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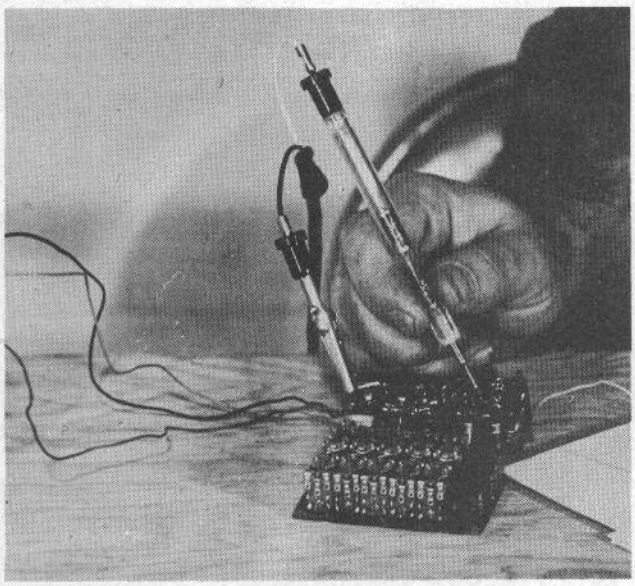
Listening For Trouble

SIMPLE TROUBLE SHOOTING



SIMPLE TEST PROBE

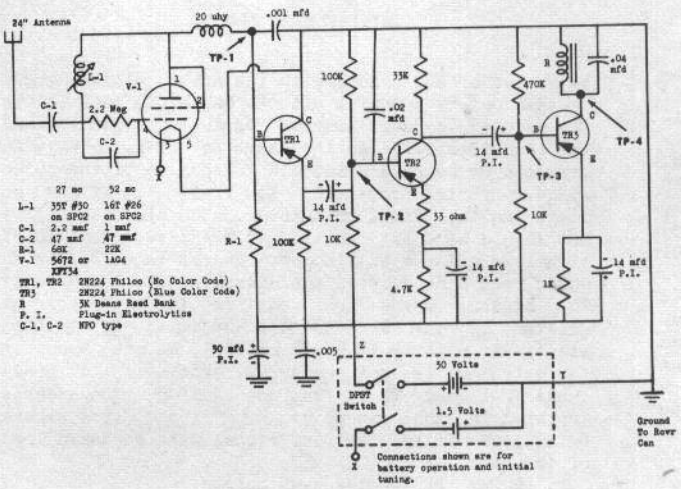
Trouble-shooting audio receivers, whether they be single or multi jobs, can be considerably simplified if you know what to look for and what can cause what malfunction to happen.

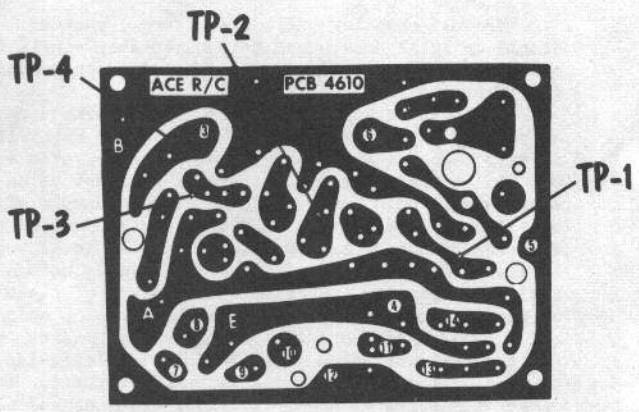
The simplest procedure for trouble-shooting a receiver of, say, the Kraft 6-4 Multi-Fli or Relay-less 10 is with a good-quality crystal earphone (or even a cheap one can be used although its signal will not be as good). A probe will need to be made consisting simply of a .01 or a larger capacitor which places the headset in series with the points to be tested. A simple test probe set is shown in the illustration. This simply uses a tubular type capacitor inserted into a piece of plastic rod or plastic tube so that it has a phone tip on one end and a phone jack on the other. The headset is then plugged into the phone jack and this completes the probe portion. For the ground portion of the unit, another phone jack along with an alligator clip is used so that this may be clipped to the PC board.

The phone tip with the alligator clip is attached to ground or B-. Now, with the probe, a listening test is then had by touching it to specific test points on the printed circuit board. Normally, when touched to the land identified on the chart as TP-1, a very faint hiss can be heard and this is indicative of the detector stage operating properly. At TP-2, the first audio stage and the first transistor, the hiss is still weak but should be a bit louder. At TP-3, second audio stage, signal is quite a bit louder, and at land TP-4 or third audio reed bank driver, the signal should be quite loud. The hissing noise you hear is the superregen noise created in the detector and amplified by each audio stage. If nothing is heard at TP-1, we must assume that the detector is not superregenerating. If heard at lands TP-1 and TP-2, but not at TP-3, the trouble is isolated in the second stage. If the tone signal is being transmitted, the tone signal will be heard instead of the hiss.

(NOTE: TP denotes test points.)

SYMPTOM	PROBABLE CAUSE
1. Receiver idles at 1.5 ma, no meter wobble, reed bank is quiet, no hiss at TP-1.	Detector is not superregenerating. Check for open coil, open choke, or improperly cleaned or soldered tuning coil leads. Check for element short across tube. Replace if necessary. Check also to see if voltage is present at plate. Check for open tube filament (most common).
2. Same as #1 above, hiss heard at TP-1 but not at TP-2.	First audio stage is not working. Replace this transistor and check for faulty resistor and coupling capacitor
3. Same as #1 above, hiss heard at TP-1 but not at TP-3.	Second audio is not functioning. Check for installation of or replace transistor or check for open components. Shorted .01 capacitor at collector of TR2.
4. Same as #3 above but only faint hiss is heard at TP-3, no increase above TP-1 and TP-2.	Open or improperly installed 14 mf emitter bypass electrolytic. Transistor weak, replace.
5. Same as #1 above but hiss heard at TP-1 and TP-2 and TP-3, but not at TP-4	Third audio reed bank stage not functioning. Check reed bank coil to make sure it has continuity. Replace third stage transistor. Check for open coupling capacitors.
6. Same as #5 but faint hiss heard at TP-4. No increase above TP-1 and TP-3.	Open bypass capacitor or coupling.
7. Receiver idle current above 4½-5 ma.	Re-inspect PC board for partial or complete shorts or improperly installed components. Check for improper lead installation at transistors.
	B battery connected in reverse. This will destroy transistors.
8. Receiver appears normal, idle current is okay but reed bank is hard to drive.	Check transmitter for proper signal output and/or signal mixing. Re-adjust channel tuning. Reed bank, reed to coil pole piece clearance excessive. Re-adjust.
	Drive signal from receiver weak or distorted. Use oscilloscope to check signal at land if distorted or weak, replace transistors.
9. Engine vibration causes unwanted reed operation.	Receiver mounting too tight in aircraft, or unbalanced propellor causing rough engine operation.
	Receiver should be mounted so reed bank reeds assume vertical position in aircraft.
	Reed contacts adjusted too close.





Trouble Shooting Technique

AN IMPORTANT ARTICLE FOR KIT BUILDERS

While this article is primarily directed to the Kraft 4-6-10 receivers, it should be noted that the same general procedure will be very helpful for all audio receivers whether they be single or multi stage units. This test procedure can be elaborated on as will be shown in the article following by Dale Springsted

Just exactly how one goes about testing any multi or single channel receiver usually depends on what test equipment is available, plus the individual's ability to properly diagnose the resultant readings obtained with such equipment. By far the easiest and simplest tests that can be made, may be done with a standard crystal headphone. From this can be determined whether or not the unit is operating, and, if not, what stage of the unit is giving trouble. This system has already been outlined in the previous article "Listening For Trouble".

The vacuum tube voltmeter or high resistance input multitester is the next best service instrument (the former is to be preferred). Many additional checks may be made using this instrument alone whereby the actual AC voltages of various receiver stages may be measured. The results obtained may be compared to standard readings obtained from a unit known to be operating properly and the difference diagnosed. Unfortunately, this instrument does not discriminate between proper or improper waveforms. In addition, there is also the inevitable difference in instruments which may result in errors of 20% or more from instrument to instrument. Couple these factors to the problem of making accurate readings where there are several AC voltages present, and one soon realizes that a third test instrument is required--the oscilloscope. The scope is a bit more universal since it allows us to measure AC voltages while actually observing them. If two or more variables are present simultaneously, one can discriminate between them easily. It is only necessary to be able to duplicate the test setup from unit to unit to accurately diagnose just what stage requires work. If both a VTVM and scope are handy, one can use both and read the AC plus visually determining what is going on in the stage under consideration.

TRACE #1

This photo was made at TP-1 of a normally operating receiver. Note that this trace shows a broad, rough pattern which appears to have highly irregular edges. To duplicate this setup, the scope should be set so the input signal is fed to the vertical amplifier with the ground side tied to B- and the input probe at TP-1. Set the horizontal sweep frequency to approximately 150 cps and advance the vertical amplifier gain control almost open, or to a point where 1" of deflection equals .1 VAC. With this same setup, you may look at the quench frequency if the sweep frequency is advanced to 25,000 cps. By doodling a bit with the vernier setting, you will be able to stop the quench frequency which will appear as a slightly distorted sine wave pattern. (Check Figure 2-B on page 2, Grid Leaks, Volume II, #9; article by Red Costlow. Also, check the Grid Leaks article on measuring quench frequency, Volume I, #9.)

In this particular trace, the quench frequency accounts for the apparent broadness of the pattern. The irregular edges are the result of the tube oscillation being set properly to the point where this oscillation is critical as it should be for maximum sensitivity. A Heath VTVM was used to measure the AC voltage occurring under these conditions. Using the 1.5 VAC scale, the reading obtained was .66 VAC. The receiver B+ voltage was 30 volts DC and the total B+ current of the receiver proved to be 2.9 ma. No transmitter signal is applied, therefore the receiver is at complete idle. The receiver relays were disconnected for these tests.

If the transmitter carrier is turned on, the receiver can be tuned simply by adjusting the dust core slug until the ragged edges disappear.

TRACE #2

In this trace. the receiver has been tuned as above and the transmitter modulated. The resulting photo shows the same characteristic broadness but, in addition, the waveform of the audio signal is also apparent. Again, the scope setup is similar to the first trace and, as in the first trace, if the sweep frequency is advanced to 25,000 cps approximately, one will be able to again see the quench frequency. The VTVM still set at 1.5 VAC RMS scale reads .65 VAC and the receiver B+ current is now 3.4 ma. At this point, it is interesting to note that we have a condition where the VTVM fails to read accurately because of its inability to distinguish between two simultaneous signals--the quench voltage and the impressed audio voltage--which are, obviously, both present. In such a case, about the only way the audio may be accurately measured is by calibrating the vertical deflection of the scope and ruler measurements of the pattern height from peaks to troughs noted. If this is done, voltages in the order of .01 to .02 VAC will be noted. (These voltages are too small to be read on the Heath meter scale with any degree of accuracy. The trace was made with 1/2" equalling .1 VAC RMS and the pattern measures 1/16" from peak to trough or approximately .01 VAC RMS.)

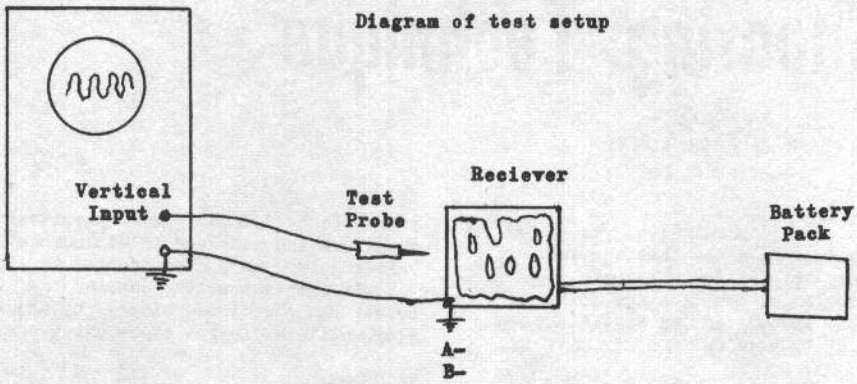
TRACE #3

This trace is taken from TP-2 which is the output of the first transistor. The pattern shows the same outline as TRACE #2, but is slightly less broad and has higher audio peaks. Some of the quench frequency has been bypassed at this point and a slight amplification of the audio signal is noted. The VTVM set at 1.5 VAC scale reads .42 VAC RMS. B+ current is again 3.4 ma. The height from pattern peak to trough measures 1/8" or, converting to voltage, approximately .025 VAC. In this photo, we visually see the normal result of this stage of the receiver since it is essentially an impedance matching stage in grounded collector form, and thus has little or no voltage gain but serves to correctly match the high plate load impedance of the tube output to the low impedance input of the following transistor amplifier. Again, it is interesting to note that the VTVM shows a lower reading at this point than it did at TP-1, so it must be assumed that the VTVM is actually reading the response of the quench voltage rather than the audio component which is the signal we wish to amplify in the following stage.

TRACE #4

This photo is taken at TP-3 which is the output of the second transistor or the first amplifier stage. Note the pattern has become sharp in appearance due to the filtering and bypassing of the remaining quench frequency. A very slight bit of raggedness may still appear at the peaks. This is accounted for since it is at this point that the transmitter carrier is actually turned off dut to 100% modulation, thus the detector stage in the receiver again attempts to start oscillation; but, because the audio rate is quite high, the tube never really reaches a good oscillation level. The scope setting in this trace has the vertical amplifier gain reduced so the 1/2" of pattern height is approxi-

Diagram of test setup



mately 1 volt RMS. A VTVM set on the 5 volt AC RMS scale shows 1.35 VAC RMS. Again, the B current is 3.4 ma. The fact that the quench frequency is eliminated at this point indicates that now the VTVM can be used to measure voltages and the results will be reasonably accurate since the instrument is called on to read only one voltage.

TRACE #5

This trace is taken at the reed bank or TP-4. Note again that the pattern is sharp and that, at this point, all traces of quench frequency have disappeared. The scope setting has again been reduced so that 10 VAC is equal to 1/4" deflection. The VTVM set at 50 VAC RMS scale reads 21 volts AC. The most interesting point of this trace is the little hook that is seen at the base of each wave. These photos were taken at approximately 300 cps and this hook gets larger as the audio frequency is reduced and tends to disappear as the audio rate is increased. This hook is formed by an inductive voltage transient caused by the reed bank inductance. The condition is not serious and is common to almost all reed receivers. The peak of this pattern is slightly rounded and this should be looked for at this point since it shows that the .04 capacitor which tunes the reeds is approximately correct. If this capacitor is removed, the pattern will be essentially similar; but, with a much sharper point. That this part of the pattern be properly shaped is important since the amount of energy driving the reeds is found to be the amount of area enveloped by the pattern. If the peak is sharp, the volume of area is reduced and the reed drive is low even though our VTVM will still show us a 21 volt reading. If the peak is properly rounded, the amount of energy to the reeds will be normal. (Again, here is a place where the VTVM can actually make us misinterpret the true results.)

TRACE #6

This trace is the output of the TP-4 but shows only the idle condition. No carrier or tone from the transmitter is applied. This trace is the amplified hiss voltage that is heard in a headset. If one compares this to TRACE #1, you can visualize the audio voltage in the ragged edges being amplified to result in the ragged appearing trace shown here. The scope setting is the same as in TRACE #5. The VTVM set on the 50 VAC scale shows 20 VAC. The B current is 2.9 ma.

When the carrier is turned on, this trace will become a thin, straight line showing that the hiss voltage is absent but no audio is present. The headset test under these conditions will have little or no hiss audible.

TRACE #7

This trace taken at TP-1 with same settings used as TRACE #1. The major difference is that the grid capacitor has deliberately been made larger than normal to force the detector stage to oscillate very strongly. Note that the extremely ragged edges of the trace as seen in TRACE #1 have been smoothed considerably. The VTVM, also set similarly, reads .71 VAC. Not that this reading is proportionately larger by about the same degree as the broadness of the patterns. As the following traces will show, this action of oscillation will result in a less sensitive receiver and, in some cases, results in low reed drive. It may be said that the stage oscillates so hard that it is a bit overstable.

TRACE #8

This trace is taken at TP-1 with tone modulation applied. Again, this is the same setup as original TRACE #2. Note that here the height from peak to valley of the audio frequency is somewhat less than that shown in TRACE #2, indicating a lesser amount of audio voltage.

TRACE #9

This trace is taken at TP-2, same conditions as the two previous traces. Once more, one can note the reduction in audio present. The VTVM, however, reads .46 VAC. When compared to the traces and readings obtained from TRACE #1, #2, and #3, it would seem that since #7, #8, and #9 are a bit higher as far as AC voltage is concerned, that this should be the desired condition, but the scope shows us that, unless we can see what is being measured, that one cannot be sure that the instrument is not actually lying.

At this point, one can review the symptoms for headphone tests and relate them to the scope traces. It also becomes very easy to spot the stage of the receiver under test that is functioning improperly since the scope trace will not be normal. The traces will also show such items as open capacitors. For instance, if the .01 capacitor at the collector of TR-2 happens to be open, the trace as seen at TP-3 will not be sharp and clear but will be very broad and will appear as an amplified version of TRACE #3.

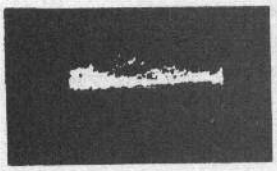
Let us assume a hypothetical case of a receiver in which no hiss is heard or seen on a scope. The initial thing to do is to carefully test all parts possible for continuity. For instance, the tube filament, tank coil, RF choke, reed bank coil, and the battery lead connections to ascertain that these items are all good. We then remove the transistors and check these for shorts and gain. If no transistor checker is available, try following the article in Grid Leaks, Volume II, #1.

These are found good. Again check the set with only the tube stage operating, and perhaps replacing the .001 plate bypass will solve the problem. It does in this case. We now replace the first transistor and check again using the trace as seen at TP-2 to tell us if it is normal. Install the second transistor. Check again at TP-3. No trace??? Try a new 14 mfd coupling capacitor and, if this does not solve it, try a new .01 capacitor at the collector of this stage. That one was shorted so now we have this stage working. Install the last transistor. Still no output at TP-4??? A new 14

mfd coupling capacitor is the first thing to try. If not this, then the 14 mfd capacitor in the emitter of this transistor may be bad. Along about now, we should have found the trouble. Now, by using the scope, the fine touches can be done by checking waveforms and voltages against minor changes of parts such as the grid leak capacitor in the tube stage, switching the transistors about in the circuit to obtain maximum gains from each stage, etc. Seldom ever does the case occur where more than one component is faulty; so, in our unit described here, things were really fouled up more than usual but this is the general manner in which troubles have to be spotted and cured.

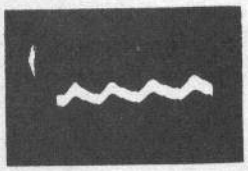
Actually, most of the material presented here can be used to good advantage on any reed receiver as well as any single channel receiver of the general type like the Kraft. The waveforms in different units may vary a bit in exact precise patterns but will have some similar characteristics so that some idea will be obtained as to the correct operation. Many times one may have a friend who has a receiver of the same sort which has been operating properly and this may be used as a guide for the normal scope patterns which may be expected and these results applied to the incorrectly operating unit.

#	TP	Receiver Condition	VTVM Reading	VTVM Scale Used	B Current Total MA	Vertical Amp Setting	Internal Osc. Setting	RMS Voltage In Inches
1	TP1	Idle--no carrier	.66 VAC RMS	Heath VTVM 1.5 VAC RMS	2.9 MA at 30V DC B+	.1 VAC RMS = 1" height	Approximately 200 cps	
2	TP1	Tone	.65 VAC RMS	Heath VTVM 1.5 VAC RMS	3.4 MA at 30V DC B+	.1 VAC RMS = 1" height	Approximately 200 cps	
3	TP2	Tone	.42 VAC RMS	Heath VTVM 1.5 VAC RMS	3.4 MA at 30V DC B+	.1 VAC RMS = 1" height	Approximately 200 cps	
4	TP3	Tone	1.35 VAC RMS	Heath VTVM 5 VAC RMS	3.4 MA at 30V DC B+	1 VAC RMS = 1" height	Approximately 200 cps	
5	TP4	Tone	21 VAC RMS	Heath VTVM 50 VAC RMS	3.4 MA at 30V DC B+	10 VAC RMS = 1/2" height	Approximately 200 cps	
6	TP4	Idle--no carrier	20 VAC RMS	Heath VTVM 50 VAC RMS	2.9 MA at 30V DC B+	10 VAC RMS = 1/2" height	Approximately 200 cps	
7	TP1	No tone	.71 VAC RMS	Heath VTVM 1.5 VAC RMS	3 MA at 30V DC B+	.1 VAC RMS = 1" height	Approximately 200 cps	Too large a capacitor used. Pattern wider and smoother.
8	TP1	Tone	.71 VAC RMS	Heath VTVM 1.5 VAC RMS	3 MA at 30V DC B+	.1 VAC RMS = 1" height	Approximately 200 cps	Too large a capacitor used. Pattern wider and smoother.
9	TP2	Tone	.46 VAC RMS	Heath VTVM 1.5 VAC RMS	3 MA at 30V DC B+	.1 VAC RMS = 1" height	Approximately 200 cps	Too large a capacitor used.



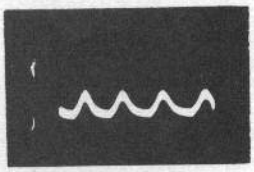
TRACE #1

Taken at TP-1
Receiver condition at idle--no carrier.
VTVM reads .66 VAC



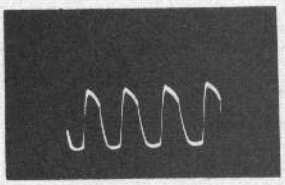
TRACE #2

Taken at TP-1
Receiver condition has audio tone present from transmitter.
VTVM reads .65 VAC RMS



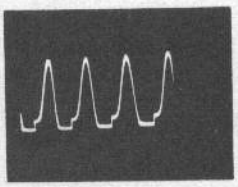
TRACE #3

Taken at TP-2
Same condition as TRACE #2.
VTVM reads .42 VAC RMS.
Shows audio at TP-2



TRACE #4

Taken at TP-3
Shows amplified audio pattern. VTVM reads 1.35 VAC RMS

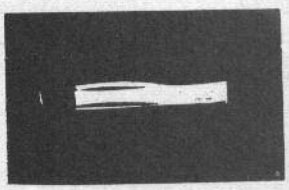


TRACE #5

Taken at TP-4
Shows amplified audio pattern at reed bank. VTVM reads 21 VAC RMS

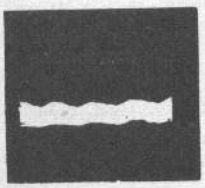
TRACE #6

Taken at TP-4
Shows amplified hiss voltage from first stage at idle condition.



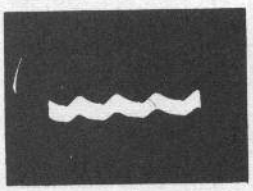
TRACE #7

Taken at TP-1
Shows detector at abnormal condition of oscillation.



TRACE #8

Taken at TP-1
With audio present showing lesser amplification.
VTVM reads .71 VAC



TRACE #9

Taken at TP-2
Same conditions as TRACE #8.

Submini Tuned Filter Circuits

ITEM IS MANUFACTURED BY RAMECO

The use of filters to separate audio frequencies for the different channels in multi-channel applications in receivers seems to be gaining favor as against the reed units. There is much to be said for filters over reeds just as much as there is to be said for relay-less servos. With filters, as with relay-less servos, there are no contacts to dirty, no dust or grime to mar reliability and, now, with the advent of a new company on the horizon--Rameco Products, P. O. Box 385, Huntington Station, New York, headed by the genial Ray Megirian--introducing a submini line of filters measuring less than 3/8" across and weighing less than 1/2 oz, we firmly predict that there will be considerable interest recurrent in filter type receivers. We, further, predict that, not only will this be done for the now known multi-channel receivers, but also for the true proportional types similar to that being manufactured by Solidtronics.

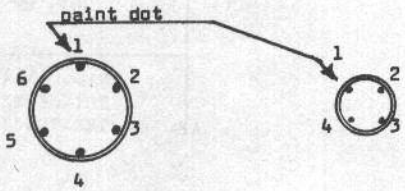
With the Rameco filters which were announced in the "What's New?" of the last issue of Grid Leaks comes a very comprehensive instruction sheet. We are presenting some of the circuitry in this instruction sheet for our Grid Leaks readers and will pass on our experiences. While the circuitry includes an all-transistor receiver, all our experience indicates that the 30 volt version, using a Marcy RF audio frequency front end circuit which is also depicted here, works admirably well with existing 5K relays if the Rameco filter circuit is used. The filters will not work interchangeably with the Marcy. The Rameco circuit, however, is only slightly more complex and only a bit more expensive.

A variety of transistors were tried. The T0037 works admirably and the work horse of the Kraft receiver --the 2N224--also works well in this circuit.

Setting up the filters is not a complicated task but is quite simple if the instructions by Rameco are followed religiously. Wire the filter circuit as shown on the schematic repeating the circuit for each channel to be used. Resistor R and the input to each filter is the only component which needs adjusting in each case. The simplest method is to temporarily substitute a 500K pot in each leg until the proper values are determined. At that time, a fixed resistor of the proper value may be permanently connected in the circuit.

Additional equipment which will aid in the set-up procedure is a 10 ma meter, low resistance moving coil type, and an earphone. When you are ready to start testing, install the meter in one battery lead and connect the earphone for audible monitoring of the receiver signal. If a crystal earphone hearing aid variety is used, it may be connected directly from the common point of all R resistors where the 5 mfd coupling capacitor from the audio output joins these resistors at ground. If a magnetic phone is used, couple one side through a .005 mfd or smaller capacitor to the collector of the last audio stage and ground the other side. Set all the R pots at maximum resistance and you are ready to start the test.

Provide a weak tone modulated signal from your transmitter and tune the receiver to its peak tone signal. The earphone will make this easy. Starting with the lowest frequency filter first, keep reducing pot R in this leg while alternately sweeping through the audio range of the transmitter tone generator until the relay actuates and the meter shows a sharp current rise. In the filter circuit shown here, idling current is about 1 ma and will have to be subtracted from the peak reading at resonance to determine relay current. Adjust each channel in the above manner for approximately equal relay currents. This current should run between 4 and 5 ma in most cases. After all channels have been set, some slight re-adjustment may be necessary to equalize all currents as much as possible.



By starting with the lowest frequency first, this interaction is minimized considerably to make the set-up a little easier. The value of each pot may now be measured and a fixed resistor of the closest value substituted.

Some very important points are covered in Rameco's instructions, some don'ts as well: Do not attempt to use these filters in any other circuit if proper results are to be realized. Do not attempt to tune with a capacitor larger than .25 mfd. Do not reduce resistor R to a very low value in order to increase relay current. If R is made too small, selectivity will be very poor and it may be impossible to separate some channels.

A simple vacuum tube modulator suitable for most MOPA transmitters is shown with this run-down of circuitry, too. All-transistorized circuits may also be used for much lower voltage drain.

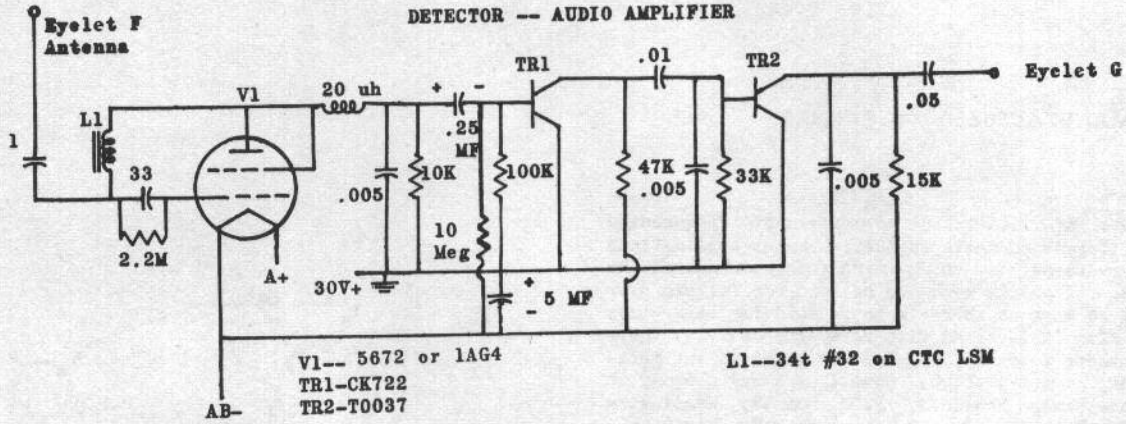
Newest from Rameco now is that they are potting these small units in an epoxi for printed circuit work. The 3-channel unit measures 7/8" in diameter by 1/2" high. They are available in two models. The PCSF-3A is 1200, 1500, and 2000 cps. The PCSF-3B is 2400, 2900, and 3700 cps.

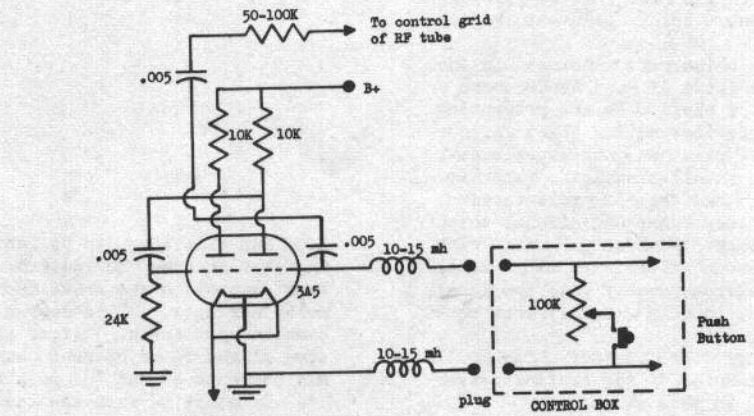
So, with two of these potted filters and with the new Gem Tini Mite relays which will be appearing on the market very shortly, it would be possible to make a fairly compact 6-channel tuned filter receiver. The expense would be only slightly more than for a comparable reed unit.

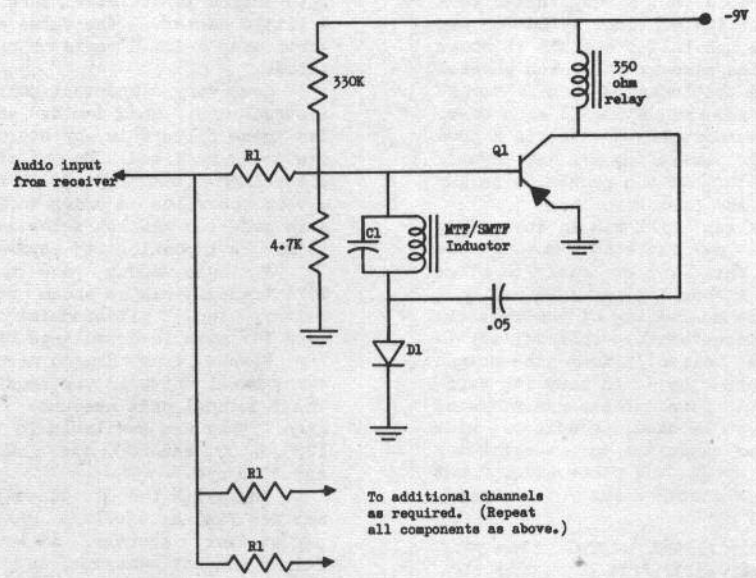
These circuits have been presented in Grid Leaks for the purpose of the serious experimenter and we hope you will share your results and that your results will be as pleasant as ours.

MARCY FRONT END

DETECTOR -- AUDIO AMPLIFIER







C1 - See channel chart on instruction sheet.
D1 - General purpose diode. 1N295, etc.
Q1 - General purpose PNP audio transistor. 2N1265, etc.
R1 - 470K (See instruction sheet).

The Septalette

1/4 A BEAUTY BY STAN JOHN

This plane comes from New Orleans and represents a shrunken or non-Sanforized version of a popular Deep South midwing design, the Septal. Named the Septalette in honor of its distinguished Cajun forbears, it is a logical extension of its larger relatives and displays the same excellent qualities. It is an advanced form of ¼A R/C and will give the builder many hours of enjoyable flying. The design is very stable and can be flown in relatively confined areas such as playgrounds and ball parks. For ROG work, pick a nice Sunday and a large shopping center parking lot.

The originals provided the author with many summer evenings of flying at the playground down the street. Beats waiting around for a suitable Sunday and really allows one to wring out the equipment with many, many flights. We have worn three engines down to nubs in this manner. The larger versions of this ship have been primarily pulse birds also--rudder only, dual pro, and coupled aileron-rudder types.

Basic flight characteristics of all types have been amazingly similar, All have been exceptionally stable ships, sensitive to commands but not erratic. Built as described, the Septalette will do well for you.

CONSTRUCTION:

Construction of the Septalette is very simple and straightforward--weight is so important in ships of this size that complexity must be abandoned. A matter of 6 ounces will mean the difference between a sweet-flying bird and a real nasty one. Keep it simple and light and strength is no problem (within limits, of course).

The fuselage is a simple box. Construct the two sides and join as shown using doublers where indicated. After completion of the basic fuselage structure, it is wise to fiberglass the nose. Fiberglass resin is used over the entire nose section and inside tank and battery compartments. Light fiberglass cloth is used on the bottom of the nose from the landing gear forward.

The L. G. is constructed of 1/16" wire or dural as preferred and is of the knock-off type. Trexler wheels were used on the originals because of their lightness and shock-absorbing qualities; however, if much of your flying is from concrete, it would be wise to use 1¼" sponge wheels for longer life.

Rudder and stab are constructed of medium and soft balsa respectively. Do not omit the 1/16" x 1/8" hard balsa stiffeners into the stab. They do much to prevent warps. The wing trailing edge is notched for the rib ends. The wing center section is sheeted on top only.

Models completed thus far have all been covered with silk, including rudder, stab, and fuselage. The silk adds greatly to the inherent strength although tissue may be used on fuselage and tail surfaces for less weight.

The cockpit, canopy, and pilot's head are cemented to the wing center section. A carved balsa pilot was used on the originals, since no commercial ones were available at the time. The newly available 1" scale Williams Brothers pilot will fit nicely.

The ship pictured was doped red with silver trim, resulting in an all-up weight of 13 ounces. This is a bit on the heavy side for a plane of this size, and, if possible, one should keep the flying weight at or below 11 ounces. The CG must be within ¼" of that shown on the plans.

RADIO INSTALLATION AND FLYING:

The planes shown have only been flown on proportional systems. Other types of control, of course, may be used as desired; and the actuator space available is adequate for escapements of the SN or cut-down compound types.

Radios have been the reliable and light-weight Kraft units. Transmitters are of several different designs including the Kraft, Orbit, and WAG units.

We have used both mechanical and electronic pulsers with good results, although if given our "druthers", we prefer the current mechanical ones. The proportional actuators used are miniature magnetic affairs, modified from the originals designed and used by George Trammell. These are described in Howard McEntee's R/C Handbook.

Battery complements can be cut to the bone, since the small magnetic actuators have only about a 50 ma current drain. We use two #7 (½ size) pencells, one on each side of the actuator and find them serviceable for several flying sessions. Receiver batteries are one U15 22½ volt or equivalent and one #7 pencell for filament supply. Suitable Acme battery boxes are available for the half-size pencells but we solder directly to the 22½ volt B battery.

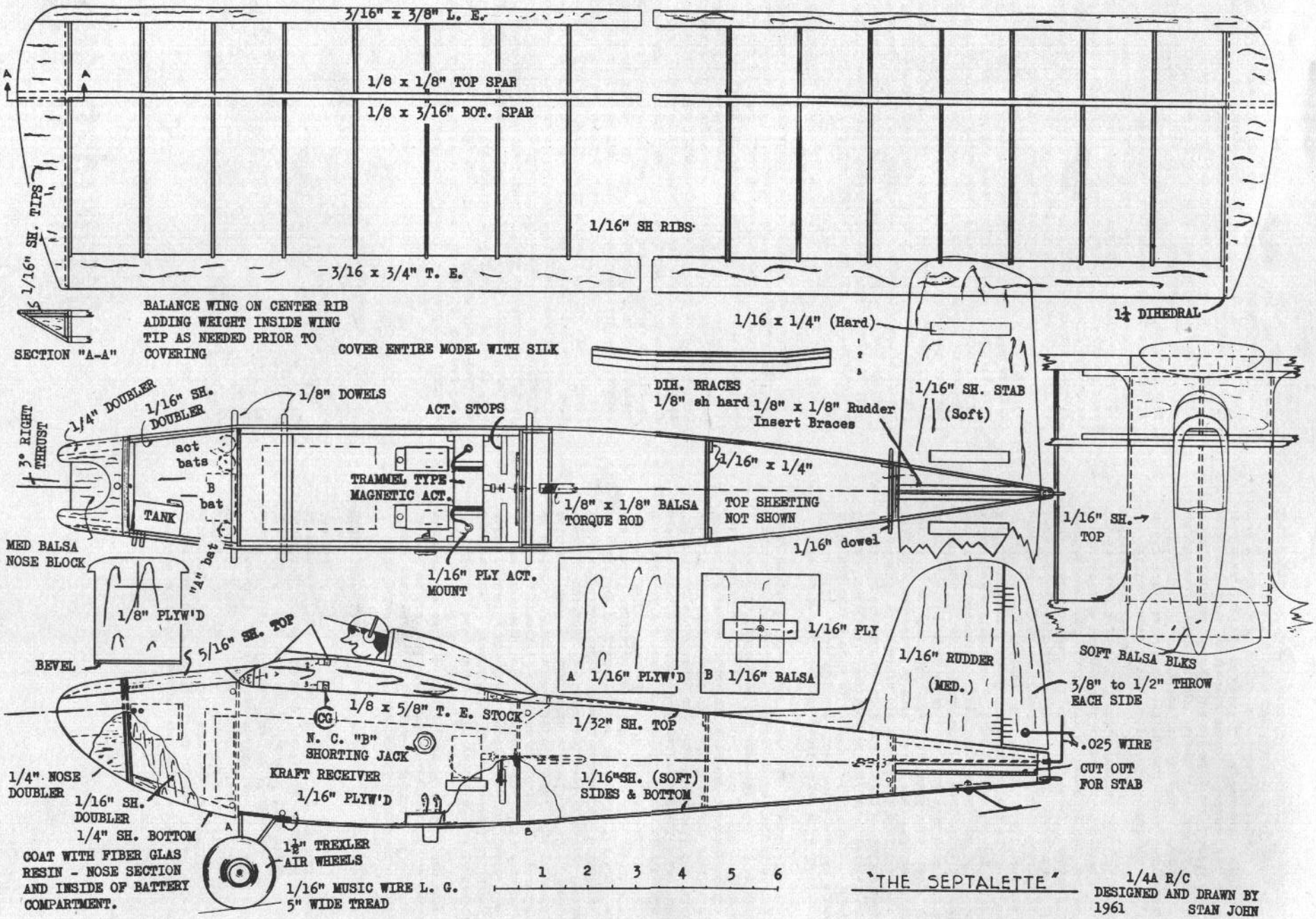
Personal preference dictates the use of an antenna permanently installed in the plane running across the rear cabin bulkhead and down the inner left fuselage side.

Trimmed as shown, the little bird will do very well in calm air. The ship has flown quite well in winds up to 20 MPH but a shim of 1/32" to 3/32" under the stab leading edge will be required for such weather conditions. Penetration is good for a ship of this size.

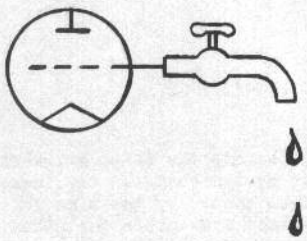
Thrust adjustments are not at all critical, but the setting shown seems to work best. Two washers of right thrust is about right. We have used both the Cox and OK engines in the ships and find them both eminently suitable. Original tanks are not used since the engine run is not adequate. The tank shown gives 5 to 7 minutes of engine time. Best prop is the Top Flite 5½" x 3"P; cut down to 5" diameter if your engine is sluggish. We have noticed that these small engines are sometimes subject to premature power loss when using the recommended hot fuels. This is many times due to glow-head deterioration. If the little mill seems to be wearing out too fast, try a new glow-head before retiring it to a watch-fob (does anyone know what a watch-fob is these days?). Erratic running is usually due to a dirty reed valve.

Flying these little birds is a real treat. They really move around the sky and will give a surprisingly good account of themselves in the stunt category. Two spirals will give enough steam for any of the usual rudder-only maneuvers. The mid-wing configuration gives excellent roll characteristics, making for a fine Immelmann, roll, or split-S. A two-turn spiral will give enough speed for an easy loop if desired.

Full size plans are available at $1.00 per set from Stan John, 1205 Green Acres Road, Metairie, Louisiana.


3/16" x 3/8" L. E.
1/8 x 1/8" TOP SPAR
1/8 x 3/16" BOT. SPAR
1/16" SH. TIPS
1/16" SH RIBS
3/16 x 3/4" T. E.
1½ DIHEDRAL
SECTION "A-A"
BALANCE WING ON CENTER RIB
ADDING WEIGHT INSIDE WING
TIP AS NEEDED PRIOR TO
COVERING
COVER ENTIRE MODEL WITH SILK
1/16 x 1/4" (Hard)
DIH. BRACES
1/8" sh hard
1/8" x 1/8" Rudder
Insert Braces
1/16" SH. STAB
(Soft)
1/4" DOUBLER
1/16" SH.
DOUBLER
1/8" DOWELS
ACT. STOPS
3° RIGHT
THRUST
act
bats
B
bat
TANK
TRAMMEL TYPE
MAGNETIC ACT.
1/8" x 1/8" BALSA
TORQUE ROD
1/16" x 1/4"
TOP SHEETING
NOT SHOWN
1/16" dowel
1/16" SH.
TOP
MED BALSA
NOSE BLOCK
"A" bat
1/16" PLY ACT.
MOUNT
1/8" PLYW'D
5/16" SH. TOP
BEVEL
A 1/16" PLYW'D
B 1/16" BALSA
1/16" PLY
1/16" RUDDER
(MED.)
SOFT BALSA BLKS
3/8" to 1/2" THROW
EACH SIDE
1/8 x 5/8" T. E. STOCK
1/32" SH. TOP
CG
N. C. "B"
SHORTING JACK
KRAFT RECEIVER
1/16" PLYW'D
1/16" SH. (SOFT)
SIDES & BOTTOM
.025 WIRE
CUT OUT
FOR STAB
1/4" NOSE
DOUBLER
1/16" SH.
DOUBLER
1/4" SH. BOTTOM
COAT WITH FIBER GLAS
RESIN - NOSE SECTION
AND INSIDE OF BATTERY
COMPARTMENT.
1½" TREXLER
AIR WHEELS
1/16" MUSIC WIRE L. G.
5" WIDE TREAD
1 2 3 4 5 6
"THE SEPTALETTE"
1/4A R/C
DESIGNED AND DRAWN BY
1961 STAN JOHN

Grid Leaks At Play



And so, Volume III of Grid Leaks begins. When the idea for Grid Leaks was first conceived, it was at that time felt that an interchange of ideas between R/Cers all over the world would provide the basis for a newsletter type of service. Editorial policy and content has, since, been refined and most of Grid Leaks is kept on a fairly advanced plane.

It is most gratifying and we want to thank the literally hundreds of you who have renewed your subscriptions to Grid Leaks. In that large group, there were only two dissenting voices with the policy as now followed by Grid Leaks. Of course, those who had not renewed probably do not agree and we shall, through a market research type of approach, get in touch with them and see if we can't find out from them where they felt Grid Leaks was not worth renewing. Their own lack of interest in R/C, other hobbies, or just what the case may be will be investigated. The non-renewers are in the minority.

As one of our renewers from California says, "This controversy between beginner and expert is, after all, just a little bit foolish because a beginner doesn't remain a beginner very long. And he maintains that, with the better type of instructions coming forward nowadays, the beginner shouldn't remain a beginner for long. This is also very true because of the wide advent that R/C clubs are having and the interchange of ideas that the various type of symposiums are giving to many people.

So with your blessings, GL will continue in pretty much the same way it has been for the last year.

As for news, these have again been very exciting days. First off, business at Ace Radio Control has never experienced such a tremendous pick-up as it did shortly after the first of the year and after the customary and expected Christmas doldrums. You see, selling 95% of our merchandise to your dealers means that, if we haven't sold it to them by December 1, he doesn't have it for Christmas trade and, therefore, business more or less dies immediately preceding Christmas and then starts picking up rather sharply. It has picked up more sharply this year than any other year in our 8-year history. This is due partially to the fact that the Kraft series of receivers and transmitters have experienced such good reception in the field. The IBM Club in Poughkeepsie, New York, for instance, reports that they are 90% Kraft users. The same is true also for the Crescent City R/C Club and others throughout the country. All are having more fun and more reliability than ever experienced previously.

With that in mind, it was again with a great deal of pleasure that Ace R/C and Grid Leaks played host to Phil Kraft on a recent visit from Los Angeles. Many ideas were kicked about and, as usual, we called in our two stalwarts from the KC/RC Club (our own R/C club affiliation), Bud Atkinson and Max Boal, and the ideas and conversations generated were quite stormy (but productive) over one whole enjoyable weekend.

In the works now are the Kraft relay 10 receiver and the Kraft simultaneous and triple simultaneous 10 channel transmitter. This has completely undergone a physical redevelopment which we predict will make it the most popular and versatile transmitter in the multi field available today. There are several unique features which will be employed in the transmitter which will greatly increase its versatility and we believe will, for the price, afford the most avid multi R/Cer the best type of control that he has had available to him to date for reed operation.

As always, it's our pleasant duty to play host to our visitors and we are more than delighted to have again had Phil and to have had such experienced counsel from our fellow KC/RC club members to enable us to come out with products that we feel will be acceptable to the greatest majority of R/Cers. We hope to present in the next issue the Kraft 10 channel triple simultaneous transmitter in its finalized form so that the do-it-yourselfers may proceed without waiting for the kit.

Project Hurricane, referred to in the previous "Grid Leaks At Play" is coming along nicely. Ship #1 was washed out due to a mechanical failure in the linkage but, undaunted, Bud and Max are hard at work on building another from parts supplied by Rob Blackwell, hope to be in the air along with yours truly as soon as the weather permits. Preliminary reports from Bud and Max indicate that the Hurricane will provide one of the best multi-channel trainers since it's very docile and easy to handle and yet capable of all the maneuvers you expect from multi. A bare preliminary number of flights (about a dozen in num-

ber) before the fatal crack-up with trim just about finalized indicated only a couple of minor design changes and these have all ready been incorporated by the manufacturer. We believe that, by the time this kit hits in another 60 days or so, Blackwell Manufacturing will make a valuable contribution to the field.

With Volume III, Number 1, we bring you what we believe to be one of our best issues. We are particularly proud of the two lead articles, "Listening for Trouble" and "Trouble-Shooting Techniques". These were evolved by Ace Radio's own Francis Bradbury and trouble-shooter, Dale Springsted. While they use the Kraft as a basis, the techniques are applicable to almost any audio receiver and we think that these two articles present an important breakthrough in the field for the home builder which has not seen publication anywhere else. We think these are definitely R/C firsts.

Also, we're exceptionally proud of Stan John's little ½A job the "Septalette" and the little actuator. This will enable a lot of back yard fun and we have all ready cleared off the work bench and begun on our own for some fun with young son, Tom.

The Trade Show in Chicago will be history by the time this issue of Grid Leaks reaches you but Bobbie and I are planning to attend and try to give you some highlights in the next issue of Grid Leaks on anything interesting that appears on the radio control horizon. From there, we will fly on to New York for conferences with Wittich Holloway of Model Airplane News and Howard McEntee of American Modeler to broaden the scope of our service to you, our readers and customers.

We suppose that, by now, quite a bit of discussion has been evoked by the proposed rule changes for radio control but, in the event that these have been missed, we're quoting from Model Aviation, 1961:

"It has been proposed to change the definition of the various R/C classes to the following in terms of control surfaces only with no restrictions on the radio gear. The proposal is as follows: Class 1, rudder only. No brakes or steering tail wheels permitted. Class 2, rudder and elevator control only. Brakes and steering tail wheel permitted only if coupled to rudder, elevator, or throttle. Class 3, rudder, elevator and wileron with no restriction as to other control. Throttle control permitted in all classes.

"Other proposals include: (1) Scoring on the basis of .025, the thought being that the object is to do all maneuvers well--not just the high-point ones. ( ) A mandatory flight pattern. (3) Allotting to a contestant the total time of approximately 11 minutes, 3 of which may be used to start his flight. (4) Requiring a qualifying flight prior to scale fidelity judging."

From discussions with our own club members, great interest is being evinced in Class 2. This the boys seem to feel will really make the so-called Intermediate class stand out and, while we have long advocated the Intermediate type, we see no reason why this particular rule will penalize. Nor do we see Class 1 hurting single channel.

We believe that, for every one person who enters radio control contests on a national basis, there are several fliers who, because of financial circumstances or choice, will be flying simple rudder only single channel type of equipment wich as much as they can get out of it.

And so, rule change or no, from where we sit, 1961 has started off pretty excitingly. With the many projected things that we know of with a do-it-yourself space control type of idea having been developed in the Virginia area and, apparently, now perfected according to late word from John Worth by Don Hewes about which we're trying to track down more information, we believe that the single, the single rudder only escapement flyer, the pulse proportional boy, and the reed and filter outfits, and the truly multi proportional outfits will see the greatest interest that they have ever seen.

So, with that in mind, let's all have R/C fun in 1961. We're looking forward to pushing the buttons quite often as the year goes on.

See you next issue.

Yours very sincerely,

Paul F. Runge
Editor

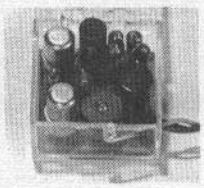
What's New

KRAFT SINGLE RELAYLESS KIT

Hardly had the February issue of Model Airplane News rolled in which featured the relay-less Kraft receiver by E. B. Chapman in the Ed Lorenz column than we, at Ace Radio, begin getting inquiries like this: "Are you going to kit?" The answer to that is a resounding "Yes". Kits are now in production and should be ready on your dealers shelves or direct from Ace Radio Control before too much longer. Elimination of the relay means that this can be used only for escapement or spring-loaded type actuators since it is an SPST contact but it does eliminate the possibility of dirty contacts and arc suppression is not required.

27¼ version	$17.95
50-54 version	$19.95

THREE POWER CONVERTERS



Here are three small power converters which may be used for powering multi 30 volt receivers. One is by Orbit which requires five Voltablocks and will put out approximately 34 volts with standard DC receiver load of 2 mils. It will put out 31 volts with a 15 mil load. In addition, this supply is burn-out proof in that, with a direct short in the receiver plus line, the supply simply stops working. When the short is removed, the supply goes back into operation. Primary drain is nominally 65 to 70 mils at the 2 ma output, load rising to approximately 120 mils when the load increases to 15 mils in the output. Price is $14.95.

The next is one manufactured by Jaytronix of 507 East Orange Grove, Pasadena, California. Requires 4.8 volts in with 30 volts out. Has about an 88% efficiency and puts out 32 volts at 10 mils. Price is $13.95.

Next is the Ace kit of the Kraft power converter which is also furnished with its own printed circuit board and features 4.8 volts in for 35 volts out and will sustain a 15 mil drain at 32 volts out. This is in kit form and is available at your dealer's or Ace Radio Control at $10.95.

CC RCA JACK

Closed circuit jack RCA and plugs have been in demand. These do not require shorting plugs when used in metering position in aircraft or boats. A set of one plug and one jack for only 30¢.

VECTOR PLUG

Vector has a 7 pin miniature plug which features round pins which do not break down the socket. This is a beautiful item and they will stand up under repeated pluggings and unpluggings. Plug available separately. Only 70¢

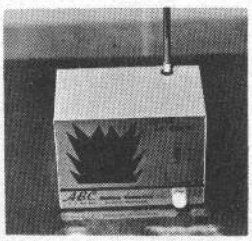
NEW ACE CATALOG

Ace's new 36-page catalog is out. It is the most comprehensive and offers a one-stop source for those hard-to-get and hard-to-locate items.
Two 4¢ stamps appreciated.

BRAMCO APPOINTED ACE

Bramco has appointed Ace as a distributor of their entire line. Ace Radio Control will shortly be stocking the entire Bramco line and it may be had through your dealer or direct from Ace Radio Control. Consult Bramco's advertising for their latest line.

ABC MONITOR



Feeling that there was a need for a good monitor for club use, ABC Battery Company has proceeded to manufacture some on a custom basis. The little monitor we tested is capable of picking up interference quite well and has quite a bit of gain and can be heard very well over the noise of engines. These are available only from ABC Battery Company, P. O. Box 626, Richland, Washington on custom built basis at $49.95. Clubs or individuals interested, please write to ABC direct.

RAMECO NEWS

Rameco now offers potted filters. These are 7/8" in diameter by 1/2" high and are three-channel types. Available in two models. The PCSF-3A is 1200, 1500, and 2000 cps. The PCSF-3B is 2400, 2900, and 3700 cps. Price is $8.80 each. These are designed for mounting on a printed circuit board. Come complete with instruction manual and are for the serious tone experimenters.

Rameco also offers their instruction and circuit manual. This new manual is supplied with all orders for Rameco filters and contains many circuits and answers for the R/C experimenter. All circuits are transistorized and included are transmitters, a typical receiver filter circuitry for multi-channel operation and tone generators. Rameco I & C Manual is 20¢.

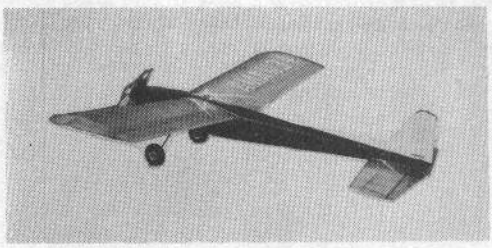
ECKTRONICS 6 TR. & RX.

Ecktronics offers the famous Kraft 6 channel ready-to-fly, completely assembled, receiver and transmitter. The same high-quality features that made the Ace kits so popular. Will be available for delivery shortly and may be had from your dealer or Ace Radio Control. Kraft 6 channel transmitter is $74.95 and the Kraft 6 channel receiver is $79.95.

R C PRIMER

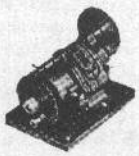
The R/C Primer by Howard McEntee should be on the market by the time you receive this. It is a new book with the beginner in mind. Published by Kalmbach Publishing Company who are famous for their fine manuals on model railroading. Written by the old master, Howard McEntee, it takes a beginner literally by the hand and leads him through the maze of electronics and helps to know where to begin and what to do. 8½" x 11" book with full-color cover. Price is low considering the wealth of information that it contains. $2.00.
Available your dealer or Ace R/C.

TMP METEOR



Coming soon! About April 1, will be the new Technical Model Products Meteor. This will be a unique multi kit in that it has a full skin strength formed fiber glass fuselage with the color moulded in. No bulkheads. About 11 oz. Conventional wing and tail with a few tricks to simplify the building. Specifications are 750 sq. in.; 12% laminar flow airfoil; 35-45 powered. Definitely designed for multi although shoulder wing configuration permits single channel operation if you're desperate. Price has not been set but this should considerably cut the building time with the fuselage completely finished. Watch future issues of Grid Leaks for price and actual release date.
Available your dealer or Ace R/C.

MOST SERVO



New "Most" proportional servo model #PS1B. Has mechanical centering and requires no rubber bands. Fast response. Compact size is 2 1/8" x 1 5/8" x 1 11/16". Operates on 2.5 to 4.5 volts. Can be used in airplanes, boats, cars, etc. Automatic neutral on the 50/50 pulse. Can be used with any pulse system. The perfect servo for use with the "Most" pulser, Simpl-Simul, or Baisden GG. Only $9.95. Available your dealer or Ace R/C.

ANTHONY PROPORTIONAL RECEIVER KIT

Joe Anthony won the Intermediate in Dallas with a simple receiver designed for proportional control. Utilizing a superhet--the Nicad, it's a cinch kit to build. Uses two relays, one for rudder and elevator ala Galloping Ghost, and one for motor, with a simple escapement. Uses 3 volts for receiver. All parts and completely built up superhet front end. Houses in aluminum case, measures 2½ x 2½ x 1, in addition to Nike case. All parts that are need with extra special step by step instructions. $67.95.

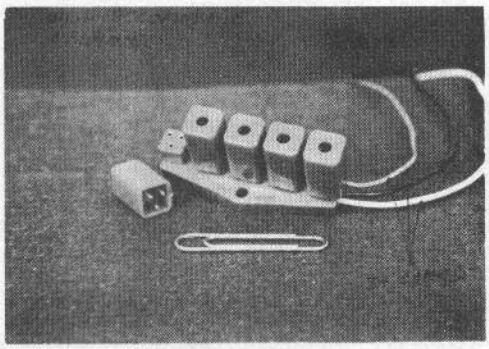
NEW AT ACE

Daily new items are appearing on Ace R/C shelves. The popular CitizenShip Air Wheels will be in stock by the time this issue reaches you. 3" or 3½", either per pair #$3.95. ERC crystal for 25.5 or 51 mc on the way. Standard pin, basic 12.750 mc -- $4.95. Tomoser 5C servos, also due in shortly. Order direct or through your dealer.

GC TUNING WAND

New tuning screwdriver. This one is it! It will tune both screwdriver slot cores, capacitors, and hexagonal head cores. Manufactured by General Cement, they list at a little more but they are of high impact plastic and will provide much service. Available from your dealer or Ace Radio Control. Order GC #8282 for 55¢.

CRESCENT NEWS



From Crescent Industries comes the following quote:

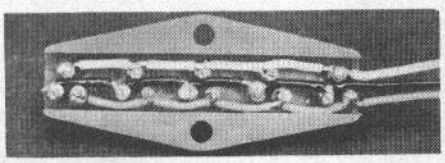
"We will have in the not-to-distant future a terminal block for the 'R/Cers'.

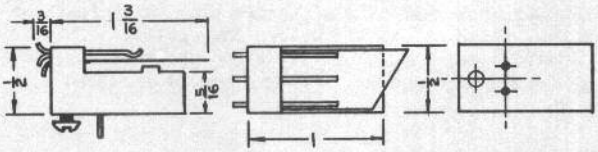
"It is similar to our family of miniature connectors, in so much as the male half of our 3 pin connectors will mate with it. It is developed primarily for the multi receivers and their servo battery connections.

"It is composed of five three pin female connectors molded together to form a compact consolidation of all the three servo battery leads from which one set of three wires only are connected to the battery supply; this will allow servo removal. The size is 1 3/4" long x 3/4" wide.

"It will be supplied with the five mating male connector pin blocks and caps. The price will be approximately $2.00 and will be in kit form as the miniature connectors."

SUBMINI REED

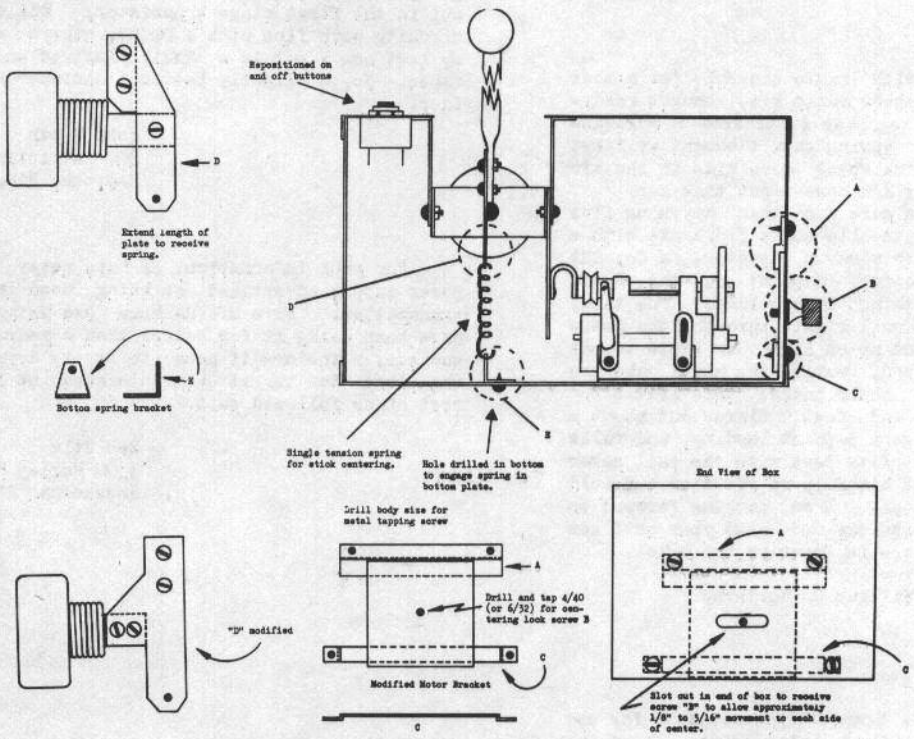




On a custom basis Ace R/C is handling the New Haven Electro Reed Bank. The smallest commercially available. Weight is only 9 grams. May be had in 4, 6, 8, 10, DC Coil, 120, 400, 800, 1K, 3K. These are made to order only. 4-6 channel $18.95. 8 to 10, $19.95. For split reeds add $2.00 to foreging.

Bits And Pieces

STICK CENTERING FOR THE "GG"



With the appearance of the Baisden GG pulser, we received a letter from Stan John of the Crescent City R/C Club in New Orleans congratulating Don on an excellent pulser and remarking that it was very similar to his with the exception that Stan had worked out a centering arrangement. With a little bit of doodling, Stan worked out that same arrangement on the Baisden GG and those drawings are presented here for the builders of the GG box who might wish to add these to their own box. Stan says this is no way to distract from Don's excellent box but merely a possible way of improving it.

The purpose of A is to keep the motor from pivoting when screw B is loosened. Also provides a track for the motor bracket when moved side to side for centering. Purpose of C is to keep the motor bracket from moving inward at the bottom when B is loosened. (NOTE: Suggest motor bracket be made of .062 instead of .050 for more thread body for screw B.)

RCM & E ADDRESS

In the R/C Bibliography presented in the last issue, reference is made to RCM & E (Radio Control Models & Electronics), a sister British publication. So many requests have been received from individuals on the availability of this magazine that we are listing here its address. Published 12 times a year, the subscription price is $4.00 for 12 issues. D. J. Laidlaw-Dickson, the editor, advises that some back issues are still available for those who wish to have complete files. Any GL readers desiring to subscribe to this excellent publication, please contact RCM & E directly at 38, Clarendon Road, Watford, Herts, England.

DREAMBOAT DOPE

With the appearance several issues ago of Red Costlow's Dream Boat in the article entitled, "We Build the Kraft Multi-Fli", Ace Radio and Red have been besieged with requests on plans. It's good news that the original .09 powered 48" plans are still available from Hobby Helpers (group #455) and sell for 50¢. Further word from Red says:

"My Dream Boat is built as follows: The hull is blown up so that it comes out to 48" long and built to the same scale throughout. The bulkheads were modified to take the servos, etc. It is sheeted with 3/32 top and sides and 1/8 on the bottom. Covering is nylon. Here is where the design changes. The wing is made of two 30" x 12" panels. Tips are another 2" and are the same style as the Live Wire Champ. Ribs are 1 5/8" Clark Y and spaced 3" apart. It is sheeted with 4" sheeting top and bottom and the trailing edge is made of 1 1/2" sheet (ala Astro). It is covered with silk. The rudder and stab is Astro all the way and is copied from the magazine article. The pod is 4 x 12 and circular, with the Torp radially mounted. The 1/4" firewall is notched to mate with the 1/4" ply pylon. This was the only weak spot in the ship, in that vibration cracked the firewall loose from the pod. This was patched with nylon and Resi-weld fillet. Works real slick. The pod is raised so that it will clear a 12" prop with about a 1/2" to spare. This will take care of the down thrust. I used a clunk tank, but I think greater strength can be had if the tank is standard and the pod is made solid around it. As I mentioned, the pylon is only 1/4" ply and is strong enough. The motor servo is mounted in the wing to the side of the pylon with the pushrod running out through a curved brass tube. This works out very well. Balance is about 40%, wing is at zero and stab is

3/8" negative measured at the hinge line.

"This size will give you a nice setup if you use the Kraft Multi 4 (or 6). There is room for the six and servos. I do feel that the full motor control is really needed. Elevator would be nice but don't know when you would use it. I used three brass washers of down thrust and one of right thrust."

"I've been fooling with radio control for almost six years now. I've assembled radio kits, bought ready-to-go equipment, and put together stuff from magazine articles. Starting this spring when I bought my first Kraft single receiver, I've spent more time in the air than all of the rest of my R/C career put together.

"My ½A Beau Bipe is more fun than anything I've built. I'm using three pencells and a Y15, Kraft with a Babcock Mark II bonded with kick-up elevator, a Cox RR1 and thin solid rubber wheels. I point out the wheels because I discovered something interesting. The thin, knife-edge K & B wheels roll right through the grass rather than getting tripped up on it. Our field is cut like an average lawn and, while the multi jobs are nosing up or flipping on their backs, this little 26" stinker comes in smooth and fast, flares out about a foot off the ground, makes a 3-point landing, and rolls to a stop in about four or five feet with the tail never meeting the ground. Just hit flip-up elevator and hold it until the plane stops. I am looking forward to bringing it to the "Simple-Posy-Um" next year so I can fly it around that flag pole in front of the motel.

William C. Northrup

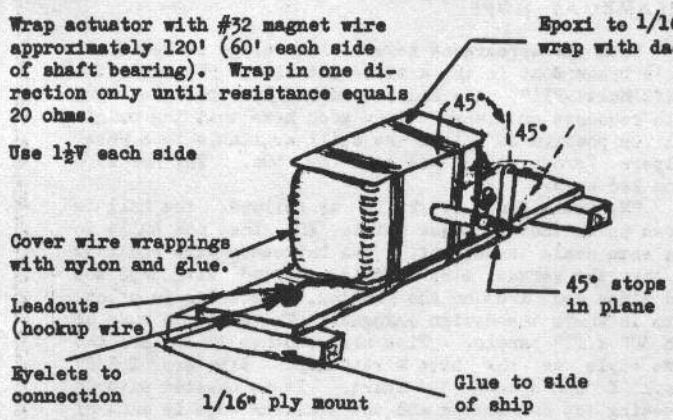
A Grid Leaks note: A number of people have tried the engine control circuit I had in the May-June '59 issue with pro and con results. When good it was very good; when not, it was soon discarded. Evidently, it's all in the first stage transistor. While I had several circuits work fine with a CK722, others were lousy. On my last one I put in a 2N217 instead and troubles vanished. So, a slightly better transistor there is a good idea.

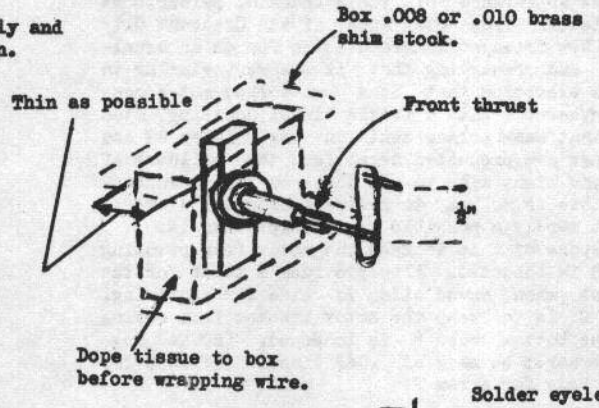
John Worth
300 Patrician Drive
Hampton, Virginia

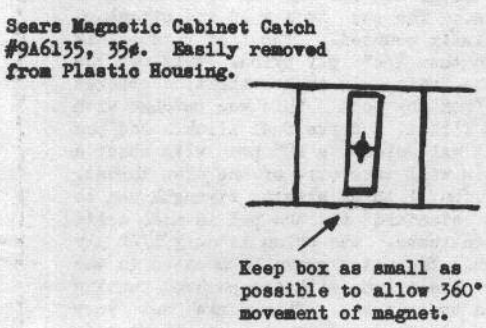
For your information, I have never seen the MC 20 power supply advertised as being used in the Good TTPW transmitter. Five of us here are using the same and have been using it for better than a year with wonderful success. The credit goes to Dennis Reynolds as he was the first to try it (in this area, at least) and the rest of us followed suit.

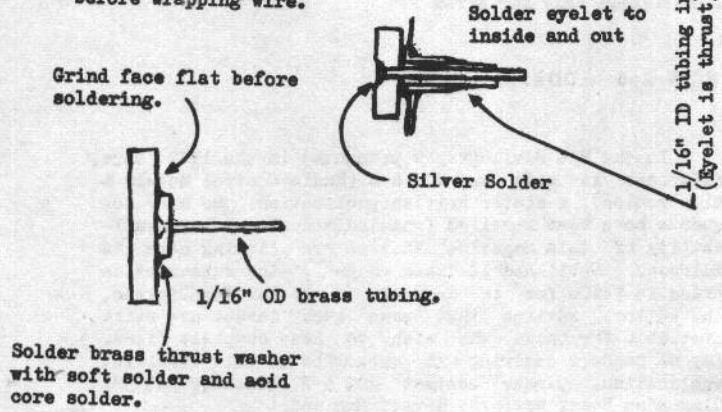
Bob Cilk
3300 Hurley Way
Sacramento 25, California

Stan John mentions a Trammel type actuator for use in the Septalette. Drawings below give all of the necessary details and building instructions.



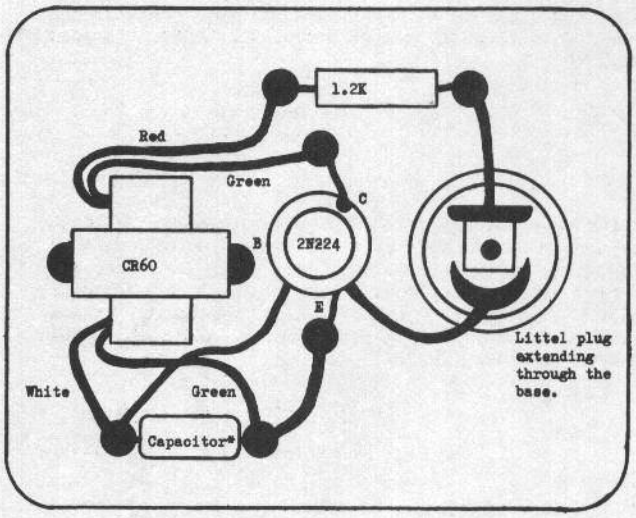






Modulate Your GDO

ADDS TO VERSATILITY



* Select from .02 to .04 for audio frequency desired.

Invariably, when the R/C bug bites and becomes serious, additional test gear is added to the R/C'ers bench beyond the simple meters used and required for the simpler type.

These instruments are generally selected from the standpoint of being helpful in their designing new equipment or trouble-shooting existing equipment.

Generally, among this added gear, one will find a grid dip oscillator. The uses of a grid dip oscillator are many and, being offered in kit form by several manufacturers, it has a lot of work bench applications at reasonable cost.

One serious shortcoming of most grid dip oscillators, however, is the fact that it is not modulated. In view of the ever-increasing work which requires a modulated signal, we set about modulating our Heath GDO. There are a lot of Heaths available and, while this circuit is designed for operation with one of this manufacture, the circuitry is similar enough on other commercially manufactured items that this circuit could probably be adapted for their operation including the one that was written up in American Modeler and designed by Howard McEntee.

Only one caution would be required and that is to make sure that the plug required for your GDO, if it is not of the Heath variety, might have a different polarity and this could be disastrous for the transistor if it did. It is imperative that the plus and minus in this circuit be used as shown on the schematic.

Modulating your grid dip meter is easy with the accessory shown in the photographs. It plugs into the phone jack and requires no changes in the internal circuitry for the Heath. Plug it in and you have a modulated GDO. Unplug it and your GDO is precisely as it was before.

The modulator takes all of its power from the GDO itself and its modulation frequency with the Heath is dependent upon the size of the capacitor. This will need to be varied to the particular audio cps that you want to work. The schematic shows the values required for a 200 to 400 audio cps with the Heath.

This plug-in accessory will be very simple and easy to build and no step-by-step building instructions will be given.

This model was built in a small plastic box which is known as the PB #1 and it uses the plug as the fastening device. It is necessary, if you cannot find the nut of the size to fit your standard phone plug, to saw off the top of the bakelite so that you leave a 1/4" bakelite ring which will then fit over the plug thread so it will serve as a mount for the plastic-shelled modulator.

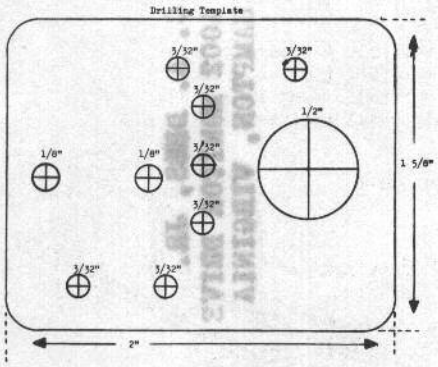
All other components of the modulator are mounted on a small piece of synthane with a dimension of 1 5/8 x 2 inches. The drilling template is given. Complete arrangement is not critical. All wiring should be checked before the circuit board is attached to the lid.

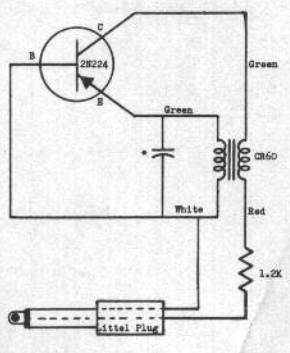
Other transistors can be substituted for the 2N224 used but the frequency of the audio may vary.

If you use a transformer which is different from the one that is indicated on the schematic, the circuit may not oscillate. If this is the case, try reversing the leads of the primary or secondary of the transformer.

With the modulator plugged into the GDO, place it near the receiver antenna and adjust the meter to the frequency of the circuit under test. Now when testing is complete, go back to normal operation by simply unplugging the modulator which takes it out of the circuit.

We believe you will find this simple GDO modulator a very handy addition to your already handy grid dip oscillator





*Select from .02 to .04 for audio frequency desired.

NOTICE TO ALL EUROPEAN READERS

By arrangements with Malcolm Douglass of Radio Control Equipment and Accessories, 19 Byron Drive, Rawcliffe Lane, York, England, Grid Leaks is available on a subscription basis to arrive via first class mail through Mr. Douglass for 25/0 for the 10 issue volume. Subscription will be begun with the current issues unless otherwise specified. Direct all subscriptions for delivery in Europe to the above address.

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