GRID LEAKS

R/C DATA SERVICE

VOLUME 2 NUMBER 2

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25C

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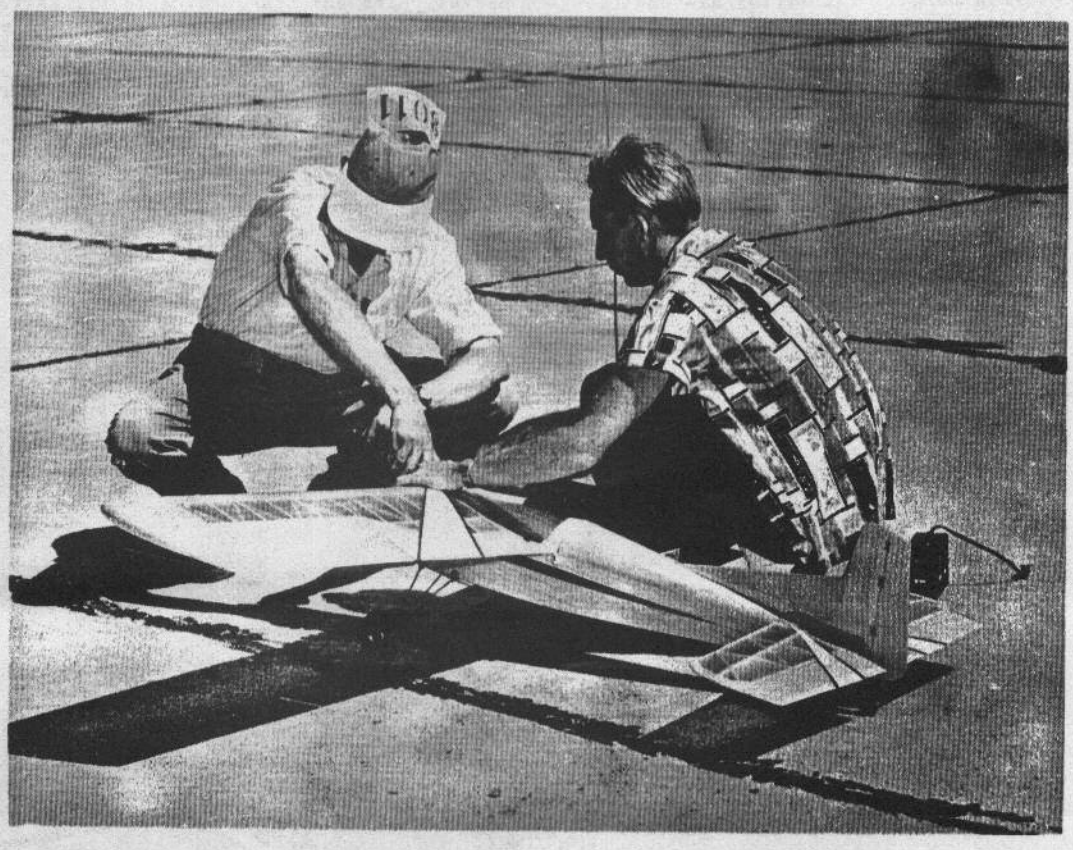
1959 NATIONALS



BOB DUNHAM with Astro Hog, 1958 Chicago Nationals
Photograph Courtesy of U. S. Navy

Due to the fact that we were not able to attend the Nats, we asked Walt and Joyce Good to inform us the results so we could give our readers one of the earliest results.

According to Walt, while the attendance at this Nats was not as high as it was in Chicago in 1958, the competition was very stiff. All sorts of flying--all sorts of ships!

Records that have been previously been set at earlier Nats were completely superseded by the top-notch flying that was done by the pros.

The weather was warm on most days, however, ocean breezes helped to cool temperatures down somewhat during most of the contest. Dr. Good said that he felt this to have been one of the best-run Nats, one of the most highly competitive Nats that he had ever attended.

For your information, we give you the results of the various sections as well as the number of entries although the number of entries does not imply that all of them flew.

R/C RUDDER - Junior and Senior Competition

1st - Paul Refspell - 130
2nd - Bob Herm - 100
3rd - Frank Kozikowski - 89
4th - Jack Bentley, Jr. - 74
5th - Billy Hanks - 30

OPEN RUDDER

1st - Charles Hayes - 191
2nd - Milt Boone - 174
3rd - John Lenderman - 154
4th - Al Doig - 140
5th - Hugh Clark - 106

There were a total of 69 entries in rudder only.

Intermediate had only 27 contestants in which Ken Willard showed up the hottest with some beautiful flying according to Walt.

INTERMEDIATE R/C

1st - Ken Willard - 257
2nd - Don Crow - 168
3rd - Don West - 166
4th - Ralph Brooke - 113
5th - Jack Bentley - 92

In the Multi, things really got rough and old pro, Bob Dunham, came through with a terrific score, racking up 519 points out of a possible 540. Bob was flying an Astro Hog, using his own Orbit equipment. In Multi there was a total of 73 entrants.

MULTI

1st - Bob Dunham - 519
2nd - Ed Kazmirski - 503
3rd - Don Mathes - 465
4th - Dale Nutter - 451
5th - Harold DeBolt - 442

We feel it is interesting to note that three Astro Hogs placed in the top five. Don Mathes had his original design and Harold DeBolt was flying his custom biplane.

In the Pylon entries, 44 pilots registered but not all of them flew and the speeds this year, in comparison to last year, were terrific according to Walt.

PYLON

1st - Bill Deans - 41.36 mph
2nd - Jerry Nelson - 40.89 mph
3rd - Bill Hershberger - 37.11 mph
4th - Bill Williams - 35.63 mph
5th - Bob Leininger - 35.59 mph

While there were only 22 entries in the Scale Events, Dr. Good says that it was run most beautifully and racked up the most points of any that have so far been run. Most ships were beautifully finished and they were flown with precision.

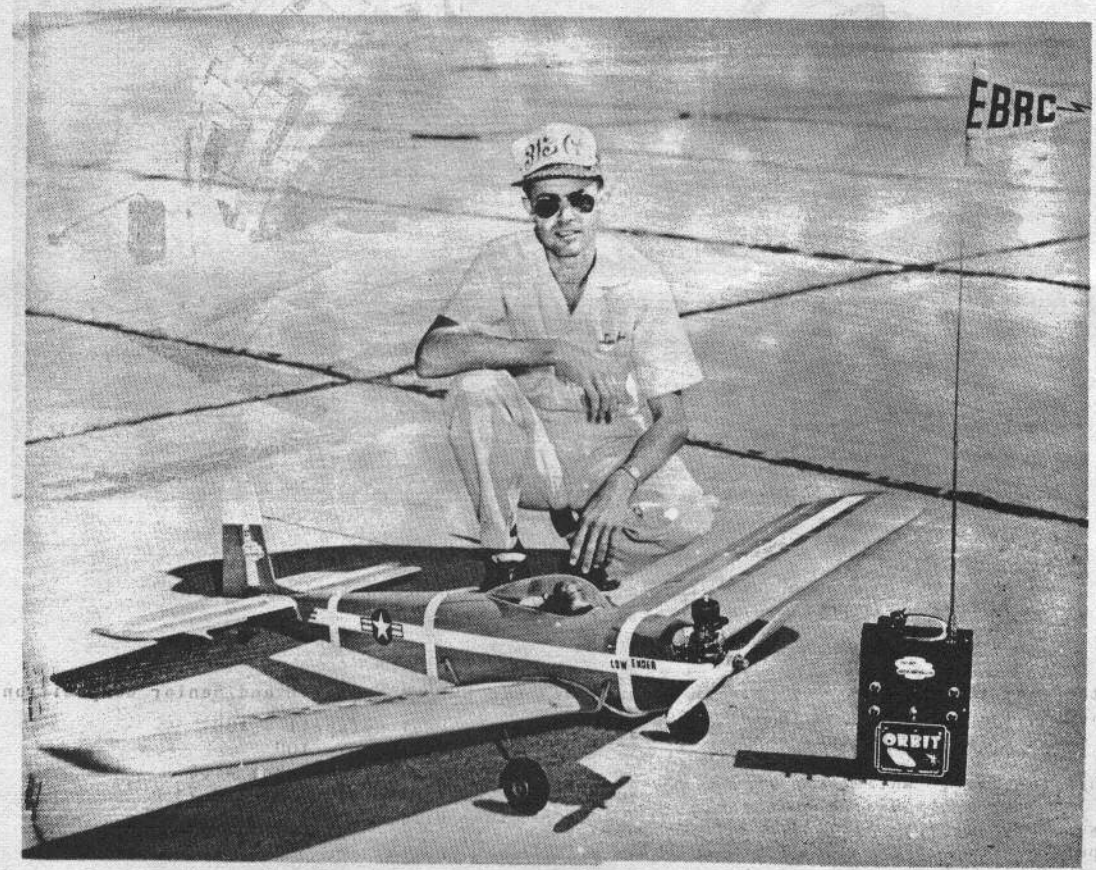
SCALE EVENTS

1st - Bob Schultz - 274 - P51
2nd - Reynold Van Dyke - 264 - Luscombe Sky Sedan
3rd - Richard Riggs - 226 - PT19
4th - Dr. Alizondo - 217 - Fokker D Tri-Plane
5th - Walker Anderson - 209 - PT19

All in all, there were 225 entries in the R C event which is considerably less than has been seen in a number of years but, according to Dr. Walter A. Good, AMA president, the flying caliber this year was terrific.

So 1959 Nats at Los Alametos are history. We shall look forward with interest to see what developments come up in the next year and see the type of flying that will be done in 1960.

The photos shown with this were taken at the 1958 Nationals by the U. S. Navy in Chicago.



DALE ROOT with Ascender, 1958 Chicago Nationals
Photograph Courtesy of U. S. Navy

Reed RCVR. - XMTR. Operation and AdJustment

BY JACK R. ALBECHT

Operation of relays by using tones which operate tuned reeds is not a recent idea. It has been utilized in commercial carrier telephone equipment for many years; however, their use in model aircraft for remote control dates back to about 1949, when Ed Rockwood designed and produced one to five reed receivers and transmitters. Members of the Mustang Club of San Francisco built and flew many varied forms of multi-channel reed equipped aircraft, gaining valuable experience in its care and maintenance.

One of the Mustangs, Alex Schneider, went on to win the Nationals three times--1952, 1954 and 1955. The equipment used was the basic 5 channel Rockwood receiver and transmitter, revamped only slightly from the original circuitry.

Since that time, great strides have been made in the design, construction, and reliability of reed equipment. However, any equipment is only as good as it is maintained and adjusted. All reed equipment, be it a 2, 5, or 8 channel set, depends on the stability of the received tone for proper operation.

The reeds themselves are inherently stable, unefected by humidity or temperature changes. Not so is the case of the audio tone generator in the transmitter.

Most reed systems have a frequency margin of from 5 to 10 cycles per second, dependent on audio drive. If the transmitter audio oscillator is not frequency stable and drifts due to voltage changes etc., the reed response in the receiver will be erratic--if at all. Intuitively, one sees that this can lead to disaster in an R/C aircraft.

Most of the present day transmitters incorporate stable audio oscillators but all will need an occasional tuning check to compensate for slight component change with use.

The theory of reed operation is as follows:

Each reed is physically cut to a specific length and, if excited by the frequency to which it is resonant, will vibrate with amplitude variations dependent on the strength of the driving signal. This is analogous to a tuning fork which, when struck, will vibrate at a specific frequency.

The construction of the reed bank is similar to that of a pair of headphones i.e. a permanent magnet establishes a fixed magnetic field. A coil with necessary core completes the matnetic flux path to the reeds. An applied audio voltage will produce an additional magnetic field which will aid and oppose the PM field, thereby causing the reed to respond which is resonant to the applied frequency.

The approximate frequency range of most present reed banks used for model control is between 200 and 400 cycles per second. Therefore, it is apparent that for any 8 channel reed bank, the spacing between each reed bandwidth is relatively narrow; hence, each reed requires a precise adjustment to the associated transmitter tone generator control.

If the tone oscillator were slightly off frequency, it may be possible for two reeds to operate with only one tone transmitted. This, obviously, is not desired. However, normal simultaneous reed operation with the receipt of two tones is desired.

The procedures and techniques presented herein are intended only as a guide. If desired, one may elaborate and develop his own methods of adjustment. Techniques included follow straight forward amateur and commercial radio practices as well as experience gained during field use of our own reed equipment during the past eight years.

ALIGNMENT OF REED EQUIPMENT:

Assume that the receiver is to be tuned to the carrier frequency of the transmitter. This may be accomplished by placing the transmitter several feet away to prevent "front-end saturation" i.e. blocking, then transmit a modulated signal. The receiver tuning slug should be tuned through the point of maximum signal and back until a definite point of maximum signal is established, usually half-way between the two extremes where the signal is first detected. This is determined by listening to the reed bank "sing". Headphones, an oscilloscope or vtvm placed across the reed coil have also been utilized to indicate maximum signal.

However, in some critical receivers the presence of additional leads tends to detune the receiver when they are removed, since they were acting as additional antenna during the front end adjustment. Therefore, it is usually wise when tuning the receiver in pre-flight checkout to do so in the environment in which it will be used i.e. servos, antenna, and all wiring connected in the airplane, boat, etc.

Following front-end alignment is individual tone adjustments made to the transmitter tone generators. If two separate tone generators are utilized, as in Orbit, CG or other equipment, one oscillator is intended for use with the low frequency reeds (longest) and the other obviously for the higher frequency reeds. Each tone should be transmitted separately, making sure we are not blocking the front end.

The associated potentiometers should be moved in such a direction so as to cause the tone for that particular reed to increase to a point where the reed will not vibrate when the control stick is operated. The next reed in line may be operating but disregard this effect for the present.

The pot is now gradually turned in the opposite direction (still continuing to operate the control stick) until the reed just begins to vibrate. By moving the pot adjustment slightly further, the proper setting will be found where the reed will start every time the control stick is depressed, and maximum stability is obtained.

The technique can only be learned from practice that will achieve the proper setting for each associated pot and reed. If properly adjusted, the relays should not hesitate in their action when the transmitter is keyed

During normal reed operation, the reed will alternately make and break a contact positioned above the reed, thereby completing a circuit to an associated relay for the desired command. This action is similar to that of a half-wave rectifier with the alternations smoothed by an appropriate resistor-capacitor filter network. After adjustment of all potentiometers, simultaneous operation (if available) may be tried. Slight touch up of the pots may be necessary when sending two tones to achieve optimum simultaneous performance due to interaction. The two reeds of each oscillator closest to each other normally will not operate satisfactorily in simultaneous operation.

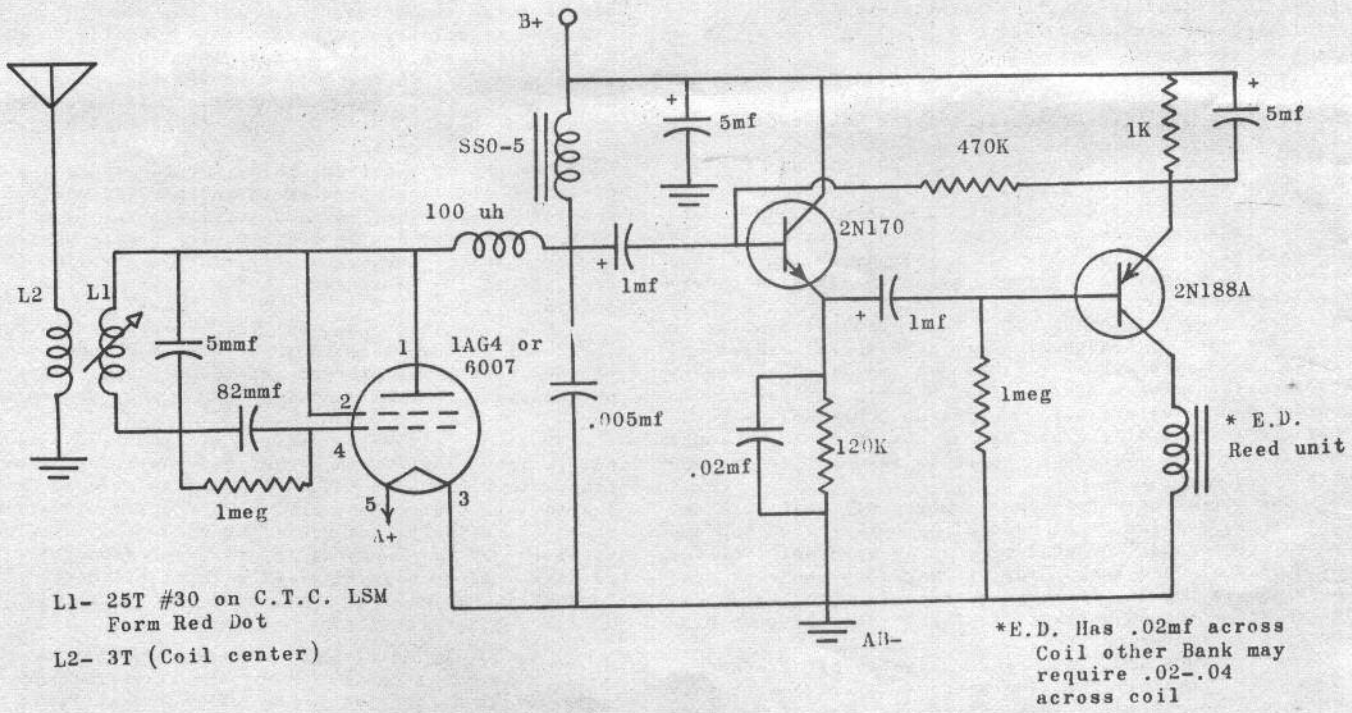
This covers the basic operation, tuning and adjustment of reed equipment but one learns best by doing, therefore, it is said that experience is the best teacher. Our present reed equipment is excellent, as the Nationals record book will show and, properly adjusted and maintained, will give many years of pleasure.

Reed Receiver

BY PETE BLISS

The reed circuit we used all year with exceptional success is enclosed and you can certainly put it in Grid Leaks if you see fit. It is pretty close to McNabb, however. The only tricky part is that the 2N188A must be picked to get the 2 ma idle. I have two such transistors and one idles at 3.6 ma and the other at about 2.2 ma. The receiver operation doesn't seem to care. The reed bank and the SS0-5 fields must be separated.

This is strictly recommended for the advanced builder and no base layout is given. We merely present this circuitry as another advance in R/C in the experimental attitude Grid Leaks has chosen to take.



L1- 25T #30 on C.T.C. LSM Form Red Dot

L2- 3T (Coil center)

*E.D. Has .02mf across Coil other Bank may require .02-.04 across coil

We Build the Commander Reciever

BY DALE SPRINGSTED

Past experience in the retail end of the R/C equipment business shows that just about all of the modellers who are about to try R/C for the first time usually try to select their equipment from the low-priced lines of the various manufacturers. Whether or not this approach to R/C is the best method financially is a point that can be argued many ways. The condition remains, however, that most builders will try the less expensive units first. At this point, let me make a flat statement and say that, although many of these cheaper receivers will not function to the makers specs, this is most certainly not true of the Commander since, properly built and tuned, it makes a most reliable unit for boats and medium sized model aircraft.

Examination of the circuit discloses one of the simplest of the many varieties of the hard tube superregenerative receivers. As in any regenerative circuit, there are two simultaneous oscillatory actions. First, the circuit is oscillating at a high frequency which is tuned to the transmitter frequency. Secondly, the circuit oscillates simultaneously at a much lower frequency. Actually, these oscillations occur as separate bursts of energy of each frequency, one damping out the other, but the best way of thinking of the circuit operation is to picture these as occurring at one and the same time. The high frequency is governed by the tank coil circuit components and the low, or quench frequency, by the quench coil and its associated components. A recent issue of GL has an article by Jerry McGeorge describing how this lower frequency may be measured. Rather than go into a lengthy description, let's look at it this way. When both of these oscillatory frequencies are present, the tube will draw a relatively high value of plate current, but if one frequency is quenched, the tube will draw relatively a lesser amount. If the tube is then loaded with a relay, we can open and close this relay with the varying current conditions. In the Com mander receiver, this plate current change is usually in the order of 1 to 1.5 milliamperes. Since we have readily available sensitive relays that will actuate with less than .5 milliamperes of current change, we may set up the receiver and fully expect to obtain good relay action.

The kit instructions are quite complete and, being of the type where each step is outlined and may be checked off as done, no one should have any difficulty in assembly. However, on completion of the construction rather than plug in the tube, hook up the batteries, and immediately test the unit, there are a few simple checks that may be made with any standard ohmmeter that will assure that the soldering is perfect and that most of the components are in good condition. That is, the coils and chokes have continuity and the capacitors are not shorted and the tube has good filaments. All that is required is a simple multimeter or vacuum tube voltmeter. Let's follow a series of step checks much like the building instructions.

1. Do not install tube. Check for a resistance reading between each pair of leads--B+, A+ and AB-. There should be no resistance indicated.

2. Check the resistance from B+ lead to tube socket pin #4. The resistance shown on the meter should be approximately 5000 ohms. If this is indicated, ignore step 3.

3. If no resistance is shown, this indicates an open connection or component. This is easy to find. Leave one lead of the meter on the B+ lead and use the other test prod to check along the circuit following the B+ path. At point R-1, resistance will be dead short, at R-2--approximately 5000 ohms, at eyelet 2--5000 ohms, at eyelet 1--5000 ohms, point 9 on the Arco trimmer--5000 ohms, point 7 at the base of tank coil--5000 ohms, and the same for point 6, also at the pins number 2 and 4 of the tube socket. For instance, if you showed the proper resistance at eyelet 2 but no resistance at eyelet 1, the indicated faulty part or terminal would be the RF choke. Another way of putting it is that when you reach the point where the proper resistance indication is lost you have just passed the faulty part or solder joint.

4. Check resistance from the A+ lead to pin 5 of the tube socket. No resistance should be shown. This should be a dead short. If an open circuit is indicated, the joint at eyelet 3 is bad or a broken wire exists.

5. Check from AB- to pin 7 of tube socket. This also should be a dead short. Any other condition would have to be an open circuit.

6. Check from R2 to eyelet 2. The resistance between these two points should be approximately 20 ohms. Any value much less than this would indicate a short in the primary of the quench coil.

7. Check from eyelet 5 to eyelet 1. This resistance value should be approximately 100 ohms. Again, any other reading would indicate a faulty secondary in the quench coil or the possibility of a short in the Arco padder.

8. Place the tube in the socket and check from A+ lead to AB- lead. The resistance will read about 5 ohms. This indicates a good tube filament.

9. Check resistances between the leads once more. The only pair that will have any resistance will be the A+ and AB- leads. All others should indicate open circuits.

10. It is now relatively safe to hook up batteries and, following the tuning instructions, adjust the set to the normal operating points listed on the instruction sheet.

The tuning procedure used is exactly the same as outlined on the instruction brochure. In steps, it is as follows:

1. Transmitter off. Power applied to receiver. Tighten the sensitivity adjustment or Arco padder until it turns firmly. The meter indication as read on a 5 milliampere movement meter in the B+ lead will be .8 to 1 ma.

2. Transmitter off. Gradually loosen the Arco adjustment until the current rises to 2.25 or 2.5 ma. This rise should occur suddenly rather than a gradual increase. As this point is found, loosen the padder 1/4 turn more.

3. Turn on transmitter and key same. Start to adjust the slug in the tank coil until a dip is noted in the meter reading to about 1 ma.

4. Turn off transmitter and note meter reading. It should rise again to the 2.5 value. If this occurs, re-adjust the padder to the point where the current just rises to full value and again add the extra 1/4 turn.

5. Again, transmit a signal and adjust the slug for lowest reading. The receiver is now tuned.

6. If, in step #4 the current does not rise, leave the slug adjustment where it is and repeat steps #1 through #5. A point should be found where the above conditions are met.

It is nice, at this point, to adjust the relay contact settings for the proper pull in drop out values. Volume I, Issue #4 of Grid Leaks would make good background reading at this point since essentially, the same technique is used.

Place a 25K to 100K ohm potentiometer in series with the B+ battery lead leaving the meter also in the circuit. Vary the pot settings and watch the meter respond. As the resistance is increased, the current value decreases and vice versa. Also, if you listen very closely, you can hear a tiny click as the relay armature pulls in and drops out. By careful adjustment of the armature gap and spring tension, you will be able to find an adjustment where the pull in value is 2 ma and the drop out value is no lower than 1.5 ma. This will be just about the best setting.

There are a few more points that are important to keep in mind when working the Commander receiver.

1. The antenna lead should not be wound around any of the other wiring of the receiver. It is most important that this lead be spaced separately. The additional capacity induced by proximity to other wires leads to faulty sensitivity tuning.

2. If the meter being used to check the tuning is to be removed from the circuit, the meter leads used should be as short as possible. If lengthy leads are used, a very noticeable drop in sensitivity will be noted on removal of the meter from the circuit. In this case, the operator will have to touch up the sensitivity control without the aid of the meter. Simply turn the adjustment in until the relay drops out, indicating low current and then loosen the adjustment until the relay pulls in and remember to go 1/4 turn past this setting so the unit will operate stably.

3. All adjustments MUST be made with a non-metallic tuning wand.

Trouble-shooting any radio control receiver is a tricky task and only a person very familiar with the circuitry and equipped with proper test equipment can isolate and cure readily all of the difficulties. There are a few things that the home builder can spot and I will try to describe several of them.

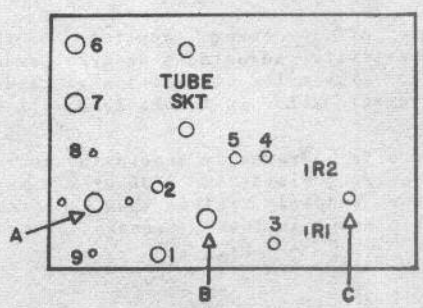
1. If the receiver is turned on and the indicated plate current immediately rises to 2.5 or 3 ma, this is a good indication that quench coil difficulties are involved. The cure is to try a new coil or Arco padder.

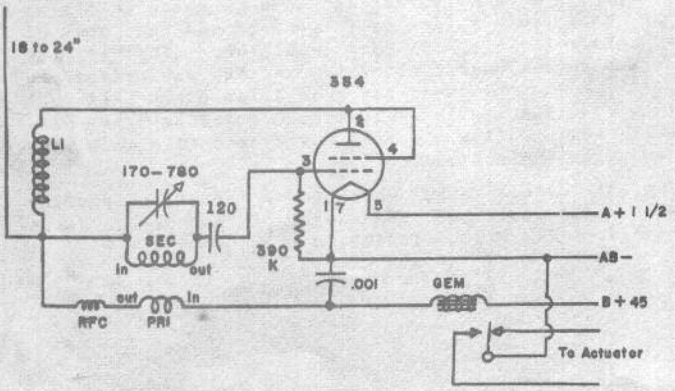
2. When the Arco padder is adjusted, sometimes the current rise is not sudden or is erratic, jumping up and reducing as the padder is continually turned in one direction. The indicated difficulty is a padder that is shorted usually by solder flux running between the plates.

3. Occasionally, one will find a receiver in which apparently all the proper tuning conditions can be met except for the dip in current on signal. No adjustment of the slug will locate this dip. A grid dip meter or RF signal generator is required to check this since most likely the unit will not tune to 27.255 mcs. To correct, first the tuning range must be found and then turns added to or subtracted from the tank coil to correct the difficulty.

4. Occasionally the RF choke, although showing continuity, will be faulty. This problem is a bit harder to spot but some indication may be seen if the receiver will respond to tuning without an antenna connected but refuses to tune with 18" of antenna tied on. Several new chokes may have to be tried to find one that gives proper operation. The chokes should be in the 10 - 70 microhenry range.

There are other indications of malfunction and, in some cases, one will find two parts rather than one to be giving trouble but this type of difficulty can only be spotted by someone having at hand all of the necessary replacement items and the home builder usually is not this well-equipped. There is one thing that should be stressed in construction of the Commander and also any other kit. The builder should use the kit components right down to the smallest screw since substitution of components is the thing most apt to lead to difficulties. Even the layout of parts is important and should be rigidly adhered to since, when one tries to improve on the kit makers plans, he is strictly on his own and the results obtained are a result of his own ingenuity.

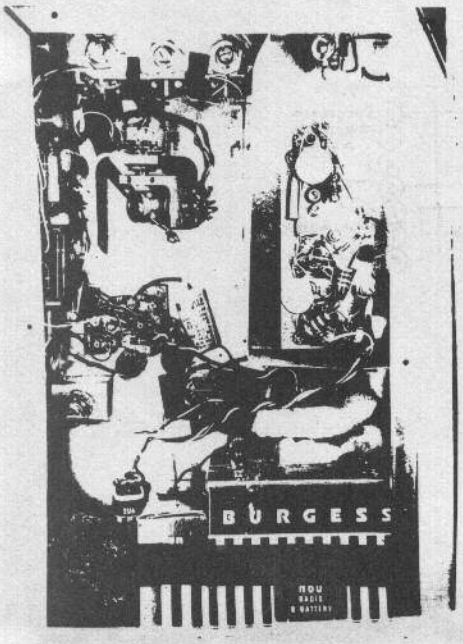


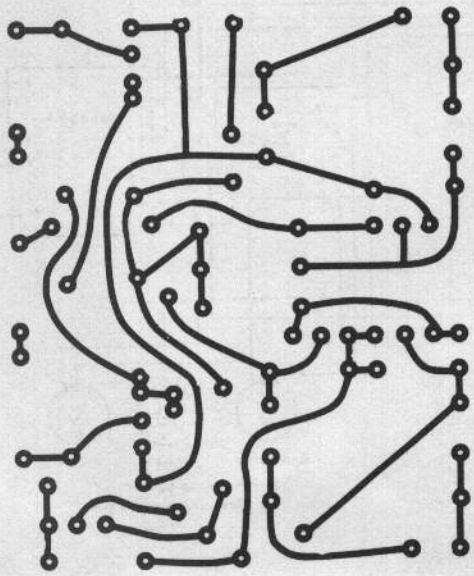


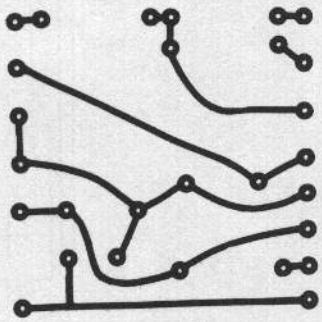
GROGAN TTPW PULSER

As mentioned in Volume II, Number 1, the schematics and the material for the WAG TTPW Grogan pulser just had to be left out because of space limitations.

These are the schematics, the base layouts, and photos which should help you considerably. We are not repeating editorial material but asking you to refer to Volume II, Number 1 for this.

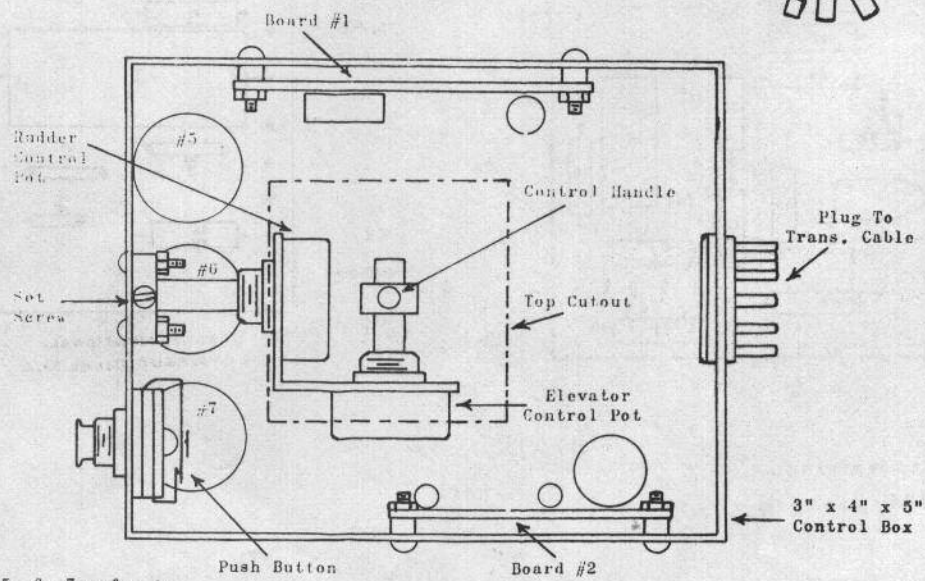






Mallory Migetrol
2 Meg Resistance

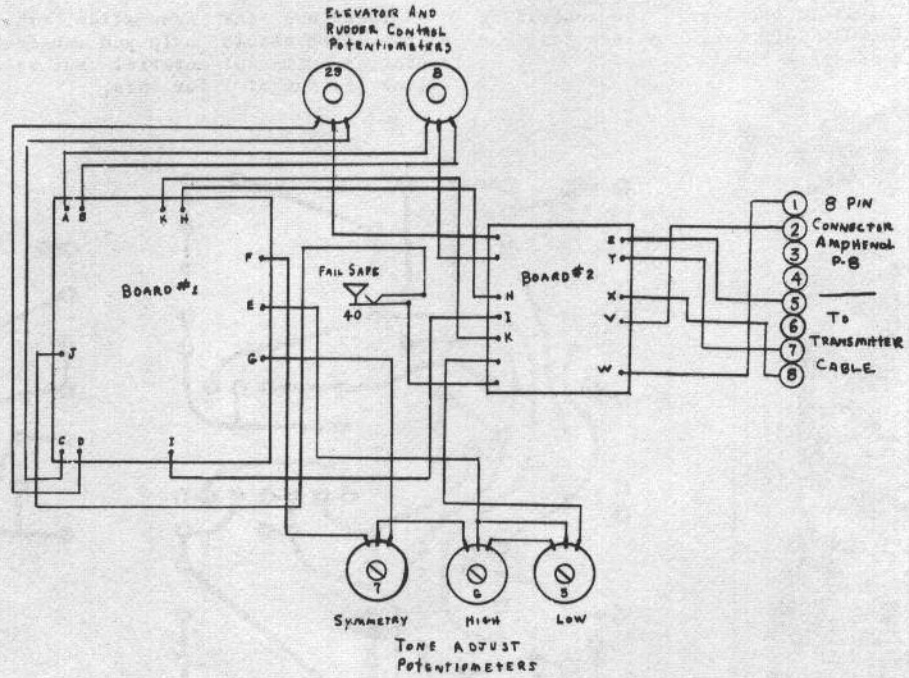
Paint unshaded area with silver conducting paint for total resi - tance of 1 meg.

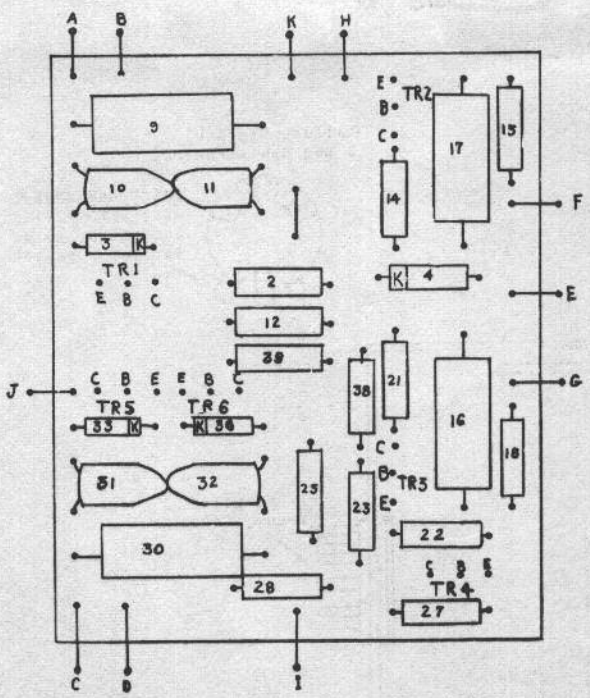


Nos. 5, 6, 7 refer to Tone Adjust Pots

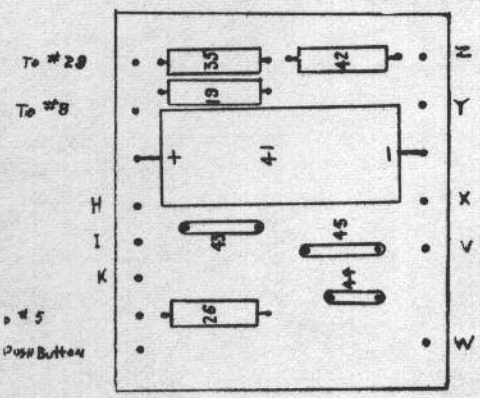
TOP VIEW

DUAL PROPORTIONAL WIRING DIAGRAM

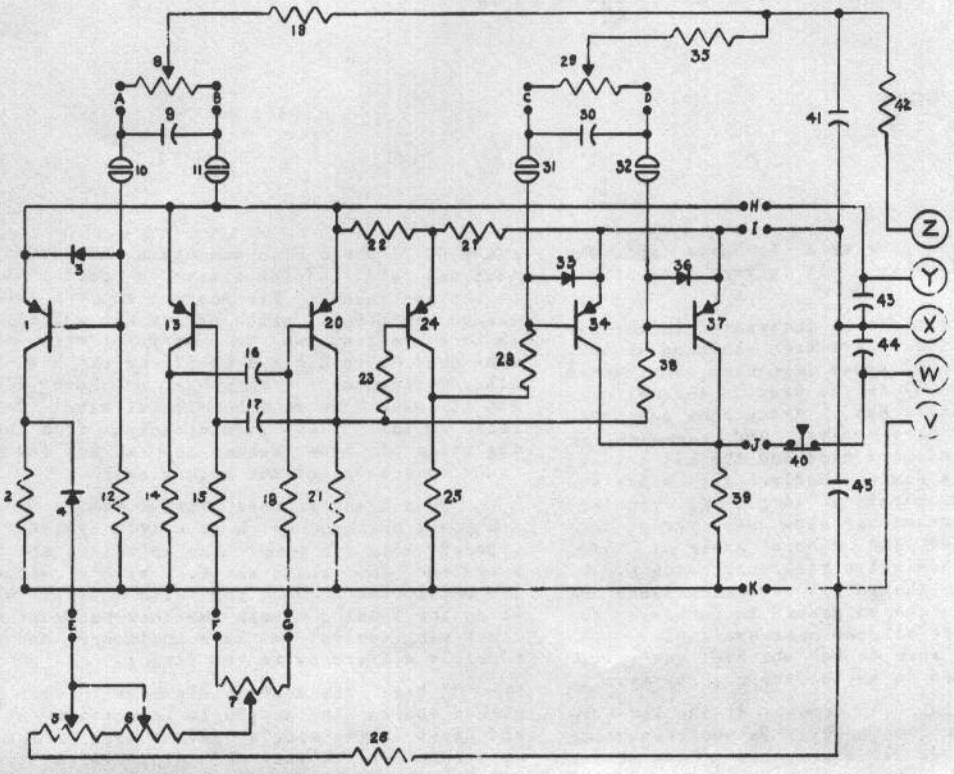




DUAL PROPORTIONAL COMPONENT BOARD No.1



DUAL PROPORTIONAL COMPONENT BOARD No.2



1 T0037 TRANSISTOR TR-1

2 4.7 K RESISTOR

3 DIODE GERM.

4 DIODE SILICON

5 250 K POT. LOW FREQ. ADJUST.

6 10 K POT. HIGH FREQ. ADJUST.

7 10 K POT. SYMETRY ADJUST.

8 2 MEG POT WITH ENDS PAINTED TO 1 MEG MALLORY MIGHT TROL

9 .25 MFD 200V CAPACITOR

10 NE-2 NEON BULB

11 NE-2 NEON BULB

12 100 K RESISTOR

13 T 0037 TRANSISTOR TR-2

14 10 K RESISTOR

15 1.2 K RESISTOR

16 .1 MFD 200V CAPACITOR

17 .1 MFD 200V CAPACITOR

18 6.8 K RESISTOR

19 220 K RESISTOR

20 T 0037 TRANSISTOR TR-3

21 10 K RESISTOR

22 100 OHM RESISTOR

23 43 K RESISTOR

24 T 0037 TRANSISTOR TR-4

25 15 K RESISTOR

26 100 K RESISTOR

27 47 OHM RESISTOR

28 100 K RESISTOR

29 2 MEG POT SAME AS #8

30 .25 MFD 200V CAPACITOR

31 NE-2 NEON BULB

32 NE-2 NEON BULB

33 DIODE GERM.

34 T 0037 TRANSISTOR TR-5

35 220 K RESISTOR

36 DIODE GERM.

37 T 0037 TRANSISTOR TR-6

38 100 K RESISTOR

39 15 K RESISTOR

40 PUSH BUTTON BREAK WHEN PUSHED

41 2 MFD TO 4 MFD 250V ELTROLYTIC CAPACITOR

42 10 K RESISTOR

43 .01 MFD CAPACITOR DISCAP

44 .001 MFD CAPACITOR DISCAP

45 .01 MFD CAPACITOR DISCAP

ALL RESISTORS ½ WATT

Radio Control in England

BY MODELLER HOWARD BOYS

"I was delighted to receive a few days ago, the last few issues of Grid Leaks. It is very kind of you to send them along to me.

"You thought readers might be interested in the receivers used over here, so I have been looking around. There is quite a variety of types from home constructed single valvers (single tube) to the Orbit 8 channel complete equipment in an Astro Hob. Among home constructors, the Aeromodeller hard valve, and Aeromodeller transistor are popular and most used and the kit put out by our old friend George Honest Redlich for valve and two transistor for reed operation is getting popular. Builders of the A. M. transistor sets have varied success; some swear by them and others swear at them. Among the commercial single valve receivers, the E.C.C. is still the most used, though not now made since the designer, Mr. Faribrass, has emigrated to Canada. The E.D. is the only commercial reed set available. The least popular receivers seem to be the XFG1 gas valve, and the Ivy, which happen to be the two used by myself,

"I think this is mainly on account of the low current change which needs a good relay. I have been using these two receivers in turn for some years. When taking my models to Switzerland four years ago I increased the capacity across the tuning coil to ten pf. to get the anode current up to about 1.3 ma. Since then the capacity has been increased gradually to 20 pf. to give the same idling current. Of course I think most of my flying has been done with the Ivy receiver during that time, but even so it does represent a very good valve life.

"The Ivy gives a current drop from 1.5 ma. to 0.5 ma. which is enough to operate my relays. These relays are made from parts used for the Ivy relay which has not been produced for a long time. It was a bit flimsy, and mine are strengthened with cotton and plastic wood. My radio reliability seems as good as anyones here and bet-than most.

"I did have a lot of receiver trouble about 18 months ago. I was unable to get a receiver working satisfactorily, sometimes it seemed all right and sometimes it was all wrong. On the day of Howard Bonner's visit to Woburn my receivers were all wrong. Shortly after I discovered that all the trouble was due to a local G.P.O. transmitter on 27.72 mc/s which comes on and off at all sorts of times. Eventually the G.P.O. interference investigator told me that it was for communication with South Africa, and its use depended on the ionospheric conditions between here and there. It was effective at the local flying field about six miles from the transmitter, but we lost that field about the same time.

"One of our top fliers, Chris Olsen, who has come to the fore this year uses all home made and designed equipment and models. His receivers are 8 channel reeds and the valves subminiature. His transmitter uses phase shift oscillators and will give two controls simultaneously. His model is the only one I have seen do a real spin that I could recognize as such from its characteristic movement being like the spin of a full size aeroplane. This was at our National contests at Whitsun, which won easily with 87 points against the second man's 66. Chris also won again last Sunday when a contest was held to pick a team to represent this country on the continent. His score then was 1366 against the second man's 695, which proves his ability. Third man in this contest was Mr. Pierpoint with the previously mentioned Astro Hog and Orbit radio. His actuators were also American made. This has not been flown much yet but it seemed to me the closest rival to Olsen, The score of third place is misleading from the actual flying point of view because he did not fly in the first round on account of the high wind.

"Fourth man in this contest was Ed Johnson who used a Ruppert engine, which is a twin cylinder horizontally opposed, with air pump. The actuators are Stegmaier air operated. His radio was E.D. with a German reed unit. The model was a Smog Hog with a lower wing added to bring the loading within the International Limits. This lower wing was set at zero incidence and made no discernible difference to the flying.

"I have not done badly myself this year, having gained second in the single control event at Whitsun, and first in the single control section last Sunday. On my second flight then the wind was so strong that the model was kept headed into wind the whole flight, deviating no more than about twenty degrees either side for recovery from gusts. At no time did the model get more than fifty yards upwind of the take-off point, and at its highest was a bit behind.

"Some of your readers might be interested to know of some of the weather conditions we experience here. For instance twice in the last year I have gone to my nearest flying field on a Sunday afternoon. It is twenty five miles from home, and I have started out in really nice weather; plenty of sun, and little wind. On arrival at the field it has been raining, and the rain keeps on most of the time. It has been possible to get in a couple of short flights during lulls and on arriving home, it is discovered that the afternoon there has been calm and sunny.

"I am still using mostly the model I built eight years ago. Although a few have been built since, none of them fly so well. This one has a 44 inch wing span, with a Mills 1.3 cc engine and a loading of 14 ounces per square foot. The control has always been pulse width proportional.

"Before closing this letter I would like to say how much I like Grid Leaks, and may the drips become a flood. There is so much information I want to make use of. I intend to build Springsted's versatile transmitter. It is just what I have been thinking about for about two years and there it is all sorted out for me. No more thinking to be done!

"Well. "Thanks a lot".

Yours sincerely,

Howard Boys
Rugby, England

New Kraft Rec. Base

SIMPLE REDESIGN ALLOWS USE OF CR 60

The March, 1959 issue of Model Airplane News featured a receiver designed by Phil Kraft. Apparently this has caught on like wildfire because the reports that we have on it from every section of the country is that this is one of the easiest sets to wire, one of the easiest sets to get into operation in audio.

The big bugaboo as far as we were concerned was the fact that the board was designed for a Telex TO-1 transformer while a CR60 worked equally well in the application. This required a slight juggling of the printed circuit board over the way it appeared in Model Airplane News and that is presented here.

Our own personal tests with this receiver indicate that everything the praisers of it have told us is true. We've checked it under every conceivable condition, under wide temperature variances and it works well all the way through.

The schematic is shown with the color code correct for the CR60.

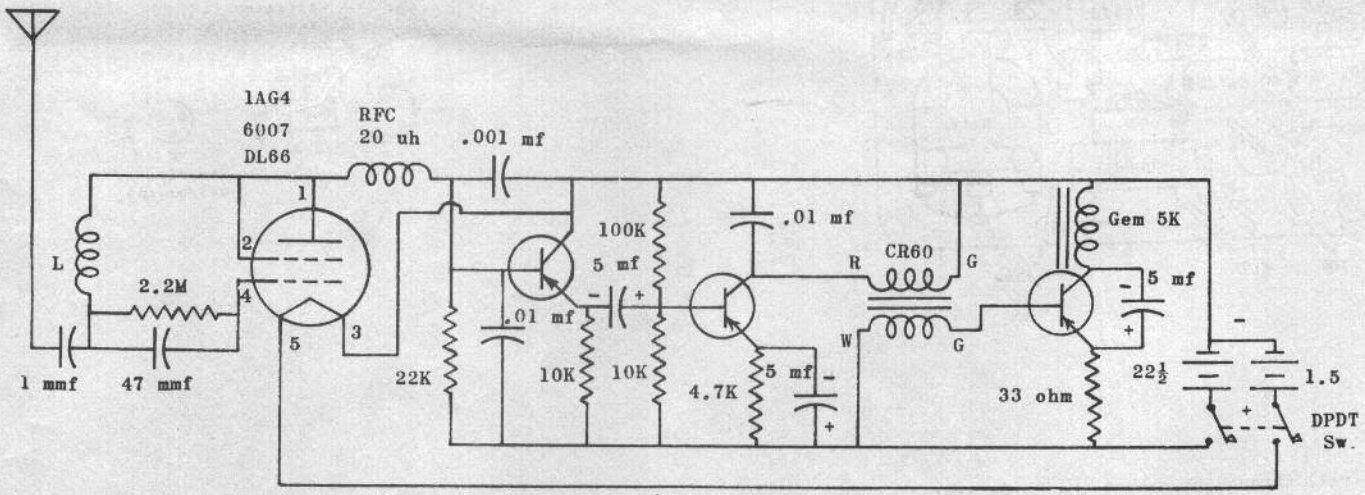
Printed circuit boards are quite easy to make. See the article in this issue by Ed Lorenz on silk-screening or see the previous issue, Volume I, Number 10 for the individual board.

In view of the demand for the receiver from all parts of the country, Ace Radio Control will kit the unit very shortly, including an undrilled printed circuit board.

While Sprague electrolytics were specified, our own checkr show that the IEI works equally well. We've tried a number of different tubes in the front end including all of those mentioned, an XF34, a CK5672, a CK526, and all seem to give equal results.

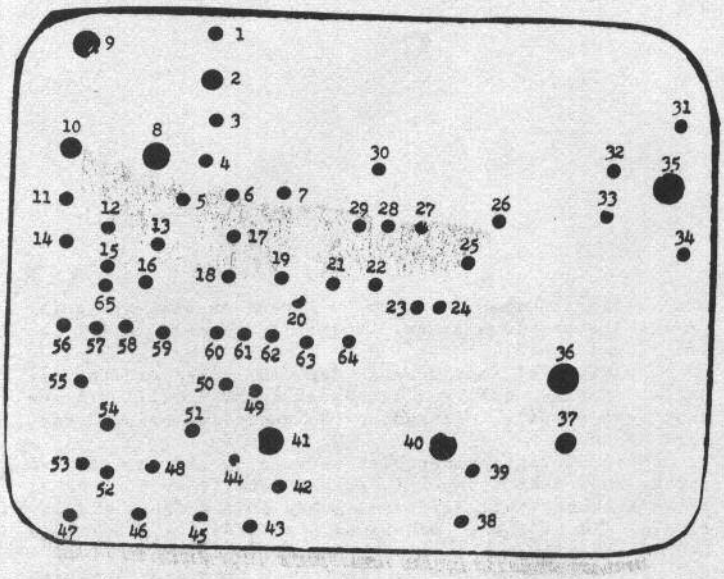
For a positive acting receiver, providing a satisfactory relay whallop with a minimum of battery requirements, we can't recommend the Kraft too highly! Our tests convince us that it is one of the best of the current circuits available.

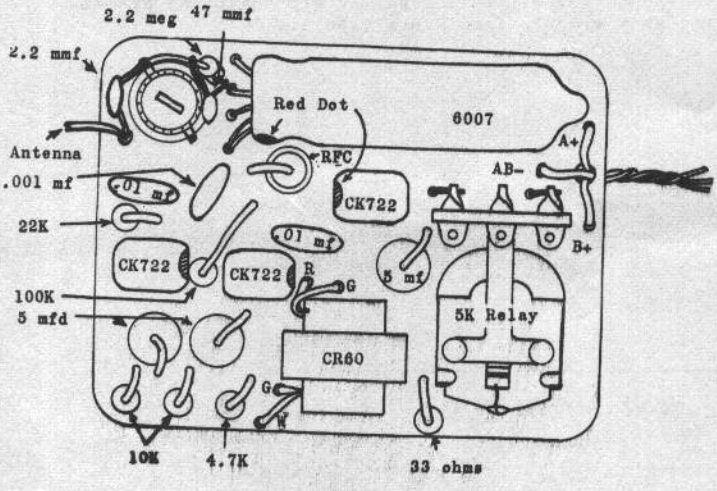
If you want a really hot receiver, join the hundreds who have built this receiver all ready and are enjoying many trouble-free hours with it.



L - 52 mc, 20T #26 Enamel Wire on 5/16" I.D. Printed Circuit, Slug Tuned
L - 27 mc, 35T #30 Enamel Wire on 5/16" I.D. Printed Circuit, Slug Tuned
Use only 1AG4 for 52 mc.
All Electrolytic Capacitors - 5 mf/50V
All Transistors - CK722 (BETA 20-30)
Antenna - Approximately 20"
Relay Setting - Pull in 2.2 ma, drop out 1.8 ma.
Transformer - CR60

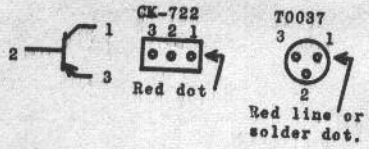
plexe to dissipate heat while soldering.





TRANSISTORS BASE DIAGRAMS
BOTTOM VIEW

1 Collector
2 Base
3 Emitter



Use #60 drill throughout except the holes listed below by numbers.

Holes #2, #10, #37 - Bit size 1/16
Holes #8, #9, #40, #41 - Bit size 5/64
Hole #35 - Bit size 1/8
Hole #36 - Bit size 3/32

Put transistor leads through holes and bend onto pattern. Hold leads with tweezers or long-nosed pliers to dissipate heat while soldering.

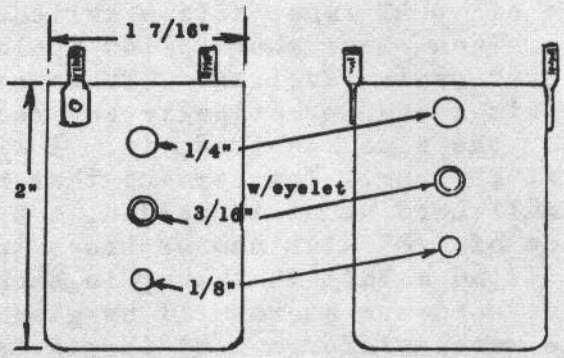
STICK CONTROL FOR SIMUL 8

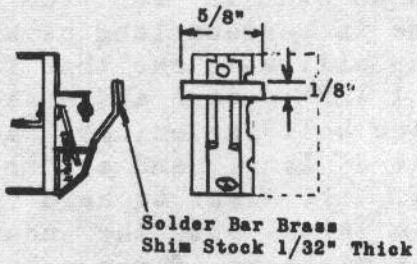
BY DALE SPRINGSTED

Building an 8 Channel Reed rig???? How have you solved the stick problem???? Here is one answer, and although it entails a bit of work, parts are cheap and easily obtainable. First you must get a couple of DPDT snap action switches, from Ace Radio at 25¢ each. Then four short 3/16" eyelets and an old IF can from a junk radio receiver. These cans come in various lengths and sizes and practically any radio shop will have one that fits the size required, ie. 1 3/8" to 1 1/2" square and at least 2" long. Try for one that has spade bolt fastenings. A small Lord Mount is needed, a 6/32 bolt 3" long, and a 2" piece of 1/8" aluminum or brass tubing. It might be hard to find a bolt that long in such a slim size but the nearest hardware store will be glad to part with one if you ask the merchant for a 1/8" toggle bolt. Price is 15¢ and the toggle will just fit the wastebasket.

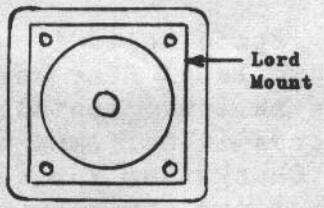
So we start. First salvage the spade bolts from the can. Next cut the can off to two inches long. Lay out and drill the various holes as shown on the sketch. Install and rivet the eyelets. Saw the DPDT switches in half and mount and solder the 5/8" pressure bars. Check them for fit in the cans. Be sure the bars clear each of the other switches, the operating arm of the switch will likely have to be rebent slightly to accomplish this. At the same time check and be sure that no part of contact at point A touches the metal box. File the hole here as required. The other two contacts are ground connections so these can ride on the box if they want. Assemble the 3" bolt and Lord Mount with a 6/32 nut. If your tubing will slip freely over the bolt, okay. Mine would not so I tapped it with a 6/32 tap in each end and was then able to thread it on the bolt. This acted as a locking nut. Attach the spade bolts to the top of the can at the corners so the stick clears them nicely. Attach the Lord Mount to the bottom of the can with a few small bolts. That's it. You should now be able to operate the switches either singly or in pairs so that right and down or left and up, for instance, are at the corner positions.

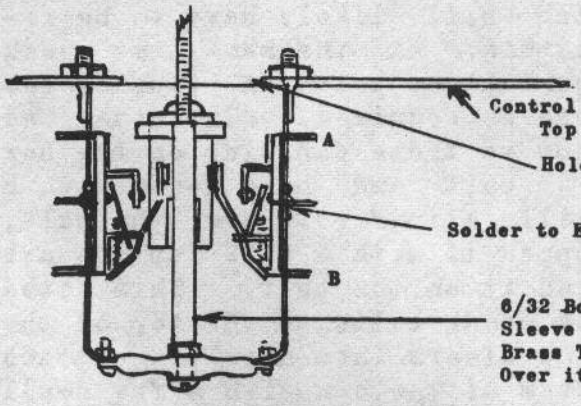
Note: This particular unit was built with modulators in mind such as the one by McGeorge that require a single breaking switch to cut or apply tone. The same type unit might be built up around the DPDT switch as it is supplied using a larger box (IF can) and bars across both switch levers.





Switch After Sawing In Half and Adding Bar.





Cut Away View

Wire Connections to A & B

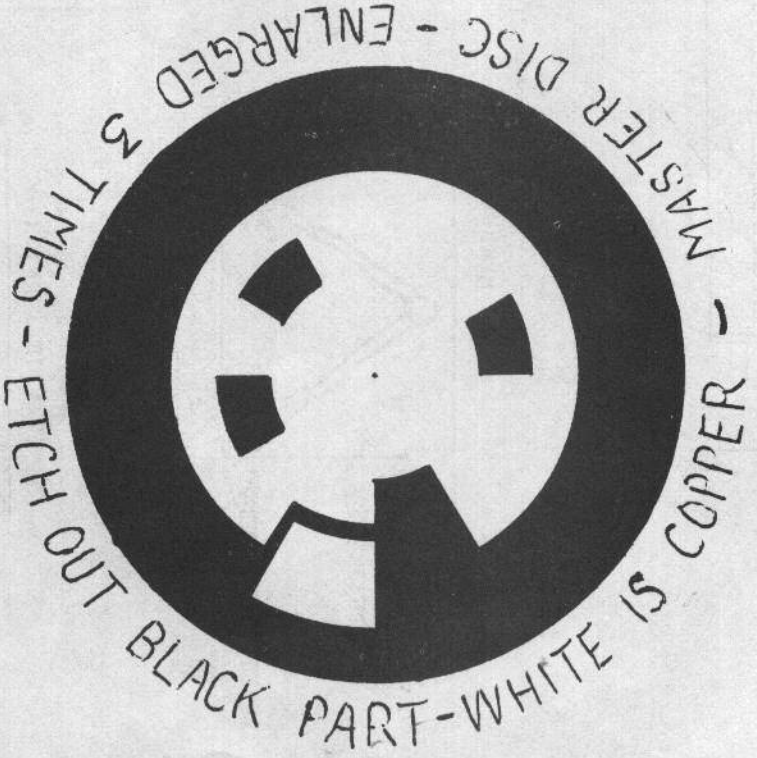
Full House Servo Conversion Kit

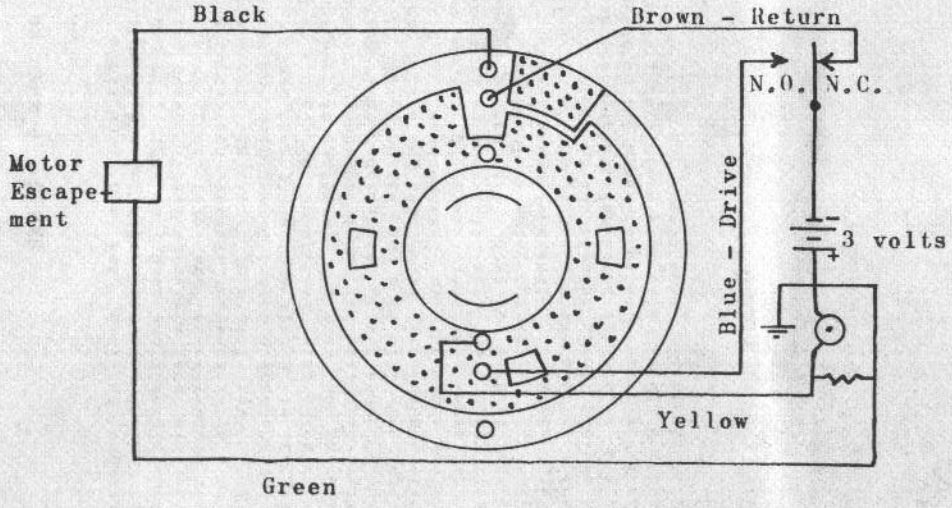
BY JOHN R. TUCKER

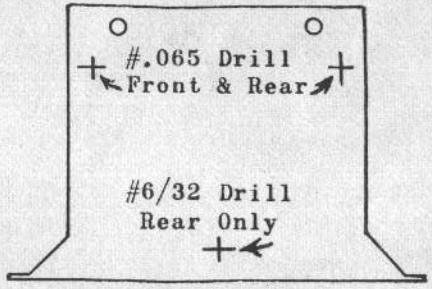
This unit has been designed especially for the CitizenShip motor driven actuator (servo) and will provide left, right, up, down and throttle control from one servo unit. These actuators are available in either built-up or kit form and since you are going to modify the servo and install the conversion, we suggest you start with the kit. This will save a little time and money and help you to better understand the operation.

The "heart" of the system is the printed circuit disc along with the special arms which supply torque to the control surfaces. It must be remembered that the control sequence is as follows: one pulse and hold gives right rudder, two pulses and hold gives up elevator, three pulses and hold will give left rudder, and four pulses and hold will give down elevator. Quick-blip will send current to the motor control escapement and another pulse will drive the servo to #1 position where it automatically cuts the current flow and returns itself to neutral. Just key a short and a long pulse (.-) for complete motor operation.

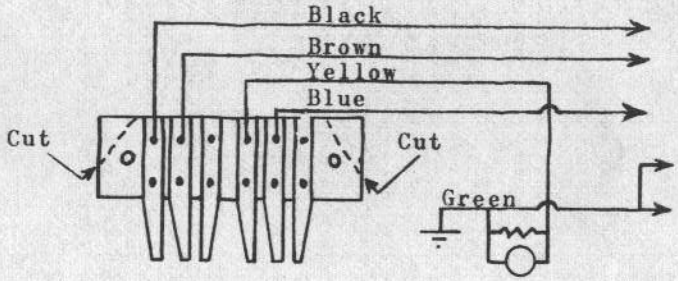
Start assembly exactly as outlined in the instruction manual except install the special printed switching disc instead of the regular disc. The second step is to use the template furnished with this kit and drill the holes in the upper corners of your servo case as shown. Be very careful in your work as these holes line up the torque rods and should be very accurate for best results. Next, cut the corners of the contact strip as shown on the drawing and install. Now install the torque rods, being careful to insert the rudder rod first. Allow these rods to hang free until you have the bell crank set up properly. To do this, it will be necessary to thread the lock nut onto the drive shaft adding lock washer and then the bell crank last. The pin in the bell crank should be unsoldered and re-installed in the other hole before attaching to the servo. The bell crank may now be turned in or out until it has the best spacing and clearance on the torque rods. Lock it in place securely. At this time, it would be wise to wire the servo as per instructions and check the enclosed drawing sheet. If it does not, you must loosen the lock nut and move the crank until it does stop in neutral upon release of signal. Finish up the assembly by installing the centering collars and the small stud on the rear of the case. Double the centering bands and install as shown--this will give firm pressure to hold all controls in neutral. Check alignment of torque rods and tighten set screws. This unit may now be mounted in your model in any position shown in the servo depending upon your own personal desires. Upon check-out, you may want to use $4\frac{1}{2}$ volts on the servo to speed up movement, and we have found that a slight left turn in your model will be advantageous prior to keying up elevator for loops. Good luck and happy flyin'!





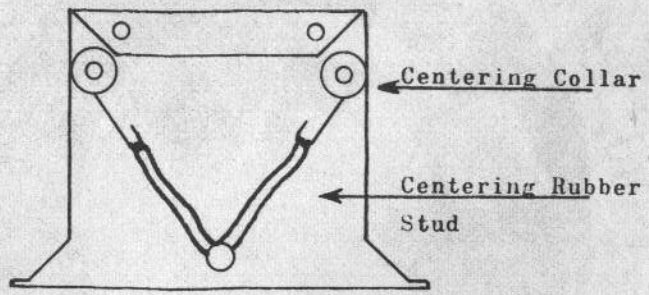


DRILLING TEMPLATE

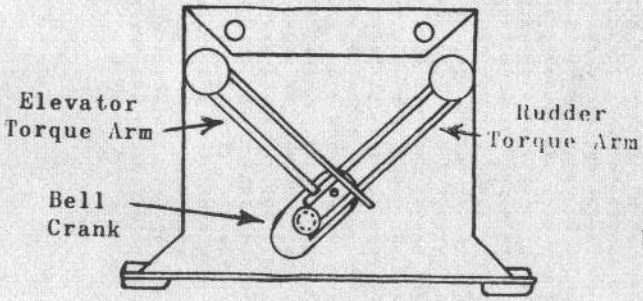


M.M.Motor

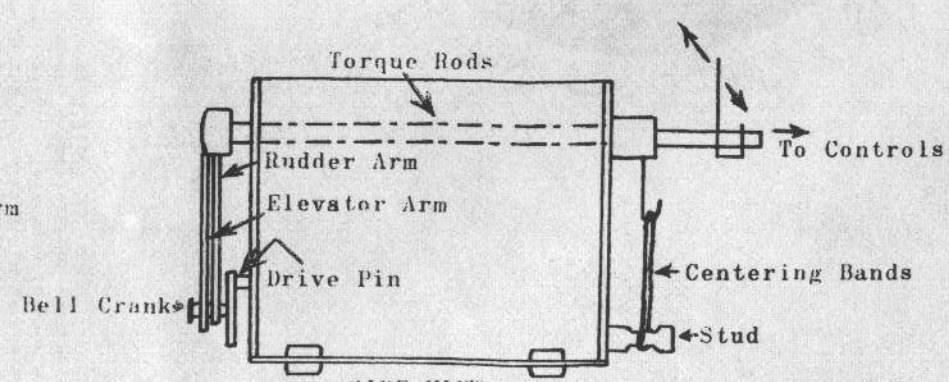
Motor Esc.
Relay N.C.
Relay N.O.
Motor Esc.
3 volts +
(3 volts - to relay arm)



REAR VIEW

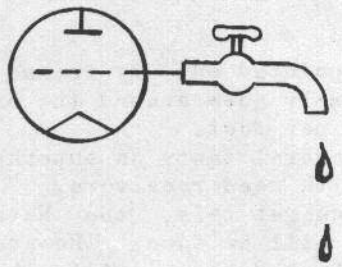


FRONT VIEW - "IN NEUTRAL"



SIDE VIEW

Grid Leaks At Play



Here, at Grid Leaks, we've been most pleased to have had, within the past week, two very distinguished families in the R/C field. Monday evening, July 13, we were pleased to have Dr. and Mrs. Walter A. Good and Terry and Ginny drop in and be our guests. As you can imagine, there were many irons in the fire--much discussion about the R/C potential--much discussion about the R/C interferenee problem with the class D walkie-talkie's coming in--much discussion about the AMA's petitions to the FCC for new frequencies to relieve this congestion--much discussion about the relative bulk and also the electrical noise problem on the superhets--much discussion about the R/C future in general and just a very pleasant time. The Good's were on their way to White Sands, New Mexico where Walt was to deliver a series of lectures and then on to the Nats. He showed us his pylon racer which had clocked over 36 miles per hour using his TTPW, of course, and performing reliably. Walt's still flying his old Multi-bug at the Nationals.

Saturday, July 17, we were pleased to have as our guests, Howard and Elinor McEntee. Howard, as you know, is the designer of a number of pieces of R/C equipment and is the editorial R/C consultant for American Modeler. Incidentally, Ace Radio was written up for a future issue of American Modeler. This was another very pleasant visit.

Howard had some very interesting ideas about the future of Grid Leaks. He said that magazines like American Modeler just simply could not carry material of the nature that we carry since they had to cater more to the guys just beginning and the amount of space is limited. Their hands are held by advertising and so the larger magazines have their problems too.

He had several new very interesting gadgets to show us and we are following up on these and will announce at a later time as to whether we are able to procure the distributorship. Among them are the Crescent Industries connectors in 7, 9, 12, and 15 prong configurations, the Arnold cores as used in the Doig system. We discussed the possibilities of future kits for Ace Radio Control and decided that systems of the Doig nature were just beyond kitting stages at the present time with transistors varying as much as they do in their characteristics.

Howard, as you know, is the designer of the circuit used in the Commander receiver which is receiving fabulous fame throughout the country for a simple, easy to build receiver.

In addition to this, we've had many of our tried and true customers come through, stopping for short visits. We're delighted to see any of you any time and if you will just give us a note, we'll try to accommodate you.

We are most gratified for all of the renewals that have come in and for all the letters that have stated "keep up the policy that you had with GRID LEAKS on an advanced stage". We would venture to say that 98% of the correspondence we've had on this has been of this nature.

Also, out of your requests has grown an R/C Primer containing the best articles--about 24 pages--from the best of GRID LEAKS in the past. This we intend to publish this fall and it should provide the answer for the guys who can no longer get back issues or who want more elementary material. This will be available, we feel, for around $1.00 per copy.

Now, for the COMMERCIAL CORNER. Since most of our subscribers have said "No ads--but tell us what's new", we will. An item that has been going exceptionally well for us here at Ace Radio Control is 1/8" i.d. ball bearings 1/4" o.d. for use in ailerons. This sells for $1.50.

Another item pointed out to us by Howard McEntee is Spectra-Strip which is 10 wires color coded in a flat cable roughly 1/2" wide which may be stripped down to 6, 7, or whatever you need. It contains 10 pieces of 19 stranded #24 wire and all who have seen it are raving about it. This sells at 20¢ per foot.

Another item pointed out by friend Ed Lorenz is Spiral Wrap which is a plastic tubing 1/8" i.d. which simply goes around the existing cables which you have in your installations. This sells for 15¢ per foot.

We have run several tests on superhets, are planning to stock some, and are dreaming about coming out with reed receivers.

By the time you get this, the Nats will have made history and we believe some really spectacular flying will be done. Howard McEntee was planning to enter in the Intermediate with the Kicking Duck system just to show that higher points would be racked up in the Intermediate than have been in previous meets.

That's it for now, we'll see you next issue!

Yours very sincerely,

Paul F. Runge
GRID LEAKS

Grid Leaks
HIGGINSVILLE, MISSOURI