

GRID LEAKS

R/C DATA SERVICE

JANUARY-FEBRUARY 1961

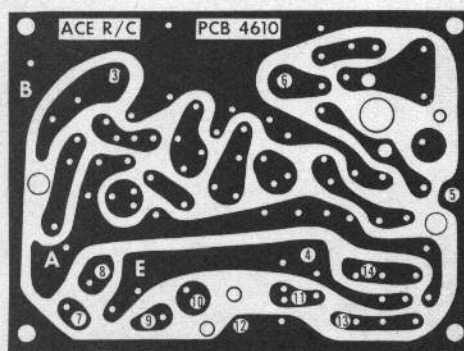
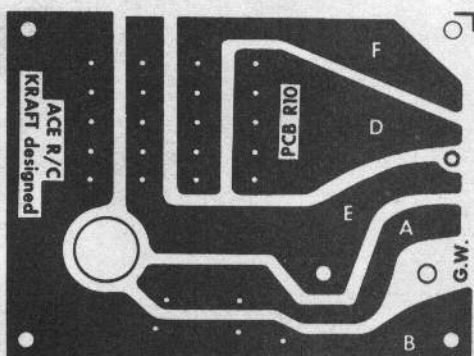
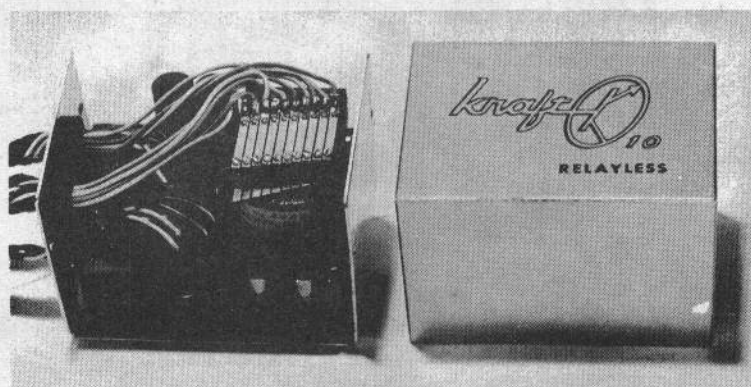
VOLUME 2 NUMBER 10

25C

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CONTENTS COPYRIGHTED 1960 BY GRID LEAKS

Kraft Relayless 10 Receiver

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About the time we, at Ace Radio Control, were working feverously with Phil Kraft to release the 4-6 channel relay version of Phil's receiver, announcement was made to the field of the Transmire servos. Immediately, a clamor was set up from throughout the country to make available a reliable, yet low-cost, kit for a 10 channel unit. Designer Kraft, with his experience, immediately used the bottom deck of the then existing 4-6 receiver and converted his unit for 10 channel relay-less operation using some of the pre-production samples as released by Bonner Specialties.

The result of this has been innumerable test flights and excellent performance in the field.

The only difference between this unit and the 4-6

is that there is no longer any common negative. The common now is A+ and B- or A+ and servo battery - so that the bias required by the Bonner Transmire may be used from the filament battery.

No special building instructions will be given here. It is necessary, however, that the final 2N224 be especially selected so that it has the RMS voltage drive required to operate the unit either simultaneously or triple simultaneously when used with the Kraft equipment. Standard Deans 10 channel reed bank is used. This has audio frequencies of 235, 265, 290, 310, 330, 360, 385, 415, 440, and 470 cycles per second.

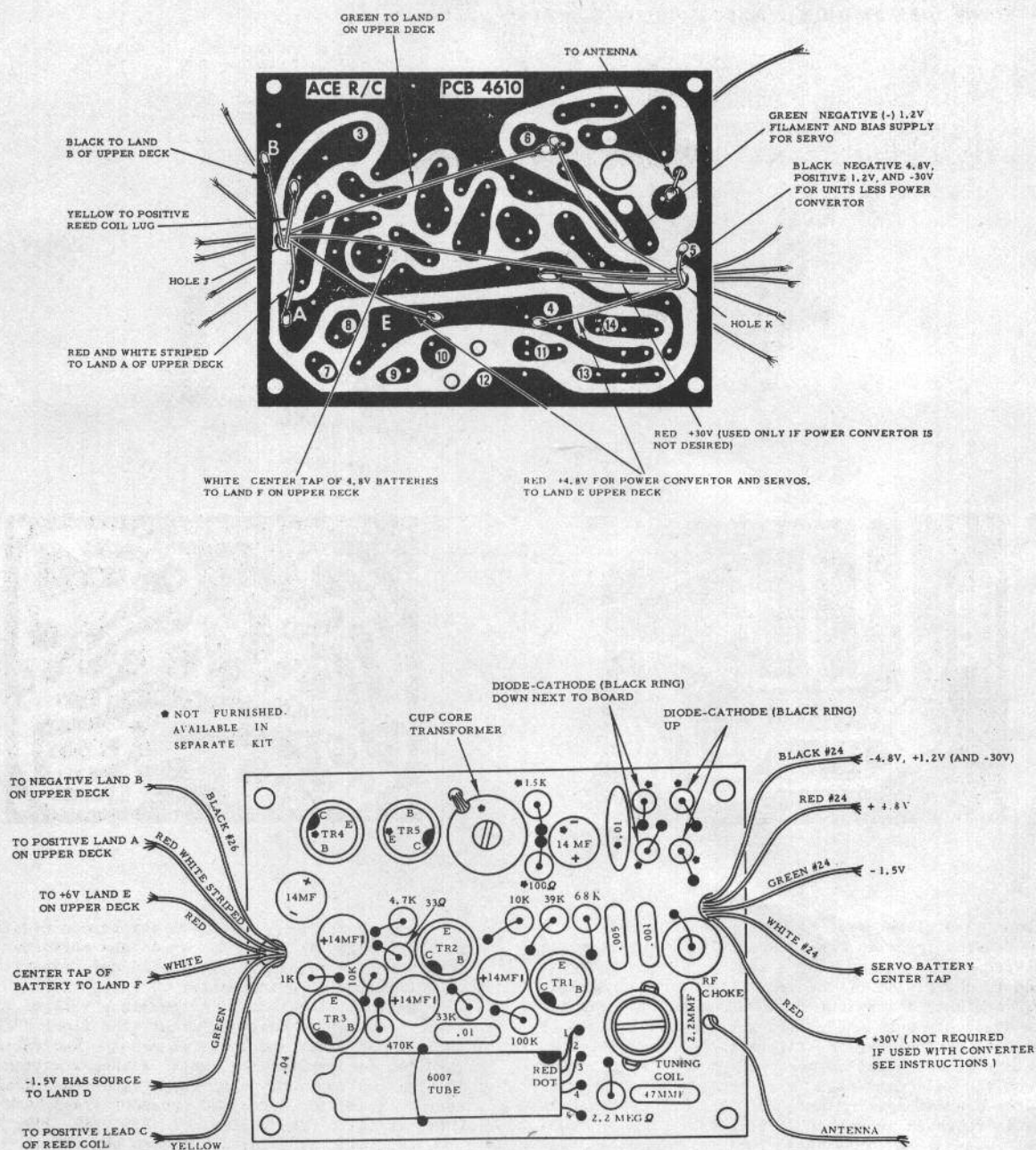
Full size printed circuit board is shown for the relay deck and the bottom receiver and power converter deck. The board, as shown in Grid Leaks Volume II,

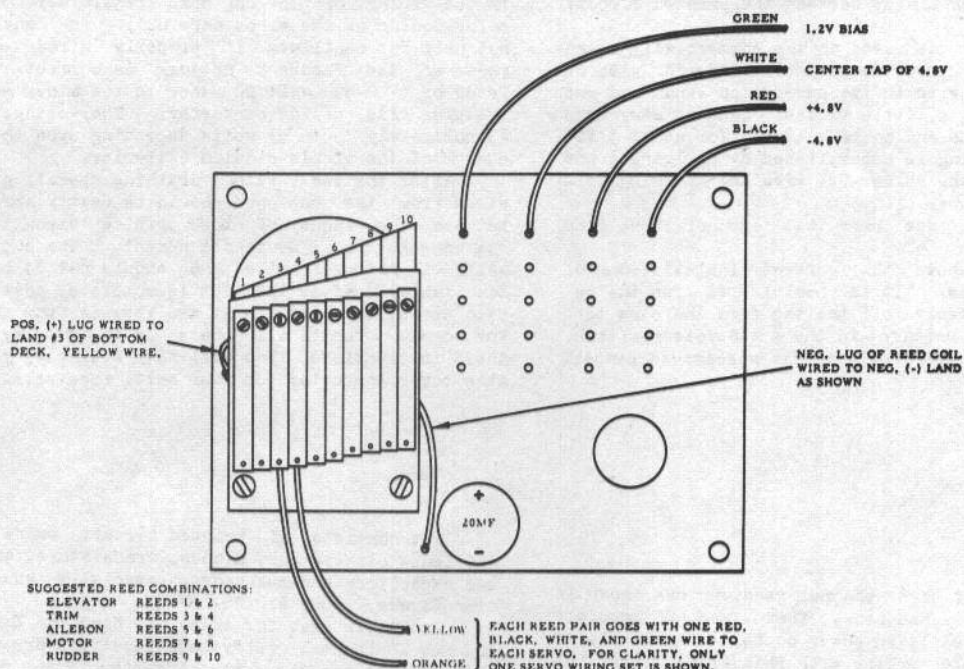
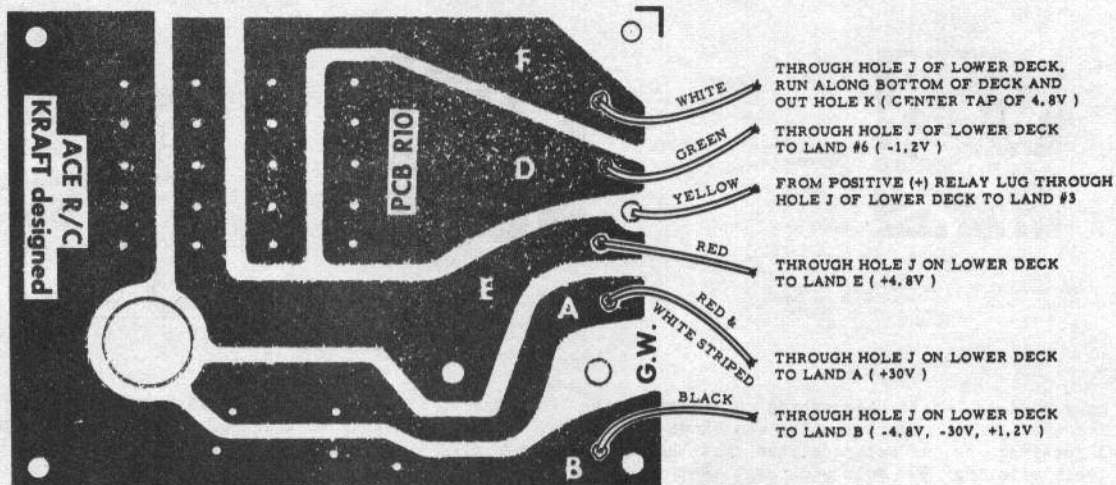
In hooking up this unit, all battery voltages are brought to the end of the receiver through switches for the power converter operation. It will be necessary for you to use one DPST and one SPST so that A-, 4.8 volt + power converter supply and the common A+ and - 4.8 volt may all three be cut off to avoid drain.

The servo hookup is then through 6 prong connectors from the receiver itself. No other connection from the battery is required to the Transmite servo. This means a much neater installation than has been possible up to now and will make a quick "disconnect" type of arrangement possible.

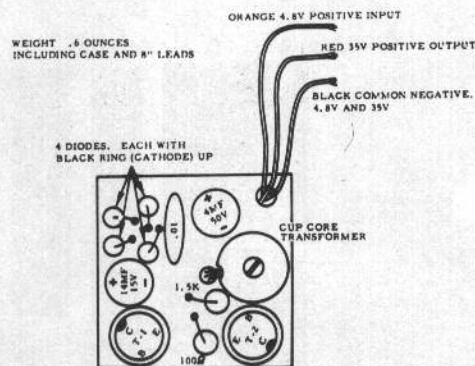
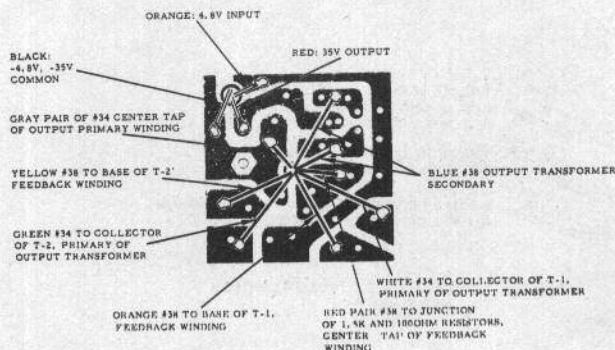
If you've been wanting to go multi, there is no finer receiver available today of the superregen class than the Kraft Multi-Fli 10 relay-less. Build it and have fun.

If you've been wanting to go multi, there is no finer receiver available today of the superregen class than the Kraft Multi-Fli 10 relay-less. Build it and have fun.





Kraft Power Converter



So many readers wrote requesting a construction article for the power converter which was shown for the Kraft 6-4 receiver as a separate item that they could use for their existing 30 volt equipment that designer Phil Kraft, has come up with a very small unit housed in a plastic box 1" x 1" x 5/8".

This unit has more than ample output to operate any of the existing 30 volt receivers from a 4.8 volt input. It is economical as far as battery drain is concerned. It may be used exceptionally well with 250 milliampere hour V0 type nickle cadmiums.

No detailed instructions will be given except to say that the color-coded leads from the cup core should be soldered on the printed circuit side of the board and soldered directly to the copper lam as per pictorial. Position the leads carefully between the printed circuit lands.

Solder-Eze wire is used on the commercially wound cup core which may be tinned and soldered without scraping. Run the wire to its associated land and cut it to length leaving a little excess. Bend it away from the board and tin the end to be soldered for about 3/16" from the end. Tinning is accomplished by applying a hot soldering iron to the Solder-Eze wire and applying solder in the usual manner.

To check out, use care that some of these fine wires are not broken.

The diagram shows the correct installation of switch and batteries. It is possible to run the receiver filament batteries off the tap from the plus terminal of the nicad battery in the - 4.8 volt position. However, we feel it preferable to use a separate pencell

battery. Some tubes do not like 1.2 volts which is the typical operating voltage of the nickle cadmium batteries. Since battery life for a single pencell on filaments with tubes of the 6007 type is extremely long, the pencell may be soldered into the installation and we feel that this extra half ounce of battery weight can avoid trouble.

To test your power converter, a battery source of four 1.2 volt nickle cadmium batteries is required. Connect as shown.

Insert a 0-150 milliamp meter in the plus lead of the battery pack and the minus lead to the red or plus lead of the receiver. The current reading should be between 55 and 65 ma at idle. If the current varies widely from this, it indicates that something is wrong in the wiring of the cup core transformer. Check the color coding of the wires carefully. The converter cannot help but oscillate if properly wired so that the phase of the feedback network is correct. Clip the leads of a 0-50 volt DC meter to the minus side and to the plus side of the converter. The voltage should be approximately 35 to 39 volts depending upon the state of charge of the nickle cadmium batteries.

After the test, with everything operating fine, the wires from the cup core should be neatly arranged flat between the lands of the printed circuit board and coated with Duco household cement. The cup core, itself, is rather fragile and should not be bolted down too tightly. After the test is complete, coat liberally with cement to reinforce it and keep it from shifting on the board. That's all there is to it! By following these instructions, you will have a simple, yet dependable power converter for your multi receivers.

KRAFT PC KITS

When the Kraft 4-6 channel receiver was shown in Grid Leaks several issues back, there was an immediate demand to have the built-in power converter available as a separate item. In working with Phil Kraft, this has now been accomplished in one small, complete package as shown in the picture. The unit measures 1" x 1" x 5/8". Weight is .6 oz. including case and 8" leads.

Has an output of 35 volts, no load, which drops to 32 volts, with 15 mils out. May use the same battery as used for the servos for real economy in operation.

Kit consists of printed circuit board completely drilled, plastic box, diodes, transistors, and two filter capacitors and resistors, specially wound cup core transformer. Only \$10.95. KP/CK.

Available also for those who have the Kraft 4-6 and the new 10 channel relay-less receivers are the conversion kits to add the power converter to the receiver.

Includes all required components including specially wound cup core transformer and sold to owners of the Kraft receiving equipment for only \$9.25. KP/C

The transformer wound as shown in this issue of Grid Leaks ready to install in your equipment. Transformer only \$3.95.

"GG" Actuator

SIMPLE, EASY TO MAKE JOB

Here is a servo motor-decoder for pulse width-pulse frequency (Galloping Ghost) systems that I have been using for some time now. You will note from the pictures that it is the ubiquitous Mighty Midget motor, but you may not recognize the Firebaby bellcranks. For a total price of \$3.50 one can duplicate the control action of a more expensive (\$10) commercial item and also save some weight. (EDITOR'S NOTE: This item now is not even available on a commercial market any longer since it has been withdrawn until an American type motor can be found.) But the biggest benefit comes from the greatly reduced size. This unit is only $1\frac{3}{4}$ " long, $1\frac{5}{8}$ " wide, and $1\frac{9}{16}$ " high. It was originally devised to convert a two-foot span SE5 to GG using push-rods instead of torque linkages, and is perfect in this application.

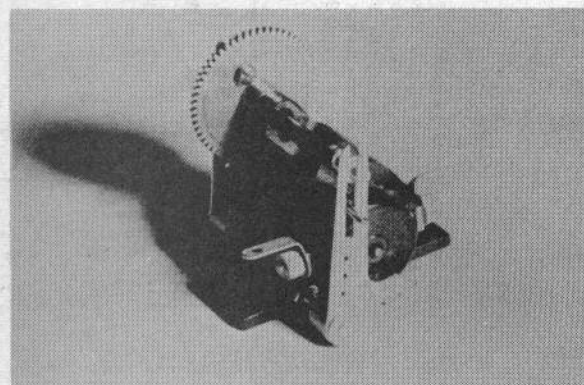
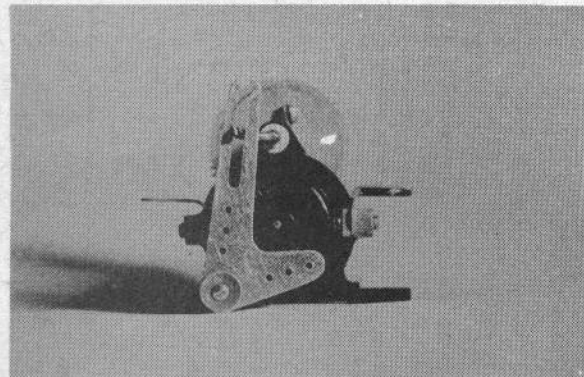
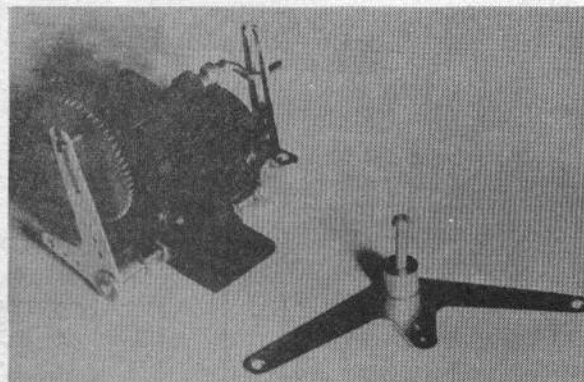
In the event the pictures do not show clearly just what was done, here are some instructions. Tap the large gear $\frac{7}{32}$ " from the center for a $\frac{2}{56} \times \frac{3}{8}$ screw; this will serve as the rudder drive pin. Install a new main gear shaft with a $\frac{7}{32}$ " crank at the end, positioned at right angles to the pin. Drill and tap a $\frac{2}{56}$ hole at the thickest part of the base of the motor (at the 7:30 o'clock position as viewed from the brush end of the motor and at the 4:30 position at the gear end.) Cut off opposite arms of each of the two bellcranks and slow the rudder bellcrank to the point at which the drive pin hits the motor case when rotated counter-clockwise as viewed from the gear end of the servo. Mount the bellcranks using $\frac{2}{56}$ bolts as supplied with the bellcrank. Motor case is tapped to a depth of $\frac{1}{4}$ ". Spacing between motor and bellcrank is another $\frac{1}{4}$ " with the remainder threaded into the bellcrank. Two $\frac{2}{56}$ lock nuts are used as lock nuts and while the pictures don't show them, internal star type lock washers have been added preventing all possibility of things loosening up under vibration. The Firebaby bellcranks have a large diameter close-fitting washer securing the crack to the threaded portion which effectively prevents excessive movements so no other constraining mechanism is needed. Drill push-rod holes as required.

I fail to see the need for a centering spring since control action is linear enough for me but those individuals who feel one is necessary can easily install one.

Here is another idea and I'm surprised that its not in common usage by the majority of pulse system advocates. Instead of using a relay in the transmitter with its attendant contact troubles, I have been using a simple switch tube circuit for the past four years. In all this time I have not had to replace this tube. It offers the further advantage in that a twin triode type tube can be used as the multi-vibrator instead of having to use two separate pentodes which the inductance of the relay coil makes necessary. While a one section triode can be used, I use a twin triode with both sections connected in parallel of the same type as used in the multi-vibrator stage to reduce the number of spares required.

(EDITOR'S NOTE: This last paragraph intrigued us as much or more than the actuator article so that we wrote to Dick for further information. The following was forthcoming.)

The enclosed diagram contains the pulser circuit you have expressed an interest in. The 1 meg potentiometer provides an 80-20% to 20-80% change in the pulse width with the .1 ufd capacitors used while the 250K potentiometer provides from 2 to 18 pulses per second



(about 50T)

tank circuit

1 1/2" Long



There is no reason why two 3A5's could not be used in place of the 6V6's in this circuit. Unfortunately, the circuit values given will not be correct if a voltage other than 250 volts is used as would be the case

ACTION

North Carolina

WHAT'S NEW

THE "MOST" PULSER

The "Most" pulser. Here is a pulser that has no interaction because it has no critical electronic circuits, no expensive batteries, requires only two C cells. The true centering stick controls rate and proportional change. The mechanical pulser can be used for Galloping Ghost or inductive dual proportional systems, or with rudder only proportional systems. Comes complete with connecting cable, factory guaranteed in the 3 x 5 x 2 anodized two-tone case. Only \$27.50 completely assembled. Available through your hobby dealer from Ace Radio Control.

GYRO TRANSVERTER

New Transverter by Gyro. All transistor B supply for transmitters. 6 volt input, 135 volt output, maximum output current 50 mc, $2\frac{1}{4} \times 3\frac{1}{4} \times 1\frac{1}{4}$, weight 4 oz. Complete kit--nothing else to buy but the batteries--Model TCK-6 \$14.95. Factory wired and tested model TC-6, \$17.95. Available through your hobby dealer from Ace Radio Control.

TEMCO RECEIVER

In the previous issue, we mentioned interference resistant receivers. We have, since, had the opportunity to check out the receivers made by Temco--Tomoser Electronics & Manufacturing Company--and found it was a cinch to operate one on 26.995 and one at 27.255 and probably it would have been easy to stick another one in there without any interaction. These, we feel, offer a more economical approach than a superhet. They are not as selective as a superhet, of course, but they will provide interference resistance. More so than even receivers of the straight audio type. The Temco receiver measures $1\frac{3}{4} \times 2\frac{3}{4} \times 1$ inch thick. Weight is $2\frac{1}{2}$ oz. Uses a tube and three transistors. Requires $1\frac{1}{2}$ volts A and 30 volts B. Price is a low \$34.95. While a transmitter for this particular receiver is under development at the present time, the existing transmitters of the MarcyTone type--the ones going from 1000 cps to 4000 cps--may be easily adapted for use. Announcement on the transmitter will be made in subsequent issues. But, for the time being, the Marcy works it beautifully. Available from your hobby dealer through Ace Radio Control.

WILLIAMS SCALE PILOTS

From Williams Brothers comes word of some high-quality pilots for scale modelers. Moulded of lightweight, flesh colored styrene plastic and may be painted with any model enamel. Also there will be matching goggles of moulded crystal styrene to fit either pilot. Available first in a 1" scale at 49¢, matching goggles 10¢. Next in a 2" scale at 75¢, matching goggles 15¢. Available either as a standard pilot or a racing pilot. These are in stock now. A little later these will be available also in a $1\frac{1}{2}$ " scale at 60¢. Goggles, 15¢. Available through your hobby dealer from Ace Radio Control.

BEST FROM GRID LEAKS

Grid Leaks has enjoyed a continual rise since its initial publication almost four years ago. There have been demands from the field that the best articles for the beginner that have appeared in this span of time be reproduced. Accordingly, we have pulled what we consider to be the best articles slanted at the beginner and now have a 36-page brochure which contains this information having titles such as these: "R/C Glossary", "Color Code Primer", "Soldering Takes Technique", "What Is Proportional Control?", "Relays, Their Adjustment and Care", "Develop a Pre-Flight Countdown", "Filling out Form 505", and many others that are certain to answer the beginner's and even more advanced questions. The reason for this is that we receive many requests for back issues which are no longer available except for certain limited quantities of certain issues of Volume II. By compiling the best from Grid Leaks over the two-

volume history and offering it attractively bound at \$1.00, we feel you will have an excellent book to provide you with the broad basic background of what radio control is all about. This is not a handbook, this is a compilation of a series of articles which were written with the beginner or novice in mind. With more and more people entering into radio control, this, we feel, will provide an answer. We'd advise you to place your initial order early so the first print can be based on your orders. Advance orders are invited. Available through your hobby dealer from Grid Leaks.

RAMECO FILTERS



Many of you have inquired about the Rameco submini filters. Just in its final word that Ace R/C will have them for resale, as well as the Rameco Submini Transmitter and the upcoming Rameco Three Channel Receiver and Transmitter for boats.

The Rameco filters will be stocked in one size in the untuned version. They may be easily tuned by following the tables below. Designed for transistor circuits, they are NOT interchangeable in the Marcy circuit as is. Circuit info is included and additional information will be published in subsequent issues of Grid Leaks. Tuned decks will be available only on special order and time should be allowed for their being custom made.

Type SMTF is housed in $\frac{3}{8}$ " pot core. Height .45". Mounting board dimensions $\frac{5}{8}$ " x $\frac{1}{2}$ " per channel. Weight $\frac{1}{5}$ oz.

Price is \$2.25 untuned. If tuned decks up to six channels are desired, please specify number of channels and allow \$2.25 per channel desired. Special order only. Specify size.

CAPACITY

FREQUENCY (SMTF)

| | |
|---------|----------|
| .01 MFD | 4.3 KC/S |
| .02 MFD | 2.9 KC/S |
| .05 MFD | 1.9 KC/S |
| .1 MFD | 1.2 KC/S |
| .25 MFD | 780 CPS |

BABCOCK NEWS

From Babcock comes word of the fact that their old #887 motor speed and sequence reversing relay has again been put into production. The boating modellers still say that this is one of the best and, perhaps, the only unit of its kind in the field today. The price is now \$9.95 because of increased manufacturing costs. Available at your dealer through Ace Radio Control.

ECKTRONICS KRAFT UNITS

Coming from Babcock will be a single channel selectable tone receiver, the BTR-12. The unit will respond only to pre-selected tone frequencies. No delicate reads or elaborate tuning adjustment will be required. Several tone frequencies will be available. List price is \$34.95.

BCT-12, single channel selectable tone transmitter. No critical adjustments required. Several tone frequencies will be available and the unit is completely legal with the FCC regulations. List price is \$39.95.

Selectable tone frequencies mean that several modelers may fly at the same time with no interference from each other and also minimized Citizens Band and CW interference. These will be available in early 1961.

SNAPDRAGON COMBO



If you're new to radio control and have been scratching your head and wondering where to start, here is an answer for you. With the introduction of the Snapdragon kit and arrangements with Ecktronics, Duke Fox, Howard Bonner, now Ace Radio Control is taking a step in this direction and offering--The Snapdragon Combo Package. This will be available in two combinations. #1 is with the completed Ecktronics Kraft transmitter and receiver and lists at \$92.95. #2 is as the foregoing but with Kraft single channel KITS; it lists at \$72.95. A complete inventory shows even small hardware is included. Three notable items are left out: cement and dopes, fuel, all batteries. Included are the Snapdragon, 6 x 12 foam rubber, one pair wheels, 3/4" tail wheel, one square yard silk, one Fox Rocket .09 with tank, one Topflite nylon 7 x 6 prop, one set cloth hinges, one DPST slide switch, one RCA jack and plug set, one Hillcrest D battery box, one 7 prong plug and socket, three feet 1/4" rubber, hardware and #62 and #64 rubber bands, torque rod bearing, Alpha hookup wire, Bonner VariComp, Kraft single channel receiver and transmitter--either built or in kit form depending on package desired. Available through your hobby dealer from Ace Radio Control.

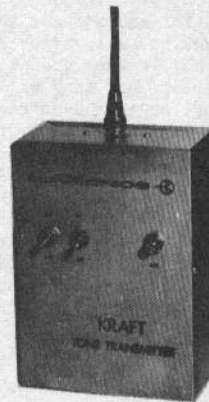
BAISDEN GG PULSER KIT

So many requests have been received for the Baisden GG pulser in kit form as was detailed in the last issue of Grid Leaks that we have gone ahead and, we hope to have for delivery shortly, a kit of the Baisden Galloping Ghost type of pulser for \$17.95. This will be highly pre-fabricated, will contain a Mighty Midget motor and all parts required to make unit. This is a mechanical pulser and doesn't use any electronic circuitry. Assures trouble-free and simple operation. Will provide proportional rudder and elevator. A review of the Nationals will reveal that proportional was top dog in Intermediate, Open Rudder, and Junior-Senior Rudder. Available through your hobby dealer from Ace Radio Control.

A three-way agreement has been worked out between Phil Kraft, Ace Radio Control, and another manufacturer for the completed Kraft units. Robert and Richard Eck have formed Ecktronics and will produce the Kraft single and multi-channel equipment in a completely factory assembled, tested, and certified form at very competitive prices. Ace R/C has had and will have the Kraft gear in KIT form as well as the Ecktronics completed units. Available through your hobby dealer from Ace Radio Control.

Kraft single channel tone transmitter. Case size is 8" x 6" x 3 1/2". All the features of the kit as furnished by Ace Radio Control but now assembled by thoroughly trained personnel using the best equipment and testing techniques. Written warranty included in each unit. \$34.95

Kraft single channel tone receiver. Re-designed to fit a new case. Dimensions are 2 1/8" x 1 5/8" x 1"; superregen circuit; proven hard-tube detector; tested from 0° to 140° F. with minimum drift; suitable for 15 pulses per second. \$29.95.



KRAFT RELAYLESS 10 KIT

IT'S HERE! The Kraft relay-less 10 channel receiver kit! Finally Ace Radio Control is proud to announce that the Kraft 10 channel relay-less receiver is ready to go. Features the same high-reliability about which hundreds of users of the 4-6 equipment have been ecstatic. Superregen detector features a vacuum tube for optimum performance. Is two-deck construction; housed in an aluminized case; measures 1 7/8" x 2 9/16" x 1 7/8". A tiny jewel of perfection.

Features Deans reed for dependability. Unit may be used for triple simultaneous operation if used in conjunction with the Kraft triple transmitter. Uses three transistors. Board has provisions for built-in power converter.

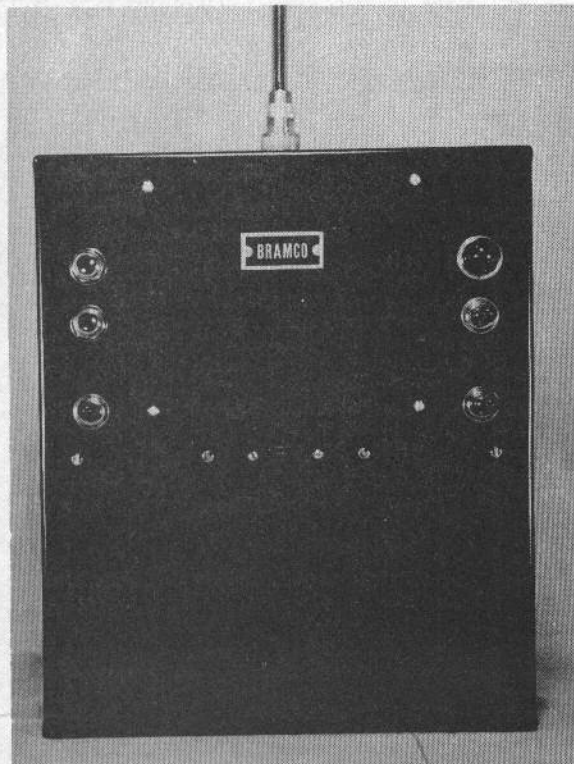
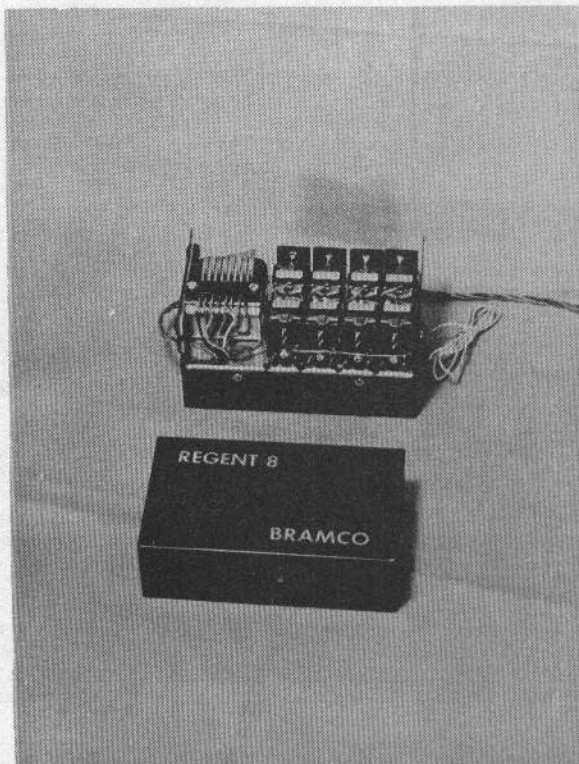
With the new Transmite servos, the airplane installation is considerably simplified.

Complete building instructions including detailed pictorials and step by step plans make this hard for someone with radio experience to go wrong. Price with everything required except for parts for the power converter is an amazingly low \$49.95.

Extras required to make this a 4.8, 1.2 volt input receiver eliminating expensive B batteries only \$9.25.

Bramco On 50-54 MC

SIMPLE CONVERSION REQUIRES FCC TICKET



In order to get off the crowded Citizens Band, John Burris, KAHSU, and I had been discussing the possibility of converting the Bramco 8 channel rig he had to six meters. He wrote the factory and they replied that they did not advise it nor did they sell the gear already on six.

In the 1959 Air Trails Annual was published a circuit of the transmitter and receiver with a long story by the engineer for Bramco. One look at the circuits told us that it shouldn't be a hard job.

Before you grab the soldering iron and start to work, let me advise you that any changes made to any equipment by any manufacturer automatically voids any guarantee that such equipment might carry. Still game? Okay! Now you need a grid dip meter which has reasonably good accuracy. A field strength meter either untuned or with a tuned circuit for six meters is also very handy for tuning up the transmitter.

We decided that any changes or parts which were to be changed should be done with separate components. In other words, if we goofed or it didn't work out, that we had not butchered any hard-to-replace parts. Also, if it did work out, it might be reasonable to assume that we might some day decide to put the gear back on 27 $\frac{1}{2}$ and if we had the unmodified parts, we could just slip them in in place of the 50 mc parts.

RECEIVER

We changed the 6007 to a 1AG4 since the 6007

doesn't work so hot on six and the 1AG4 does a swell job there. Then the existing slug tuned tank coil with the three turn antenna coil around it was removed along with the 5 mmf across the tank coil. A new coil was wound on a J. W. Miller type 4300 slug tuned ceramic coil form of #28 wire and the turns should be about 60% of those on the original. The grid dip meter comes into play here. Wind the new coil and lightly solder it in and check with the grid dip meter and see if the coil will now tune through the six meter band. You should have a tuning range from about 45 mcs to almost 60 mcs with the coil slug all the way in to all the way out. If the range is too low, take off a few turns and, if the range is too high, wind the coil over and add a few turns. This has to be a cut and try process, but, if you are careful and take a little trouble, your little extra work is well worth the effort.

At this point we fired up the receiver and were very disappointed in the results. We reduced the antenna coupling coil to two turns of hook up wire (insulated) and this helped only a little. We then removed the 82 mmf condensor in the grid circuit and replaced it with a 47 (or 50) mmf disc. (Use one that is little, preferably of the silver or NPO type) and then began to see some results. One look at the RF choke and we decided that it had to go. Removed it carefully and replaced it with a 7 Microhenry (I repeat--MICROhenry) RF choke and it was as hot as ever. A choke from about 5

to 10 microhenry will be okay. The one I used was a little one about the size of a half watt resistor and was wound on a ferrite core. I don't know where I got it, but I believe Ace has them. (EDITOR'S NOTE: RCA type 10 uh.) In any event, if you stick a 7 millihenry choke in it, it just will not work.

We put the receiver back together and range-checked it with a home-made six meter transmitter I had built and it worked perfectly and was stable with plenty of sensitivity.

The transmitter was even simpler. Incidentally, the transmitter is as straightforward as you can find and that probably accounts for the fact that it works so well. It uses a crystal of about 6813.75 kcs and the first 3V4 doubles to 13,627.50 in the plate. The second 3V4 then doubles in the plate circuit (a pi-coupled circuit, incidentally) to 27.255. We had a crystal at 13480 kcs that we had used for 26960 (which was the low end of the old 11 meter ham band, and had put it in the parts box since it didn't do much good what with the non-selective receivers hereabouts. We dusted it off and multiplied by four. Result--53,920 kcs! Just 80 kilocycles inside the high end of six. Perfect!

Now in the Bramco the crystal is soldered in so we tinned the leads on our prize crystal and enlarged the holes that the old Bramco crystal had been in and soldered it in. Now we have to change the plate coil of the oscillator. It is a slug tuned coil and, in our particular transmitter, is a CTC SPC2-B-4L. This coil is not easy to find and we had a spare and didn't want to butcher the old one. After counting the turns on the old coil which we removed with no trouble, we estimated that it used #28 wire and we wound a new coil with about 50 or 60 per cent of turns that were on the original and soldered it in. A check with the grid dip meter told us that we were not high enough so we took it out and took off a turn or two and we could tune the coil through the 26960 (we are doubling in this stage) spot perfectly. Then the final tank coil which, in our model, is wound in #16 copper wire was removed and a new coil of #16 wire was wound around a 3V4 (just the right diameter for a winding form) of about 55 to 60 per cent as many turns as the original. Soldered it in after scraping the enamel off and tinning it and fired up the transmitter. We had set it up on approximate frequency with the grid dip meter and it was putting out a nice signal from scratch. Further peaking of the oscillator coil slug

and tuning and loading of the PI network (if you don't know how to tune a tank like this, better read up on it) showed us that we were in business with a good healthy six meter signal. We had all the old parts in a little box and, with very little trouble, could go back to 27½ if ever necessary.

If the RF output is not enough to suit, remember that the 3V4 is straining to do the job on this high a frequency. Substituting a 3B4 with proper grid leak and screen dropping resistor (ala Good's TTPW transmitter) (EDITOR'S NOTE: Grid leak - 2.2M; SG drop resistor - 33K) will bring the output up to snuff with the best of them. Actually, we have tested the units as is and found them okay but some prefer more power from the transmitter and you can get it by the above substitution. You must remember that the socket connections for the 3B4 are different from the 3V4 and you can cut away the printed circuit leads from the board and rewire easily. If you ever go back to 27 mcs, simple wire straps will put the wiring back as was before.

That's all there is to it. In short: Replace the 6007 with a 6AG4 (use a new one, just to be safe), put in a new tank coil on a 3/16" form with less turns and use a two turn antenna link. Remove the old tank coil condenser and replace the 82 mmfd condenser in the grid circuit with a 47 or 50 mmfd. And, (very important) put in a new RF choke of about 5 to 10 microhenry. Try to get one that is not physically large and bulky or you might have trouble. The transmitter requires a crystal of 1/4 the six meter frequency you want and a new oscillator coil on a CTC form that will tune to the second harmonic of the crystal. The final tank coil is changed to tune to the fourth harmonic of the crystal and you are on six.

NOTE: The RF choke and, more especially, the condenser, in the grid circuit of the receiver have a great deal to do with the sensitivity. If the RF choke is okay, the sensitivity can be increased (to a reasonable point) by reducing the grid condenser and the reverse can be achieved by increasing it.

This is an easy modification to accomplish but is not (repeat) not recommended for a beginner. If you want to tackle it and are not sure, better find a ham or technical man who knows what he is doing and let him help you.

Frank Schwartz
Nashville, Tennessee

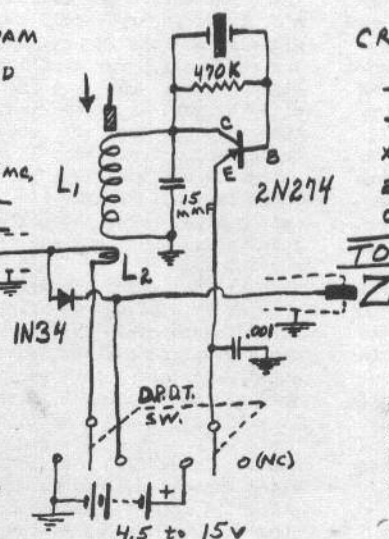
SIMPLE CITIZENS BAND CONVERTER

L₁ = 15T #26 or 28 ENAM
ON A 3/8" SLUG-TUNED
FORM, OR ANY L.C.
COMBINATION THAT
WILL TUNE 26-27.5 MC

ANT. IN
Y G

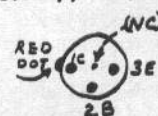
L₂ = 2T HOOK-UP
WIRE ON 1/8" END
OF COIL.

Y-Z = AUTO ANTENNA
COAX EXTENSION CUT IN
TWO PIECES - Y FEMALE
Z MALE



CRYSTAL: 26.200 Mc
-CAN BE FROM 25.5
TO 26.4, BUT THE 26.2
XTAL WILL PUT YOUR
26.995 FREQ IN ABOUT
CENTER OF YOUR BC DIAL
TO AUTO BC RCVR

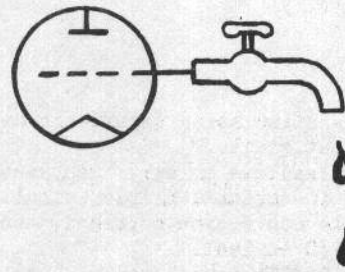
2N247 OR 2N274



Glen Chambers, 1410 Pattie, Wichita 11, Kansas, has worked out a circuit for small "converters" which you can plug into your automobile radio and then tune in the CRS spot frequencies. Max Boal has built up the one-transistor circuit shown below. Our thanks to Mr. Chambers for his sharing of his circuit info.

(Reprinted from KC/RC Contacts, October 31, 1960)

Grid Leaks At Play



As these lines are being dictated, 1960 is fast drawing to a close. 1960--the year that saw rapid advances in radio control. 1960 saw increased use of Class D and increased interference for the radio control modeller. 1960--the year that saw the first FIA International R/C Championship. 1960--the year that will be remembered as the year that was the spring-board for a greater number of people to enjoy this growing hobby with greater reliability.

As has been Grid Leaks' custom, we present the annual R/C Bibliography which is an index of articles which have appeared in all different types of magazines including the new British publication which made its bow on the world R/C front this past year. For an infant, it has made a decided impact. Radio Control Models and Electronics, published by the same firm that publishes Aeromodeller, and edited capably by D. J. Laidlaw-Dickson will have a bright and glowing future, we predict, if they follow in the gigantic footsteps with which they have begun. For any reader who is a serious and avid R/C fan, we would urge you to do yourself a favor and write to RCM & E and get yourself on the subscription list.

The future of R/C from where we sit looks very promising, in spite of the minor irritations that crop up such as interference and others. These problems will be with us. How long it will take to whip them, of course, is anyone's conjecture. But, knowing the R/C fan as well as we believe we do, even temporary set-backs such as interfering signals will not keep him down very long.

There are many areas of the country where Class D has not yet represented any serious threat. It has only been in recent months that the gang flying at the KC/RC site at Lake Jacomo near Kansas City has first experienced their real, serious interference problems.

In line with the interference problem, the December issue of Electronics Illustrated has as their editorial the following: "Let's face it! The Citizens Radio Service is a mess! It was intended to fulfill a useful purpose: 'Private communications and communications with business or personal activities limited to the minimum practical transmission time.' But, quickly after its conception in September, 1958, it became a playground for a mob of undisciplined microphone maniacs. Using Ham procedure but having nothing of the Ham spirit to fill the CB channels with long and pointless conversation in direct violation of the FCC regulations and rules of common sense. The people who really need and use CB for business purposes have a tough time busting the incessant chattering.

"I know from personal observations that the problem is national in scope. During the summer of 1960, I monitored the CB bands for about six hours of every day of a seven-week trip by car from New York to California and a return of more than 9,000 miles over a non-duplicating route. For a while, my wife and I kept a time record of Ham type operation vs. business traffic but we gave this up after the first few days because the phony amateurs quite clearly were hogging all the Class D channels.

"It is painfully evident that Citizens Radio Service is top-heavy with communications of the wrong kind. The FCC can and should get tough with present licensees who ignore the FCC rules and cancel their tickets if necessary."

We quote the foregoing to show that there are problems which may increase in 1961 but also to point up as we have in issues past that, before any of us on Class C can call Class D stinkers, we must approach the problem with clean hands ourselves. That means that we must use equipment which is FCC conformable and that we make sure we have a station license. We have stood on the fact that Class C users must have an FCC license, that Form 505 is available from their nearest FCC office, and that it must be filed before any Class C use of R/C equipment is put into effect. This we propose to do throughout 1961 because if we are ever to get additional frequencies for R/C use, we must be able to point out to the FCC that we are legitimate in our use of the frequencies. It will do us no good to merely point a finger of scorn at the Class D users while we are bootlegging on the Class C frequencies. Let's make a concerted effort in 1961 to make sure that everyone that uses R/C is licensed.

These last few months have been very exciting for us here at Grid Leaks. We were honored to have a visit by one of our top R/C designers in the U. S., Phillip O. Kraft. It

was a stimulating experience and you will see on the first pages of this issue some results of that visit.

Needless to say, many new things are also in the works from prolific Phil including the 10 channel triple simultaneous transmitter, an interference-resistant receiver, a double conversion superhet, and many exciting things that give us a promise of new vistas for R/C in 1961.

The Transmite servos are now in the hands of the modelling public and it looks like Howard Bonner has another winner in them. Shipments were made in early November which is only a few weeks behind the projected schedule and is a wonderful tribute to Howard's ability to get on top of a situation and stay on top of it.

We, personally, have had the great pleasure of working very closely with two of the top R/C'ers in the country in our books, Bud Atkinson and Max Boal of the KC/RC. They have been working on Project "Whitey". The project was so named because the plane, a somewhat stock Explorer with only a few minor changes in which the 6 channel Kraft equipment has been placed. The unit has been placed at the disposal of members and friends of the KC/RC. The plane has deported itself so well that almost anyone in the KC/RC with a yen to fly has had the opportunity to fly old "Whitey". In early correspondence, here was a comment from Max:

"Sunday, October 9, we checked it out on the ground and in the air and then invited everybody to fly. This they did. Twelve fliers and several spectators had the controls. The only trouble we had was getting the transmitter away from the flier. Each guy thought his turn was too short. With the receiver giving us rudder and motor control, we had excellent luck. The transmitter was in "LO" position all of the time and the airplane was upwind, downwind, and so high you could hardly see it but it never missed a lick. The comments of 'just nice' turned to 'wonderful', 'how much for the 6, 8, and 10 channel' and one spectator even wanted to buy the whole outfit. Nobody could believe that we were only using 67! volts on the transmitter. Even fliers who already had existing multi equipment were now asking about the 10 channel Kraft."

Since that time, Bud and Max have been working closely with Ace R/C and Grid Leaks in working on the 10 channel triple simultaneous unit so that the units are thoroughly ground-checked and flight tested before the first kits of these are released. The 10 channel Kraft receiver has been placed in "Relay-less Red" and "Relay-less Red" was airborne for the first time with very satisfactory performance on November 20th.

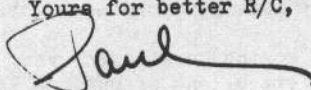
Now, with Rob Blackwell of Blackwell Models Manufacturing Co., Bud, Max, and yours truly are up to their ears in Project "Hurricane". This is the low-wing, 600 square inch job that will be released shortly by Blackwell Manufacturing Company designed specifically for multi. The airplane, at this writing, is being constructed by Rob Blackwell, will use the Kraft 10 channel relay-less receiver along with Bonner Transmite servos and a K & B .35 up front. We are most anxious to give this a thorough wringing out to check out not only the radio end of the gear but also the brand new airplane before it is placed on the market. By working so closely with contest seasoned fliers of the caliber of Bud and Max, we feel that Ace R/C and Grid Leaks will be in the top position of offering our readers and our buying public the best in multi equipment available from any source.

Needless to say, the operation has been one of very much fun and we, publicly, herewith, wish to acknowledge with thanks the terrifically many long hours that Bud and Max have so willingly put into Project "Whitey" and Project "Relay-less Red" and now soon on Project "Hurricane".

We hope to have pictures in the next issues of Grid Leaks of some of these Projects to give you blow-by-blow accounts of them.

During 1961, we, here at Grid Leaks and Ace Radio Control, wish for each one of you the very best. We invite your comments and we hope you will like the articles that we have in the line-up for the coming issues of Grid Leaks. We are most humbly grateful to the ever-increasing number of subscribers that Grid Leaks is attaining and, while it still is in the "labor of love" category, it is definitely a joy to work with such a vast number of responsive readers. We appreciate the literally hundreds of letters that we have received in the past several weeks telling us how well you like the established editorial policy and we want to take this opportunity of wishing for you in 1961, the very best of everything. If there is anything you would like to share with the family of Grid Leaks readers during 1961, we'd like very much the opportunity of looking at it. If you have any suggestions, criticisms, or any ideas as to how Grid Leaks can serve you better in 1961, let's hear from you.

Yours for better R/C,


Paul F. Runge
EDITOR

RC Bibliography for 1960

INDEX COVERS RC IN MODEL MAGS

During 1960, many articles of interest to the R/C fan were published in a variety of magazines. As has been Grid Leaks' custom in its publishing history, we have compiled an index of these articles for the ready reference of our readers. To use, look under the appropriate heading for the item you want.

Most modellers are avid collectors of magazines and, with this index, you now have a ready source of a listing of materials for that dream plane that you want to build in your next spare hours by referring to the Bibliography.

A complete code of the magazines involved in the Bibliography will be found at the conclusion of this article.

R/C BOATS

*Boat Arc Suppression Ideas
FM, 9-10-60, p. 25

Boat R/C Installation by D. Connelly
Describing an ingenious R/C setup in an electric powered model of King George V.
RCM & E, 8-60, p. 184

Cruiser Under Control
Author P. Drake shows how much can be done to obtain a multitude of boat controls ranging from simple speed to depth charge dropping.
RCM & E, 12-60, p. 403

Fun and Thrills with Model Radio Control Car and Boat
Joe Stanton and Ralph Horner show simple air-driven model car and model boat with complete R/C installation.
FM, 5-60, p. 141

"Hull" by William Baughman
Story and details on radio control speed boats as written by an old pro.
AM, 6-60, p. 18

It's Very Simple to Install Radio Controls in a Boat
Russell Keller gives complete article showing simple boat installations of R/C gear.
AM, 5-60, p. 38

Lazy Man's R/C by Red Costlow
Many boating ideas including a siren, battery maintenance, and printed circuit board for forward, reverse, stop switch.
GL, V2, #7

"Maverick" Gold Cup Racer for Remote Control
F. C. Smith shows detailed plans for water-cooled glo engines .29 to .60 cubic inch displacement.
AM, 11-60, p. 19

Simple Boat Control by Peter Wells
RCM & E, 6-60, p. 88

*Soltis' R/C Movie Boat is Eye Opener
AM, 2-60, p. 20

Starting R/C Model Boating
A general article covering a lot of installations.
ATMA, 1960, p. 40

*Transistorized Horn
AM, 2-60, p. 20

"Up-N-Adam" by Bill Baughman
Outboard cruiser featuring no-rib construction. 27 $\frac{1}{2}$ " long using one of the popular type of outboard glo engines.
AM, 2-60, p. 30

We Build the RA-BOAT
GL, V2, #6

R/C PLANES

Alouette by Jack Luck
Bi-plane using a .15, .19, or .29 motor for rudder only inductive kick and Simpl-Simul proportional rigs.
MAN, 11-60, p. 12

Andreasson BA-7
A model of a home-built job using a K & B .15 ATMA, 1960, p. 6

Bonner's "Suds" by Bill Deans
R/C pylon racer. Three views.
AM, 8-60, p. 33

Canadian Saucer by Ernest Houselander
Radio-controlled Plato Platter designed by Ernest Houselander for a .15 engine. Unique design is simple saucer entirely sheet constructed. Single channel.
AM, 10-60, p. 26

Cessna L-19 "Bird Dog" by Vincent Micchia
Designed for .049 engines with light R/C gear.
FM, 4-60, p. 14

The Charger by Milt Boon
A contest rudder only R/C plane using modified Bonner escapement for motor control. .15 displacement.
AM, 1-60, p. 14

The "Chief" by Bill Deans
A radio controlled A/2 Nordic Glider. Span is 64". Length is 39". Total area 515 square inches. Weight is 14.5 ounces. A slope soaring winner. Structure is simple and straightforward.
FM, 2-60, p. 9

*Cicada
62" span R/C for .15 to .19 engines by John Marquette.
RCM & E, 12-60, p. 412

The Fokker D-8 by Walter Musciano
Designed for .14 to .19 engines. 465 square inches. Realistic scale model.
MAN 1960 Annual, p. 14

Good Knight
Radio control plane by Walter Musciano. .19 engine. trike landing gear, good looking rudder only radio controlled aircraft.
AMA, 1961, p. 22

Indoor R/C Design
Shows simple airplane for indoor control.
GL, V2, #6

*The Kakadu
Rudder only bi-plane. Suitable for transistor receivers.
RCM & E, 5-60, p. 47

Li'l Beau Biplane by William C. Northrup, Jr.
R/C Biplane. 21", .020 power engine.
AM, 8-60, p. 26

Miss L by Ted Strader
For that idle .049 trike-gear.
FM, 1-60, p. 17

"Most Beautiful" by William H. Neukom
Bi-plane returns as radio model--the Fleet. A .45 airplane. Completely detailed article.
AM, 6-60, p. 12

"Nova" Champion R/C Pylon Racer by Jerry Nelson
Using a Torp .19
AM, 7-60, p. 36

The Orion by Ed Kazmirski
Smooth in maneuvers. Better approaches, better ground handling are features of this fine multi for R/C engines in .45 class.
MAN, 6-60, p. 9

"Panic" by Paul DelGatto
Single channel R/C design using a .15 engine.
FM, 6-60, p. 18

P-51 Mustang by Ted Strader
A .020 R/C profile job. Simple and easy-to-build.
Full size plans.
FM, 3-60, p. 22

Pegasus
Jerry Nelson's widely acclaimed R/C ship. Shoulder-wing job. Designed for K & B .45 and Multi equipment.
AM, 4-60, p. 19

Pylon Polisher
A pylon plane by Frank V. Ehling
AM, 12-60, p. 26

*R/C Intermediate 1959 Winner Views by Ken Willard
AMA, 1961, p. 45

Ryan ST by Ted Strader
Beautifully detailed scale model for use with the .19 engine and 4 to 6 channel equipment.
MAN, 9-60, p. 13

The S. E. 5. A. Bi-plane by Paul Palanek
26 1/2" span. .020 to .024 engines.
FM, 8-9-60, p. 11

"Shoo-fly" Radio Control Plane by Aubrey Kochman
.074 to .09 engine for contest flying. Shoulder wing job.
AM, 3-60, p. 29

Snapdragon 44 For Beginners
Installation article for single channel rudder only airplane.
GL, V2, #9

Stinson S for R/C by Chester D. Lanzo
Scale type R/C for engines of .45 displacement.
MAN, 1-60, p. 18

Studs by Howard Bonner
1959 R/C pylon racer views
AMA, 1961, p. 44

Tipsey "Nipper" by James Noonan
Small R/C scale airplane.
MAN, 12-60, p. 18

"Wireless Stunt" by Ken Willard
How to use a regular U-control stunt kit for .09 engines.
MAN, 1-60, p. 14

R/C TRANSMITTERS

All-Transistor Transmitter
Project strictly for the more expert by Tommy Ives and David McQue.
RCM & E, 12-60, p. 376

Antenna Loading Device
To increase efficiency of shorter antennas.
MAN, 3-60, p. 23

11 Meter R/C Transmitter by Don Hall
Complete transistorized unit. Does not require any license whatever.
PE, 3-60, p. 43

The Hill Transmitter
Designed by Eric Hill. Starting with the basic unit, newcomer can add single channel tone and finally control box for tuned reed working as and when his skill demands. Unit is crystal controlled.
RCM & E, 8-60, p. 167

The Ivy-AM/CW Transmitter
Construction article for amplitude modulation carrier wave transmitter (non-crystal controlled).
RCM & E, 10-60, p. 271

*Kraft Dual or Triple Simultaneous Transmitter
GL, V2, #8

Kraft Multi-Flt 6-4 Transmitter
GL, V2, #6

Kraft PC Audio Transmitter
Printed circuit board using an MOPA type transistor with the two-transistor modulator for 400 cps audio 100% modulation.
GL, V2, #4

"Legal Mac" Transmitter by Howard McEntee
Home-built for radio control. Meets FCC regulations. Permits changing the 27 frequencies at will.
AM, 6-60, p. 20

*Lorenz MOPA
Using two 6AK5 tubes.
MAN, 8-60, p. 29

*Lorenz MOPA
With buffer added for ultra-stable FCC approved operation.
MAN, 9-60, p. 28

McQue Versatile by Dave McQue
Transmitter for tone, CW, single, multi, or pulsing.
RCM & E, 5-60, p. 12
Modulation for the Mac 50 R/C Transmitter
AMA, 1961, p. 53

Modulation Technique for Simultaneous Multiple Channel Control by H. Cuckson
RCM & E, 11-60, p. 346

Modulation Technique for Simultaneous Multi-Channel Control
Part II of a series of articles by H. Cuckson
RCM & E, 12-60, p. 393

PC for Marcy Triple Modulator by E. S. Knight
GL, V2, #5

Radio Control with OOMPH!
Make a 30 watt transmitter by J. H. Thomas. Tube line-up uses one 12AV76BQ6 and a 12AT7. AC power supply schematic provided.
RE, 10-60, p. 82

R/C Transmitter
Construction article by I. Queen. Simple transmitter using single 3A5 for either modulated or unmodulated RF output.
RE, 9-60, p. 50

Simple Tone Transmitter by Dave McQue
Crystal-controlled. Uses two 3V4 tubes.
A, 3-60, p. 144

What's Your Citizens Band Frequency?
While intended for Class D CitizenShip Material, Donald L. Stoner, 11W1507, describes the techniques which are admirably suited for Class C equipment.
EW, 8-60, p. 36

CONTROL

*All-transistor Pulsar
Printed circuit base and complete schematic by Phelps.
AM, 12-60, p. 33

*"Around the Corner" Motor Control
MAN, 4-60, p. 26

The Boystick Control by Howard Boys
An all-transistorized Galloping Ghost modification.
RCM & E, 5-60, p. 49

CAR by Maynard L. Hill
Coupled aileron rudder system for radio control. Complete write-up on use of this system for TTPW and reed users.
ATMA, 1960, p. 36

Compound Interest
A summary of rubber driven multiple control units.
RCM & E, 7-60, p. 133

Contact Spring Pressure by R. H. Waring
RCM & E, 11-60, p. 345

Dual Action Actuator by Ted Strader
A complete how-to-build article for a proportional which has an auxiliary power actuated arm. Includes details on converting several existing pulsers.
FM, 9-10-60, p. 17

Elevator and Proportional Rudder From One Actuator
Article by Peter Lovegrove, B. Sc.
RCM & E, 10-60, p. 303

Galloping Ghost Engine Control Approach as taken from May-June issue of Grid Leaks and expounded in experiment.
A, 2-60, p. 82

How Much Control Power by L. R. Purdy
Series of graphs showing how much muscle is required to move control surfaces.
MAN, 6-60, p. 27

Inverted Flight with Simpl-Simul by Charles Riall
RCM & E, 7-60, p. 140

Jay's Pulser
Completely transistorized pulser designed by Munro J. Kreinik for tone work.
RCM & E, 9-60, p. 249

Kitchen Rudder and Actuating Mechanism by G. C. Chapman
For model boat work.
RCM & E, 10-60, p. 297

Marcy Stick Box
How to make a simple stick box for Marcy 6 channel.
GL, V2, #4

McQue Relay-Less Pulsed Tone Generator and Three Transistor Tone Generator for Reeds by Dave McQue
RCM & E, 6-60, p. 70

Mechanical GG Pulser by Don Baisden
Simple rudder and elevator or Galloping Ghost.
GL, V2, #9

*Mechanical Motor Control with Simpl-Simul
MAN, 4-60, p. 26

Mechanical Rudder Only Pulser by Don Baisden
Simple to build. Templates provided.
GL, V2, #8

Mighty Midget Modified
Simple modification.
RCM & E, 10-60, p. 304

*Mighty Midget With Nylon Gear for Non-slipage
AM, 10-60, p. 32

*Mono-line Parts Used for Servo by Sam Allen
AM, 3-60, p. 32

Motor-Driven Selector for Boat Work by I. R. Bittle
RCM & E, 10-60, p. 293

POD (Pulse Omission Detector)
A complete construction article by Don Dickerson and James Shows on a pulse omission detector for proportional control systems.
GL, V2, #7

Practical Servo Testing by L. R. Purdy
RCM & E, 5-60, p. 19

*Pulse Omission Detector by Dr. R. C. Lein
Simple engine control.
MAN, 8-60, p. 29

Reed Relay-less Servo Circuit by William E. Savage
GL, V2, #8

Servo for Simpl-Simul by James E. Kirtland
At last! A wear-proof, crash-proof, actuator built around the favorite Mighty Midget Motor.
MAN, 2-60, p. 28

*Simple Servo by Dale Springsted
AM, 5-60, p. 32

Simple Three-position Motor Control by Don Clark
Featured in the DC/RC newsletter and re-printed in Grid Leaks.
GL, V2, #4

Simpl-Simul Explained for the Uninitiated
Article by Peter Lovegrove.

RCM & E, 12-60, p. 391

Single Channel Actuator
RCM & E, 11-60, p. 358

Single Channel Modulator
Low drain all-transistor circuit featuring PC board for any MOPA transmitter. 400 cps, 100% modulation.
GL, V2, #4

Special Simpl-Simul Servos by Peter Lovegrove
RCM & E, 12-60, p. 390

Two Channel Simultaneous Proportional Control
A variation of the Kicking Duck system by Peter Lovegrove, B. Sc.
RCM & E, 9-60, p. 231

*"Unijunction" Transistor Pulser by Jack Lemon
AM, 2-60, p. 32

R/C RECEIVERS

"305" All-Transistor Superregenerative Receiver by Dave Cuttriss and Tom Taylor
RCM & E, 7-60, p. 116

Circuit Selection
Detailing a Dutch all-transistor, A Belgian transistorized PC WAG TTPW, improved Kraft single audio from Grid Leaks, Henry's transistor receiver.
RCM & E, 11-60, p. 335

Eliminating Relays in Reed Circuits
GL, V2, #6

Improved Kraft Single Audio Receiver by Phillip O. Kraft
Construction article.
GL, V2, #5

Indoor R/C Design by Francis Plessier
Part II of a series of articles covering actuator and receiver.
GL, V2, #7

Kraft Multi Receivers
GL, V2, #6

*Kraft Simul Multi Reed Receiver by Phillip O. Kraft
GL, V2, #5

Marcy Multi Receiver with Toroids
Designed by Pete Bliss. Printed circuit board.
GL, V2, #8

The Monitor
A match-box size receiver by Sqdr. Ldr. Stan Sarll
RCM & E, 12-60, p. 384

The New Ivy Receiver
An ultra-simple CW receiver designed especially for the novice by Tommy Ives. Complete construction article.
RCM & E, 9-60, p. 219

Newest Multi-Fli Receiver Layout is Flexible
Shows 4 and 6 channel receiver by Phillip O. Kraft with power converter facilities.
GL, V2, #8

PC Boards for WAG Dual Receiver
GL, V2, #7

PC for Marcy Triple Receiver by E. S. Knight
GL, V2, #5

Reed Trouble Shooting Chart by Phillip O. Kraft
GL, V2, #9

Roundup of Marcy Tips
GL, V2, #6

*Russian Relay-less SC Receiver
Only a circuit from an article in a Russian magazine.
RCM & E, 9-60, p. 236

Six-Transistor Superhet Receiver
From South Rhodesia. Band-width of 200 kc. Non-crystal controlled.
RCM & E, 5-60, p. 39

Transistorized Multi Control System

Part I of a series of construction details of a vacuum tube two-transistor reed receiver including construction details on a subminiature reed by Louie Scheel and Ken Oliver. System is relay-less.
MAN, 4-60, p. 18

Transistorized Multi Control System

Part II of a series of articles by Louie Scheel and Ken Oliver.
MAN, 5-60, p. 28

We Build the Kraft Receiver by Dale Springsted

A run-down of the early Kraft receiver and improvements on the same.
GL, V2, #4

COMMERCIAL CORNER

Alpha Tech Rigs Permit Two Fliers Same Time Operation
AM, 11-60, p. 52

Babcock Mark III Magic Carpet Receiver
AM, 3-60, p. 52

CitizenShip's CTX Transmitter and SSTR Receiver
AM, 5-60, p. 52

DeBolt Servo Series

A complete run-down of the DeBolt single and multi channel equipment
RCM & E, 8-60, p. 199

Electra One Channel

Receiver and transmitter by World Wide Radio Control.
AM, 10-60, p. 52

F & M Venus Transmitter and Mercury Receiver
AM, 8-60, p. 50

Guillow's R/C Vanguard

Designed for the beginner.
AM, 10-60, p. 50

MarcyTone R/C Equipment

Starts with single tone then takes more channels.
AM, 2-60, p. 48

Rangemaster Tone Rigs Conform to Latest Rules on "27"

Describing the TRR tone receiver and the 2AP tone transmitter as marketed by Aristo and Polk's.
AM, 9-60, p. 52

"Rep" Tone

A run-down of the Unitone transmitter and receiver as made by Radio & Electronics Products in Great Britain and schematic for the "Rep" simultaneous 8 channel transmitter. An editorial evaluation of these particular units.
A, 1-60, p. 34

We Test the CG Nike Converter

GL, V2, #6

GENERAL

ABC's of R/C By S. Calhoun Smith

A complete run-down of radio control including how it works, installation R/C harness, installation battery connections, how to distance check pre-flight model, how to design check, how to distance check radio, how to fly, etc.
MAN ANNUAL, 1960, p. 30

Basic Radio by G. E. Dixie

Part I of a series of articles on fundamentals.
RCM & E, 11-60, p. 343

Basic Radio by G. E. Dixie

Part II of a series of articles on fundamentals.
RCM & E, 12-60, p. 401

Bitten by the R/C Bug

Some practical advice from outstanding R/C fliers.
ATMA, 1960, p. 98

Build a Field Monitor by Gerald Gill

GL, V2, #5

The Cathode Ray Oscilloscope

Part I of a series of articles by F. C. Judd
RCM & E, 7-60, p. 145

The Cathode Ray Oscilloscope

Part II of a series of articles by F. C. Judd
RCM & E, 8-60, p. 177

The Cathode Ray Oscilloscope

Part III of a series of articles by F. C. Judd
RCM & E, 9-60, p. 241

Change the Multi Rules by Harold DeBolt

Present rules cause jam flight landings and make it impossible for most judges to decide winners. Famous R/C'ers discuss some possibilities.
MAN, 2-60, p. 22

Coil Design

Theoretical and practical aspects of coil design by R. H. Waring.
RCM & E, 12-60, p. 396

Color Code Chart

RCM & E, Data Sheet #1 Insert, 6-60

Contact Design by R. H. Waring

RCM & E, 7-60, p. 142

Contact Materials

Part II of an article by Ron Warring.
RCM & E, 8-60, p. 192

*Convert WAG tone Transmitter and Receiver to Reeds by

Don Dickerson
AM, 3-60, p. 33

D. E. A. C. Cells by Ed Johnson

RCM & E, 6-60, p. 64.

FAI World R/C Championship at Dubendorf

RCM & E, 10-60, p. 284

"The Fast Club" Speed Trials by Ken Willard

A report of the world records speed attempts at this contest held in California October 17 and 18, 1959.
MAN, 3-60, p. 14

First World Wide Radio Control Inter-Nats

By Walt Wood
AM, 12-60, p. 18

Fly Something Simple

An old song-title parody offers sage advice.
GL, V2, #4

"How Many Classes for Radio Control?"

Ken Willard, Intermediate R/C champ gives run-down on proposed rule changes.
AM, 4-60, p. 65

How to Fly Radio Control Planes by Bob Dunham

Starts with a self-neutralizing system.
AM, 4-60, p. 26

Interpretation of the FCC Docket #12902

Ed Lorenz's R/C column.
MAN, 1-60, p. 28

Introduction to Transistors by Dave McQue

Part I of a series of articles describing how transistors work.
RCM & E, 7-60, p. 137

Introduction to Transistors

Part II of a series of articles by Dave McQue.
RCM & E, 8-60, p. 186

Introduction to Transistors

Part III of a series of articles by Dave McQue.
RCM & E, 9-60, p. 252

Introduction to Transistors

Part IV of a series of articles by Dave McQue.
RCM & E, 10-60, p. 280

Introduction to Transistors

Part V of a series of articles by Dave McQue.
RCM & E, 11-60, p. 349

Look Mom--No More Batteries

A power converter construction article including PC board.

GL, V2, #7

Mac's Monitor--R/C Check Rig by Howard McEntee

A simple device intended for club use to determine interference problems.

AM, 7-60, p. 24

Make Your Own Code Practice Oscillator

GL, V2, #4

Making a Simple Oscilloscope by F. C. Judd

RCM & E, 11-60, p. 323

Meters are Musts in R/C

A digested article from Grid Leaks.

RCM & E, 5-60, p. 24

Model Plane as a Tool of Science

Article shows how Temco Aircraft uses multi-channel rig to test gear. Shows construction data on the GDDI.

ATMA, 1960, p. 48

Multi-Channel Operation

Part I of a series of articles for beginners by Col. H. J. Taplin

RCM & E, 5-60, p. 35

Multi-Channel Operation

Part II of a series of articles by Col. H. J. Taplin

RCM & E, 6-60, p. 80

Multi-Channel Operation

Part III of a series of articles by Col. H. J. Taplin

RCM & E, 7-60, p. 139

Multimeter by J. S. Blackburn

Complete construction article.

RCM & E, 5-60, p. 26

Ni-Cads: The "Inside" Story

AM, 9-60, p. 20

Notes on Using Standard Wire Tables by R. H. Warring

RCM & E, 9-60, p. 246

Over the Waves

A review of new equipment specifically the Kraft receiver, Cobb system, and Microdyne receiver.

A, 1-60, p. 42

Phase Shift Oscillators by Ted Sills

RCM & E, 5-60, p. 31

Photographic PC Boards

GL, V2, #5

Printed Circuit Precip

Description of how to make printed circuits including a reprint of an article from Grid Leaks.

RCM & E, 11-60, p. 328

Printed Circuits

A do-it-yourself method by Sqdn. Ldr. S. W. Sarll, A. M. (Brit.), IRE

A, 1-60, p. 43

Pro and Con on Pro

A discussion of proportional control by the experts.

GL, V2, #5

Radio Control at the Smithsonian

Presentation of the "Big Guff" by the Good brothers to the Smithsonian Institute.

MAN, 9-60, p. 36

Radio Control Queries

A symposium of questions and answers covering a broad field.

AM, 7-60, p. 41

R/C at the 1960 Nationals

GL, V2, #8

R/C Bibliography for 1959

Index covers R/C in model magazines during the year.

GL, V2, #4

R/C Distance Champ by John Jackson

A run-through of the world record for distance by two English fliers.

MAN, 8-60, p. 39

R/C Installations

Part I of a series of articles on best installations.

RCM & E, 7-60, p. 125

R/C Installations

Part II of a series of articles on best installations.

RCM & E, 9-60, p. 225

R/C World Championships by Paul B. Byrum, Jr.

MAN, 11-60, p. 28

Slope Soaring by R. D. Willoughby

The sport of R/C gliding.

FM, 3-60, p. 17

Solders and Soldering Methods by R. H. Waring

RCM & E, 10-60, p. 305

Starting R/C Plane Modelling

Helpful hints on installation in the airplane.

AMA, 1961, p. 42

Starting R/C Plane Modelling by S. Calhoun Smith

An introduction to some of the most simple approaches to the beginner in R/C.

AM, 3-60, p. 60

Tool Box Battery Charger

Detailed construction article for making a simple battery charger for the nicad series.

AM, 10-60, p. 28

Twenty Easy Ways to go Wrong in Radio Control

Contains 7 hints under general instructions, 3 hints under boats, 3 hints under transmitters, 7 hints under receivers and planes.

AM, 2-60, p. 28

We Build the Kraft Multi-Fli by Red Costlow

Article of helpful hints including the scope traces.

GL, V2, #9

What They Flew at the Nationals

AMA, 1961, p. 61

What They Flew at the 1959 Nats

A run-down of who flew what.

ATMA, 1960, p. 48

* - Schematic only

CODE

A - Aeromodeler

ATMA - Air Trails Model Annual

AM - American Modeler

AMA - American Modeler Annual

EW - Electronics World

FM - Flying Models

GL - Grid Leaks

MAN - Model Airplane News

PE - Popular Electronics

PM - Popular Mechanics

RCM & E - Radio Control Models & Electronics

RE - Radio Electronics

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