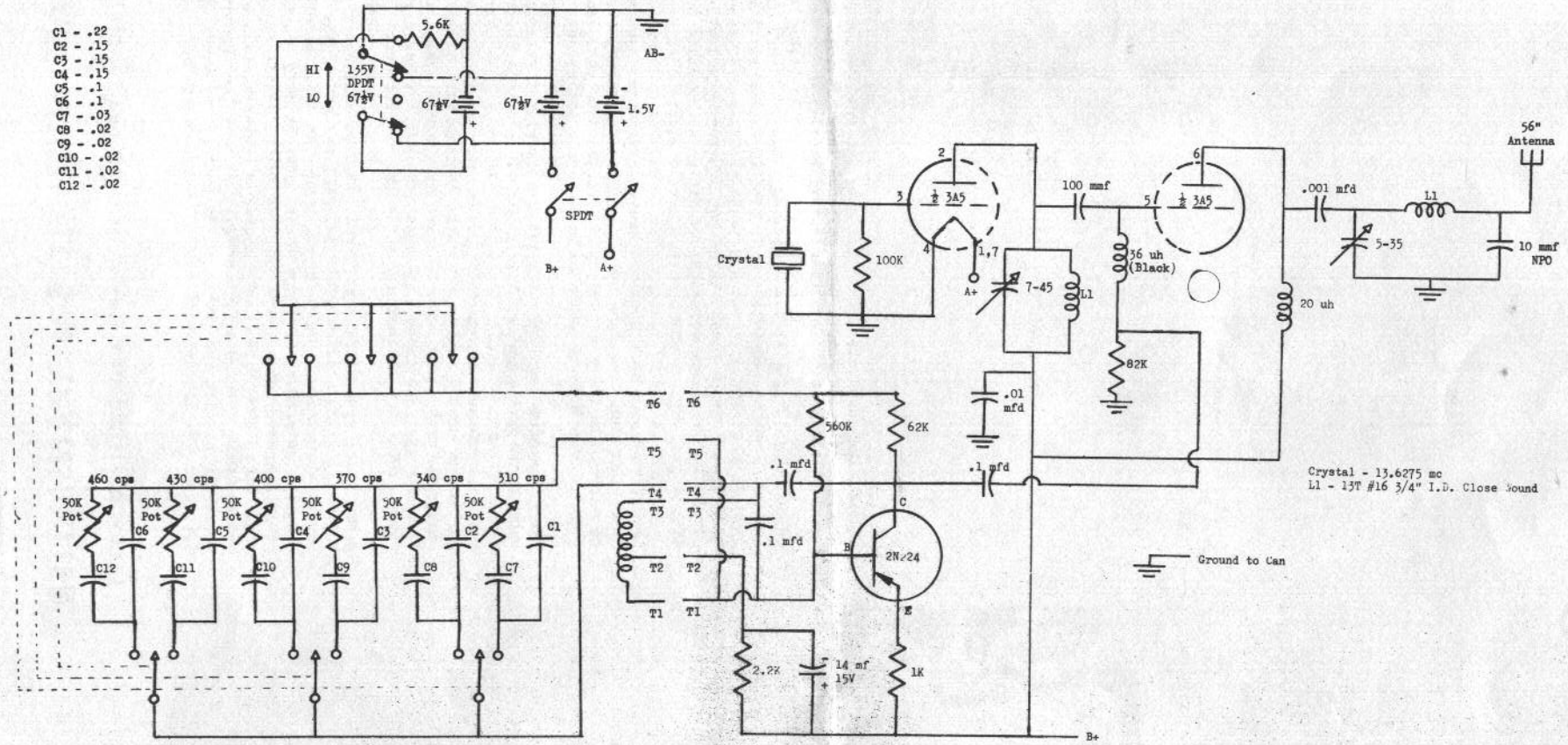








C1 - .22
C2 - .15
C3 - .15
C4 - .15
C5 - .1
C6 - .1
C7 - .03
C8 - .02
C9 - .02
C10 - .02
C11 - .02
C12 - .02



Crystal - 13.6275 mc
L1 - 13T #16 3/4" I.D. Close Wound

All tone switches are Switchcraft Lev-R 3037 DPDT

C1 - C6 base values given. These will need to be padded for correct frequencies.

Toroid Lead Identification

Brown - T1
Red - T2
Orange - T3

This portion of the circuit is contained on the front of the case used to house the transmitter. The toroid is also mounted there. The pots and capaitors are mounted on a piece of synthane 3 5/8 x 5 1/2" which is secured by a set of brackets mounted on the battery bracket.

Portion of the schematic shown above, indicate all of the components which are used on the Printed Circuit portion of the Multi-Fli 6-4 Transmitter. For further details a pictorial of this part of the circuit is shown elsewhere.

INDOOR RC DESIGN

EDITOR'S NOTE: The trend seems definitely to be to smaller R/C planes. Last issue in Grid Leaks, we pointed out this trend from the Hobby Industry Association of America Trade Show. In addition to the ½A planes listed in the previous issue of Grid Leaks, there are two more ½A jobs which will be appearing before too long. These will be marketed by A. J. Aircraft, makers of the Hornet and the Fire Baby, with their R/C design known as the Fire Cub, and Carl Goldberg with his new R/C Ranger.

Equally interesting to those who experiment further is the advent of the ¼A plane. These are being followed in various sections of the country and the world as well by the indoor type of airplane which are slow-flying devices and built around subminiaturized radio and actuating devices. After considerable exchange of correspondence with a top radio enthusiast from France, Capt. Francis Plessier, we were delighted to see in the other morning's mail, a complete outline of a series of articles covering an airplane, actuator, recepteur (receiver), and pulser. In order to present these most effectively, we will present them as a two-part series. This issue will contain material on the airplane and the next issues will contain material on the receiver and actuator

We follow with Capt. Plessier's description.

Miniaturization has always been a challenge for some R/C fans. A first step in this direction was to fly ¼A airplanes. This could be achieved quite easily with commercial equipment without too much of a problem.

But, to go further and try to fly R/C planes indoors or in limited fields such as a tennis court with calm weather, many problems soon became evident. Weight, of course, and the lack of proper equipment were among these; it has been done successfully by U. S. fliers as the article in the May, 1959 Model Airplane News by Ken Willard shows. I had additional problems here in France because I couldn't find a proper receiver and, besides, I am a pulse or proportional fan and I didn't want to go back to escapements for such a model which, at best, is difficult to trim where you need a great deal of piloting accuracy when flying indoors. Therefore, I set about to design, for myself, a complete airplane with an actuator and receiver.

The Mosquito, as we have chosen to call it, has been especially designed and tested. It is really not too bad a looking crate. And, having a pusher prop is very handy for indoor flying. Of course, the selection for the engine was the Peewee .020 made by Cox. (EDITOR'S NOTE: Since this article was written, another .024 engine has been announced, manufactured by O. K. Cub.) But, we find the Peewee is too powerful. However, it is easy to lose power when you shorten the prop and the prop can also be reversed for reverse flights.

This type of plane, with a highly cambered airfoil and a very large angular difference is trimmed to fly on the verge of a stall. It actually hovers very slowly with the engine pushing the plane nose down. The tail will nose up again as soon as it gains speed. Powered flight is okay but the glide, we find, is very bad. This nearly resembles a big A2 glider when the dethermalizer is open.

Building is very simple and fast. The two sides of the forward fuselage and the bottom are cut in 1 mm balsa. (EDITOR'S NOTE: We will hold to the 1 mm designation recognizing the fact that there are 25.4 mm in one inch. This will allow you to convert to the nearest American equivalents. For instance, 1 mm would actually be 1/25 of an inch.) The main bulkhead which holds the engine is 3 mm balsa with a small piece of plywood under the engine. The .020 Peewee is held by four nails with the heads removed and which are now being used as centering pins. It is held in position by rubber bands going to the 3 mm aluminum tubing which is used for the wing hold-downs.

The whole front end of the fuselage is solid. The canopy will be painted later and the openings for the receiver, actuator, and batteries cut out.

On the building board, place the bottom of the fuselage, the main bulkhead, and the two sides. Then will come the upper part of the boom which is built in a geodetic construction with diagonal bases of light 1 mm balsa. The tail unit must be light. Tail, plane, and fins are held by rubber bands on the pylon. This pylon holds the rudder which is aero-dynamically balanced. A small bar of 6 by 3 mm hardwood crosses the controls to hold the two nylon cords going to the actuator.

The whole fuselage is paper-covered, fuel-proofed, and then the 3 mm aluminum tubing pieces are added for the wings, being careful to have them placed for the right incidence.

No special problems for the tail plane and the fins are encountered except that these must be kept very light. It is important to have the marks on the tail so that the tail unit will always be placed in the same place after it has once been removed.

The wing is fairly special though the airfoil seems classical. Actually, the few ribs are here only for structural strength and the wing is covered only on the upper portion giving it a cambered airfoil. No spars are used. The leading edge is made out of a triangular trailing edge sanded in a diamond shape. Building is very simple. The ribs are placed on the board and the leading and trailing edge 1.5 by 10 mm balsa and the planking made of .8 balsa. The center ribs are a little stronger--2.5 mm balsa--with holes for the dowels and slightly tilted for dihedral. Wing tips are made of 2 mm bamboo.

The wing is covered by tissue but it is very important to pin strongly on a board during the whole process of watering, doping, and fuel-proofing to prevent warping. Actually, the tips will take a large amount of warp but it is a good feature. The wing is held by rubber bands with .5 mm music wire struts. They cross the fuselage in small aluminum tubing and hook up in the wing through aluminum tubing cemented to this. Without engine, the weight of the plane will be about 70 grams. (American equivalent-- 1 gram = .03215 oz.)

NEXT ISSUE -- RECEIVER AND ACTUATOR

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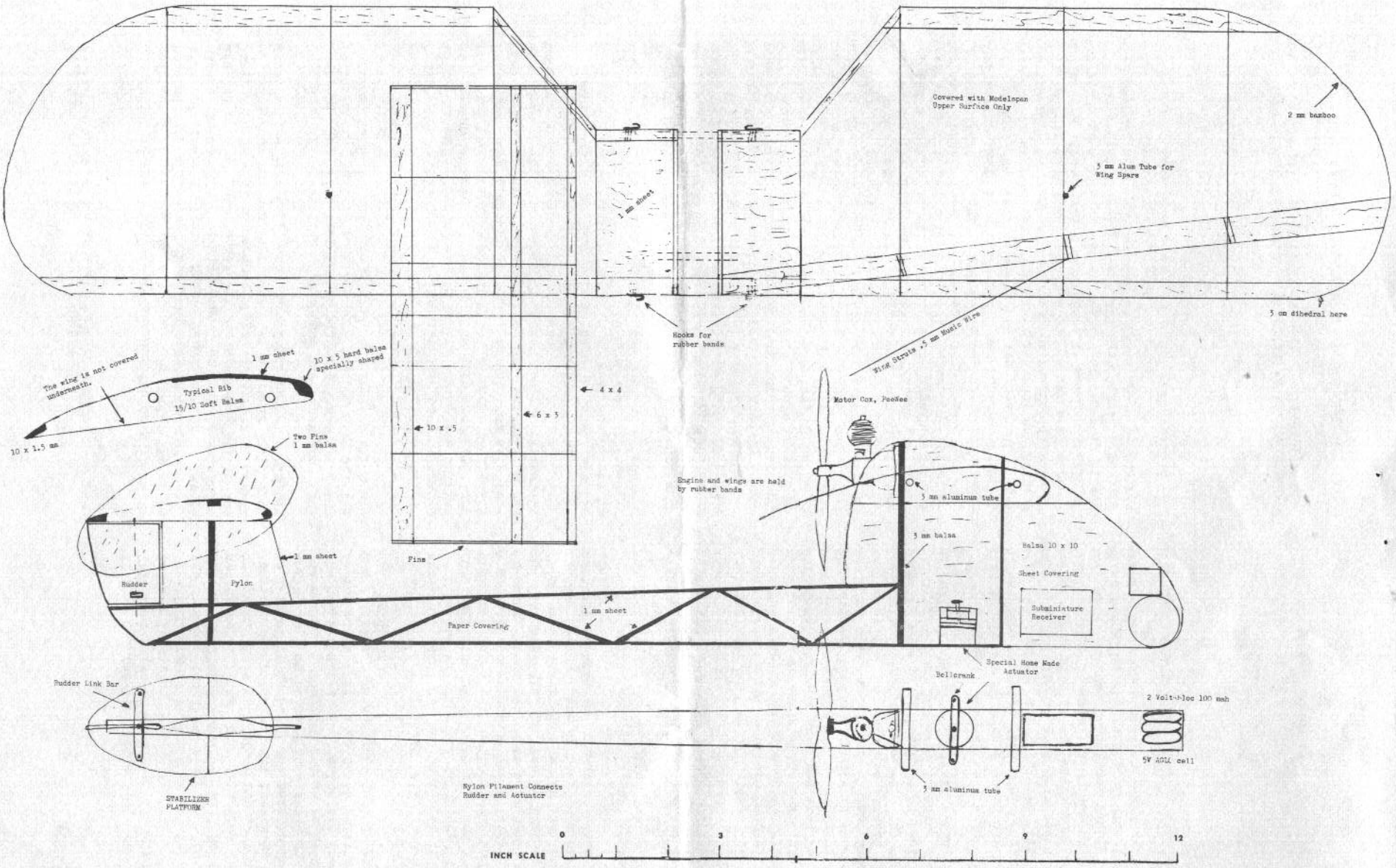
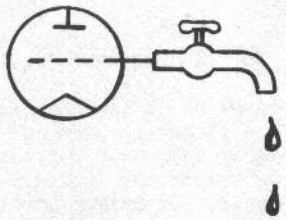


Le MOSQUITO

INDOOR RC DESIGN BY CAPTAIN FRANCIS PLESSIER

Grid Leaks At Play



Following up on the experimentation begun with the last issue of GL, when a new paper was used to provide, we hope, a greater legibility on an improved type of stock, this brings you a new type face. We hope that the combination of the improved opacity and paper stock, as well as a more legible type face will make your reading of Grid Leaks a still greater pleasure.

You will note that this issue is lacking in any reference to the debate which was begun several issues ago on proportional control. This is not due to the fact that we didn't receive any letters but rather because there is so much other editorial content that we felt it advisable to delay until a future issue. The letters continue to roll in on the argument on proportional vs reeds and there is no definite trend that we can say has been established. We note that there has been little comment from the Orbit-land R/C fans and must assume that this is due to the fact that they simply don't have time to write because they are too busy flying, HI! Seriously, the arguments are shaping up well on both sides and we'd be interested in hearing your comments--either pro or con--based on your experience, your opinions, or both. Why don't you write us and throw in your two cents worth?

A big growth in R/C seems to be quite evident. More and more people are getting into this fascinating hobby of ours and, as more and more come in, of course, the field has been broadened to include more people who know nothing about radio and are, therefore, somewhat nonplussed as they enter into the field. Again, the age old question comes up as to how we can best handle these new-comers and how we can best make sure that they get a satisfactory experience out of their initial radio control attempt so that they will stay with the hobby. We feel it has been proven that those who are successful beginners become more than moderately successful semi-experts.

We've been disturbed at some of the trends that our mail has been taking lately. Just as a sampling--while the instructions on a well-known make of hard-tube receiver, manufactured by a well-known manufacturer, does definitely call for the use of a 0-5 milliamp meter in the tuning of the device, this was ignored by one who not only chose to write about it but also used the telephone. He was attempting to tune the receiver by listening and following the click-clack of the relay as it pulled in or out as he varied the various slugs for both sensitivity and tuning on this particular job. As we pointed out to him on the phone, meters were musts. As a matter of fact, this follows very closely an article we had in Grid Leaks several issues back. However, he hadn't taken the time or the trouble to read the instructions carefully and, being a loner, was quite convinced that there was something wrong with the equipment.

Or, picture another letter coming from an individual who had the old reliable Lorenz two-tuber hooked up and, with use of scope and signal generators and monitored voltage sources, was getting a very good drop on the first stage indicating that it was superregenerating. This, in turn, was triggering the second stage from 0 to almost 3 mils but nothing was happening to the relay. Perturbed, he write in about this and said, quite evidently, there was something wrong in the circuit. We had to point out the fact that this, quite evidently, again, was in the relay adjustment which either got shook up when it came from the manufacturer to the kit manufacturer or in transit from the kit manufacturer to the individual. We haven't heard from him since on pointing this up but hope that he has found that the simple job (to the experienced) of adjusting the relay has cured his trouble.

Another hurry-up telephone call stated that the user, in using Bill Grogan's nicad charger as contained in the DC/RC Newsletter and a subsequent issue of Grid Leaks, would not go low enough on the current in spite of the fact that they were using the smallest light bulb available. We checked everything by long distance that we know how and follow-up correspondence revealed that they had finally decided to check their milliamp meter and found that the one in use was considerably off scale and reading far too high when checked with a precision instrument.

We could go on at considerable length about these factors. To us, in several respects, they are disturbing because, quite obviously, as publishers of an R/C paper and, as manufacturers of R/C kits, somewhere a gap is being left which is not readily being filled. This applies particularly to those who are loners in R/C and do not have contact with radio control clubs. In instances where radio control clubs and old-timers are available, a lot of these troubles can be whipped quite easily. Most old-timers will be very opinionated in

their help to all beginners but, at least, it is help and this is what is desperately needed.

This brings us to the old saw again of what shall we do editorial-wise? We kicked this one off well over a year ago and it's been with us ever since in our mail.

Needless to say, our own personal opinion is that, with the many excellent books that are on the market today, a lot of this can be picked up if the beginner is in earnest. However, we must, frankly, admit that the picture, in its broad scope, is very confusing. It's a lot different than when we started in radio control and the choice of equipment and the type of flying or boating or controlling whatever was extremely limited. Now, the beginner faces an almost awesome choice and having made his choice, he is sometimes flabbergasted and dismayed when it comes to make what to old-timers would seem to be the most elementary and simple of installations.

We do not know which way the answer lies. We do know that the answer must be resolved if more and more people are going to get into radio control and remain happy with the hobby.

As far as editorial policy goes, we feel, after being boosted by the many hundreds of letters that we've received that Grid Leaks should remain on a more or less advanced plane. There have been dissenting votes to this, of course, but they have been so far in the minority that we feel constrained to follow the majority of opinions because, after all, this magazine was designed to please the greatest number.

Across our desks the other day came the initial copy of the new English publication, "Radio Control Models and Electronics", which made its debut with the May 1960 issue. Published by the publishers of Aeromodeller, we feel that here is another magazine that will fill a terrific need for not only the advanced but also the beginner in R/C.

In the initial issue, there are articles such as "The McQue Versatile Transmitter"; "Practical Servo Testing"; "Meters are Musts in R/C" (a digest of the article as it appeared in Grid Leaks several issues back); "A Simple Multimeter"; "Multi-Channel Operation for Beginners, Part I"; and the "Boystick Control for Simpl-Simul Type of Operation". The magazine will be published monthly and is available on a subscription basis. We don't know exactly the amount of American dollars required for the subscription but we suggest that a letter to the offices at 38 Clarendon Road, Watford, Herts, England would give the information. The price as listed in their covers overseas is 27/6. We'd say that if it costs $3 to $4 American money for a year's subscription it would be found by most R/C'ers to be worth every penny of it. We wish it well and welcome it to the fold of R/C info disseminators.

Class D Citizen's Band boys were handed a ruling by the FCC recently which came about as part of the confusion that has existed for the voice communications that the FCC allowed as part of docket #11994 which went into effect September 15, 1958. We quote in part from the FCC. "It appears that a number of licensees have either intentionally or mistakenly interpreted Part 19 to permit unrestricted use of stations and amateur type of communications. It seems apparent that any substantial use of citizen's radio stations for amateur type or rag-chewing activities would create intolerable interference and defeat the Commission's purpose in establishing the service.

"Under no circumstances, other than civil defense activities or similar emergencies, may they communicate with stations not licensed in the Citizen's Radio Service.

"The licensee of a station in the Citizen's Radio Service, Class D, should neither call nor answer distant stations which are located outside of the local ground-wave coverage of his station. Even within his local area, he should refrain from communicating with other stations unless he has a definite and purposeful communication requirement. The practice of 'test' call for the purpose of inviting the DX-contact with unknown stations will be considered to be subterfuge in lieu on the general call CW and in violation of the rules."

We hope that this will alleviate the situation that has existed as far as interference is concerned somewhat. It won't eliminate it, of course, but it should help.

In a recent issue of Grid Leaks, we mentioned that a re-run of Grid Leaks had been made on Volume I. This was met with such instantaneous reception that most of these are now exhausted. A limited number of Volume I, Numbers 5, 6, 7, 8, and 9 still exist and these will go at 35¢ for as long as they last. It is not physically possible to comtemplate any more re-runs. This last run was the third run of its kind we have made.

As of this writing, all of Volume II is still available as back issues and we will be happy to send you these as long as they last. Again, re-runs will not be made.

As to what's in the works for coming issues, some more articles by that top-designer, Phil Kraft, a continuation of Indoor R/C Models by Capt. Francis Plessier, and several more really hot items that we are on the track of should do much to whet your appetite and keep you happy.

As we enter into the new flying season in earnest, may we wish you happy landings!

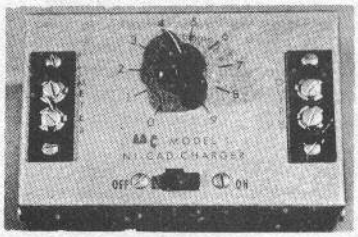
Yours very sincerely,

Paul

Paul F. Runge, Editor

WHAT'S NEW?

MC NICAD CHARGER



Here is an important break-through by MC Manufacturing & Sales, 6720 Monroe, Kansas City, Missouri who announce the MC Model 1 Nicad battery charger. Housed in aluminum case, it measures 3" x 2½" x 4½". Unit comes less meter, but provision is made so that accurate metering may be had for good battery charging.

Uses a step-down transformer from the 110 volt AC line to secure the voltage required. Milliamp range of the unit is from 10 mils to 250 mils. Designed for the smaller type of nickel cadmium batteries, particularly the Eveready N46, VO.500 and VO.800. At the extremely low price, we are sure this will become a terrific R/C favorite. Meter is not furnished but any 0-300 milliamp meter or equivalent may be used for testing. $4.95.

MICRO BURNISHER

Desire has been expressed for a thinner contact burnisher so up comes one called a Micro Burnisher manufactured in California. Physical dimensions are .00035" x 1/8" x 2 3/4". It comes complete with plastic tubu x 1/8" x 2 3/4". It comes complete with plastic tubular case to keep it safe from dirt and dust. Retail price is 97¢ per burnisher. These are really thin for those hard to get at spots.

SPECIAL BUY!

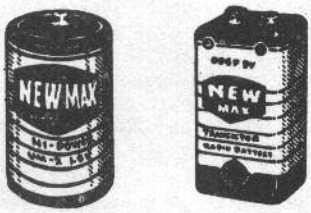
Weight, 1 oz.
Size:
.88W, .93H, 1.38L

Ace R/C has been able to locate a very limited number of new Deans AR-5 5 channel reed units. This is a special buy. These are of the high impedance type and are just it for experimenters. These will be sold at the ridiculous price of $9.95 while the supply lasts. In stock at Ace R/C. Get your order in now. Weight is one ounce. Size is 7/8" x 15/16" x 1 3/8".

NIKE CONVERTER

The Nike, as described fully on other pages of this issue of Grid Leaks is a superhet converter designed for most audio receivers in use today. Will convert them into a superhet. Will be furnished with a 27.145 crystal unless ordered otherwise. In combination with any Ace gear of the audio type such as the Kraft single and multi channel receivers, or the TR 4.5 all-transistorized receiver, you have a superhet unbeaten in performance by units costing much more. $39.95.

IMPORTED BATTERIES



Imported batteries from Japan are in increasing favorite with the larger number of R/C fans because they are proving very reliable and are lower in price.

The BL-145 is a 67½ Volt transmitter battery. These are the equivalent of the XX45 and sell for $2.50.

The BL-006-P is a 9 volt equivalent of the American 2U6 and retails at 95¢

The BL-MV15 is a 22½ volt equivalent to the Y15 and retails at $1.05.

The BL-015 is a 22½ volt equivalent to the U15 and retails at $1.05.

The BL-020 is a 30 volt equivalent to the U20 and retails at $1.35.

PRICE INCREASES

Price rises in radio control and modeling are not too uncommon in these days. Much as manufacturers regret having to make decisions of this nature, it is sometimes entirely beyond control. Therefore, the announcement from Rob Blackwell of Blackwell Models Manufacturing Co. in Canon City, Colorado on their T-100 and S-10-W price raises is not too surprising.

Effective May 15, 1960, the price of the T-100 will be $10.95 instead of $9.95 and the Ranger S-10-W will be $12.95 instead of $11.95. Future shipments of all of these will carry the foregoing price tag.

MC 101B CW RECEIVER

From MC Manufacturing & Sales comes word of their new MC101B receiver. This is a transistorized version of their very popular 100B receiver. The 101B is a CW type and, unlike the 100B, has a current rise due to the fact that the transistor follows the regular 100B circuitry. This means you have an idle of 3/4 mil which, upon receipt of a CW signal, rises to 4 mils plus. Features the same high-quality components on their glass epoxi printed circuit base. The 101B sells for a very low price of $14.95. This is a new item under development that will probably be released by the time you read these lines.

TORQUE ROD BEARINGS

Torque rod bearings, with wear surfaces of tempered steel are offered by Blackwell Manufacturing at 20¢ per pair. These use 1/16" wire for the rod and fit in to a 9/64" diameter hole at the rear of fusehge.

70 DEGREE BELL CRANKS

In response to many requests, Model Plastics, the manufacturer of the Nylon Aileron Bell Cranks, which so many multi fliers use, now has a 70° version as well as the 90°. Also at the same price of 45¢ per pair. Be sure to specify 90 or 70° types.

JUST IN! The RA-BOAT--Kit $4.95.