GRID LEAKS

R/C DATA SERVICE

VOLUME 2 NUMBER 8

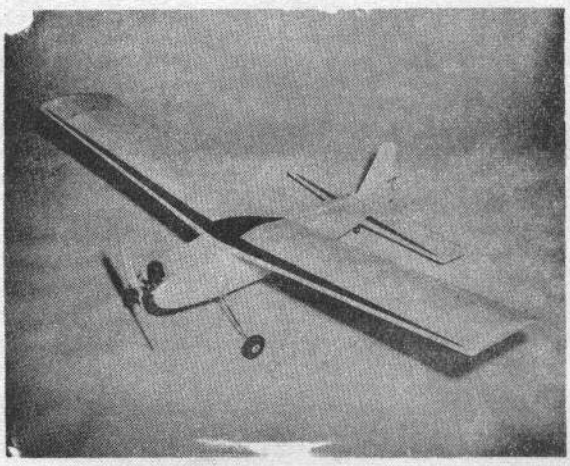
SEPTEMBER OCTOBER 1960

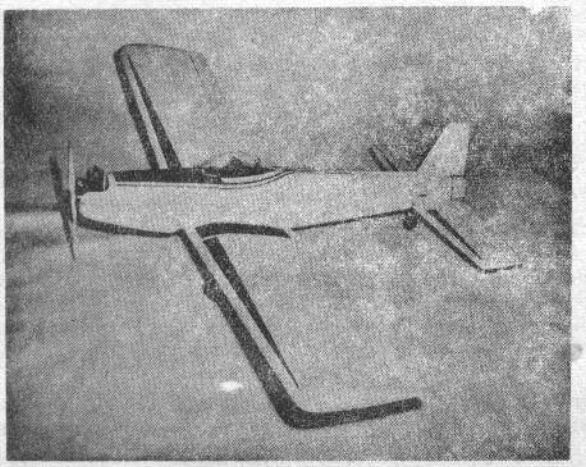
25C

PUBLISHED BI-MONTHLY AT HIGGINSVILLE, MO.

PREVIEW OF NEW ITEMS

TWO NEW PLANES FROM BLACKWELL





SNAPDRAGON 44

From Blackwell Manufacturing Company, the home of the T-100 and Ranger S-10-W, comes word of two new R/C kits which are in the offing.

This is at a time when the T-100 and Ranger S-10-W have, in competition, come through with flying colors at the annual Mile-Hi R/C contest in Colorado. In a rough count of the entries, almost 20% of the models entered were T-100's. They used control systems from rudder only to wiggle and Intermediate cascaded escapements. In the final results, A T-100 won first and second places in rudder only, second in Intermediate was the Ranger, and third place in Intermediate was won with a T-100. Second place in Intermediate was within 5 points of first place and the flight pattern was made under extremely bad weather conditions with wind up to 25 mph.

The first item scheduled for delivery in early October--price still tentative at $7.95--will be the Snapdragon 44. This is a unique airplane in the fact that it will be designed with the instructions for the beginner for rudder only applications.

Its physical size will be limited. Its design will be made so that the beginner will have his choice of only two radios which may be installed because of the battery weight involved, only two types of escapements which will be recommended. The plans will be quite specific and quite thorough about where the placements of what goes and also will be designed for use with a .09 engine which will be radial mounted using the integral gas tank so no problems should be encountered in this particular installation.

The test models balance about 22% of the chord which gives this particular plane a fairly low rate of climb and yet a fairly steep glide which is satisfactory for wind penetration and, for calm weather, it is only necessary to add a slight bit of weight to the tail with no tricky trim being involved.

The pre-production models are undergoing extreme testing conditions. We will be able to test some here at Grid Leaks very shortly. So far, they indicate that they are very steady in flight and will control well without violent turning tendencies in spite of the fact that rudder movement is excessive so that, for the beginner, the exact placement of the rudder loop on the plans.

HURRICANE 600

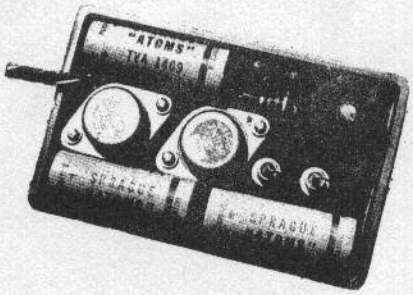
Physical specs of this particular unit which, of course, can be taken on by the advanced flier and changed to suit himself are as follows: It will be of the shoulder wing type with a span of 44" and a chord of 7½" with a total wing area of 330 sq. in.; the average wing loading will be 10 oz. per square foot with the 3 volt CG Saturn or a Kraft single; the air foil is flat bottomed 12% thickness for good wind penetration; engines recommended are in the .074 to .099 category; average construction for even the beginner will be three to four evenings; the fuselage will be pre-assembled to insure the beginner that no building warps will be encountered.

For later delivery, Blackwell Models is also working on a low wing job which will be known as the Hurricane 600. This will definitely fall into the expert category since it can only be classed as a hot ship.

The designer states that, if the Hurricane is attempted by a beginner, trouble may be expected although pre-assembly and settings will help eliminate quite a few of the trim difficulties which are encounterable in low wing jobs. For the R/C boys who do know their radio control and airplanes, this kit should be a winner in any category for everything from rudder only through multi-channel.

Physical specifications are as follows: Span is 62" with a chord of 10"; area is 600 sq. in; air foil is semi-symmetrical; wing area is 4.2 sq. ft.; average weight is 3¼ to 3½ pounds single channel with Intermediate control system; 4½ to 5 pounds with 8 channel radio. .19 for single channel; .29 - .35 for multi. The fuselage will be pre-assembled. Landing gear wing mounted of knock-off type held down with rubber bands. The price has not been fixed nor has a delivery schedule

HILLCREST ITEMS



Transmitter Power Supply Converter. 4.8 volt input gives full 135 volt D.C. output free of ripple. Will definitely not interfere with tones. Use four Nicad rechargeable batteries of two to eight amp hours capacity. If you do a lot of flying this will pay for itself many times over. This unit is a solid state electronic device completely enclosed in a protective plastic case--will last indefinitely. $27.95

Air Wheels. Semi-pneumatic type. Tires are locked into hub--cannot roll off. Come in a do-it-yourself pack. One pair of tires and hubs packaged in poly bag. Can be assembled in less than a minute.

1 3/4" diameter per pair	.55
2 1/4" diameter per pair	.85

Spinners. 2 1/4" diameter. Perfectly balanced. Blunt streamline shape minimizes damage to cars and spectators.

High impact fuel-proof styrene (red only)	.45
Nylon - guaranteed unbreakable (black only)	.85

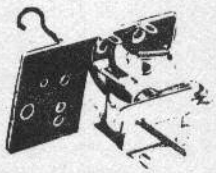
Nylon Fuel Tanks. Ideal for single channel R/C models. Visible fuel level. Outlet, vent and filler tubes. May be pressurized.

2 oz. capacity	.95
1 oz. capacity	.75

Plastic Piano Type Hinge. For R/C or U/C model control surfaces. Much stronger than cloth hinges. Easy to install, regular model cement will weld it firmly to balsa. Two 8" lengths per set. May be cut into shorter lengths as required. Control horn included.

Packaged two sets in poly bag .50

ECK-BABCOCK PRODUCTS



One of the most recent items introduced by the new Eck-Babcock concern taken over by Richard C. Eck as sales manager within the past few months is the Motor Minder servo. This is their model #EM-1 and sells for $4.95 and gives perfect flight control of throttle-controlled R/C engines. Same reliable relay action as the Mark II Super Compound escapement. Can also be used as a two-position escapement for rudder and elevator control. Lead valve accessories available to convert standard engines to two-speed operation.

Continued in the Eck-Babcock line are their Magic Wand transmitter, the Mark III Magic Carpet receiver, the Mark II Super Compound, the Electric Compound #897 and their line of plastic R/C planes and boats.

HYDROMETER AND BATTERY BOOKLET

Of interest to the lead acid battery users are the Tower Hydrometer and a booklet titled "Care and Feeding of Baby Batteries".

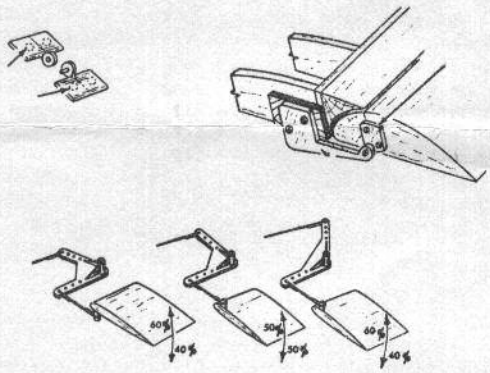
It is safe to say that there are many of the lead acid batteries in use particularly in model boats. These are not, in any way, to be confused with dry cells or nickle cadmium cells. Rather, these are the ones that require sulphuric acid electrolyte. Many of these are also available in the 2 volt series and are so being used in power supplies of transmitters.

The booklet "Care and Feeding of Batteries" at 25¢ represents an excellent treatise in its pages as to what makes a battery like this tick and what it takes to keep it in shape. Complete with drawings, it gives charging instructions and the use of Hydrometers.

The 25¢ involved in the cost of this booklet, we feel is considerably offset by the amount of information it contains.

Available also is a small Hydrometer which contains red and green gravity balls and works very much as the regular car battery hydrometer would with the exception that it has been designed for subminiature applications and will fit in batteries of the small Aristo series. The price of the hydrometer including the battery booklet is $1.25. We recommend each of these items highly.

NYLON PRODUCTS



From Williams Brothers out California way comes word of several new items of interest to the multi fan. These come highly recommended by multi users and are made entirely of nylon. They may also be adapted for control line use in certain instances and cover nylon bellcranks in 60°, 90°, and 120° configurations at 55¢ each, large and small control surface hinges at 50¢ and 39¢ each respectively, large and small nylon aileron hinges at 45¢ and 35¢ each respectively. The aileron hinges are a two-hinge set while the control surface hinges are a set of four.

MISCELLANEOUS

Among new items mentioned in more detail in the article on the 1960 NATS, are two Superhet Reed Receivers. Also mentioned is the Bonner Relayless Servo.

Items listed on this page, as well as the Bonner relayless Servo above will be carried by Ace Radio as soon as they become available from the manufacturers. Already in stock are Bonner Servo cans--bottom portion--at $2.. Also Alco submini toggle switches in DPDT for $3.00, and SPST for $2.50. The Cobb Micro Boat Car Servo $10.95... Almost daily new arrivals come in. Deliveries on Kraft 4 and 6 channel equipment has been begun.

RC at the 1960 Nationals

RANDOM THOUGHTS OF A ROVING CORRESPONDENT

If there is one thing that can be said for certain about the 1960 R/C Nationals held the last weekend in July in Dallas, it is that the weather was hot!!!

Other than that, we feel that we are like many who attended this event--we went there with some preconceived ideas and what we saw, by and large, merely confirmed those pre-conceived ideas!

Not that R/C'ers as a whole are not an open-minded lot but some are just a bit hard to convince.

Temperature difficulties were one of the major problems encountered at this Nats if the crack-ups that littered the runways were any indication. This crossed the board, we believe, fairly uniformly regardless of what type of equipment was being used and affected the single channel equipment as well as the multi-channel equipment of all types.

In our humble opinion, quite a few bouquets must be passed out to those who were responsible for organizing these Nationals compared to the one that was held in this same location four years ago. More and better shelters were available consisting of large tents borrowed for this purpose to keep the blistering sun--and rain--away from the contestants when not competing.

The flight line or lines moved quickly in most instances and there appeared to be a minimum of confusion.

A screened-in booth was provided in which checking of equipment could be done to minimize any interference from this source.

The transmitting equipment of all types was impounded in one of the headquarters tents and should have minimized interference from this particular direction at least considerably.

As in previous years, the flights were monitored by a communications type of receiver and, while interference was present, it was readily apparent when it was and when it was not.

Introduced at this particular Nationals was the Solidtronics proportional equipment and, while it may not have made the impressive splash that was hoped for it by some of the proportional fans, it did show great promise for future development. In fact, it bore out the contention of many proportional fans that proportional control is merely gaining a good foothold at the present time and will be a thing to reckon with in the foreseeable future. The package that Solidtronics has engineered thoroughly from stick box to servos is beautifully fashioned and thoroughly engineered. The fact that the flights were not what one would expect of this equipment were due to a number of factors and it is not our preference to go into them here. We would venture to go out on a limb, however, and predict that much will be heard from this new name in R/C in the future.

The comment could also be heard with reference to proportional control that "it looks like this year has sounded the death knell for proportional". This was a comment overheard by an unknown observer in the P X, one lunch time and, while we didn't choose to challenge the maker of this remark openly, we would like to merely point to the fact that in Intermediate, proportional placed high in the list of winners in several spots. Also from word just in from France, proportional copped a first place in the French Nationals just completed--this from Francis Plessier, author of GL's Indoor RC of several issues ago. Death knell?

Other items that we feel are shaping up very definite trends in things to come apply in the reed field. Many of the old time reed fliers were flying with a relay-less reed system which has now been perfected and will shortly be placed on the market by Howard Bonner. This unit comprising six transistors completely replaces the relays as they are currently being used in the reed receivers and all that is required is a good front end coupled to a good reed bank which then utilizes exactly the same battery complement as would normally be used by the reed system anyway and completely eliminates the relays.

According to the manufacturer and others who have tested them, the temperature problems have been whipped and only a few minor questions remain which are of a production nature and not of technical problems. They are primarily concerned with the end marketing of these units and have to do with the final pricing of the product. As it now stands, the Bonner relay-less servos will run roughly twice as much or two and one-half times as much as the Bonner servo now does. The final price will depend upon the ultimate selection of several of the transistors to be used.

When it is considered that this replaces two relays in a system, this is not expensive because it is coupled with an attendant decrease in weight.

There will also be marketed by Bonner a conversion kit type from which the owner of present day servos may convert to the relay-less type of operation without obsoleting any of his existing servo or reed equipment with the exception of the relays.

Exactly how soon this will hit the market the word was not too firm. It will depend upon a number of factors and, knowing Bonner's reputation for his exactitude and high quality products, it will not be until the finest and minutest of details have been ironed out.

To hit the market about the same time will be a new relay-less reed superhet receiver which will be a compack package indeed since it is designed for use with the Bonner servos and is to sell somewhere in the neighborhood of $80. It will not be announced for public consumption until it and the servos are ready to roll, however. This is merely a peek into the future.

Also, heard of but not seen, was a new 10 channel superhet receiver by CitizenShip which used the new subminiature Gem relays. This, too, was an ultra-small version as related by those who had seen it and speaks well for the progress of R/C in the future.

Editorially, we do not feel that the relays are yet about to be completely replaced in radio control. Our own feeling in the matter is that relays are still here and will still be here for some time to come. One of the primary factors for keeping them will be economy and the other is that, in use in R/C installations with the current engines, the additional weight isn't as big a factor as it once was considered to be.

Another item which caused a great deal of comment among those in the know was a new reed bank to be manufactured by Fred Dunn of Astro Hog and Astro Bipe fame. This had several distinguishing features, chief among which is that it will purportedly have greater stability as far as audio frequencies is concerned when it comes to interchangeability of reed banks. This is due to a unique printed circuit design of the top board and moulded case base. It will also be a somewhat lower design than any which are now commercially available allowing thinner receiver designs when coupled with some of the more compact relays that are coming or for use in the relay-less servo design receivers. The price also is said to be very reasonable. It will appear in several versions. One in a low ohmage design for use in transistorized applications and one in a high ohmage for use in vacuum tube hybrid installations. The prices for the 8 and 10 channel and other equipment were not yet finalized enough to be publicized neither had production dates been fully set but they should be available through regular jobber-dealer channels very shortly.

Speaking of the Astro designs, there were many low wing jobs at the 1960 Nats which were of the Astro Hog version which featured minor changes and which gave the reed users very nicely performing airplanes. Another airplane that was beginning to show up in numbers was the Orion which was designed by Ed Kazmirski and the plans for which appeared in a recent issue of Model Airplane News. This ship showed great promise at the Nats because of many design features which were incorporated in the basic structure. It proved itself to be a hot ship in the hands of hot pilots but a consensus of many of the more experienced is not a design which can be recommended for pilots with limited skill or little experience.

Ed Kazmirski, it was announced over the PA system from a cable which had been sent from Switzerland by the U.S. International team manager, W. A. Good, placed first in the International competition in the team of three that went to the International R/C Meet from this country. The other team members were Harold DeBolt who placed seventh and Bob Dunham who placed tenth. The American team, as a group, placed second while first place prize was copped by the British team. No further information than this was available.

A further word on equipment in the radio line which appeared at the Nationals we feel to be in order. There was a great variety of this equipment going from the simplest single channel to the most complex 10 and more channel reed equipment available. We feel it only fair to say that there were those who were very happy with certain makes of commercial gear while others who were flying identical gear made by the identical manufacturer suffered troubles and were not happy with the equipment. Our own personal opinion in this matter is--and we must speak very highly of our so-called "competitors"--is that all commercially available equipment today approaches a reliability never dreamed of and absolutely unheard of a few short years ago. The fact that this equipment seems to perform better for some than it does for others raises a question in our own minds which we shall leave dangling and leave the reader to settle for himself. We do feel, however, that it is not fair to condemn <u>any</u> equipment because of its apparent malfunction, apparent lack of performance, or like based on a single experience at a competition such as the Nationals.

Further, on the word of equipment, we are most happy to state that the Kraft single channel receiver and transmitter equipment which was in evidence at the Nationals apparently performed highly satisfactorily in spite of the extremely high temperature. It performed well under the escapement type of operation and pulse type of operation. The 10 channel triple simultaneous equipment in the hands of Bill Deans won many comments because of its greater flexibility than the simultaneous equipment.

It is not the purpose of this article to go into great length or to report who won what at the Nationals since our stay at the Nationals was confined to a relatively few short days. This report is intended to give you an overall--and possibly biased--report of what observations, conversations, and deductions were had by this observer. We leave for magazines of such caliber as American Modeler, Model Airplane News, and Flying Models to give you pictorially and statistically the reports of who won what, how the air ships looked, and what equipment was being used by all contestants. These magazines, after all, are much more capable of doing this than this publication is and, because of their greater staff coverage and greater time coverage of an event of this nature, can do a more objective job of reporting than we can.

The judges at the Nationals had been briefed and had been given flight demonstrations and had been told what to look for in these flights by competent R/C'ers before the Nationals took place. The judges' job in any R/C event, even on a local scale, is not an enviable one. In fact, it can be termed a very thankless job because there will be those in any event held anywhere who will not agree with the judges points as they are rendered.

On this subject, we feel that the AMA is making a distinct contribution to all R/C modellers and contestants by making available an R/C Judges Guide at a cost of 25¢ per copy. It may be had from the AMA at 1025 Connecticut Avenue, N. W., Washington 6, D. C. This, a reprint from the February, March, and April issues of Model Aviation, is a six-page printed guide and is to help satisfy both the minds of newcomers and advanced competition fliers and judges as to what each maneuver should consist of and how it should be performed in order that scoring, particularly on local and state levels may become more uniform throughout. This set of standards, we feel will do much for the R/C contestant.

It was good seeing the many friends we made through the years at other Nationals in Chicago, Willow Grove, and four years ago at Dallas and we look forward to seeing you at the future Nationals wherever they are held. Our time is not always our own but we enjoy going.

See you at the next Nats in '61!

KRAFT DUAL OR TRIPLE SIMUL TRANSMITTER SCHEMATIC

Never in the history of Grid Leaks, have we been so besieged for advance information, as we have about the Kraft Dual and Triple Simultaneous reed transmitter. So earnest have been these pleas, that although the final engineering on these units is far from complete, we present here the schematic. While the engineering is going on, this involves mostly final selection of components and physical layout. Little if any real changes will be made in the basic circuitry--- this has already been flight proven well over a period of several years.

The circuit shown is for eight channels -- for ten or twelve simply add pots and Lever Switches, and you have it. An unlooked for dividend is showing up in the triple units---much greater flexibility of which controls may be had simultaneously. Seldom do the users use it in a triple fashion, but it does offer greater variety in what controls may be had at the same time.

While this is the bare schematic, the demand for it has been so insistent, GL felt it could not put it off any longer. It is presented for the advanced R/C fan as a matter of interest.

PARTS LIST
2 - DPDT toggle switches
1 - Crystal
1 - Crystal socket
1 - Tube socket
1 - 3A5 tube

2 - L1 - 13T #16 3/4" I.D. close wound
3 - L2 - 1 henry high Q toroid (DC resistance less than 90 ohms) tapped 1/3
1 - 20 uh RF choke
1 - 36 uh RF choke
1 - 56" antenna telescoping type

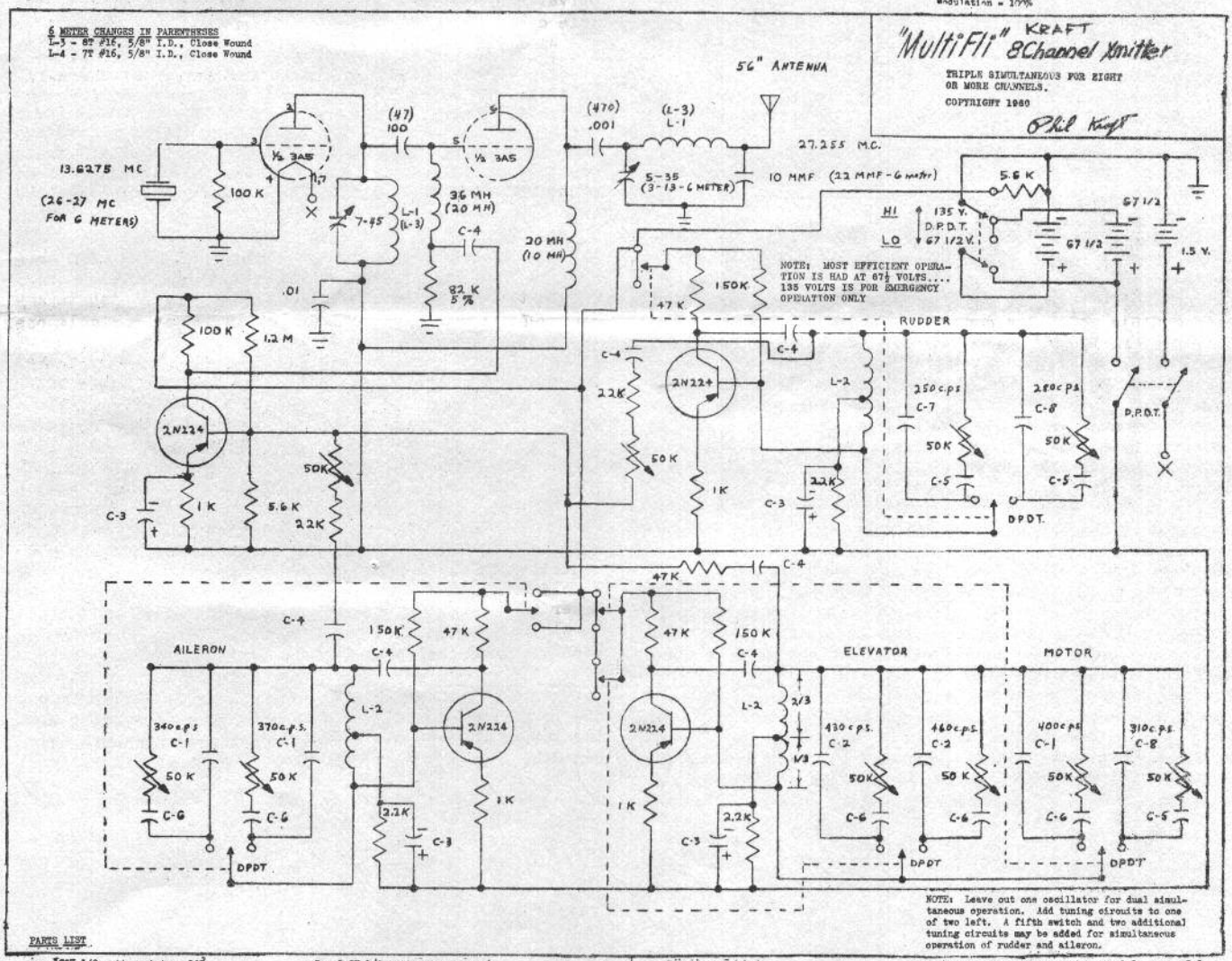
SPECIFICATIONS
Tone frequency: No measurable shift 340 - 460 cps. Less than 1/2 cps 250 - 340 cps at 0° - 150° F. or 40 - 150 volts
Oscillator beta tolerance: 40 - 120
Mixer beta tolerance: 60 - 120
R-F frequency: Within crystal tolerance

CURRENT DRAIN

	67.5V	135V
Transmitter and mixer	6 ma	15.5 ma
Plus one tone	6.6 ma total	16.5 ma total
Plus two tones	7.4 ma total	18.0 ma total
Plus three tones	8.0 ma total	19.0 ma total

"A" = 220 ma 1.5V
Modulation = 100%

6 METER CHANGES IN PARENTHESES
L-3 - 8T #16, 5/8" I.D., Close Wound
L-4 - 7T #16, 5/8" I.D., Close Wound



NOTE: Leave out one oscillator for dual simultaneous operation. Add tuning circuits to one of two left. A fifth switch and two additional tuning circuits may be added for simultaneous operation of rudder and aileron.

PARTS LIST

4 - 100K 1/2 watt resistors 10%
4 - 47K 1/2 watt resistors 10%
1 - 1.2M 1/2 watt resistor 10%
1 - 82K 1/2 watt resistor 5%
4 - 1K 1/2 watt resistors 10%
2 - 5.6K 1/2 watt resistors 10%
3 - 150K 1/2 watt resistors 10%

3 - 2.2K 1/2 watt resistors 10%
2 - 22K 1/2 watt resistors 10%
10 - 50K 1/2 watt pots
7 - .25 mf 200V mini tubular - C-4
4 - 14 mf 15V mini PC electrolytics - C-3
1 - 5-35 mmf ceramic trimmer
1 - 7-45 mmf ceramic trimmer

1 - .01 mf disc ceramic
1 - 100 mmf disc ceramic
1 - .001 mf disc ceramic
1 - 10 mmf disc ceramic
3 - .03 mf 200V tubular - C-5
5 - .02 mf 200V tubular - C-6
1 - .33 mf 200V tubular, pad to reed frequency C-7

2 - .22 mf 200V tubular, pad to reed frequency C-8
3 - .15 mf 200V tubular, pad to reed frequency C-1
2 - .1 mf 200V tubular, pad to reed frequency C-2
.02, .03, .05 mf 200V tubular to pad to reed frequency as needed
4 - Philco 2N224
4 - DPDT Center-off spring return - Switchcraft #5037

NEWEST MULTI-FLI RECEIVER LAYOUT IS FLEXIBLE

When Grid Leaks presented the Kraft Multi Receiver circuit and initial layouts for a 4 channel and 8 channel receiver, there was a lot of interest, and understandably so, since the Kraft Single Channel equipment continues to win new friends among fun and contest fliers daily.

Because of the impressive response, it was decided to kit this equipment, but in a much refined and improved form.

First, it was changed to a double deck type of construction making a much smaller configuration possible; second, it was felt that the vacuum tube still offered the best detector, but that there would be a big advantage in using the same batteries as were used by the servoes, and therefore a power converter was included so B batteries could be eliminated if desired.

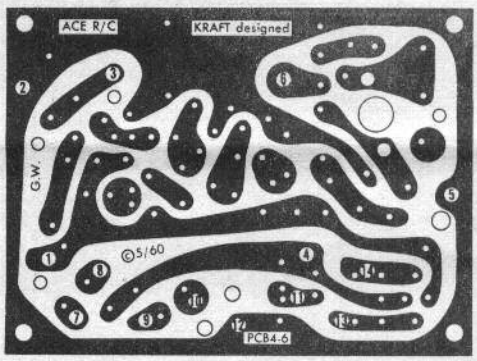
Essentially the circuit remained unchanged; but in the engineering of the final product by Phil Kraft the new design offers many possibilities for years to come.

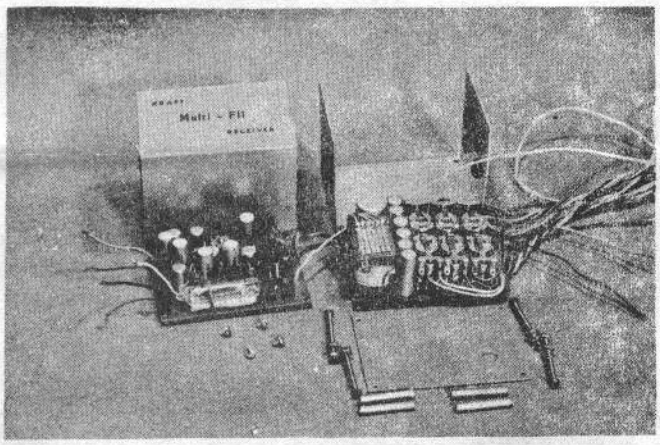
Pilot test models were sent to various builders throught the country. They proceeded to build the units -- offering suggestions on instruction and construction improvements. It was extensively test flown by experts and beginners alike--and no bugs were left to be ironed out. The units -- with batteries or a converter -- were approved by some of the most critical constructors and fliers in the country.

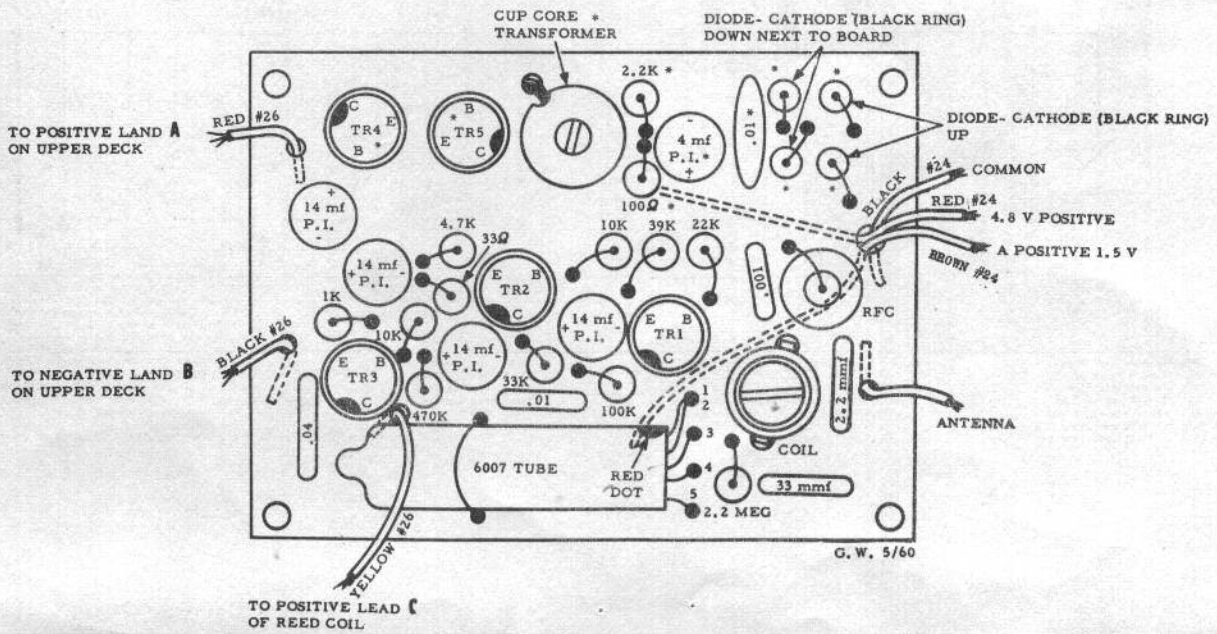
While it is not an inexpensive unit to build, it is one of the best and has the greatest flexibility of any available today. For the economy minded it may be used with the reed/relay combination with conventional servoes--using the flight proven Deans units.

It will also offer to the advanced builder, the opportunity of using it in an 8, 10 or 12 channel configuration with the relayless servoes which are beginning to appear. The relayless servoes have the transistors built right into them, and eliminate the relays from the circuit. By maintaining the bottom deck as it is, using the 20 mf. capacitor and a reed unit of the desired number of channels on the top deck it can be made into a relayless unit of almost any desired number of channels. The reed unit should be of 3K resistance for proper results.

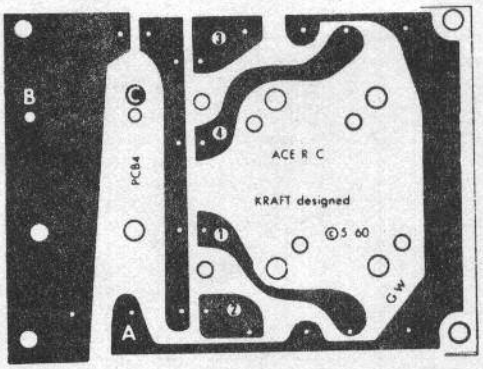
The Kraft Multi Fli design is the most flexible--it may be built for battery operation, for power converter operation, for reed/relay combinations in 4 and 6 channel design in the units shown, for relayless operation in this size for almost any number of channels as desired! No need to wait for an "improved" circuit --with the Kraft, it's here!

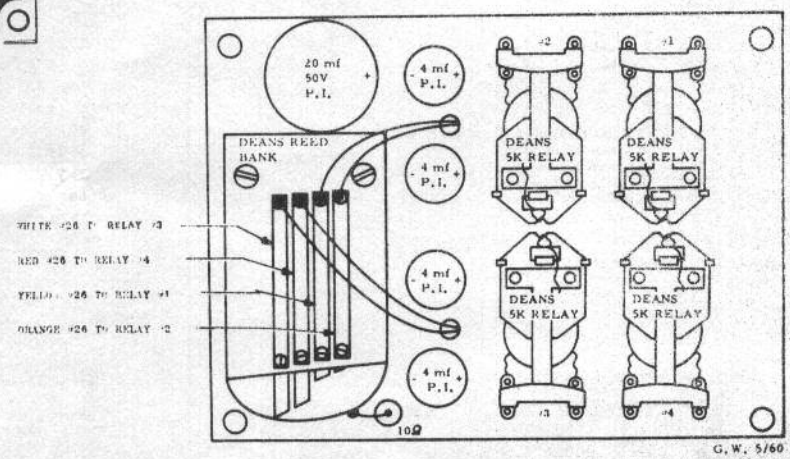






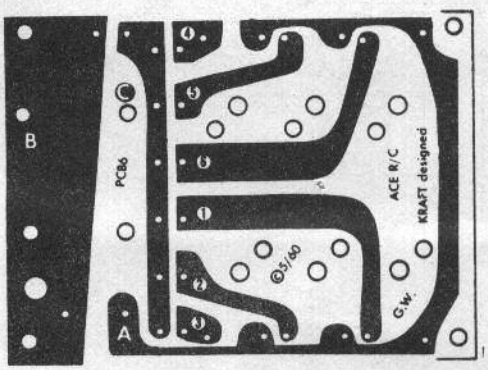
FOUR CHANNEL REED DECK --TOP PART OF SANDWICH CONSTRUCTION





G. W. 5/60

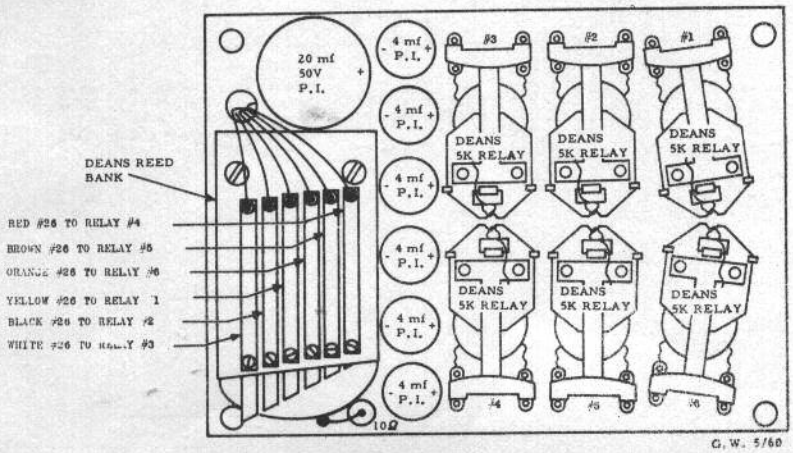
SIX CHANNEL REED DECK -- TOP PART OF SANDWICH CONSTRUCTION



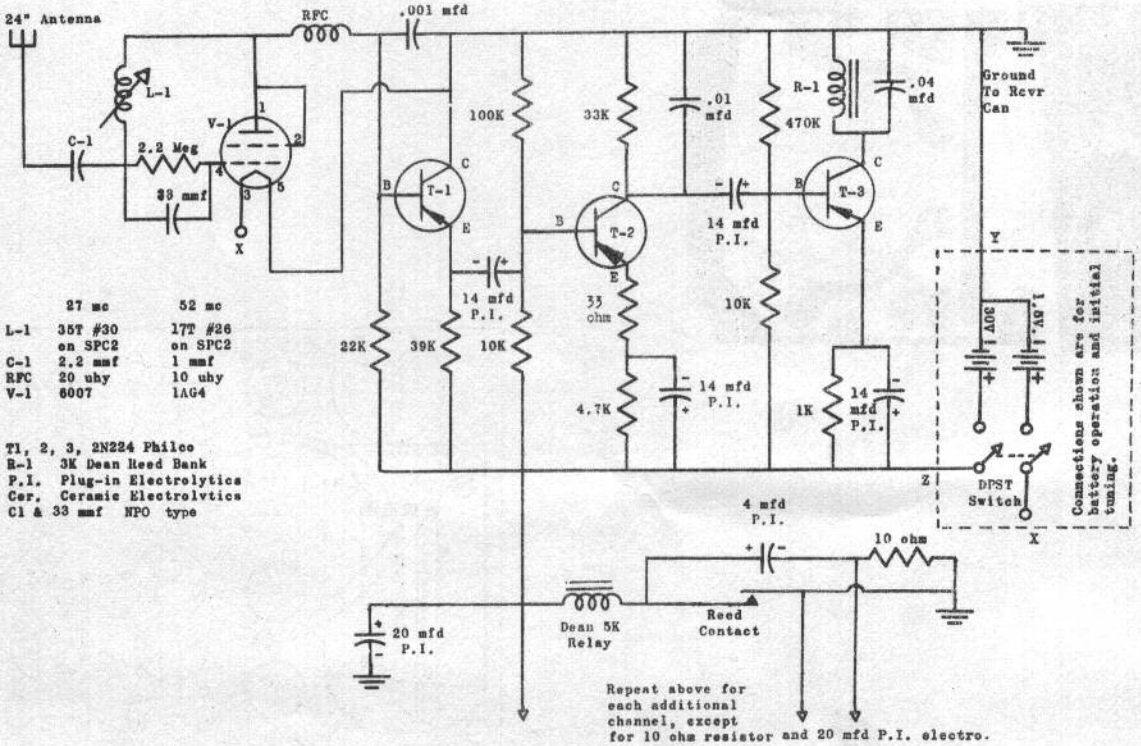
RELAY PAIRS
1 & 6 2 & 3 4 & 5

1 & 6 - MOTOR
2 & 3 - ELEVATOR
4 & 5 - RUDDER
} FOR SIMULTANEOUS OPERATION

THE CANT IN THE TWO END RELAYS IS FOR THE SCREW CLEARANCE, IN FINAL ASSEMBLY

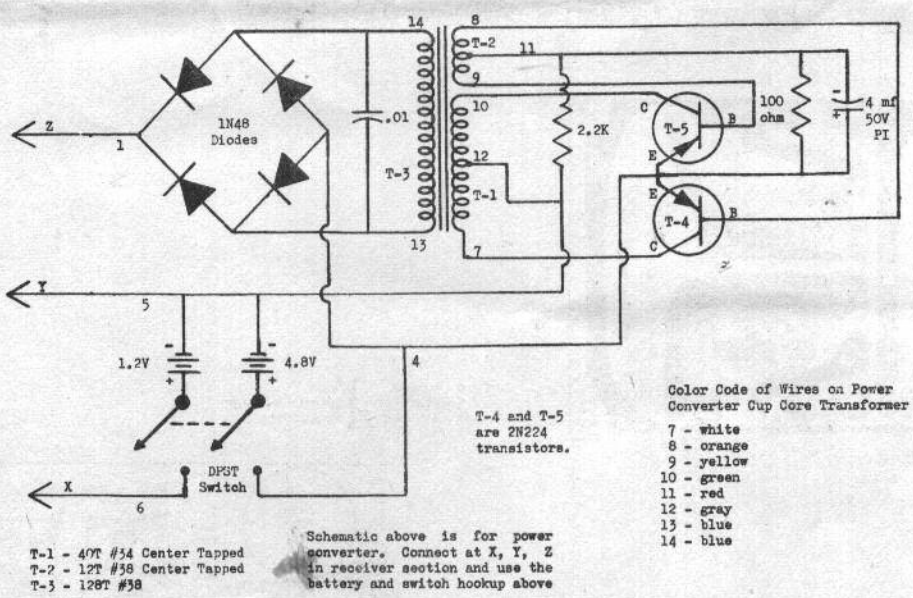


G. W. 5/60



	27 mc	52 mc
L-1	35T #30 on SPC2	17T #26 on SPC2
C-1	2.2 mmf	1 mmf
RFC	20 uhy	10 uhy
V-1	6007	1AG4

T1, 2, 3, 2N224 Philco
R-1 3K Dean Reed Bank
P.I. Plug-in Electrolytics
Cer. Ceramic Electrolytics
C1 & 33 mmf NPO type



T-1 - 40T #34 Center Tapped
T-2 - 12T #36 Center Tapped
T-3 - 128T #38

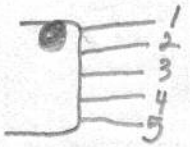
Schematic above is for power converter. Connect at X, Y, Z in receiver section and use the battery and switch hookup above

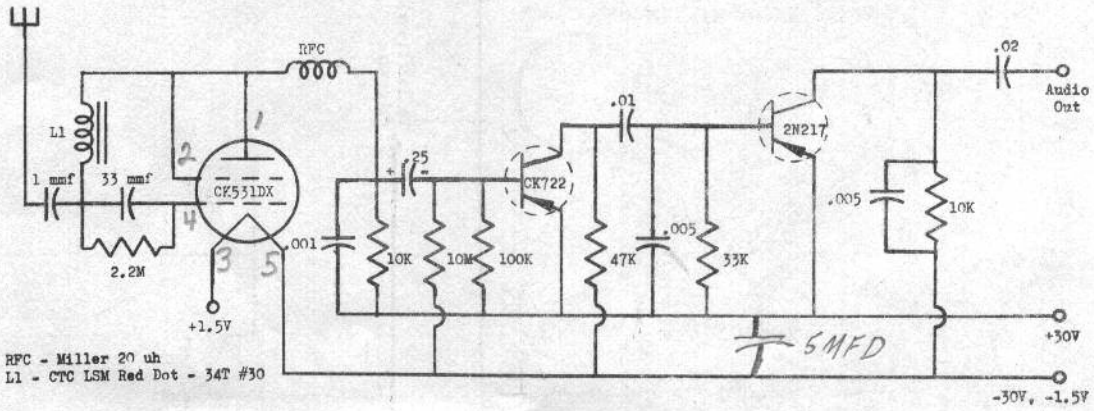
T-4 and T-5 are 2N224 transistors.

Color Code of Wires on Power Converter Cup Core Transformer

7 - white
8 - orange
9 - yellow
10 - green
11 - red
12 - gray
13 - blue
14 - blue

MARCY MULTI RECEIVER WITH TOROIDS





RFC - Miller 20 uh
L1 - CTC LSM Red Dot - 34T #30

RF-AF SCHEMATIC

From Pete Bliss comes a report of a project which their club in Corning, New York attempted by having a club receiver and transmitter which each member builds and understands. The plan for that receiver essentially is the MarcyTone with the exception that a number of fundamental changes have been made. The plan is that the layouts shown can be started as one channel and can be added to as funds become available.

Pete says they chose the Marcy because of the great success they had to date. They state, further: "You will also notice that we wind toroids on Doig's form (Arnold Engineering #A-050056-2) and use .25 capacitors for the filters. The forms cost about $1.00 per piece and take about 40 minutes to wind. It does require equipment to set up the tones, however, because a 400 turn toroid will cover 3,000 to 4,800 cycles by just selecting the .25 caps. They are much more selective and require less driving voltage. We have found that .1 volts RMS at the collector is plenty and the harmonics don't touch it.

"A transmitter re-designed has also been worked out which uses toroids for tone stabilization because this is required with the toroids in the receiver because they are much more tricky.

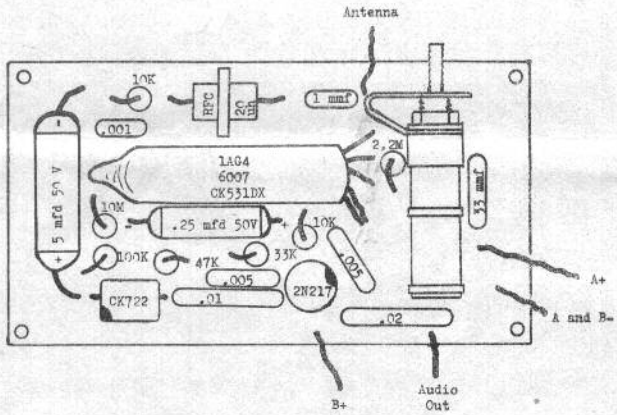
"The first step in winding the receiver toroid is to make a bobbin of a piece of aluminum welding rod 1/16" diameter by 6 1/2" long. It must be very soft so it will not strip the wire. 1/16" aluminum tubing found in hobby shops should work okay.

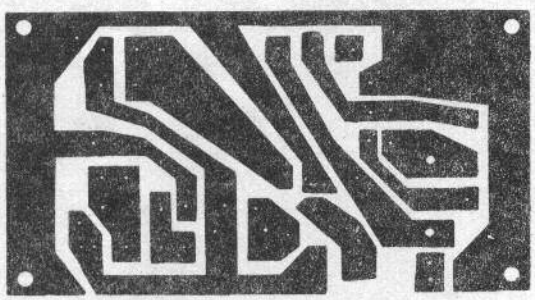
"The next step is to cut 1/4" deep slits into each end with an X-Acto saw blade. All burrs must be sanded off and it is ready to go. The table below shows the turns necessary for each coil using the mean of 8 .25 mf capacitors. The wire required is #34 heavy Formvar wire. Actually, this is first wound on the bobbin and then the bobbin is used to wind the toroid ring. This bobbin is necessary so that the wedding ring type of toroid winding can be done."

It takes a little time to learn but Pete says that it is quite easy to wind about 10 turns a minute.

Channel #1 - 1600 cps - 750T - 45T on bobbin
Channel #2 - 1950 cps - 700T - 40T on bobbin
Channel #3 - 2300 cps - 600T - 37T on bobbin
Channel #4 - 2600 cps - 500T - 35T on bobbin
Channel #5 - 3100 cps - 400T - 33T on bobbin
Channel #6 - 3600 cps - 350T - 30T on bobbin

The layout shown is essentially a double-deck affair and housed in an aluminum can which is the size of the toroid relay deck and deep enough to house both the RF and toroid relay deck in depth.

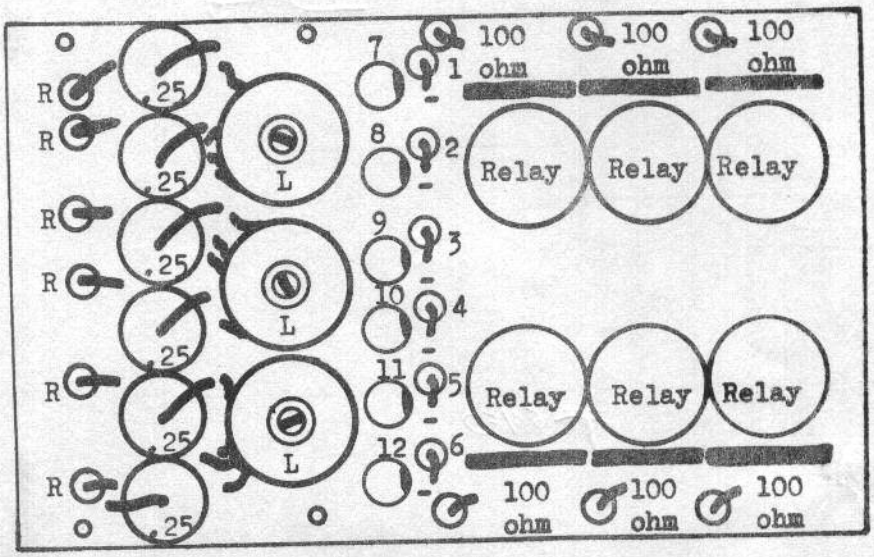




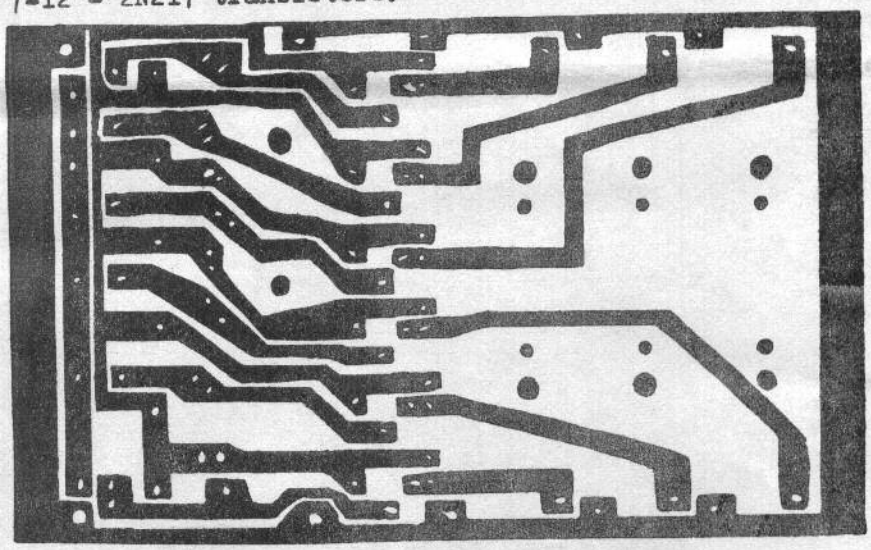
RF-AF PRINTED CIRCUIT BOARD AND LAYOUT

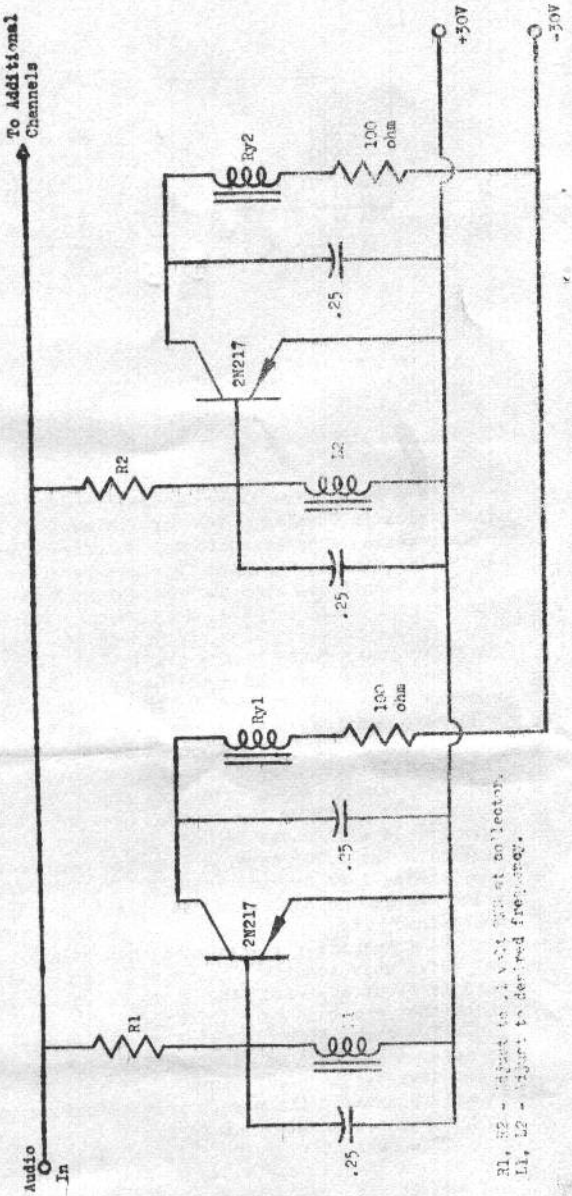
LOWER BOARD LAYOUT

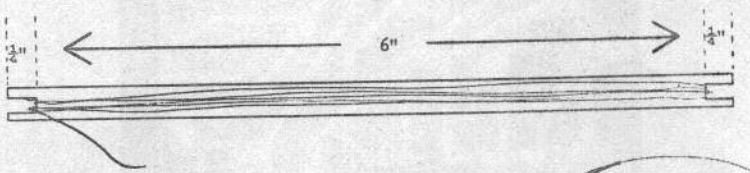
FULL SIZE



R - Adjust to .1 volt RMS at collector.
L - Adjust to desired frequency.
1-6 - .25 mfd 50 volt ceramic electrolytics.
7-12 - 2N217 transistors.

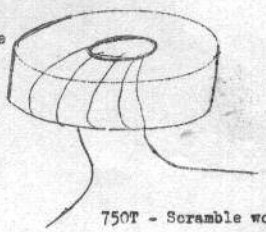






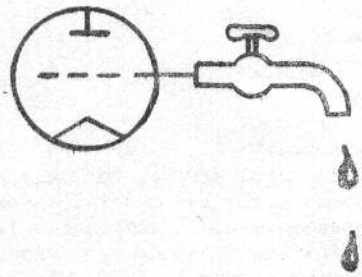
Unwind the 45T on the bobbin around the toroid and it gives the 750T's.

TOROID WINDING INFO. WIND THE NUMBER OF TURNS ON BOBBIN AS ARE GIVEN AT EXTREME RIGHT ON FOREGOING PAGE TO ACHIEVE THE CORRECT TOROID TURNS



750T - Scramble wound

Grid Leaks At Play



Quite a big push seems to be ahead in the expansion of Citizens Band radio particularly with reference to the Class D two-way telephony service. Recent magazines such as "Jobber News and Wholesaling", which are independent publications of the radio wholesale industry, carried articles pointing up the fact that the Citizens Band at the recent parts show held in Chicago in May had top interest in Citizens Band equipment.

Another issue of this particular magazine had three articles plus the editorial entitled "Citizens Band Radio Expands".

All of this, of course, is of great interest to the R/C fan because he works on the Citizens Band too but, for remote control only and, therefore Class D, in effect, will give him more interference than he has been used to in the past. While this will still be interference which is limited in certain areas of our country because of non-congested population, these areas of interference will increase in greater extent because there is a great emphasis on the two-way Class D communications.

We can recall the time when Citizens Service was first made open to the general public for remote control devices on Class C and there was no band wagon on which the manufacturers would climb to make radio control receivers available to the general public. As a matter of fact, there was little if any direct effort at that time by manufacturer to get aboard a band wagon.

There is a band wagon today, however, on the Class D because Class D is sparking the excitement among non-technical users for Citizens Band equipment and more and more of the big manufacturers in general radio are getting into the building of equipment for Class D. Just take a listing of most of the top names in radio and television manufacturers and you will see them making plans for entry into the Class D field for two-way voice communication.

This editorial is not in any way, shape, or form intended as a gripe or a criticism. It is merely to point up to those of us who are holders of licenses under the FCC for use of the Class C portion of the Citizens Band that interference will become a greater and more increasing problem as time goes forward. The only way to combat interference is to take what we feel to be a solid and respectable course of action.

This means, first of all, that all of those who are using remote control facilities of the Class C portion of the Citizens Band to make sure that they are properly licensed using the correct form, Form 505, that can be had from the Federal Communications Commission or any of their local offices. This form must be correctly filled out before any Class C type or radio controlled type of equipment can be legally operated regardless of by whom it is manufactured. Not only must the form be filled out and sent in to the FCC at Washington 25, D.C. but it is up to the applicant to make sure that he has on hand a license from the FCC which makes it legal for him to operate his transmitter. It is absolutely illegal to operate a radio controlled transmitter without this license from the FCC regardless of how little the power.

Next, because the FCC frankly states that interference will be a factor, model builders should recognize interference and recognize, further, the fact that it will increase and they must be willing to live with this interference. The Class C band was never designed for the sole operation by the R/C fan at its inception.

It also behooves all club members to make sure that fellow club members are licensed operators and all those who intend to operate R/C gear to apply on Form 505.

With the terrific influx that has taken place on the Class D section, Form 505 is not always available in the quantity that manufacturers like and the responsibility of procuring this form is directly placed by the FCC on the person who will ultimately use the equipment. Therefore, in the event that you procure equipment which is not furnished with Form 505, it is still your responsibility as a potential user of this equipment to secure a form for yourself, to fill it in, and to file with the FCC. In many instances, hobby shops have made these forms available to their customers and potential customers as a good

will feature.

Knowing the R/C fan for many years now, we feel it will not be but a question of time until there will be several answers for the interference that has come into prominence. These answers are all within the legal realm of possibility and this is the only realm that we can consider or condone. Immediate thought which comes to mind are the superhets which are becoming commercially available on the market in transistorized versions from several manufacturers. There has also (and it was written up in Grid Leaks in the past issue) appeared a converter which converts existing vacuum tube or transistor equipment into a superhet very effectively and economically will change over existing equipment to the narrow bandpass that a superhet does allow.

Several conjectures have been made as to whether we could go to a high cps and be in the clear as far as operation is concerned. However, a communication signed by Ben F. Waple, Acting Secretary of the Federal Communications Commission in reply to an inquiry we addressed to him reads as follows: "This is in reply concerning the permissibility of operating radio control transmitters in the 26.97 - 27.25 mc band using amplitude modulation of audio control frequencies in the 8000 to 9000 cycle range.

"As noted by you, stations licensed in the Citizens Radio Service and operating on frequencies in the above band are limited to 8 kc occupied bandwidth. This would limit the highest audio frequency in an amplitude modulated signal to something less than 4000 cycles, unless single-sideband or similar techniques were employed. Accordingly, it appears evident that the type of operation proposed by you would not be permissible for a station licensed in the Citizens Radio Service."

This is merely to point out the fact that anything higher than 4,000 cps in audio frequency, as a rule, is an infringement of the conditions under which we are enjoying examination free radio control in this country today.

From where we sit, it would appear to us that the forefront of this burden of achieving some relief from interference belongs to the modeller himself. It would appear to us further that, unless and until the FCC is convinced, as has been pointed out by American Modeler and Model Airplane News and Flying Models magazines in countless previous issues, that there are enough radio control enthusiasts using Class C services to warrant additional frequencies, that they can be granted. The only way in which the FCC can assume that there is a congestion that works a hardship on Class C modellers is to have all of the Class C modellers officially registered with the FCC.

Until such time as all of the modellers are willing to accept the Class C radio control operational frequency as a special service of the government which is offered to them without any strings attached as far as examinations or any hardships are really concerned, and until and unless the modeller is willing to make sure that his application is filed, the interference may have to increase before the situation resolves itself into anything better. It would seem that the correct licensing by each and every individual who is or wants to enjoy this privilege would be a very small and a very minor price to pay for that privilege.

Yours truly,

Paul

Paul F. Runge

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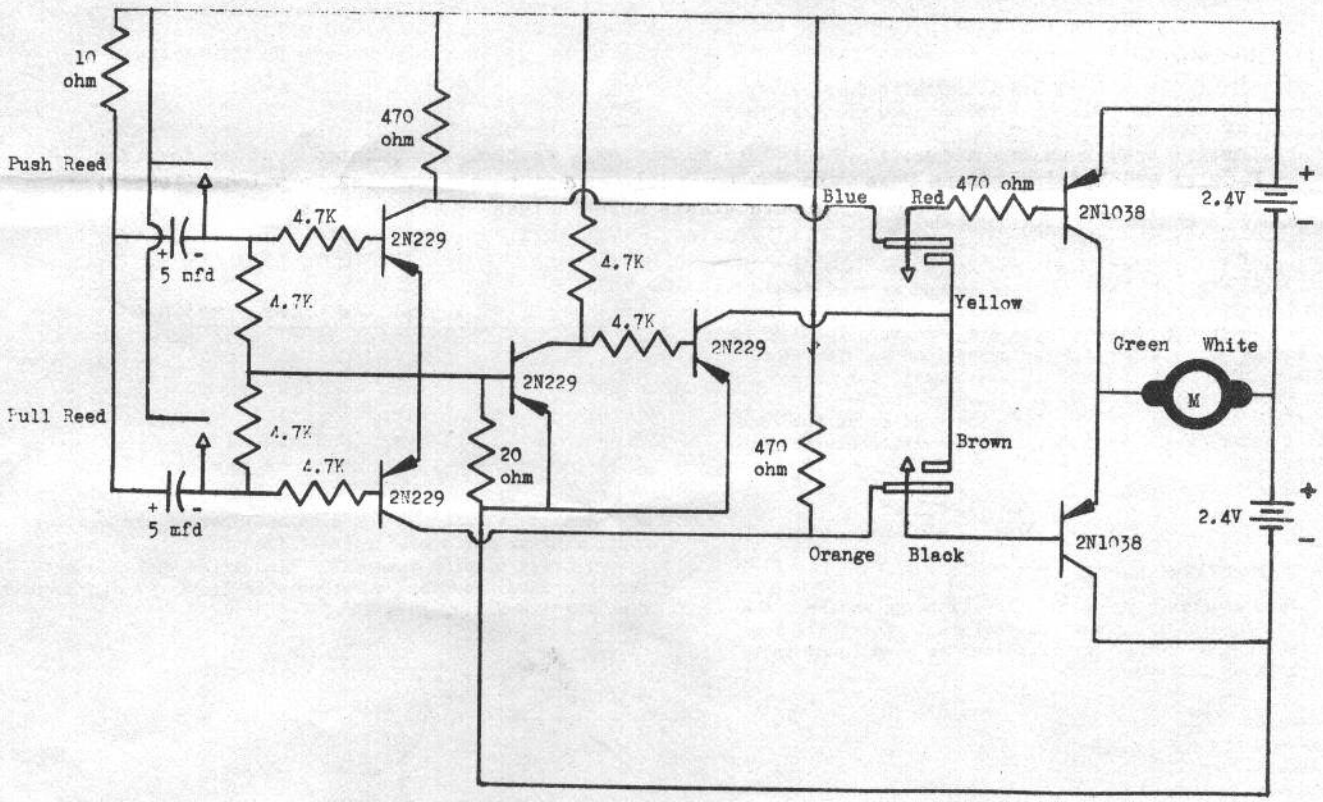
A Reed Relayless Servo Circuit

This circuit was developed for use with the Duramite servo but it can handle any servo that I know of and it gives reed operation without the use of relays. It can cost less than the relays it replaces. Either trimmable or neutral return versions are feasible. It operates off the regular servo batteries. Idle drain is 3 ma. Any standard reed bank may be used. As shown, it works at 40° and 125°. It doesn't work at 135° and I haven't tried it lower.

My printed circuit board is 7/8 x 1 1/2 so that it fits the end of a Duramite. I pot it in resin and then I cement it to the Duramite. Only five leads are required to the receiver and batteries. Without the resin it weighs 25 grams. I used 2N1038 transistors but 2N670's would be cheaper.

Hope the unit will be of interest to Grid Leaks readers.

William E. Savage
Castro Valley, California



EDITOR'S NOTE: Publication of the above circuit is solely for the use of the home experimenter. Its publication does not imply the right for use by commercial manufacturers.

BITS AND PIECES

TR NOTE

An interesting note on the TR. I have had difficulties in the past in obtaining range with an occasional receiver even though everything was apparently O.K. On many units, I had been going to the use of a 3 turn antenna link closely coupled which did not seem to hurt things at all and definitely improved the operation. I have been trying some capacity coupling too and this seems to help. I use a 2.2 to 6.8 mmfd from the A01 collector side of the tank coil to the antenna rather than the link to ground. Range increase is good up to 100% and better.

Dale M. Springsted
Schenectady, New York

MARCY TIP

Merrill McCoy of Des Moines, Iowa mentioned the fact that substitution of 2N224 transistors in the Marcy receiver greatly improved the operation of his particular unit. This is being mentioned in view of the fact that in this issue an article is being carried by Pete Bliss which shows the 2N217 as being used in this circuit. Apparently, there are many transistors which may be used instead of the specified ones with admirable success.

BEEFED UP MOTOR

I built the Marcy dual simul transmitter, receiver, and pulser from Grid Leaks and thought you might be interested.

The capacitors, resistors and transistors were not matched in my pulser but I found that, by using 45 volts instead of 30, it worked perfectly.

I have seen numerous ideas concerning strengthening Mighty Midget motors but I like mine better. I broke the lugs off (accidentally) and filed the base down to the magnet, glued (Pliobond) and thread wrapped to a 1" x 2" phenolic base. Crack-up proof!

I use two of these Mighty Midgets in a T-100 with the dual simul, a Fox .19 for power and an old rebuilt (back to idle with no signal) escapement for throttle with Fred Warnocks (Feb. 1960 FM) Motor Control.

This 4½ pound T-100 flies and handles well, good design and rugged. This is my first venture past single channel.

Paul J. Allred
Mobile, Alabama

MC CONVERTER NOTES

Just received my copy of Grid Leaks and read the article on the MC power converters. There are some changes in the transformer windings we have found to be desirable as follows:

6 Volt Operation

Primary - 38T #26 or #28
Feedback - 25T #28
Secondary - 1100T #38

5 Volt Operation

Primary - Same as 6 Volt
Feedback - Same as 6 Volt
Secondary - 1300T #38

Also in the construction of the transformer, the secondary is wound on the inside first, then the primary followed by the feedback winding. This is important for correct functioning.

Bill Webb
Belton, Missouri

A READER COMMENTS

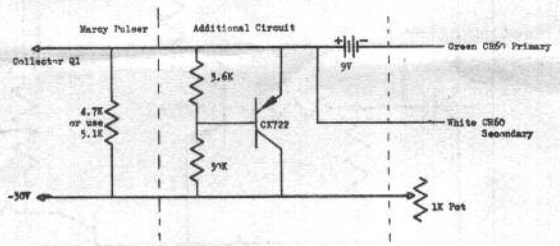
From Texas:

"I am a firm reader of your GRID LEAKS and as of a recent publication, you ask for pros and cons in regards to beginners and experts articles. I wish, at this time, to state my views on this matter. There are going to be more and more beginners in the next few years due to the lowering prices of all units and more and more modellers will be switching to radio. I therefore would suggest that at least one article per publication be directed to beginners. Your GRID LEAKS is a great help even to as rank an amateur as myself. By studying each article I can and have learned a great deal even though I do not understand all of the technical items."

A LITTLE ON A LOT

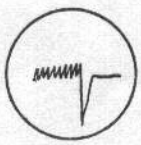
Here are a few ideas off the top of my work bench (they fell off),

Use a CK722 in place of the Gem relay in the Marcy pulser to operate the MarcyTone oscillator. The CK722 base current affects the oscillator output until the CK722 saturates with signal on. With the values shown, base current is about 150 micro amps. This circuit hasn't been checked for temperature sensitivity yet and



may need stabilizing. You also will need a transmitter audio monitor for operator stabilization.

I tried placing the CK722 in series with the battery but this produces a rather wild looking spike each time the transistor cuts off.



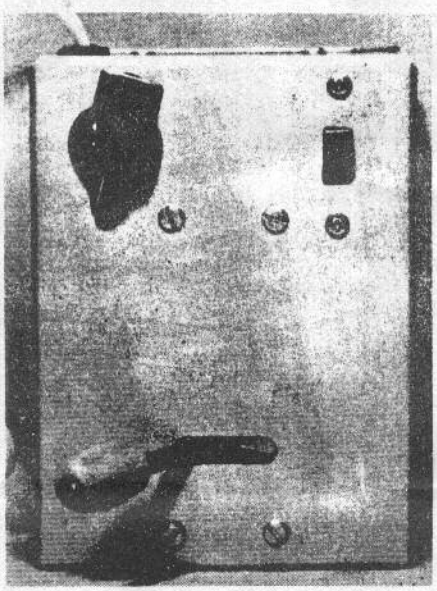
5" Scope

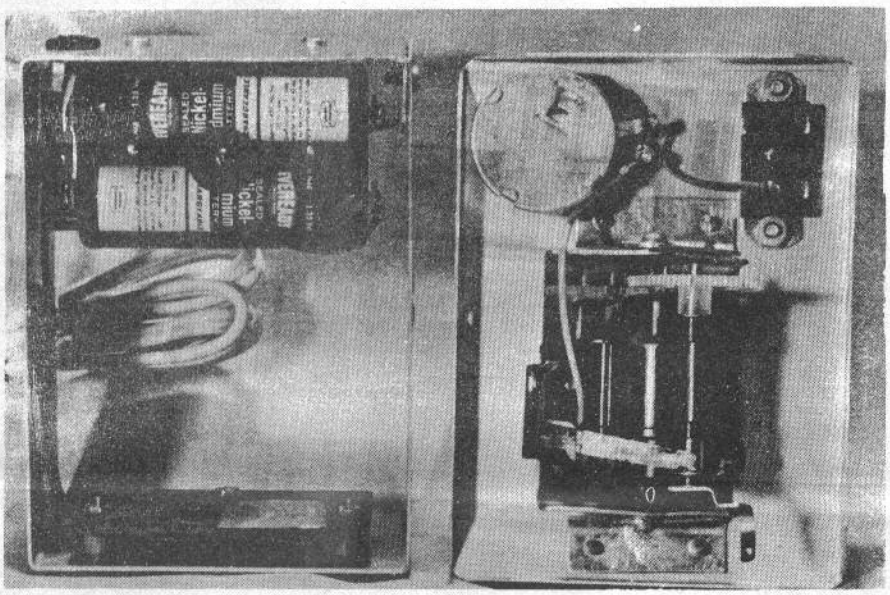
I also tried to replace the 4.7K resistor with the audio oscillator and appropriate resistors; the multi vibrator will neither multi nor vibrate.

I'm using a 5 ma meter in my FSM. It's from a surplus ARC-5 antenna switch box. The meter is marked "antenna current indication" made by Weston and has a linear scale 0-10. The meter movement is non-linear, much more sensitive on the low end. This makes the FSM response more realistic. Much easier than building a logrithmic FSM.

Capt. Leo J. Corbalis
Pease AFB, New Hampshire

Mechanical RO Pulser





For the proportional control fans, it seemed to the author that some simplification was needed at the transmitter end since many of the fellows shied at the expense or the complexity of existing electronic pulsers. This article is presented for those seeking a simple, inexpensive, and yet reliable system for a mechanical rudder only pulser. Begin construction by fabricating the Mighty Midget motor base as shown in "A". Cut and bend the two pivot brackets as shown in "B". Both "A" and "B" are constructed from semi-hard aluminum .040" thick. Fabricate the battery box bracket from the same type of material as shown in "C". All dimensions are given in inches. This last will be used to mount a Hillcrest 2 pencell battery box in the case and is shown in the mounting sketch and photographs.

If you do not have access to sheet bending facilities, it might be worth while to look up a metal shop in your area since good bends produce a neat and smooth working unit.

Construct the stick by slipping a length of 3/16" O.D. brass tube approximately 1.85" long over a 2" 8/32 round head screw; there should be enough threads still exposed to accommodate two nuts and the .040" thickness of the motor base. As seen in the side drawing, this tubing and 8/32 screw is mounted directly on the motor base to provide the motion of the motor on the pivots in a left to right manner. File the screw head to match the tubing and press fit a small plastic ball or piece of plastic over the end. It has been found here that some of the roll-on type of deodorants use a plastic type of ball dispenser which, while large, nevertheless may be fastened to this piece of brass tubing by applying heat from the soldering iron to the brass tubing and force fitting the ball at the top portion to be used for a handle.

Assemble the motor base and the two support brackets using the 4/40 screws, nuts, and washers. A type of blind nut such as is available in most hobby shops is preferred here so that vibration or continued action of the stick will not loosen the 4/40 nuts. If conventional nuts are used, they should be bound using some type of binder such as Pliobond, GE Glyptal, etc.

When this assembly has been made, consult the drawing "F" which shows the bottom view of the top cover of an Ace 2" x 3" x 4" aluminum can and lay out a center line on the case lid. Cut the slot for the stick. Align the stick motor base assembly on the cover and transfer the four holes from the pivot bracket to the case; these are drilled to receive #4 self tap screws which hold the unit to the case cover and together. Before transferring the holes, it is best to clamp the

unit together and check the stick movement for any binds.

Remove the large gear from a Mighty Midget motor and slip the shaft and pulley out. Solder a wiper strip as shown in drawing "E" and label board wiper made out of beryllium copper approximately .008" thick to a brass wiper support which may be a portion of a round headed paper fastener and solder the unit to the back face of the Mighty Midget pulley as per drawing "E". This operation is easier if all parts are tinned and the wiper and supporter are clamped with a clothespin while soldering is taking place. Bend the wiper strip to a C shape to make it a positive spring contact which will make contact with the printed circuit contact board which is shown in drawing "F".

Re-install the shaft and mount the Mighty Midget on its base with a two point tie lug under one of the mounting nuts. Consult drawing A-1 to see the approximate position of this two lug mounting strip. To the insulated lug portion of this mounting strip, solder a short length of .008" beryllium copper which is shown on drawing "E" and labeled pulley wiper so that it will ride on the cylindrical portion of the pulley so as to form a whisker contact. Solder this in place on lug.

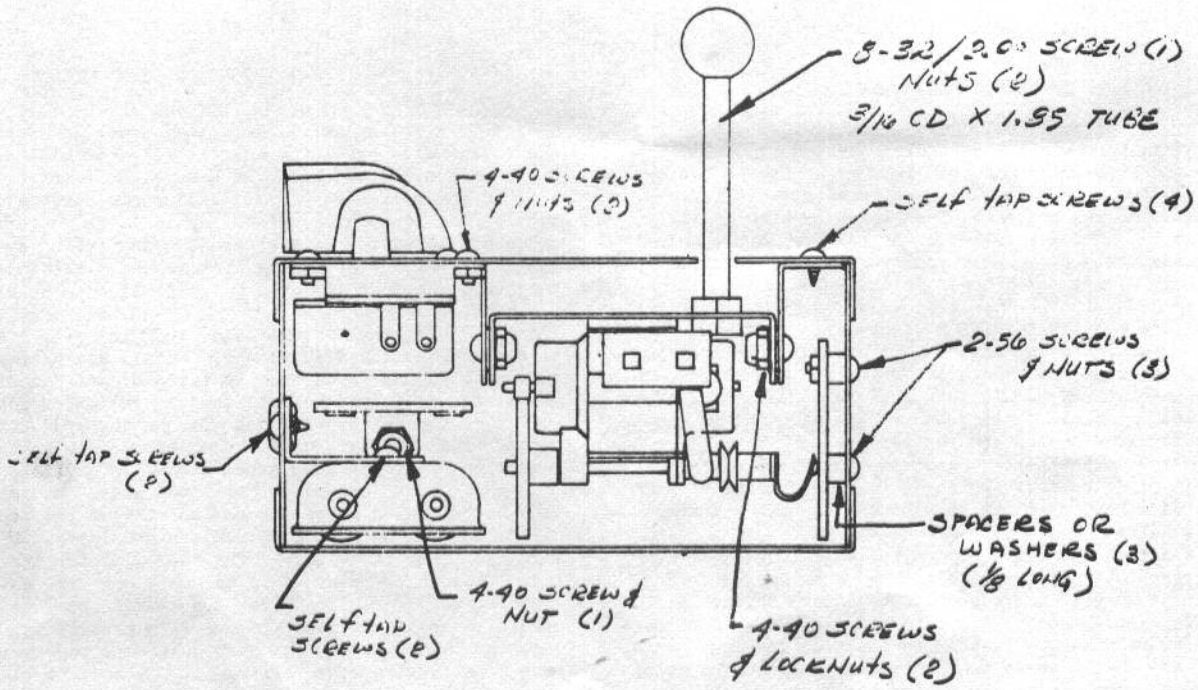
Make the printed circuit contact board from 1/16" printed circuit copper laminated material either of the paper or epoxi type whichever is available. Consult drawing "F" and remove excess copper. The center line and the excess copper may be peeled off by using a sharp model maker's knife or an etching procedure may be used. It is important to make sure that the two portions of copper which are shown as shaded areas do not touch each other. Align this printed circuit contact board on the end of the case as shown in A-1 as to approximate position and drill holes for the 2/56 x 1/4 screws and nuts which will hold the printed circuit board on this end of the shell of the case using 1/8" spacers or washers as standoffs.

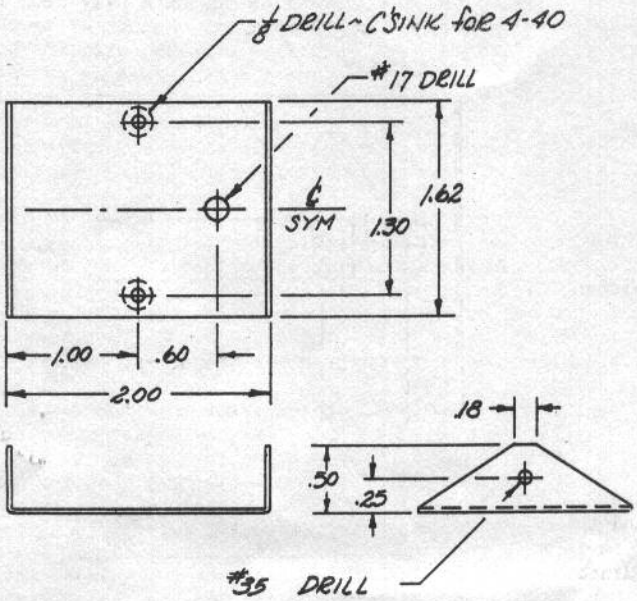
The case top may now be completely finished by drilling holes for the On-Off SPST slide switch and the 15 ohm rate pot which may now be mounted by consulting "D" and A-1. Now drill holes on the case away from the printed circuit end for the battery mounting bracket and install the battery mounting bracket with its battery holder and a rubber grommet in this end as shown in G2. The battery mounting bracket is held by two #4 self tap screws. One 4/40 x 1/4" screw and nut hold a three point tie lug above the battery bracket and this may be seen in the extreme left above the battery bracket and below the pot in A-1.

Now you are ready to begin wiring. First, complete the wiring of the Mighty Midget, the 15 ohm pot, and the SPST switch along with the batteries. To do this, connect one end of the Hillcrest battery box ends so that the two batteries of the pencell type or of the rechargeable Eveready N46 type may be placed in series. Run flexible wire from the other end of the battery box to first the SPST switch. Continue with a flexible wire to the 15 ohm pot. From the underside of the pot, continue with the wire to the Mighty Midget motor nut. From the other Mighty Midget motor nut, continue with a flexible wire to the remaining battery connection. In essence, the batteries, the SPST switch, the 15 ohm pot, and the Mighty Midget motor are all wired in series. This forms a mechanical revolving device which may be turned on and off with the switch and the rate of which may be either slowed up or speeded up by using the 15 ohm pot as a variable device.

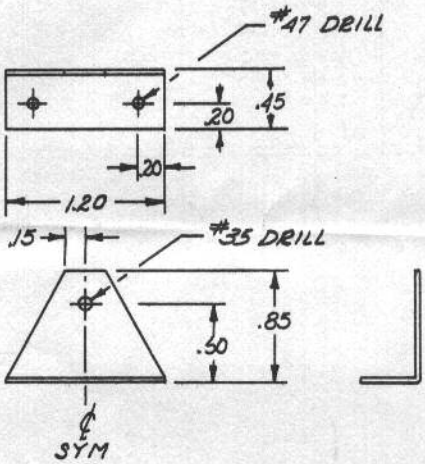
To complete wiring of the pulse box, only two simple procedures are needed. Run a bit of flexible wire from one segment and one segment only (this may be either segment of the printed circuit board but not both) to one of the top portions of the three point tie lug mounted above the battery case. Bring another bit of flexible wire from the Mighty Midget motor wiper strip which rides on the cylindrical portion of the pulley of the Mighty Midget motor to the other insulated portion of the three point tie lug. Now, wire in flexible cord of the zip cord type to these two connections

A-1

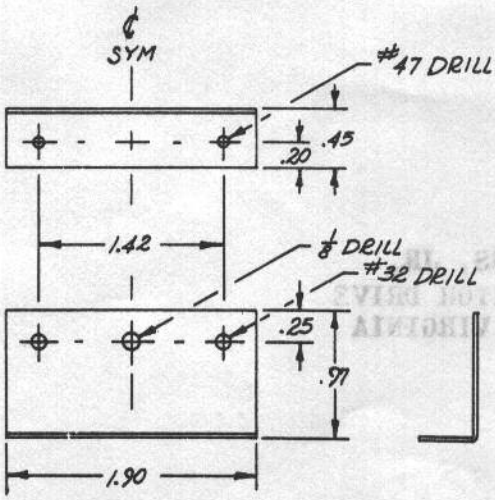




A Motor Bracket



B Support Bracket



C Battery Box Bracket

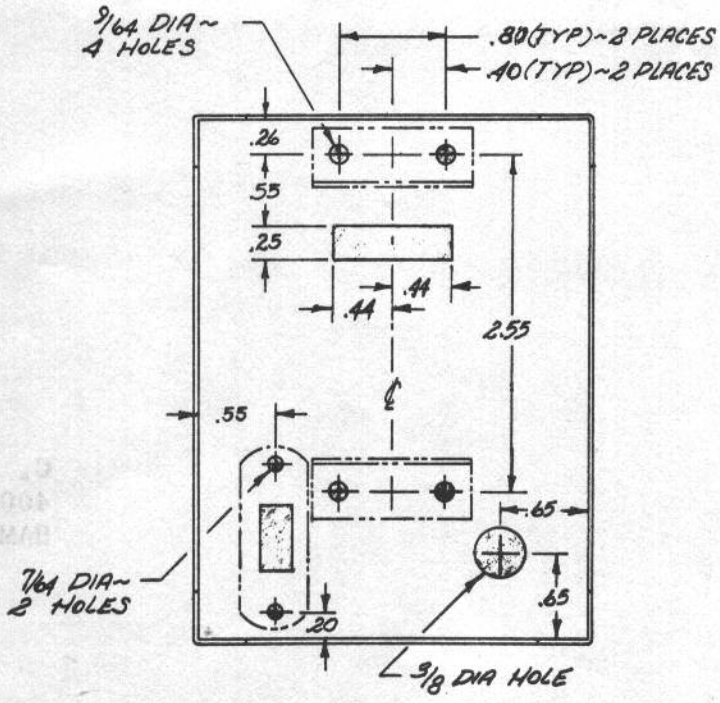
and bring through the end of the box where the grommet has been mounted as shown in G2 to whatever length desired and make the connection at the opposite end of the zip cord into whatever device you choose to connect this pulse box across the key or push switch of your transmitter. In effect, this mechanical pulser is a switch which turns your transmitter on and off with a ratio which varies the degree of On to Off depending upon the position of the stick.

Movement of the stick with the motor turned on should move the "C" portion of the beryllium board copper across the printed circuit board so that the ratio of on and off varies completely but that the unit is never completely on or completely off. If the assembly instructions and drawings have been followed, this will be the case. If the stick is held in the center position, there should be a 50% to 50% ratio of on-off.

For those who desire centering, this may be achieved by slipping a piece of 1/2" sponge rubber between the motor base and the case top. It may be necessary to reverse polarity to obtain the correct direction of motor rotation. Refrain from moving the stick unnecessarily with the motor off to prevent bending the wiper strip sideways.

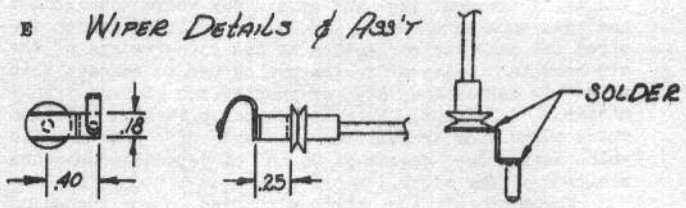
This unit is small enough to be installed on the front cover of many hand-held transmitters; in this case add an angle bracket for mounting contact board. No placement dimensions will be given to allow you to juggle the parts to suit yourself. Push buttons may be added to give full on or full off of the signal. These are merely wired in across contacts going from the three point tie lug. Wiper pressure may be varied by bending the wiper support and the pulley whisker pressure may be varied by bending the tie lug. All wiper surfaces should be checked periodically and cleaned with carbon tet to insure proper operation.

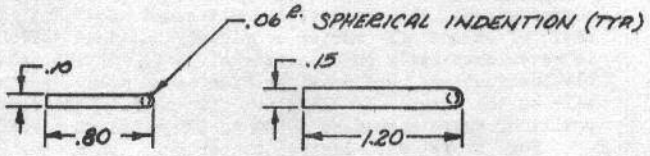
NOTE: Drawings are to scale, but they are NOT full size— for size of aluminum case refer to text.



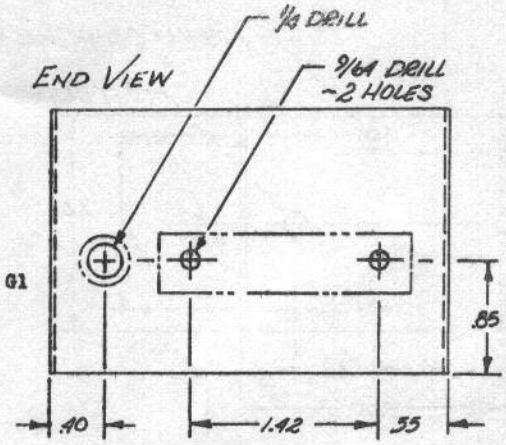
D Bottom View of Top Cover

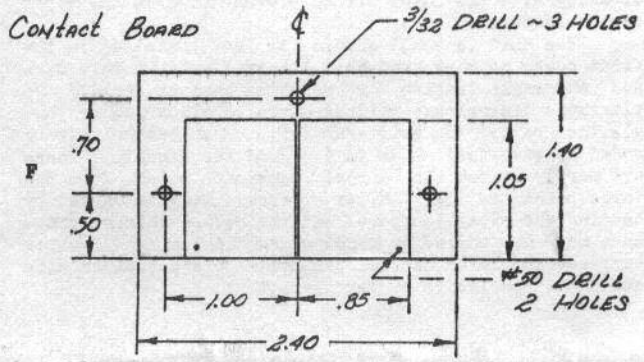
E WIPER Details & Ass'y

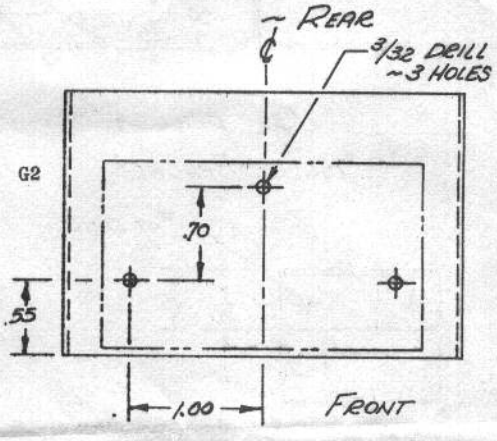




BOARD WIPER PULLY WIPER







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