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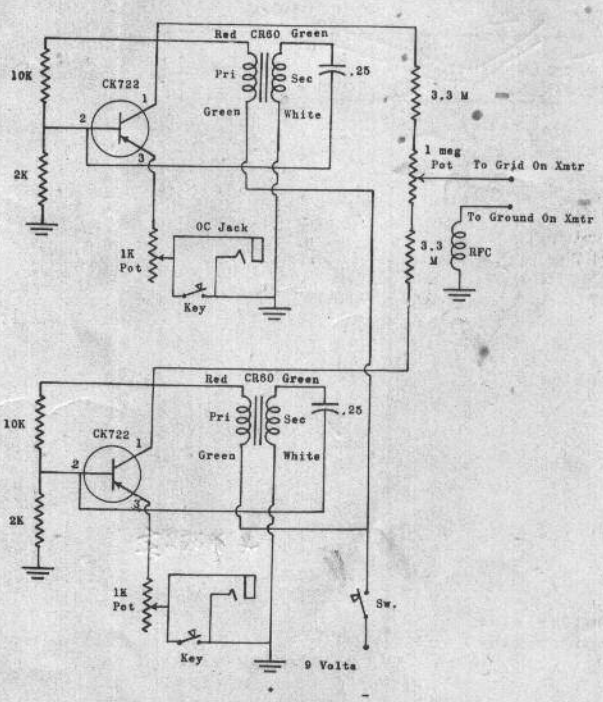
MaRCytone Twin Simul Tone Generator



This MarcyTone dual tone generator compliments the MarcyTone transmitter and must be used with the Marcy Twin Simul transmitter. It is quite easy to change the conventional transmitters over to the type shown in this issue of Grid Leaks but a tone generator must be used. For simplicity and ease of operation, we've seen few to beat these particular tone generators.

A study of the connection chart and the photographs will quickly show the more experienced how this circuit is hooked up. It is one of the easiest to get going and very tolerant as to parts used and may be used with other transmitters provided it goes through an amplifier tube to the modulator.

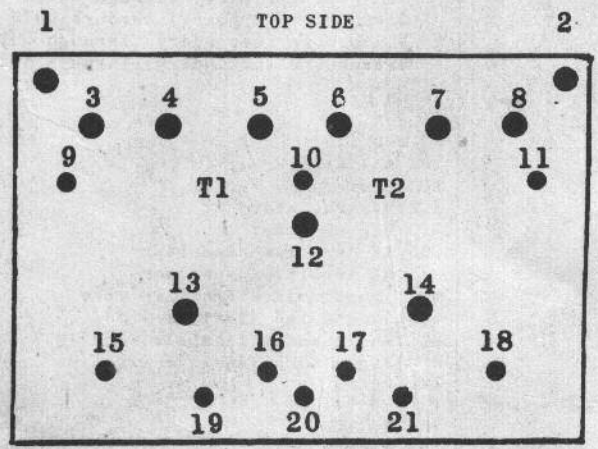
The audio cycles per second are had by varying the 1K pots. These may be varied in audio range from approximately 1000 to 6000 cycles per second.

A 1 meg balancer pot is used to provide an even balance of audio output in case one tone generator has a greater output than the other and this is reflected in receiver current rise range. This is detailed under the receiver write-up.

This completes the construction of a very versatile flying system and the tone generator may be used with the push buttons or, as may be seen from the photographs and drawings, open circuit jacks have been provided into which pulsers may be plugged for Twin Simul proportional operation.

Using the MarcyTone transmitter and the tone generator of this type with two push buttons, it should be perfectly feasible to fly two MarcyTone receivers simultaneously provided their audio cps are far enough apart. It would not be advisable to use two transmitters, but simply have two different keys going to two different people flying off the same transmitter. If two transmitters were to be used, there would be a beat frequency involved and it is questionable whether the receivers would operate.

The Marcy Twin Simul transistorized pulsers will be printed in the next issue of Grid Leaks.



Full size of synthane chassis

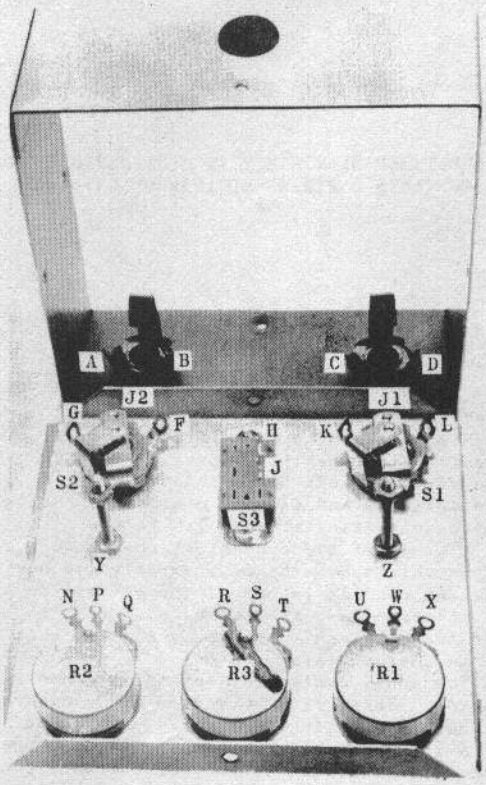
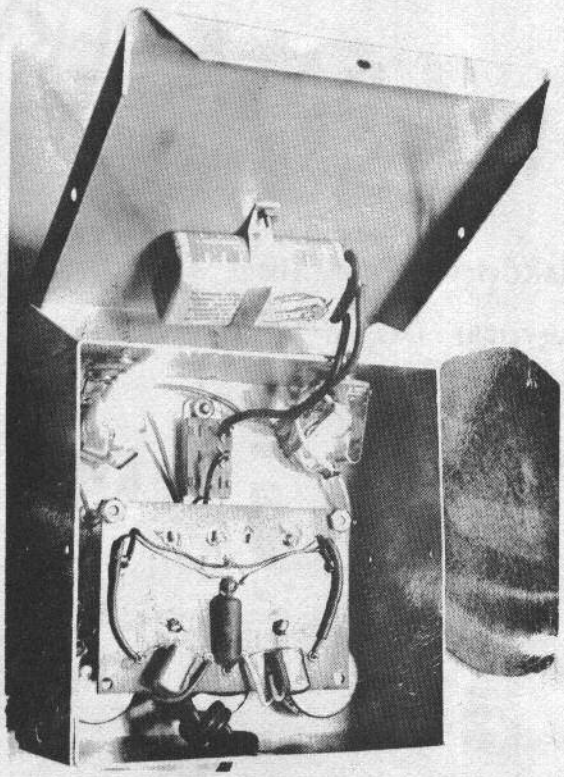


Photo shows placement of parts before wiring. Note 4/40 x 1 bolts and nuts which will be to hold synthane chassis when wiring is complete

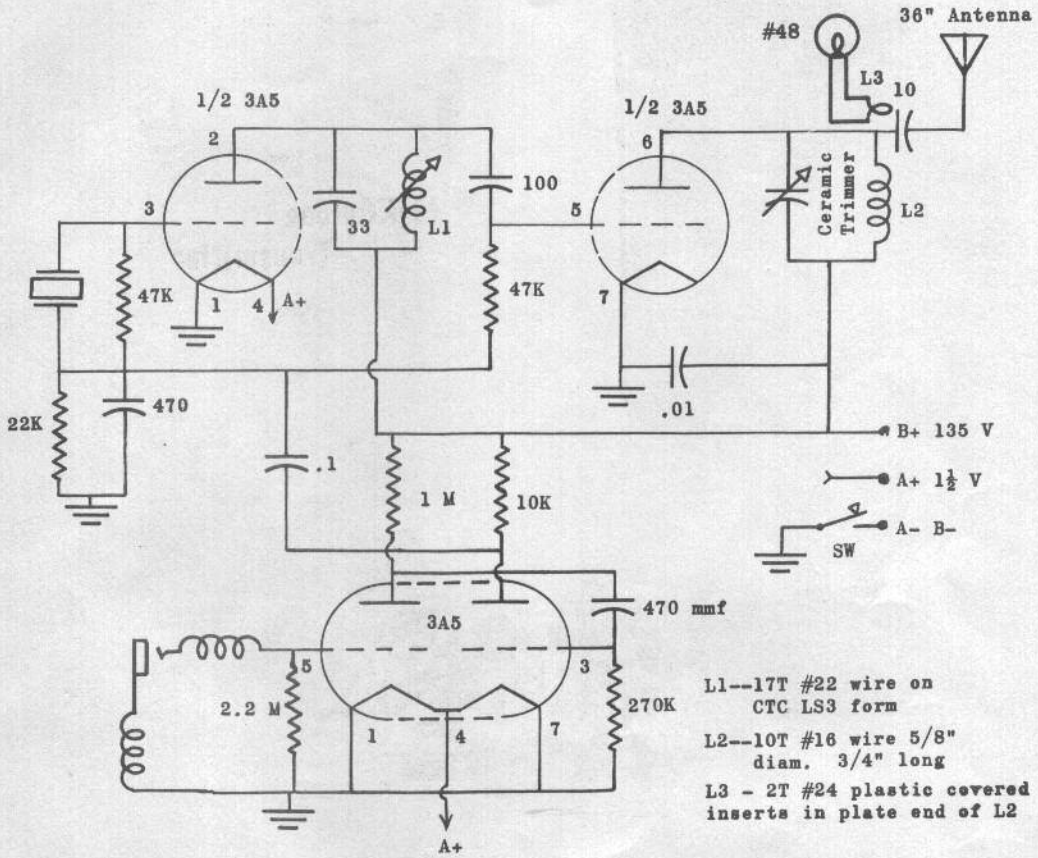


Completely wired unit. Only CK722's and RFC are on the bottom of chas-is. All other including CR60's on other side.

CONNECTION CHART

COMPONENT	CONNECTS FROM	TO
T1 Connections		
Red wire (primary) through hole 3	----	15
Green wire (primary) through hole 3	----	10
White wire (secondary) through hole 3	----	12
Green wire (secondary) through hole 3	----	9
T2 Connections		
Red wire (primary) through hole 8	----	18
Green wire (primary) through hole 8	----	10
White wire (secondary) through hole 8	----	12
Green wire (secondary) through hole 8	----	11
70 uh RFC	12 (bottom side)	20 (bottom side)
2K resistor	12	14
2K resistor	12	13
10K resistor	14	18
10K resistor	13	15
3.3 Meg resistor	18	21
3.3 Meg resistor	15	19
.25 mf Aerolite capacitor	13	9
.25 mf Aerolite capacitor	14	11
4½" length black flexible wire	10	NC
4½" length red flexible wire	12	NC
2" length white flexible wire	16 (bottom side)	NC
2" length blue flexible wire	17 (bottom side)	NC
TR1 Base	----	14 (bottom side)
TR1 Collector	----	18 (bottom side)
TR1 Emitter	----	17 (bottom side)
TR2 Base	----	13 (bottom side)
TR2 Collector	----	15 (bottom side)
TR2 Emitter	----	16 (bottom side)
2" length blue flexible wire	----	21 (bottom side)
2" length white flexible wire	----	19 (bottom side)

Marcy Twin Simul Transmitter



No particular building instructions are given for this transmitter in this issue of Grid Leaks for the very simple reason that we feel that Grid Leaks readers are experienced enough to take circuits and go with them.

A connection chart, however, is shown which, with the material presented, will help considerably in the wiring of these units.

With the Marcy Twin system now becoming available, it is possible to apply two distinct channels either on push button operation or pulse operation. The Twin Simul generators may be made with either push buttons or open circuit jacks into which the Marcy transistor pulsers may be plugged for dual simultaneous operation.

The system was evolved by Marcy after long experimentation and after much flight testing and has had very much success in the air.

Tuning procedure for the transmitter is still exactly the same as the old transmitter. The master oscillator must be gotten into resonance with the meter and then the power amplifier tuned for resonance with the bulb glowing dimly. While this represents low RF output, this is more than adequate to power the MarcyTone receiver well in excess of 2000 feet on the ground.

For the home brewers, it would be entirely possible and feasible to house the MarcyTone Twin Simul tone generators on the transmitter into one cabinet but in producing a kit of this nature, we felt it advisable to keep in mind the thousands that have bought the MarcyTone single channel or multi channel equipment who would wish to convert and therefore the Twin Simul tone generator is housed separately.

Ever since the appearance of the MarcyTone system, both single and multi, in Grid Leaks Volume I, Numbers 4 and 5, there has been increasing interest throughout the country in having a twin simul receiver and transmitter combination.

The fact that the MarcyTone is being so universally accepted throughout the country is evidenced by the number of fliers who are using this system in preference to reeds. There are certain areas of the country where the MarcyTone has really caught on and has made many converts. We feel the new Marcy Twin Simul system will also win many converts because of its great versatility. Old MarcyTone transmitter users will be delighted to know that there will be very little scrapping of their material to convert their present transmitters to Twin Simul operation.

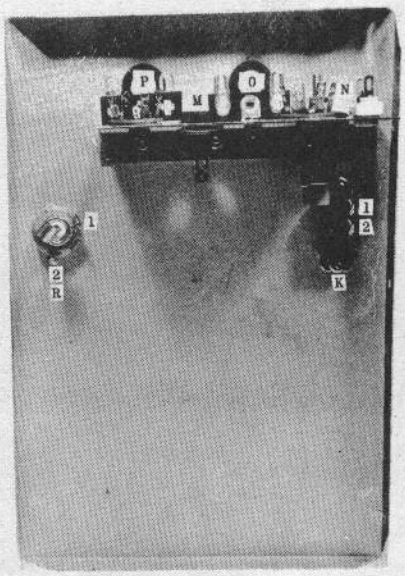
All it will require, as the study of the schematic will show, is the rewiring of the 3A5 which, in the old MarcyTone transmitter, is used as a multivibrator audio modulator, into a two stage amplifier. Into this, then, is plugged a two tone simultaneous audio generator which the transmitter then accepts. There is only one change in the RF section of the transmitter and that is the 100K resistor in the power amplifier is changed to a 47K to make the modulation come to 100%.

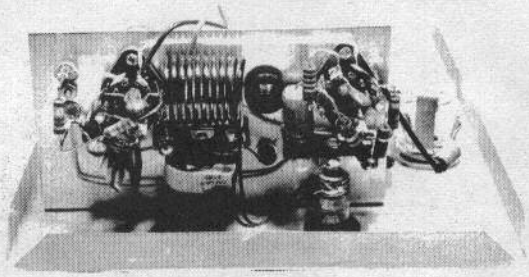
The Twin Simul tone generators are all-transistorized and are temperature stable from both extremes of both hot and cold.

The material for the Twin Simul tone generators is presented in another article in this issue.

The MarcyTone equipment has been checked against frequency standards and is acceptable under the new FCC specifications on the new docket.

It should also be possible to fly two ships simultaneously using two receivers on different audio frequencies and have two push buttons or pulsers coming from the tone generators. This has not been tried but is, at least theoretically, possible.

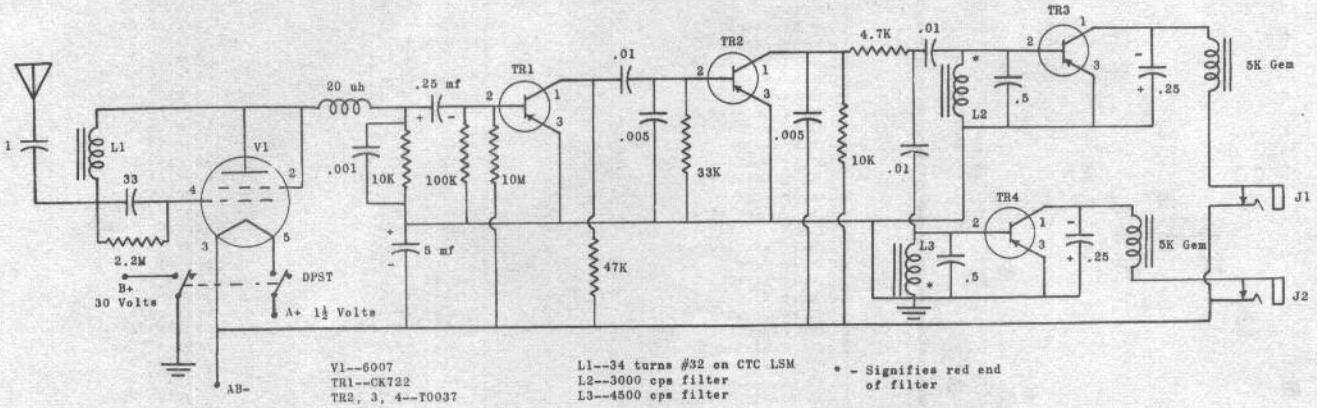


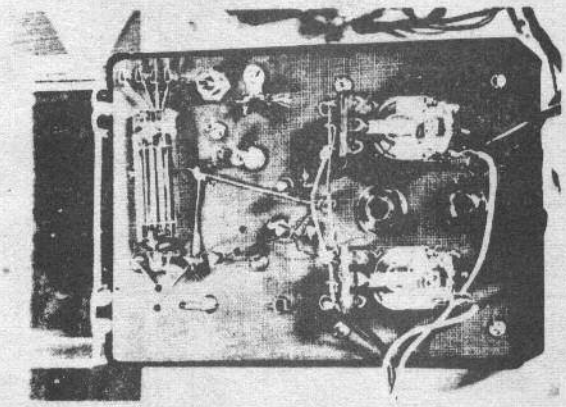


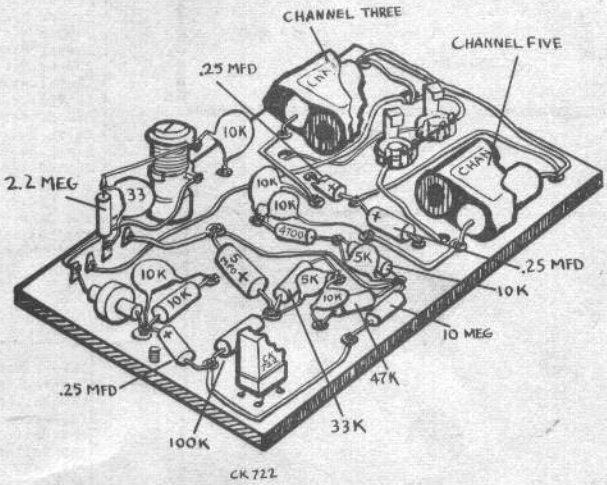
CONNECTION CHART

COMPONENT	CONNECTS FROM	TO
Jumper	B1 and B7	X
Jumper	F1 and P7	Y
Jumper	B4	F4
Jumper	B6	C2
Jumper	C1	G2
5" length brown flexible wire	B4	NC
4" length black flexible wire	X	NC
6" length red flexible wire	C1	NC
Jumper	A2	G1
Jumper	A1	B3
Jumper	L1 (through H)	C1
Jumper	L2 (through H)	B2
33 mmf capacitor (silver)	L1	L2
47K resistor	A1	A2
22K resistor	A2	B7
100 mmf capacitor	B2	B5
47K resistor	B5	A2
10 mmf Erie capacitor	C2 (through E)	D (antenna jack)
.01 mfd disc capacitor	C1	X
Ceramic trimmer	C1	C2
L2 (tank coil)	C1	C2
470 mmf capacitor	A2	X
270K resistor	F3	F1
10K resistor	F2	G2
1 Meg resistor	F6	G2
.1 mfd capacitor	F2	G1
470 mmf capacitor	F6	F3
2.2 Meg resistor	F5	F7

MaRCytone Twin Simul Receiver







Readers of Grid Leaks and MarcyTone users, in particular, will see that the MarcyTone Twin Simul is only a slight alteration of the single channel receiver.

The only change in the deal is the coupling resistor 4.7K going through two .01's to the two filters.

It should be perfectly feasible to house an additional channel in another plastic box the same size as the MarcyTone single channel unit and make present receiver conversions without any sweat.

The receiver is, admittedly, a little large but this doesn't seem to bother in the installation, as witness, the one from Marcy.

Marcy is pulsing both channels and using a mechanical motor control device on the rudder. As you will note from the photograph, he is using one Orange Blossom Actuator and one single-geared Mighty Midget Motor which has a servo switch on it. This means that with full on from the control box, the polarity drives the motor in one direction and makes contact and full off drives it in the other direction to make contact on some contact points at the base and yet swings a full 180° through the rudder so that flight is still straight forward.

Tuning procedure is just a little more complicated than the single channel but not bad. On the schematic you will find the two test jacks, one for each channel. These will be used after the initial tuning has been accomplished. To tune initially, hook a 0-5 milliamp meter in B+ lead as with the conventional receivers. Now turn on the carrier of the transmitter, leaving the audio from the single generators off. Tune slug of L1 until a very slight dip is indicated in current. This will be about 3.2 ma to 3 ma.

Now take the meter out of B+ and plug into jack #1. Then using the MarcyTone dual tone generator with transmitter, key one audio button. Vary the corresponding 1K pot until a rise in current reaches about 5 ma.

Now plug meter into jack #2 and key the other audio button, varying that corresponding 1K pot for the same reading.

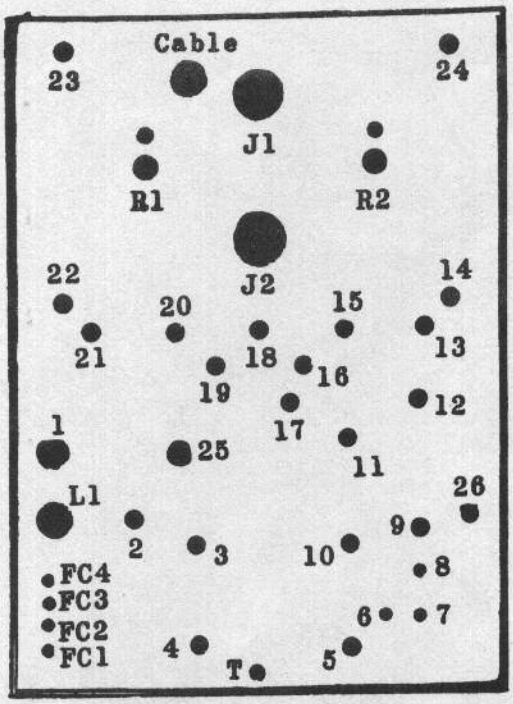
If, when the two channels are tuned to their maximum, there is a difference in their current readings, vary the 1 meg balancer pot in the dual tone generators until the readings are equal.

Entire unit may be housed in a plastic box. If this is done, it is recommended to use a couple of pieces of wood to rest the receiver on. The coil form will hold one corner and the opposite corner, adjacent to the CK722, place a piece of wood approximately ¼ x ¼ x 13/16 tall. Cement this to the plastic box.

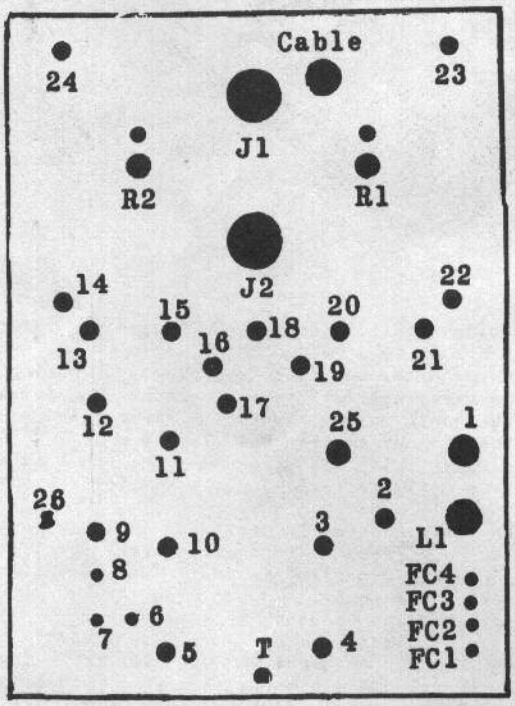
Under the two filters, lay a piece of wood approximately 2½ inches long by 1 inch wide and 5/16 inch high. Cement this to the box and also to the filters to prevent the receiver from bouncing around in the box.

When wiring the switch (and a DPST must be used), it is used in the A+ and B+ lead.

The receiver will be found to be acceptable for either straight commands or very fast pulsing. It's one of the fastest pulsing receivers available today. It may be used for Twin Simul for proportional operation or with the tone generators push buttons to give you two channels of control simultaneously.



Component Side



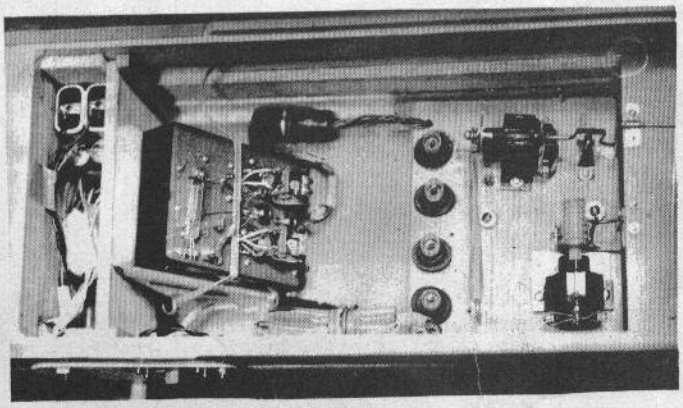
Tube Side

COMPONENT SIDE CONNECTION CHART

COMPONENT	CONNECTS FROM	TO
RF Choke	Flea Clip 1	Eyelet 4
10K Resistor	Eyelet 4	Eyelet 3
.001 Capacitor	Eyelet 4	Eyelet 3
.25 Electrolytic	Eyelet 4 (+)	Eyelet 5
100K Resistor	Eyelet 5	Eyelet 10
33K Resistor	Eyelet 10	Eyelet 11
.005 Capacitor	Eyelet 10	Eyelet 11
.01 Capacitor	Eyelet 11	Eyelet 9
47K Resistor	Eyelet 9	Eyelet 12
10 Meg Resistor	Eyelet 12	Eyelet 26
5 mf Electrolytic	Eyelet 10 (+)	Eyelet 2
Jumper Wire	Eyelet 26	Eyelet 5
2.2 Meg Resistor	Flea Clip 3	Top Coil Lug
33 mmf Capacitor	Flea Clip 3	Top Coil Lug
1 mmf Capacitor	Eyelet 1	Top Coil Lug
Jumper Wire	Flea Clip 1	Lower Coil Lug
Jumper Wire	Eyelet 2	Flea Clip 4
Jumper Wire	Eyelet 2	Eyelet 12
10K Resistor	Eyelet 12	Eyelet 17
.005 Capacitor	Eyelet 12	Eyelet 17
4.7K Resistor	Eyelet 17	Eyelet 25
.01 Capacitor	Eyelet 25	Eyelet 16
.01 Capacitor	Eyelet 25	Eyelet 19
.25 Electrolytic	Eyelet 18 (+)	Eyelet 20
.25 Electrolytic	Eyelet 18 (+)	Eyelet 15
Jumper Wire	Eyelet 16	Eyelet 14
Jumper Wire	Eyelet 19	Eyelet 22
Jumper Wire	Eyelet 23	Eyelet 24
Jumper Wire	Eyelet 24	Eyelet 18
Jumper Wire	Jack 1 through hole 21	Relay 1
Jumper Wire	Jack 2 through hole 13	Relay 2
L2 Filter Coil & Capacitor-red end to	Eyelet 22	Eyelet 23
L3 Filter Coil & Capacitor	Eyelet 14 - red end to	Eyelet 24
Red Battery Lead	-----	Eyelet 23
Brown Battery Lead	-----	Flea Clip 2
Black Battery Lead	-----	Jacks 1 and 2
Jumper Wire	Eyelet 12	Negative Side of Phone Jacks
TR1 Collector	Through hole 8	Eyelet 9
TR1 Base	Through hole 6	Eyelet 5
TR1 Emitter	Through hole 7	Eyelet 10

TUBE SIDE CONNECTION CHART

COMPONENT	CONNECTS FROM	TO
Jumper Wire	Eyelet 18	Eyelet 3
Jumper Wire	Eyelet 3	Eyelet 10
TR2 Collector	-----	Eyelet 17
TR2 Base	-----	Eyelet 11
TR2 Emitter	-----	Eyelet 10
TR3 Collector	-----	Eyelet 20
TR3 Base	-----	Eyelet 19
TR3 Emitter	-----	Eyelet 18
TR4 Collector	-----	Eyelet 15
TR4 Base	-----	Eyelet 16
TR4 Emitter	-----	Eyelet 18
Jumper Wire	Eyelet 20	Relay 1
Jumper Wire	Eyelet 15	Relay 2



Printed Circuit Wiring For RC Use

BY ED J. LORENZ

Printed wiring has been used in the model RC field for about five years. Prior to that, the art dates back almost 50 years.

With the growing interest in RC work it is anticipated that printed wiring will be used to an even greater degree. In addition to conventional chassis assembly cards, printed wiring has aided the servo designer in producing better and more versatile units.

What is printed wiring? Or more correctly known, as we will use it, etched wiring. Etched wiring is a process for obtaining a predetermined electrically conductive circuit pattern on an insulated base. Although there are many ways of achieving the same results, these articles will be concerned with the etched process.

The insulating part of the card is generally a phenolic paper or epoxi glass laminate with copper foil .0014" thick bonded to one or both sides. Thickness of the base, for our purpose is 1/16", although other thicknesses, insulating materials and foils are obtainable. The material is purchased as a copper foil clad laminate.

The method of producing an etched circuit is fairly straight forward. A pattern is placed on the cleaned copper surface, using an acid resistant material. The exposed copper area is then etched away using such chemicals as ferric chloride, nitric acid, ammonium persulphate, chromic/sulphuric acid and copper chloride solutions. When the background copper is completely etched away, the resist material is removed, leaving a copper conductor pattern. Holes are then drilled, components inserted and then soldered.

Figure 1 shows the typical cross section of the evolution of an etched conductor.

Design parameters for etched wiring cards produced by the RC modeler may vary from those used in industry, due to method of manufacture. Some of the questions asked are: How much current will a narrow line carry? What wattage iron and what kind of solder should be used? How is the material cut or drilled? Using .0014" thick, or 1 ounce copper (one square foot weighs 1 ounce), a 1/32" wide line will carry about 3 amps. That is well below the average burn out point of 5 amps.

An Ungar, or similar iron, having a 1/8" to 3/16" diameter tip rated at 26 to 37 watts is most desirable. Ersin multicore 60/40 (red box) #20 guage solder has been found to be excellent for printed wiring work. Pure rosin core solder is good provided the parts to be soldered are absolutely clean. Do not try to solder a printed wiring chassis using a 250 watt soldering gun.

Drilling XXXP material can be done with regular high speed drills. Epoxi glass material can be drilled with high speed drills. Epoxi glass material can be drilled with high speed drills although carbide drills are better for large quantities of cards. In all cases keep the drills sharp, and, if at all possible, use a high speed drill press (3000-4000 rpm). Drill the hole, do not use a drill press as a punch press.

Cutting of the material can be done using a small bench shear or with a fine tooth saw. XXXP materials are available in both hot and cold punching or shearing. If the material cracks when attempting to punch or shear it cold (room temperature), heat to about 125-150 F. It does little good to heat epoxi glass when punching or shearing, although this will depend on the particular grade.

What material is used for RC work? XXXP laminate is perfectly satisfactory provided the part is small and does not have relatively heavy parts mounted on it. Epoxi glass has considerably greater strength and, in most cases, is more tolerant of poor soldering techniques. Industry takes advantage of its high operating temperature properties. Epoxi glass is about 1/2 times heavier than XXXP and costs approximately 3 to 4 times more. 1/16" thicknesses are most commonly used, with copper on one side. If two sided circuitry is required, and there is very little need for it in this field, the two circuit patterns may be joined at opposite lands or pads by an eyelet or a piece of wire inserted through the hole bent over and soldered. A reliable connection for two sided circuitry when using an eyelet depends on many factors, not easily controlled by the RC builder and therefore the wire jumper is recommended.

In order to save the etching solution and maintain adequate conductor bond, it is desirable to keep the conductors as wide as possible and fill in areas that are common to one another. This, of course, is dependent upon the circuit, since large areas of copper act as "ground planes". Figure 2 shows the same circuit laid out with narrow lines vs. heavier conductors.

Next issue we'll describe exactly how to produce a circuit. In the meantime you might want to start collecting some of the basic equipment and materials. The methods for producing a pattern will be fully covered. This leaves us with the etching problem. For one or two small cards, a Mason jar would be adequate. If your club wants to turn out a number of receiver or transmitter chassis you'll need a Pyrex baking dish or a polyethylene tray of the proper size. Try to maintain at least a one quart volume of solution. The ferric chloride solution gives best results at about 90-100 degrees F. This temperature can be obtained by heating in a Pyrex container or by using a double-boiler setup for the polyethylene container. Only two etchants will be discussed, ferric chloride and ammonium persulphate. Both are oxidizing agents and are corrosive, therefore, keep them away from all metal surfaces except the copper you want to etch. The ferric chloride solution is less critical in operation but the ammonium persulphate is cleaner and less expensive. Solutions are as follows:

FERRIC CHLORIDE - 4 3/4 pounds per gallon of water, plus 1 to 2 ounces of mutiatic acid per gallon of solution.

AMMONIUM PERSULPHATE - 2 1/2 pounds per gallon of water.

Dissolve either the ferric chloride or ammonium persulphate in warm water, 100 F. stirring until completely in solution.

Etching time with either solution will vary from about 3 minutes to 20-25 minutes for one ounce copper, depending upon temperature, agitation and amount of copper in solution. The etchant becomes depleted when you have dissolved from 6 to 8 ounces of copper per gallon into it. In disposing of it, pour it outside into a shallow hole in the ground and cover with dirt. DON'T put it down your drain, especially a number of times, if you don't want trouble with the pipes. Both chemicals can be obtained through local chemical supply or your druggist. Other basic materials for creating your own etched circuit chassis can be obtained through Ace Radio Control.

In using printed wiring you get a neater layout and a reproducible one which is exact for one to a million.

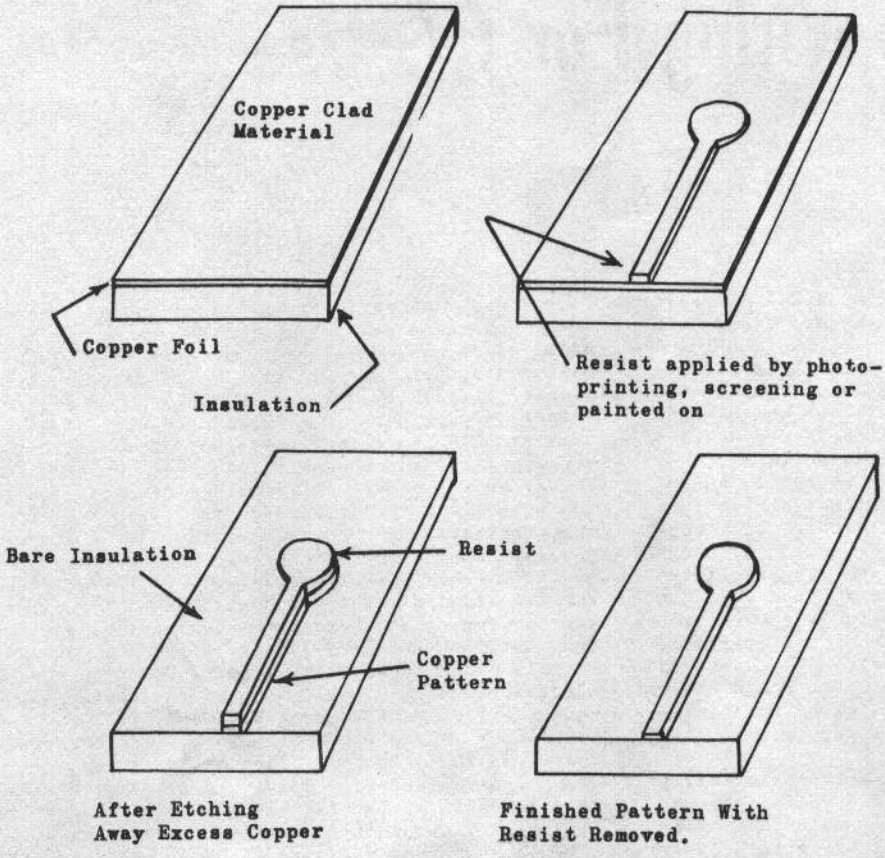


Figure 1

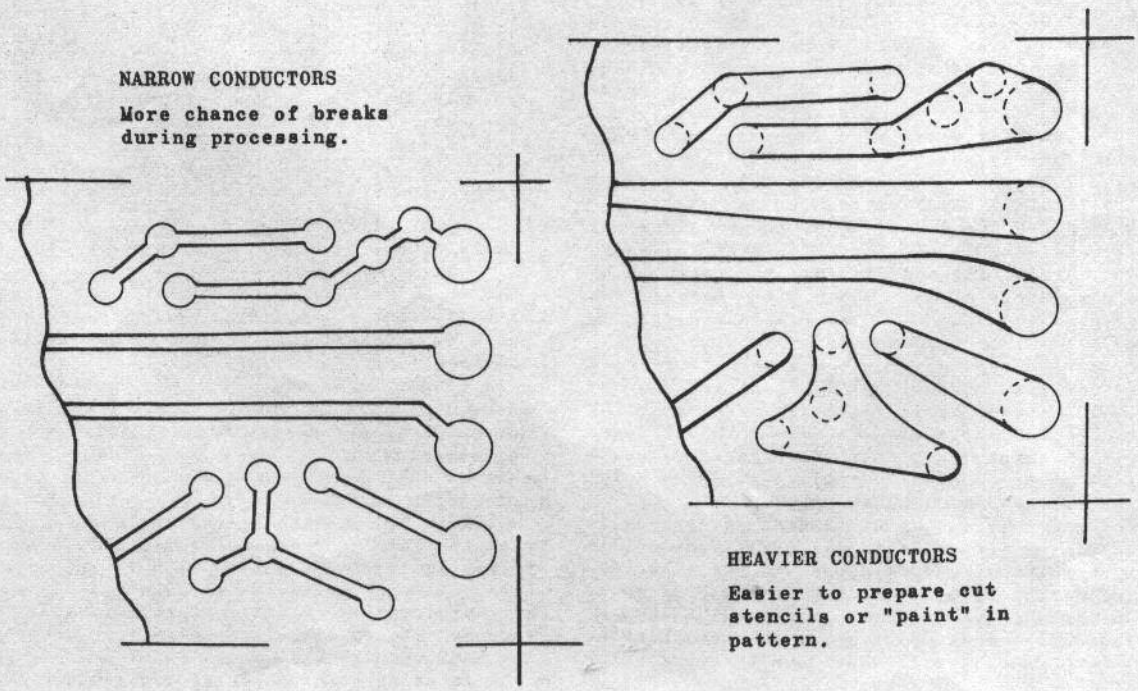
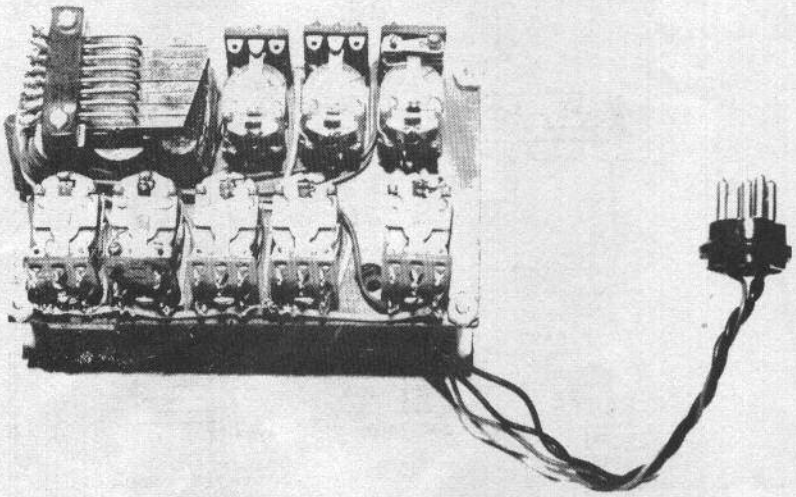


Figure 2

PC Pearce 8 Channel Receiver

BY DALE SPRINGSTED



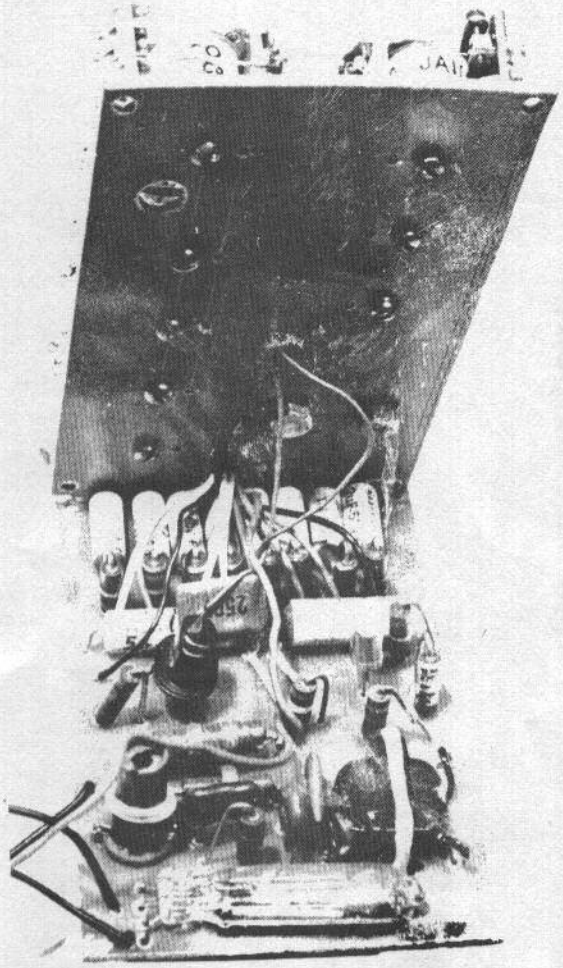
Receiver is a two deck affair, separated by 4/40 x 1 bolts which are used with 3/4" aluminum tube spacers Reed and relays are held on top deck, while the receiver portion is mounted on PC base.

Having read several articles and notes about users of the Pearce receiver circuit from January, 1958 MAN, who had relatively good success, it was decided to take a whack at it with 8 channel simultaneous operation in mind. Thinking in 8 channel terms just about clinches the proposition of going to a printed circuit board to mount components, both for ease of construction, and space and weight conservation as well.

Accordingly, a board was drawn up that was not too difficult to manufacture with the normal home techniques. The result was worth the effort put forth since the finished receiver compares favorably in both weight and overall size with practically any of the commercial products available at the time the receiver was built.

The unit shown in these photos is just about the same as the magazine article originally published in MAN with a bit of pruning at the last transistor. The builder had no 2N107's but did have a 2N188A, and thus used this transistor which apparently has a bit more gain, thus interstage oscillation cropped up in the initial tests. The difficulty was eliminated by use of a 100 ohm resistor in the emitter of the 2N169. Addition of this eliminated the audio oscillation and left a seemingly good voltage amplifier operating since no further difficulty has been experienced.

Checks showed the reed bank was getting about 14.5 to 15 volts AC drive which is considered sufficient to give proper operation. The waveform, as viewed on an oscilloscope at the collector of the individual stages, is clean and follows the input pattern. Attempts to operate the receiver simultaneously indicate that this can be accomplished, but the builder having at hand a transmitter with square wave emission noted difficulties which would hamper operation of this type. Therefore it might be suggested that any users consider carefully their selection of transmitters and modulators if simul-operation is desired.



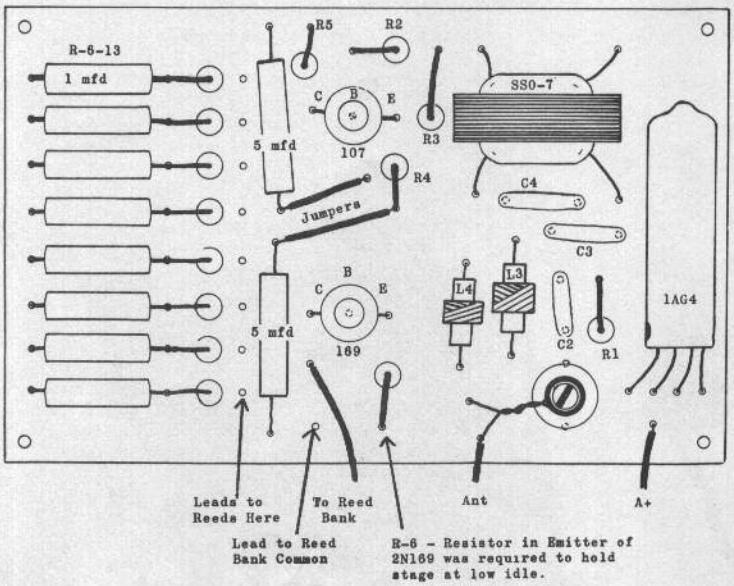
For a better view the two decks are shown apart. It uses 1AG4 tube, although 6007 also will work well.

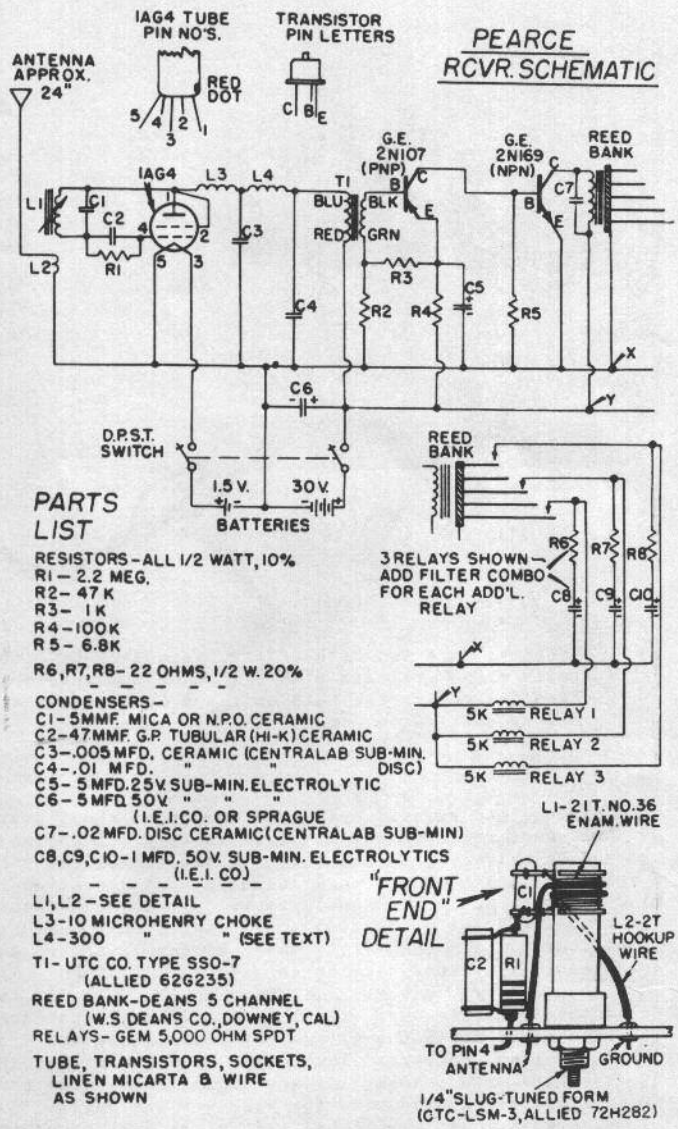
There are no specific tricks involved in construction. The board layout is made and blocked in with any good anti-etch paint or resist as it is called. (Try Sherwin Williams Asphaltum B.) (Editorial note: Plain Testor's Dope has also been used with success.) Etching is done with ferric chloride and water, heated slightly to speed it up. The result is washed, lightly buffed, and then drilled where the components fit. The various components are placed and soldered, then the two boards are joined and the reed bank connections to both PC board and relays are completed.

The unit should be ready to go. Idle current was found to be 1.5 ma and of course about 5 ma on single tone. Since this type of receiver and construction technique is at best rather complicated, this should not be attempted by anyone not having had some previous experience in this line.

Schematic for the Pearce appeared originally in MAN January 1958 and is copyright by Model Airplane News and is reproduced by permission.

Top View Full Size





PARTS LIST

RESISTORS - ALL 1/2 WATT, 10%
R1 — 2.2 MEG.
R2 - 47 K
R3 - 1 K
R4 - 100 K
R5 - 6.8 K

R6, R7, R8 - 22 OHMS, 1/2 W. 20%

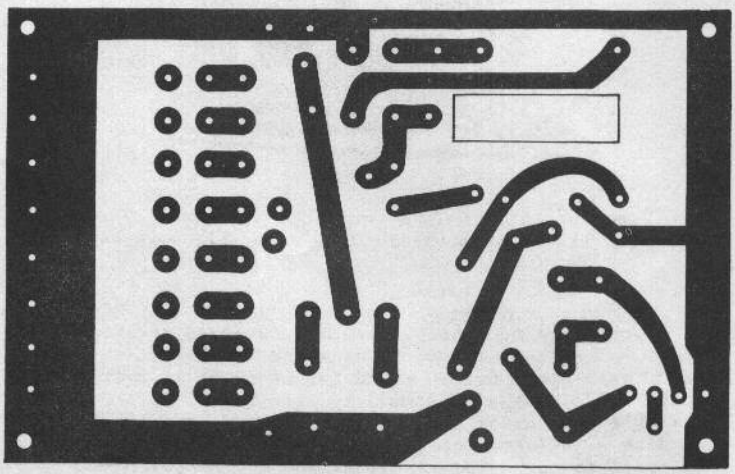
CONDENSERS -
C1 - 5 MMF. MICA OR N.P.O. CERAMIC
C2 - 47 MMF. G.P. TUBULAR (HI-K) CERAMIC
C3 - .005 MFD. CERAMIC (CENTRALAB SUB-MIN. DISC)
C4 - .01 MFD. " "
C5 - 5 MFD. 25 V. SUB-MIN. ELECTROLYTIC
C6 - 5 MFD. 50 V. " " "
(I.E.I. CO. OR SPRAGUE
C7 - .02 MFD. DISC CERAMIC (CENTRALAB SUB-MIN)
C8, C9, C10 - 1 MFD. 50 V. SUB-MIN. ELECTROLYTICS (I.E.I. CO.)

L1, L2 - SEE DETAIL
L3 - 10 MICROHENRY CHOKE
L4 - 300 " " (SEE TEXT)

T1 - UTC CO. TYPE SSO-7 (ALLIED 62G235)
REED BANK - DEANS 5 CHANNEL (W.S DEANS CO., DOWNEY, CAL)
RELAYS - GEM 5,000 OHM SPDT

TUBE, TRANSISTORS, SOCKETS, LINEN MICARTA & WIRE AS SHOWN

This is the bottom view of the printed circuit for the Pearce Receiver--8 channel. View below shows parts placement.



Design Considerations For Manufacturing an RC Tx and Rx

BY JOE CURTIS

The average R/C fan who visits his local hobby shop to purchase equipment very seldom, if ever, gives the slightest thought to the thousand and one problems that must be solved before the particular unit he purchases can be on the hobby shop shelves.

In this article we will try to present some of these obstacles, and how they are overcome, and the reasons for our approach in the development and manufacture of an inexpensive tone transmitter and receiver for the hobby trade from common basic circuits.

First, we will take the transmitter, because it is less critical and presents fewer problems. Inasmuch as we already are in the business, we adapt our present cabinet and RF assembly (model 250B), but for someone starting from scratch, he would have to design a cabinet and the RF circuitry. In this tone transmitter we have two major problems--the actual tone generator and the modulation process. If you recall, we said "inexpensive", so that lets out doing it the easiest way, using separate tone generator and modulator tubes. We must do the job with one tube.

As for the tube, we chose the 3A4, for reasons we will enumerate later. In the early thirties, yours truly had the "ham" bug and had constructed several code practice tone oscillators, using a center tapped transformer to feed back energy from the plate to the grid to sustain oscillation. This sort of an arrangement is inexpensive and covers a fair frequency range with moderately good wave form.

Here let us state that in the initial discussion of this equipment we had chosen 1,000 cycles as the audio tone we would use--for no other reason that it is a more or less standard tone for test, etc. Simple calculation tells us that so much inductance and capacitance are required to obtain a given frequency desired, so we contact a local transformer manufacturer, give him the value of inductance and size needed, and request a sample transformer with a number of taps, which will permit us to find the optimum tap position for the "feed back". The proper locations of this position also helps obtain a good wave form, but right here in the tone generator circuit is where we run into capacitor trouble.

Many of you may not know that capacitors are responsible for lots of R/C troubles. Ceramics, particularly disc ceramics, are not the best of capacitors, but they are inexpensive; therefore, their use has become almost universal in all except the most expensive electronic gear. The most common problem is GMV (guaranteed minimum value), which means plus 100% to minus 20% from the stated value. Now you don't have to be a technician or engineer to realize that if we expect a certain frequency out of our tone oscillator, we can't have that wide of a capacitance variation.

Initially we tried to get capacitors of close enough tolerance to hold the frequency, but with the variable in the transformer that wasn't good enough. The up-shot of the problem was 10% plus or minus capacitors and a variable grid resistor to compensate for both the transformer and capacitors. This tone oscillator covers from about 400 to 1500 cycles with fair to good wave form and is capable of moderate power output.

Once the tone generator has been established, the next problem is to modulate the RF stage. The 3A4 in the above modulation stage kicks up more than 100 (open circuited) AC volts, which we found quite adequate to screen modulate the 3A4 RF stage to about 3/4's of its maximum RF capabilities. Field tests proved this more than satisfactory.

With reference as to why we chose the two 3A4 tubes, the explanation is this: First the 3A4 is a must in the RF stage; therefore, it is necessary that we stock it and if we use two of them it doesn't increase our stocked numbers. For the second reason, it will be noticed from the schematic that the tubes are in series with a total of six volts needed. This filament arrangement helped some on the modulator bias problem, but most of all it "sets up" the transmitter for operation from six volt transistor converters, which can be operated from the same six volt battery that supplies the filament voltage, or from any six volt source, including the little 6 volt Aristo wet battery. So much for the transmitter.

Receivers, all kinds from broadcast to UHF are more difficult to design than transmitters. There are more variables and they are harder to control. We use the same basic circuit used in the multi or single channel audio receiver described in "Grid Leaks" Volume I, Numbers 2 and 3 by Max Boal and used successfully in hundreds of flights. From the schematic it will be noted that the Amperex 6007 is used for the super regenerator in preference to either a 1AG4 or a transistor. Two factors must be taken into consideration here--cost and reliability. In order for the receiver to be inexpensive, the cost of each individual part must be weighed carefully. Secondly, but the most important consideration, is reliability. Here the tube far excells the transistor even at several times its cost, even considering the disadvantage of having to use a filament battery. However, for the 6007 a single pencell will do a good job on the filament. From our tests it will operate a 13 ma heater for 24 hours. Cheap for absolute reliability--come rain or shine, cold or hot.

The "super" circuit was set up separately, using an electronic audio volt meter as the audio amplifier and a number of different chokes, capacitors, and resistor values were tried to obtain the most audio output. We use an RF signal generator with a variable audio oscillator. This permits the selection of values giving the greatest response at the desired audio frequency very easily. Our plans called for a small receiver; therefore, a small transformer of the proper characteristics was needed. We found that a $\frac{1}{2}$" x $\frac{1}{2}$" x $\frac{1}{2}$" import with a 100K to 1K ration proved to be satisfactory. Note that we have worked one circuit at a time obtaining optimum results before we progress to the next one.

Our next problem is the audio amplifier. Again, we are faced with the expense problem. This time luck is with us, for the transistor manufacturers are moving so fast that new and better transistors are coming on the market constantly. We purchased quite a number of the newer and (paper-wise) more promising ones, and found several good ones that met the requirements very well. We chose the RCA 2N591, a small signal high voltage gain transistor, and the Raytheon 2N632, a 160 mf unit with good gain and power characteristics. These were used in RC coupled networks to give a very usable voltage at the relay.

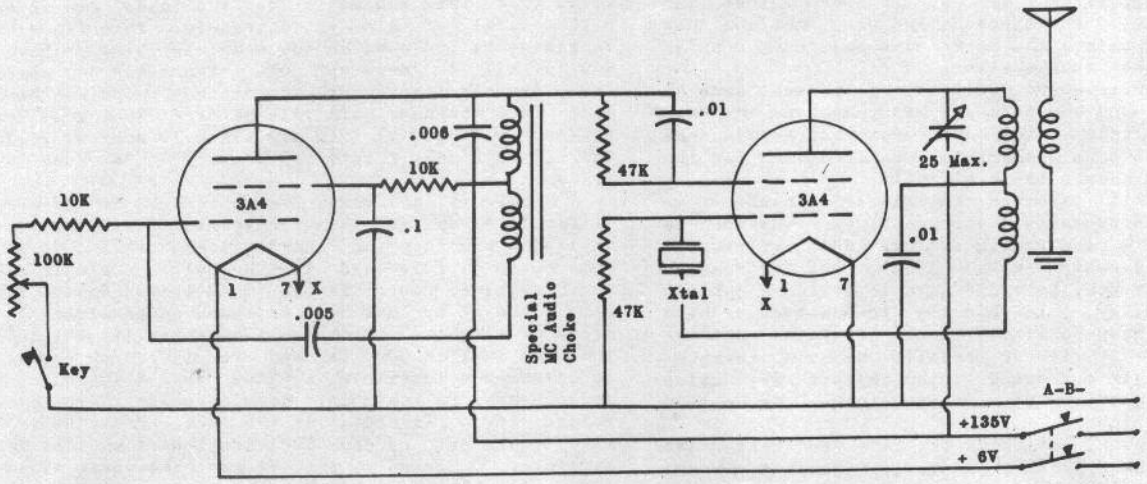
This receiver with $22\frac{1}{2}$ volts idles at about .6 ma and rises to 5 ma on signal. With 30 volts in, it idles at about 1 ma and rises to 6 ma. As in the transmitters, the several ceramic capacitors had to be of a specific tolerance in order to obtain uniformity of product. This condition when overlooked can cause a lot of headaches, and does to the RC fan who just buys a capacitor at the radio wholesale house.

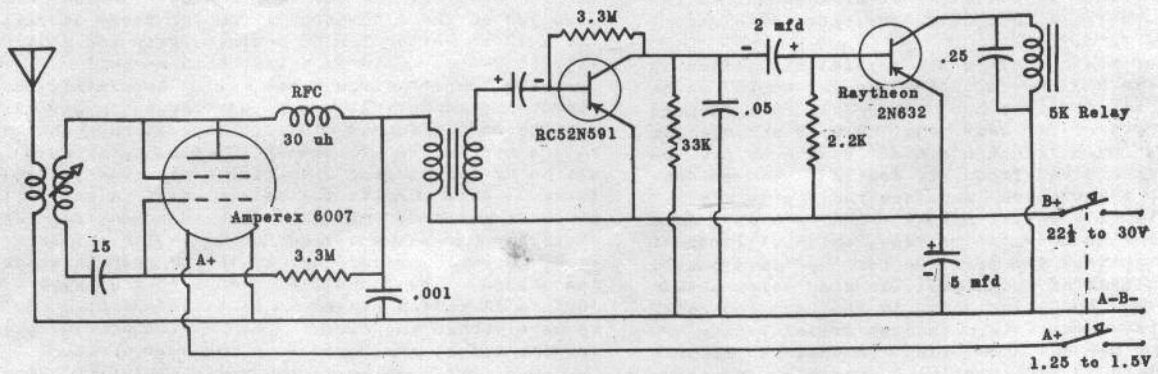
Construction is on an epoxi glass etched circuit board for ruggedness and ease of assembly. It might be further pointed out that if two ounces of copper is used for all practical purposes breaks in the conductor (on PC board) under any normal usage is eliminated. The only extravagance in the entire unit is in the circuit board. Epoxi glassboard with two ounces of copper costs four times as much as phenolic board with one ounce of copper. It was felt this expense was more than justi-

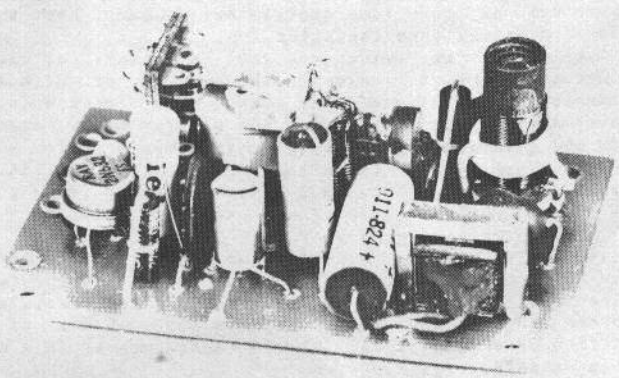
fied, for it takes practically an explosion to break epoxi glass board; thus, protecting the customer's investment more adequately.

The power requirements are quite simple--a 22½ or 30 volt "B" battery and a single pencell. However, we would like to mention that the Nicad cells make perfect filament supplies and four of the 250 ma or the new Gould 450 ma cells can power transistor converters (to replace B batteries). This combination will give years of service for less than $1.00 a year after the first cost.

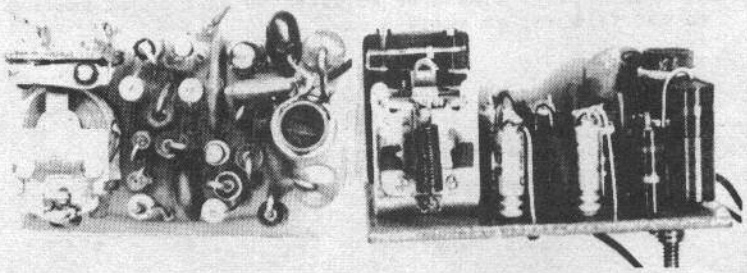
In conclusion we hope we have made the manufacturer's problems a little more understandable to the RC fan. We also would like to thank Max Boal for suggestions and help rendered in tests and field checks.







GROGAN'S MICRO-X TRANSISTOR RECEIVER



SPECIFICATIONS

Frequency	27.255 mc to 26.995 mc
Tone Frequency	100 cycles to 900 cycles
Weight	1 ounce
Power Requirements	6 volts DC at 1.5 ma with tone rising to 18 ma with constant carrier

Drill all component holes with a #62 drill and #38 for the relay mounting screw and aligning pin, and a #18 for mounting of the LSM coil form. Do not center punch but use the indentation that has already been formed by etching.

The etched board is now cleaned and polished by using a household cleanser, such as Bon Ami or Comet, etc. Now lay out all components in the order of their component numbers and proceed to wire them in by using a small pencil type soldering iron, such as the one made by Unger. Use good solder with an internal rosin flux and apply only enough heat to insure a good connection. If you think a component will not make a good connection, clean and pre-tin the leads before inserting in the board. Start with the coil part #2 and connect part #3, the 47 mmf Discap to the coil terminals with one turn and then solder, leaving the leads long. Now place in position on the board as indicated in the layout and put the bottom terminal lead of part #3 through the hole between the location of part #5 and #9. Place the nut on the coil form and tighten firmly. Cut off the lead near the board and solder. Now insert one lead of part #1, the 3 mmf capacitor and bend the other lead to go through the hole between the location of part #7 and part #5 and at the same time make sure that it touches the lower terminal of the coil form. Solder to the coil form terminal and then turn over the board and cut off the leads and solder. Now part #4, the 470 Discap, is placed in the position indicated by the layout with one lead through the board and the other lead against the top terminal of the coil form. Solder the lead to the top terminal of the coil and cut off the remaining lead of part #3 and #4. Turn over and cut off the lead and solder.

Now insert and solder the rest of the components in the order indicated in the following list and in the position set forth by the layout drawing.

Component No.	5	Component No.	16*
Component No.	6	Component No.	13
Component No.	10	Component No.	15
Component No.	9	Component No.	17
Component No.	8	Component No.	18
Component No.	12	Component No.	21*
Component No.	11*	Component No.	24*

The parts #11, 16, 21 and 24 as indicated by the asterisks are correctly polarized when the positive end is next to the board and the negative end away from the board.

When installing the diodes and transistors, be sure to use a heat sink of cotton wrapped around the component and saturate with alcohol. Next install part #22 It is correctly polarized when the cathode end (marked end) is away from the board. Part #23 is correctly polarized when the cathode end is placed next to the board. Now install part #7, the detector transistor. It is correctly polarized when the collector lead (the one by which there is a red mark) is inserted in hole indicated by the large round mark on the layout drawing. Leave lead lengths of about ¼ inch between board and transistor body. Then cut off excess lead and solder.

Part #14 is now installed and then part #19 in the same way as part #7.

The relay, part #20, is now installed and the coil terminals are connected to the board with excess pieces of lead that have been cut from components that have been installed.

The antenna consisting of a 24 inch length of flexible wire is now connected. Then the power connection leads are connected, red for "Y" and black for "Z". If tuning is to be done with head phones or volt meter then also attach another wire to the other side of the relay coil.

The receiver can now be given an operational test by connecting to a six volt battery. The plus side to the red or "Y" lead and the minus side to the black or "Z" lead. A head phone or a volt meter having a 6 volt or higher scale can be connected to the black lead and to the other lead coil. A 0-1 ma meter can be used in place of the volt meter if a 10,000 ohm resistor is connected in series with it. If head phones are used a strong hiss should be heard and then with a transmitter turned on to continuous carrier, the hiss should disappear as the receiver coil slug is tuned to the proper frequency.

Now when an audio signal is turned on, the audio tone should be heard very loudly.

If a volt meter is used, the following conditions should be observed. With no carrier, the voltage across the relay coil should be about 4 to 5 volts, then with continuous carrier and the receiver coil slug is tuned to the proper frequency, the voltage should rise to about 6 volts across the relay coil. When the audio is turned on the voltage across the relay coil should approach 0 volts.

If these results are obtained, then connect flexible wires to the relay contact terminals and install the receiver in the aluminum case.

The receiver is now ready for a distance check and installation. When making a distance check tune for optimum slug position.

If the receiver does not operate properly, then have a friend check your soldering and layout and connections.

When this receiver is to be used in small planes, the antenna should be allowed to trail from the fin. The sensitivity can be somewhat increased by connecting a length of wire to the case and extending it in another direction from the antenna.

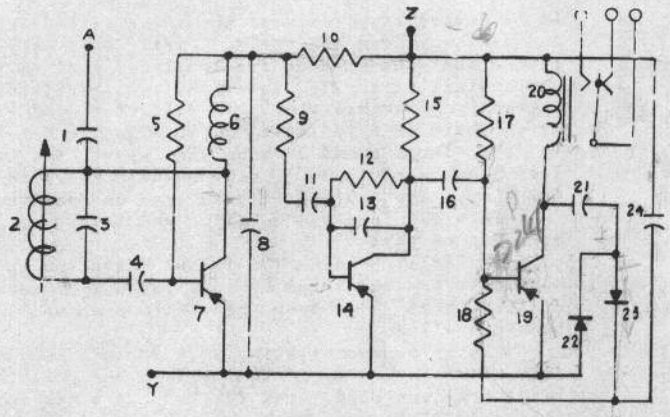
This receiver is very efficient and will work for a very long time on the smallest batteries. I suggest the use of the half size pen cells. Connect 4 in series and they should give power for many hours of flying. Change them when they measure 4.5 volts under load. This receiver is designed to operate on voltages as low as 4.5 volts with some loss of sensitivity. Another fine power source is made by 4 of the small Nickel Cadmium batteries which can be recharged and used many times.

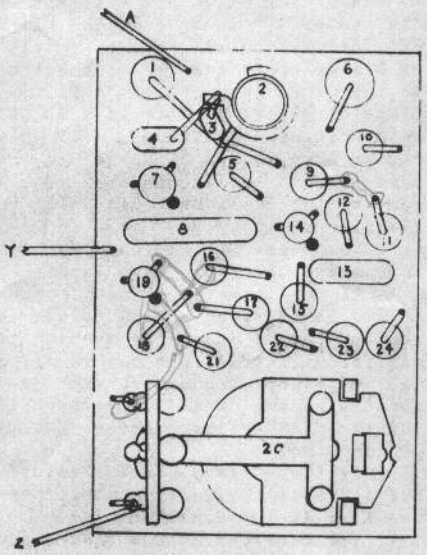
The installation of this receiver is not critical. However, the following things should be done. Adequately shock mount the receiver and mount it so that the relay armature pivot is not in the same direction as the shaft of the engine. (This is to prevent engine vibration from affecting the relay operation.) A spark suppressor should be used across the terminals of the actuator and can be one of the following:

1. 100 ohm ½ watt resistor
2. .01 Discap
3. .01 Discap in series with a 10 ohm resistor

The receiver is not particularly sensitive to electrical noise, but a suppressor should be used.

The relay should be adjusted to come in at about 8 ma and fall out at about 6 ma.



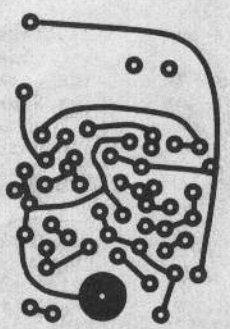


1. 3 MMF CAPACITOR CERAMIC
2. 8 TURNS #26 ON LSM FORM
3. 47 MMF DISCAP
4. 470 MMF DISCAP
5. 100 K ½ W RESISTOR
6. 22 MICRO HENRY R.F.C. JEFFERS ELEC.
7. SB103 TRANSISTOR
8. .01 MFD DISCAP
9. 30 K ½ W RESISTOR
10. 5.8 K ½ W RESISTOR
11. .25 MFD CAPACITOR BARCO
12. 1 MEG ½ W RESISTOR
13. .001 MFD DISCAP
14. TRANSISTOR T 0037
15. 10 K ½ W RESISTOR
16. .25 MFD CAPACITOR BARCO
17. 47 K ½ W RESISTOR
18. 10 K ½ W RESISTOR
19. TRANSISTOR T 0037
20. GEM RELAY 350 OHM COIL
21. .25 MFD CAPACITOR BARCO
22. GERM DIODE
23. GERM DIODE
24. .25 MFD CAPACITOR BARCO

A ANTENNA 18" to 24"

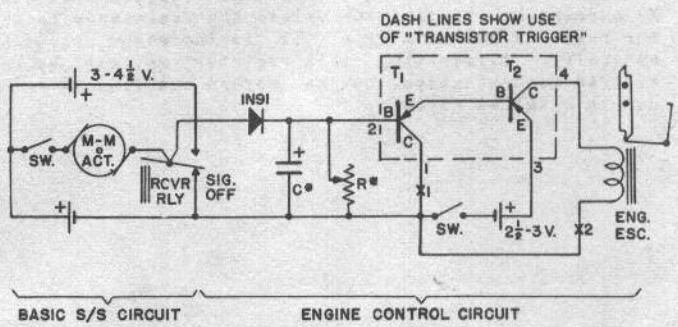
Y + SIDE OF SIX VOLT BATTERY

Z - SIDE OF SIX VOLT BATTERY



TRANSISTORIZED ENGINE CONTROL FOR S-S

BY JOHN WORTH



Engine control for Simpl-Simul has been tried by many approaches, both mechanical and electronic. Having been involved with several of each type, I have come to some conclusions as to what is an acceptable and satisfactory engine control: No compromise with the mechanical simplicity and reliability of basic S/S. To me, this means retention of crank stops in the system--most mechanical engine control schemes have required dispensing with the stops and thus, in my opinion, reliability. Stopless schemes seen to date require critical balance between pulse rate, pulse width, centering tension and actuator voltage. Other mechanical approaches which permit crank stops suggest an even more critical balance of the same factors. Use of dry cell power for the actuator aggravates the balance problem since voltage is not stable over a reasonable length of time. Silvercel or Nicad power may help this type of control by offering consistent voltage level, but the approach is still very demanding. No compromise with the electrical simplicity of basic S/S. Too often, supposed fail-safe gimmicks cause failure. The usual approach is to use a relay which, when held in by pulsing, completes the basic actuator circuit. On solid signal, the relay drops out, breaking the actuator circuit and making the engine circuit. But, if this relay acts up, the basic control is affected. We accept this if there is no choice but, preferably, malfunction of the engine control components should not be likely to cause loss of basic control--it's nice to have your cake and eat it too! Minimum model flight disturbance. Here the ideal seems to be unavailable without special radio gear----for ordinary single channel, some compromise appears inevitable. Since S/S is most popular as a single channel system, the only choice seems to be to minimize the control effect so that the imperfect engine scheme may be acceptable. Now we nibble at our cake a little, but not badly.

A little discussion on what we can accept: practically all S/S engine control ideas involve full deflection of control surfaces during a momentary non-pulsing period. If this time period is no more than one-half second, flight effects need not be bad. It means acceptance of a momentary lurch of the model when engine speed is changed. On the ground, during R.O.G. or on the roll during touch and go, the effect is hardly bothersome.

Also, if the engine speed change mechanism is triggered instantly after the minimum delay time there is no need for neutralizing of the control surfaces. Experience suggests that when the need for engine speed change is recognized during flight immediate response is usually desired; we want to floorboard the throttle or chop it back. If some definite intermediate speed is also available, so much the better. But we like to know that the engine is in some definite power condition at all times so that the airplane can be flown accordingly. Trimming type engine controls are therefore not as appealing since there are many indefinite power conditions available--proportional engine control would be fine since power is definitely related to throttle position, but this has not been achieved in a simple system as yet.

An escapement type engine control operation works very well--it is fast and positive positioning. Whether the escapement action is rubber band or motor powered is optional--the important point is that the action is trigger initiated. We have only to send the signal to start the action--once triggered, the engine control change can occur while normal flight control is resumed. Thus the flight effect is held to a minimum for least compromise of performance.

The engine control circuit shown is a natural evolution, based on most successful pulse methods. These have usually used a tube and relay circuit to trigger an engine escapement. It was natural to eliminate the tube by means of a transistor, to get rid of the filament and plate current drains. Similarly, another transistor can be used to eliminate the relay, with its adjustment and contact point problems.

The result is a circuit which uses only the battery necessary for escapement operation, does not alter the basic S/S installation, requires no power when not being operated, has ample margin of current change for reliable escapement action, has been proved by flight testing to be unfussy, consistent, rugged. Added feature if used to trigger an SN type escapement: engine cutoff is available automatically on signal off.

The circuit is simple to build up from scratch and also may be neatly adapted to make use of the Transistor Trigger unit which is produced commercially by Brayton Paul and available through Ace R/C. Practically any transistor may be used for the first stage--the cheap CK722 and 2N107 types have been perfectly satisfactory. Even those with some leakage may be acceptable as the normal circuit action is to cancel any current flow during pulsing (another reliability feature). The power transistor need not be an expensive one--a minimum collector rating of 6 volts @ 1 amp is sufficient (the Sylvania 2N101 and CBS 2N255 are very cheap and are used very conservatively).

Detailed Description

T1 - CK722, 2N107, or practically any PNP transistor.

T2 - 2N101, 2N255, or any medium power PNP transistor rated for a minimum current of 500 ma on collector. 1 amp preferred.

R* - Probably between 25K and 50K. Select to obtain desired current at X2: approximately 25% above minimum current required to operate escapement positively (approximately 350 ma for original Bonner SN)

C* - Dependent upon value of R and nature of transistors. After R is chosen, select C so that circuit will not trigger at normal minimum pulse rate and maximum signal off side of pulse width (stick in back corner of box). Minimum value of C will provide the shortest delay time--may vary considerably from one circuit to another (original circuit required only 3 mf, others have required 25 mf or more). Note - capacitance value can be affected by voltage one rated at 5 mf @ 50 volts may be different from a 5 mf 5 volt unit--cut and try here is unavoidable.

1N91 - or any good quality diode, selenium type preferred.

Step by Step Checkout Procedure:

1. a) Disconnect engine circuit from basic S/S circuit.
   b) Provide 500 ma or 1 amp meter at X2.
   c) Omit C and diode from circuit.
   d) Set R at maximum resistance.

2. Close switch and check for current at X2--note whether the escapement pulls in or not.

   a) If little or no current shows at X2, reduce resistance of R to raise current and pull in escapement. If lowering pot resistance does not raise current at X2, check for current at X1, using a 5 ma meter. X2 current should rise when approximately .5 to 1 ma current flows through T1 and should continue to rise as pot resistance is reduced (X1 current may reverse and lower somewhat but X2 current should rise until maximum). If at minimum pot resistance current at X2 is insufficient to pull in escapement, meter resistance may be preventing maximum flow--observe for pull in with meter removed from circuit.
   b) If escapement pulls in at maximum resistance setting of R, increase resistance of R (either higher resistance pot or fixed resistor in series with original pot--5K to 10K probably enough. What is desired is a value of R which will provide control of escapement current through pull in and drop out so that operation can be adjusted precisely.

3. With X2 current check okay, open engine circuit switch; then add diode and connect engine circuit to basic S/S circuit--polarity of S/S batteries and of diode must be as shown.

4. With receiver relay in signal off position, close engine switch and check current again at X2--should be as before.

5. Change relay armature to signal on position (manually). X2 current should be zero or close to it (may improve after several pulses). If not, double check polarity of all engine circuit components.

6. Pulse S/S circuit normally, with stick full back (lowest rate) and full over (to signal off side). X2 current should pulse also.

7. Try various condensers at C, selecting one which allows X2 current to barely indicate on meter--more than enough capacitance will hold X2 to zero, but will increase delay time excessively. Desired value permits slight triggering of X2 current with stick full back and over on signal off side, so long as there is no tendency of escapement to operate. Once the value of C is narrowed down to near desired operation, use pot for minor trimming of exact time delay.

8. Try hitting solid signal off to get the feel of time delay required for positive triggering of escapement. This should not exceed one-half second for most satisfactory results.

NOTES:

Heating of circuit from soldering during trial and error substitutions will give higher X2 current than normal--allow circuit to cool completely before final check (may take several minutes).

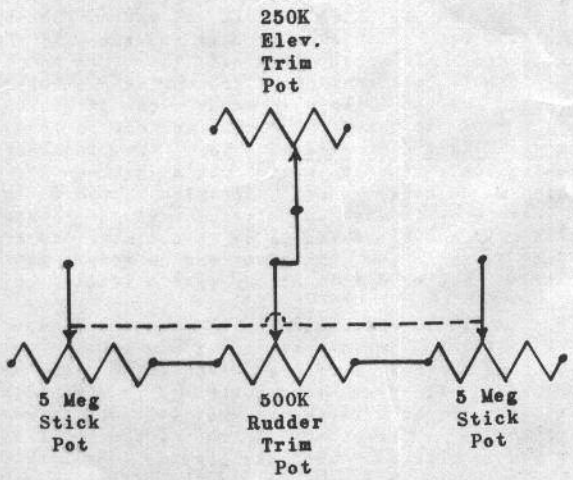
Use of SN escapement to operate Annco throttle valve is recommended. Annco, used as a throttle alone, provides typical dual needle valve action--lags on high speed change due to over richening of engine which needs several seconds to clear--okay for initial engine control work, but not ideal.

But, Annco has shut-off feature which is desirable. It is worth utilizing even if exhaust or intake throttling is used--simply link in with other throttle and set the Annco needle valve open enough so as not to interfere with normal engine needle valve adjustment. The Annco and the SN escapement then automatically provide engine shut off on signal off--either through transmitter failure, out of range, or whenever desired. During normal engine speed changes, the SN escapement blips through the held in condition, stopping at one neutral or the other. Annco likewise blips through the cutoff position. On solid signal off, escapement holds in and Annco valve stops in cutoff.

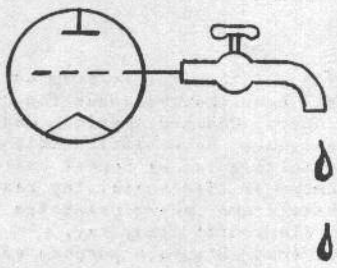
If the Brayton Paul "Transistor Trigger" is used, X2 current may be limited unless the resistance between the base and the emitter of T1 is increased or cut out entirely. Eliminating this resistor may not be considered good practice, but has worked out fine in actual use in original circuit.

ADDING RUDDER TRIM TO S-S

Adding a rudder trim pot to the S/S pulser makes this unit still more versatile. Because of the unique dual width pot arrangement of the S/S pulser, adding rudder trim is very simple. The original WAG and Mac pulsers, using geared or 60 degree pots, require the use of a dual pot for width trim, but the S/S pulser needs only a standard single pot for the same job. Each end terminal of the rudder trim pot is connected to its respective 5 meg control stick pot and the center terminal is connected to the center tap of the elevator trim pot.



Grid Leaks At Play



With this issue of Grid Leaks, we complete our first volume. This is Volume I, Number 10 and all charter subscribers who have not yet renewed subscriptions are hereby advised that subscriptions for Volume II are due immediately if you wish to receive further copies of this publication.

We are most happy with the reception that Grid Leaks has received in its first volume of publication and we want to take this opportunity to thank the many of you that have written in. The hobby shops who sell Grid Leaks have increased their orders in almost every instance and we have had only one individual cancellation of a subscription and we believe that this was due to non-delivery of the magazine by the postal department.

This issue is also different from other issues in that there are no "Bits and Pieces" or "Short Circuits" but we are bringing you a solid issue of editorial matter which we believe will be of terrific interest to the R/C fraternity. There is material here for both the tyro and the pro. We will have more on the discussion of beginners in R/C at a little later in this letter.

For the next issue, we have many fine articles also lined up. Among them Bill Grogan's transistorized relay-less pulser and modulator for the WAG TTPW, a printed circuit board for the Tech 27 receiver which means that virtually all of the problems associated with the assembly of this type unit (the two-tube version, not transistorized) have been eliminated and production assembly can be begun. Also the first of a series of articles "We Build--" which will eventually cover virtually all of the kits that are available to the R/C fan today. There will be many other choice goodies. Among them an additional article on printed circuitry as well as additional information on many subjects and we hope to continue the interchange of correspondence which you fellows have begun and continue our "Bits and Pieces" and "Short Circuits" which have piled up due to the fact that this issue just could not hold them.

Among the new items that are going to be available from Ace Radio Control very shortly are the Voltablock cell holders which were detailed in the April issue of Model Airplane News by Fred Stong at 95¢, the Marcy Twin transmitter, tone generators, and receiver in this issue and the pulser which will also be given editorial coverage in the next issue.

Also in the works is Grogan's Micro-X receiver which is detailed in this issue. The MC 100T receiver and the 250T transmitter written up by Joe Curtis in this issue will also be very shortly available at $20.95 each.

In the works at MC Manufacturing & Sales is a transmitter power converter which will be offered in two models. The first model, known as the 15-135 will have an output of 135 volts at 15 milliamps with 6 volts in and will retail for $14.95. The 30-135, with an output of 135 volts at 30 milliamps has not been finally settled in price but will likely be in the neighborhood of $20.95.

We have been asked by Lester W. Nelson, Jr. of 8 Carrie Lane, Nanuet, New York on the possibility of having some decals made strictly for radio control. Lester has been in touch with the Tekni-Labels company of California about the possibility of producing a set of decals for R/C and he received a quote from them that it was "a real good idea to bring out a decal in this field and we are going to program a set for the future". Lester was asked to supply his ideas for such a set. However, he wants some help. What should we have in the way of labels? What would you like to label your receivers and transmitters in the way of MOPA, Tune, Antenna, On-Off, etc.? Won't you get in touch with Lester on this?

Now we come to something which has been hedging fire for several issues. We've received increasing correspondence from beginners who are perturbed with the fact that we don't have more articles for the beginners. We're receiving an equal number of perturbed letters from advanced R/C'ers who say "Let's keep this an advanced R/C publication on the basis of exchange of advanced R/C information for the benefit of advancing the R/C art."

We're going to let our readers decide on this issue and we invite your correspondence on this matter. How should we handle the beginner? After all, there are many excellent beginner pamphlets and booklets and books already on the market which the beginner can use for his library. Among them are "Basics of Radio Control" offered by Hobby Helpers at 770 Hunts Point, Long Island, New York at 35¢ a copy; Howard McEntee's "R/C Handbook" at $2.25 available from most dealers; World Wide Radio's catalog and handbook available from World Wide, 10281 Troy, Oak Park 37, Michigan at $1.00; Berkeley's $1.00 Radio Control Book available at most hobby stores or from Berkeley direct.

To further fan the flames, here are quotes from two different letters received. We're going to ask you to read them carefully and then write us your judgment.

"I am confused! I'm trying to learn how to build radio control into model airplanes with absolutely no knowledge of radio and very little of electricity. Your Grid Leaks is the most help so far but there are a few things you must add for us real 'green horns'. First of all, we must have a dictionary of commonly used terms. I've about decided that WAG stands for Walter A. Good, but I'm not sure. MOPA and TTPW, to mention two out of about two hundred have me confused.

"It's going to be very easy for you to get your publication so filled with advanced experimentation and expensive circuits that one look at it will discourage us stupid beginners. If you consider this part of your job to attract newcomers into R/C (I know that one) why don't you make sure that each issue has the words--FOR BEGINNERS--on at least one page and follow it with basic information. I just found out my transmitter won't work with the new 3 volt transistor receivers now coming out. You can read some pretty wild advertising in some of the various model magazines and I don't know what to believe. You don't have to make many expensive mistakes to lose interest in R/C completely.

"I think Grid Leaks should be primarily for the experienced R/C fan. Don't forget that too many of us are learners and have no access to groups and clubs and some basic and simple methods and ideas that are normal procedure to a club member come to us the hard way, if at

all."

Now for the other side of the picture from an old-timer: "Here's something I have thought about for quite some time on the R/C beginner. MAN and American Modeler, going back for quite a few years, have battled this same problem but they have had to do a lot of repeat business for the beginner for a number of life-sustaining reasons

"By doing so, they have drawn sharp criticism from the advanced R/C'er.'Same old stuff', they say.

"I got the impression that GL's main purpose was to provide an outlet for this higher order of technical understanding and technical matters. I still think that GL's ultimate success lies somewhere in this area.

"Before I get onto the beginner's problem, let's take a look at ham radio. There's hardly a thing in QST that a rank beginner can understand and very little attempt is made by this aged and wise mag staff to accommodate the beginner except to demonstrate by the technical quality of the articles that 'You too, Mr. Beginner, can some day, if you work and learn the principles, appreciate and use these writings and discussions.'

"Out of this struggle came the ARRL Handbook and the self-taught beginner's manuals. In effect, these old guys have said, 'Look, kid, if you want to get with the best of us--go to work on the principles'. And out of this challenging position has developed a flood of thousands and thousands of aspirants to the distinction of being known as a Ham. Uncle says, 'Pass a test to demonstrate your understanding of just the basic fundamentals,' and here is where the men are separated from the boys. R/C doesn't have this hurdle, therefore we catch all manner of self-styled radio experts and frequency butchers. The fact that the above labeled guys are the ones who have the bucks to spend makes it an important and serious consideration. However, there is still the finer side which treats the technology and art of applied radio. This is the area in which we find the club publications and this is the area in which we find GL going full stream.

"A radio control handbook similar to the ARRL would be along the lines of the ARRL Handbook but much simpler, treating all the fundamentals in the light of R/C applications. First part could be published and re-published as time went on, always with revisions, of course, but it would preceed in every instance, the second part which would consist of circuits of the day or call it what you want--the latest R/C circuits etc. The point is that the second part would reflect the ever-changing notions of the fraternity but the first part would always continue to carry the fundamentals just as does the ARRL Handbook. It's exactly the pattern as used by the ARRL Handbook and it sells and informs the beginner and certainly is a reference for the old-timer. This is ideal in concept but we must have ideals to make dynamic progress."

There you have both sides of the argument! Which course Grid Leaks will take will depend on its 4000 subscribers and we're inviting you to join the debate by having you give us your ideas as to which course we should take. This is <u>your</u> magazine!

We founded Grid Leaks several years ago with the basic idea in mind that it would form an interchange of R/C ideas among all in the R/C fraternity. Obviously, it is impossible to continually repeat beginner's articles which have already been run in Grid Leaks in the first volume as we begin Volume II. As we cast about for ideas for Volume II, we are going to be guided in our consideration of these ideas by the preferences that you give us. Won't you join in the battle?

Yours very sincerely,

Paul

Paul F. Runge

Grid Leaks

HIGGINSVILLE, MISSOURI