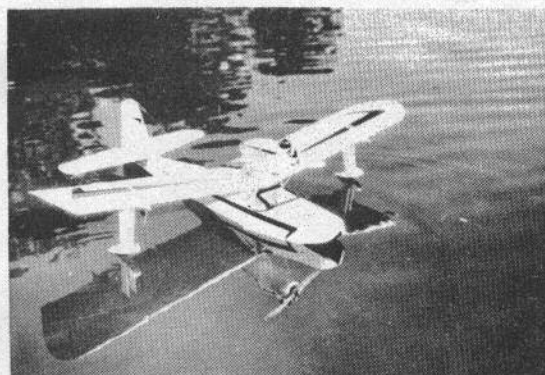
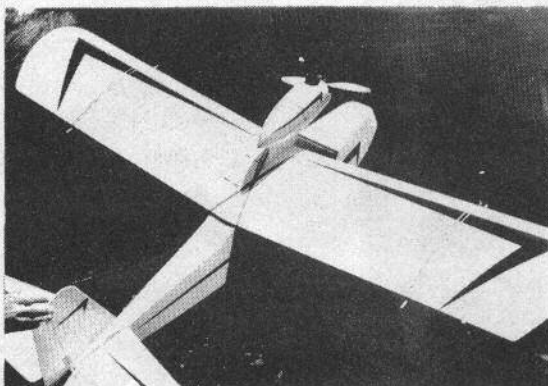


R/C DATA SERVICE

PUBLISHED BI-MONTHLY AT HIGGINSVILLE, MO.
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We Build the Kraft Multi-Fli

BY RED COSTLOW



Being a proportional addict, I had quite a few pre-conceived ideas when I was asked to build up a Kraft 6 channel transmitter and 4 channel receiver. To say these ideas were dispelled would be the understatement of the year!

Opening the kits gives you the first jolt. What a lot of parts, topped off with instruction manuals that look like dictionaries. Quality is stamped all over the place and this is one of the finest series of kits Ace R/C has released.

I decided to build the transmitter first. It is the easiest to build but takes the longest. The RF portion is a snap to build using the printed circuit board and is nearly identical to the now popular single channel transmitter. The rest of the time is spent wiring the pots, capacitors, and switches. This is all done in the open and fastened in when assembly is completed.

The RF portion takes a matter of seconds to put into operation (remember the FCC requires that a commercial operator has to check this out). The Hi-Lo switch, paralleling the batteries ($67\frac{1}{2}$ volts) for low and series (135 volts) for high, is a fine addition. Actually there is no need for the high position, for the $67\frac{1}{2}$ volts puts out a good signal plus giving you twice the battery life. This is quite a treat with the current hungry multi rigs we have now. Final adjustments and tuning the tones would have to wait until the receiver was built.

The Kraft Multi-Fli receivers are novel in many respects. The use of Philco 2N224 transistors, Deans relays and reed banks are only part of the high quality plusses. One fine feature is the two-deck construction. The lower deck is the RF and audio with the upper deck containing the reed bank and relays. The lower deck is

Scope Pictures of the Kraft Multi-Fli Units

Figure 1-A

HISS ACROSS REED BANK

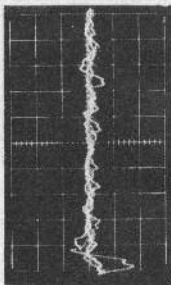


Figure 2-A

WAVEFORM ACROSS A RELAY WITH TONE

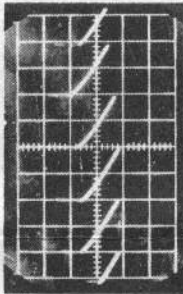


Figure 3-A

WAVEFORM MEASURED AT THE
THE COLLECTOR OF
THE TONE GENERATORS.
THIS IS HI POWER.

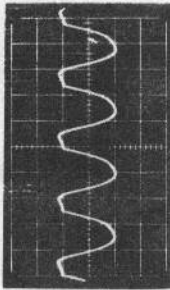


Figure 1-B

A TONE ACROSS REED BANK

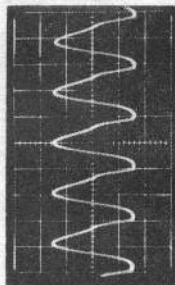


Figure 2-B

SUPERBEN HISS ACROSS THE
PLATE LOAD RESISTOR
(JUST A SHADE OVER 50 KC.
UNIT IS ON 52 MC.)

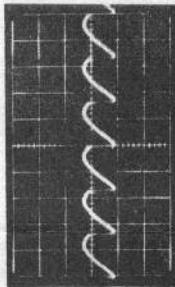
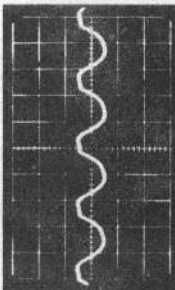
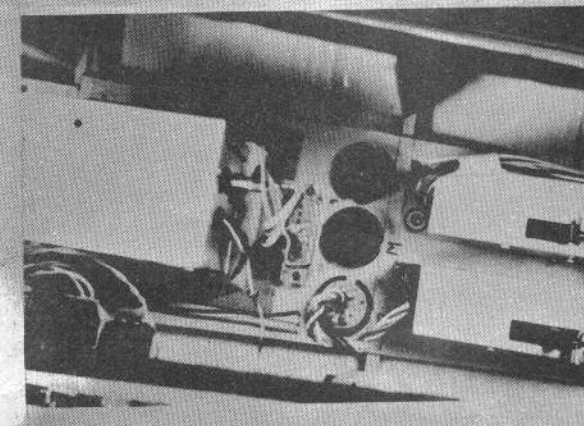
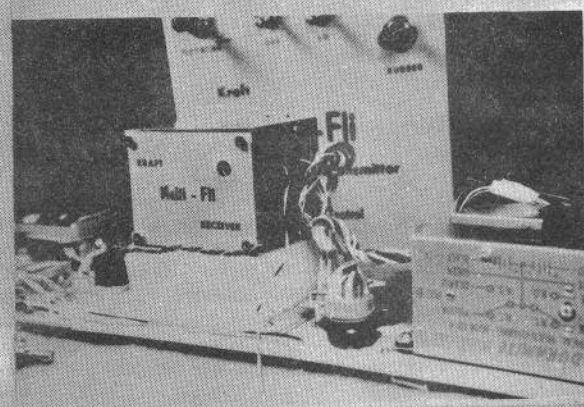
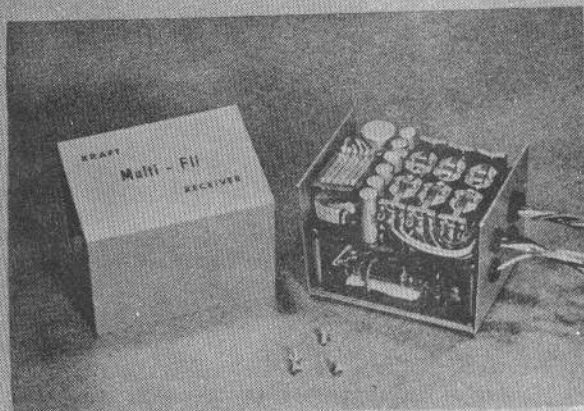


Figure 3-B

SAME AS 3-A BUT ON LO POWER.
NOTE: NO SHIFT ON FREQUENCY.





the same for the 4 or 6 channel unit with the upper deck having either 4 or 6 relays and a 4 or 6 reed bank. The real "gasser" though is the inclusion of a printed circuit portion on the lower deck for a DC to DC converter to supply B+ from the servo batteries. The parts for the converter are purchased extra but would be worth the investment.

Construction is easy, though a bit crowded. The parts are popped into the PC board and soldered. The old rules of a small iron, rosin core solder, and neat work really apply here. I think the most important part in construction of the receiver is GO SLOW and double check each step. To make a mistake and have to dig into the innards to correct it takes all the fun out of building. When construction is done, the receiver is bolted into the can and the cover is fastened on with 4 screws. This gives a rugged, light weight unit.

After the receiver is built comes the fun part--putting everything in operation. It works--just like the little book says it will. At this point you can realize the problem that faced Ace and Phil Kraft. How to tune the tone generators to the reeds? The easy way would have "broad" tuned circuits to cover varying parts tolerances. However, this would make the circuits too unstable for reed operation. The hard way (the method used) would use "narrow" tuned circuits that had to be pruned to the particular reed. This sounds like a lot of work, but it isn't. Included with the transmitter is a bag of extra capacitors which are used (if needed) to "pad" the circuit "on frequency". The instructions are very clear on this procedure and it takes a matter of minutes. The pots then give you enough coverage for that extra fine touch. Another method of padding would be with a capacitor substitution box. Then it would be just a matter of plugging in the correct value of capacitor(s) from those supplied.

There is no doubt that the receiver is working when power is applied. The reed bank "sings" and is quite audible. Tuning the receiver to the carrier is straightforward, although there isn't a large current change when resonance is reached. I especially like the procedure Kraft has evolved for tuning the pots to the reeds. There is no doubt when the pots are on frequency. This is quite critical, for, if the pots are not tuned properly, the reeds won't start all the time or else will be weak on drive. It is similar in nature to tuning the oscillator of a transmitter. The maximum point of drive is not the place you want.

Figures 1, 2, and 3 are scope traces that might prove helpful to those having difficulties. Figure 1-A is the hiss across the reed bank. This will be in the neighborhood of 15 volts. Figure 1-B is the wave form with a tone across the reed bank. This will be about 25 volts. Figure 2-A is the wave form across the relay coil showing the filter action with a tone applied. Figure 2-B is the superregen action across the 22K plate load resistor. This was just slightly over 50 KC's. Figures 3-A and 3-B are the wave forms at the collector of the transmitter tone generator. Figure A is high power and Figure B is low power. It is interesting to note there is no change in audio frequency from high to low power. This speaks well of stability of this equipment.

The receiver is currently being used in a blown-up and revamped Torp .35 powered Dreamboat. The 4 channels operate motor and rudder.

It is doubtful that any piece of equipment will have all the features that a builder wants. On the minus side with the Kraft Multi-Fli is the necessity of pulling the pot board to tune the RF section. This is a minor point, for once the transmitter is in operation, it shouldn't have to be touched. The motor control toggle on the right side might confuse some fliers although this can be moved to the left side. Many fliers are used to having the vertical moving toggles on the left and the horizontal toggles on the right.

These minor points are outweighed by the many plus features, the most obvious being the stability and reliability. The investment of multi doesn't permit the possibility of not having 100% reliability. The DC converter eliminates the expensive bother of a "B" battery. Those with 4 channel units can go to 6 channel without the receiver becoming obsolete. In fact, the basic receiver can be used to drive any of the relay-less circuits. Finally, the terrific instruction manuals are the best I've seen. Even those not using Kraft equipment would do well to own a set of these manuals. They are loaded with information.

If you have been holding back about going into multi, wait no longer. The performance of the Kraft Multi-Fli will please even the most critical builder.

BITS AND PIECES

STRICTLY FOR LAUGHS

EDITOR'S NOTE: One of the important things that all hobbyists in the R/C field (and this includes most manufacturers) must learn is to be able to look at themselves objectively and point with a finger and chuckle or even laugh out loud at some of the boo-boos that are made. As a matter of fact, a previous issue of Grid Leaks featured a photograph which summed up the opinion of Gordon Gabbert of Dallas in the succinct words "Smile dammit, it's only a hobby!" It is with this tongue in cheek approach that we offer the following reprint from "The Printed Circuit" which is produced by the North Jersey Radio Control Club of which Art Schroeder is the editor. His address is 24 Baker Street, Rockaway, New Jersey.

With the rapid advances in the commercial field of R/C equipment, the average modeler is somewhat confused by the terminology of the ad writers. Now the various concerns mean very definite things when they use a word or phrase to induce you to buy their gear. So that the membership of the NJRCC can make an intelligent choice in the purchase of the equipment for their next crash, the PRINTED CIRCUIT offers, as a service, the following brief, but nonetheless revealing, dictionary for those who may be experiencing some difficulty with the language of the ad writer. Incidentally, you can thank (blame) Niel Stolk for spending the hours obviously required to compile the information.

R/C AD TERMINOLOGY DICTIONARY

(Please note the lack of alphabetical order since your editor has yet to learn the alphabet and my son in the third grade is asleep.)

- NEW - Different color from the old design.
- ALL NEW - Parts not interchangeable with old design.
- EXCLUSIVE - Imported products.
- UNMATCHED - Almost as good as competition
- DESIGN SIMPLICITY - Costs out to the bone (manufacturer's cost, not yours).
- FOOL PROOF OPERATION - No provision for necessary adjustments.
- ADVANCED DESIGN - No one understands it.
- IT'S HERE AT LAST - No one knew it was coming.
- FIELD TESTED - Manufacturer lacks test equipment.
- TEMPERATURE COMPENSATED - Works at 30° below and 160° above, nowhere in between.
- HIGH ACCURACY - Parts fit.
- DIRECT SALES ONLY - Manufacturer had argument with the distributor.
- RUGGED - Too heavy to lift.
- EASY TO TUNE - Any electronic P.H.D. can do it.
- NO CRITICAL TUNING - Even the electronic genius can't.
- YEARS OF DEVELOPMENT - Read about it in last month's AM.
- DURABLE - Might last all season, with luck.
- TAKES OUT THE GUESSWORK - Replaces it with something worse.
- LIGHT WEIGHT - Lighter than rugged, still too heavy to lift.
- TROUBLE FREE - Until airborne; also trouble isn't free, it costs.
- DISCRIMINATING MODELLER - One possessing a multimeter.
- PAYS TO USE THE BEST - You also pay to use the worst.
- GADGET MINDED MODELLER - One looking for a way out of building.
- VERSATILE - Will cause crashes in any type model.

SUPERIOR DESIGN - Effective range exceeds 50 feet.

FABULOUS PERFORMANCE - Two consecutive flights without failure.

UNPRECEDENTED PERFORMANCE - Three consecutive flights without failure.

SIMPLE - You were--to buy it.

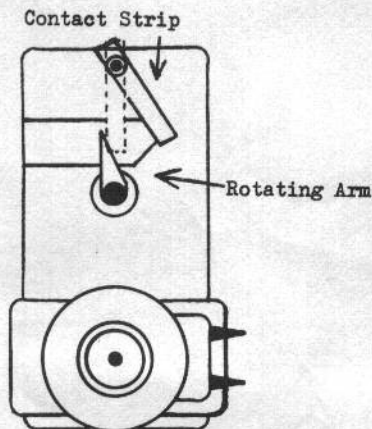
SATISFACTION GUARANTEED - Manufacturer's (Upon receipt of your check).

We're kidding, of course. One thing that any R/Cer that has been around realizes is that, if it weren't for the constant development carried on by the various manufacturers, large and small, receivers would still require seven foot airplanes to carry them, transmitters would still drive you nuts and R/C, as we know it today, just simply wouldn't exist!

INTERMEDIATE SETUP

Have a good setup in Intermediate using Cobb's Micro 4. The best setup I have is a Cobb Micro 4 on rudder, a Micro Multi on elevator and a Hillcrest throttle servo on throttle. Using J. Roberts Vari Speed exhaust restrictor and let the motor servo make a complete revolution. However, I imagine the 3 position Cobb Micro would work as well or better on the quick blip.

Here is how I worked the servo through the Micro 4 quick blip.



View is Exaggerated

I moved the contact strip over so that the rotating arm would hold the contact strip down until you gave it a long pulse which makes it rotate completely and stop under the contact arm. In this way you can operate a servo instead of an escapement. The Micro 4 needs to be shock mounted or it will slow down to about 1/2 speed. Two other R/Cer's and I are using the TR 4.5. If anybody has a receiver that will outrange the TR 4.5, I've got to see it.

J. I. Kinnaman
Baker, Oregon

For Beginners-Snapdragon 44

SNAP TO BUILD, EASY TO FLY

One of the first things to become apparent when opening the kit for the new Blackwell Snapdragon 44 model airplane is the beautiful finish of the Sig balsa which is included. There is no other apt description for this wood. It is highly pre-fabricated and pieces are apparently cut with TLC*.

Next to become apparent is the ease with which the kit may be built. It goes together like a charm with the band-sawed pieces and the pre-assembled fuselage being a joy to work on. When the manufacturer says it takes two to three evenings, at the most, to completely assemble this unit, would dare say that he is being honest.

As with most airplane kits today, the unit is furnished less silk covering and is known as a "dry kit". This doesn't cause too much of a problem, however, since one square yard of silk will be more than ample to cover the wing and tail surfaces since the fuselage does not, under ordinary circumstances, require covering. A large tube of cement, one 4-oz. bottle of wood filler, one 4-oz. of clear dope, and one 4-oz. color dope should be all that is really required in addition to silk.

Installation of radio control gear can be made relatively simply, too. For the test unit, the Bonner VariComp was chosen since the fuselage is amply wide for this installation and, for a beginner, it seemed to us to present a relatively inexpensive and yet reliable approach to rudder control only--with possible motor later on.

A study of the plans of the manufacturer as well as

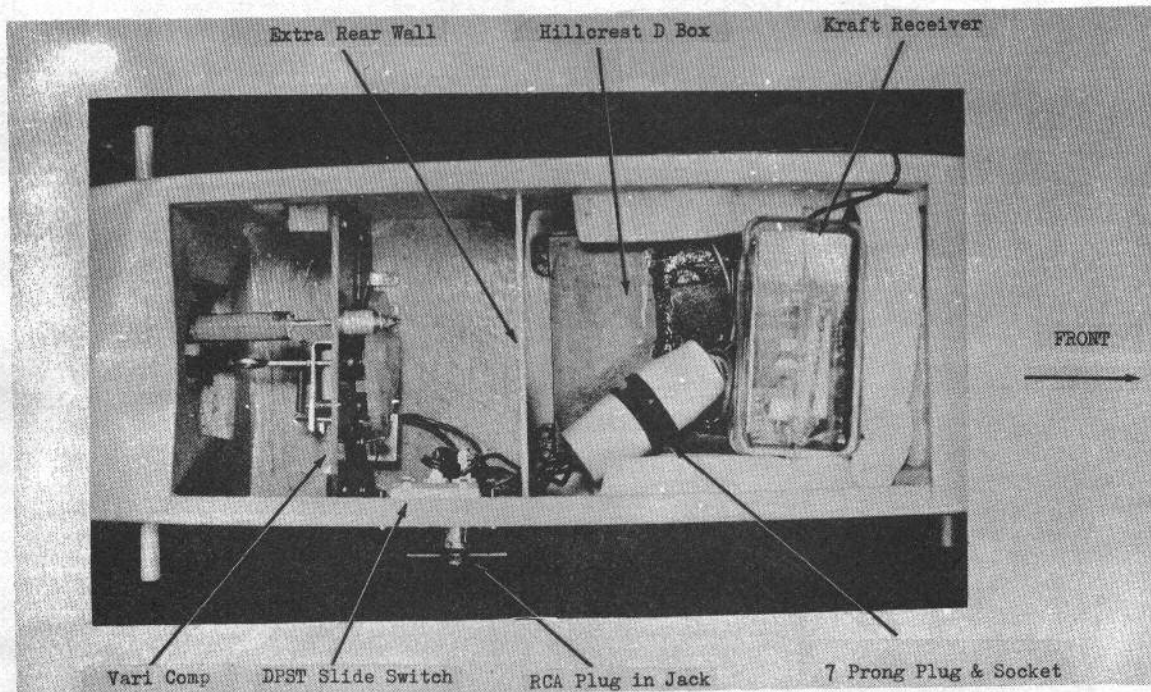
the photographs accompanying this article will help installation. The use of 1/4" wide rubber on the VariComp is to be highly recommended since it allows the packing in of a number of turns and will assure the wallop that is required. More will be said on this subject later since it has a bearing on the voltage required for the VariComp.

To make radio control gear as ultra-simple as possible in our test model, we decided to use the technique pioneered by John Worth of the Virginia area which has appeared in some of the national model magazines and which appeared in Grid Leaks some time ago for smaller airplanes.

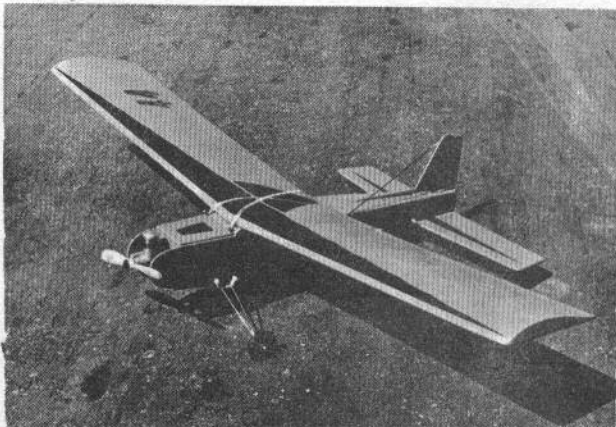
We chose the Kraft single channel receiver in its small plastic box along with a Hillcrest D type flat box. These were mounted with the generous use of 1/2" foam rubber which was cut so that the Hillcrest D box could be mounted flat on the fuselage bottom. This, amply padded with additional 1/2" rubber. The Kraft receiver was mounted in the plane so that the printed circuit board would face the front plywood bulkhead with a 1/2" sponge rubber in between so that, on impact, it could only move forward and not damage any components by either bending or moving. Also, this type of installation is relatively vibration resistant.

To make the installation ultra-simple, a small wall was added immediately in front of the VariComp so that the entire gear could be completely packed with 1/2" foam thus eliminating the necessity of binding the box

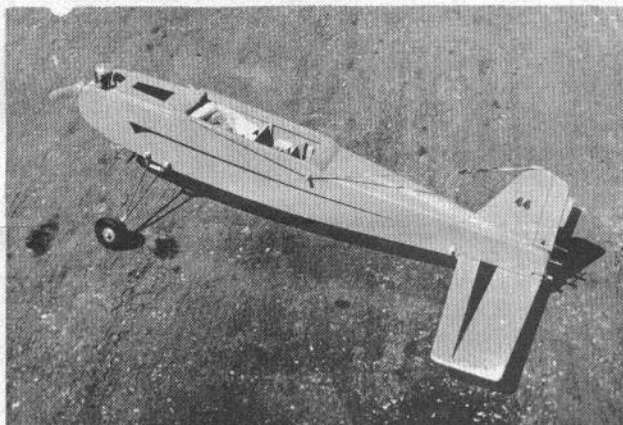
*Tender Loving Care



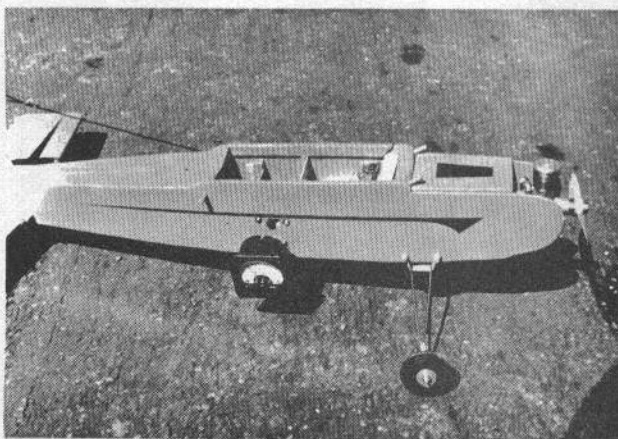
View of Fuselage with Wing Removed. Shows installation of Radio Gear in Compartment. Extra Foam is Left out to Show Installation.



In spite of its ease of construction, the Snapdragon is a nice looking ship; one you'll be proud of.



This view shows how the antenna is run out of the fuselage by way of a small notch, then under rear dowel for wing, and to rubber band on fin.



Meter (0-5 MA) plugs into RCA jack for range check. Shorted plug replaces meter for flying. View also shows DPST switch.

and the receiver down and having the entire unit more or less completely foam rubber housed in the radio gear compartment.

A DPST slide switch and RCA type phono jack with two plugs--one for the meter and one shorted for the plane installation--along with a 7 prong plug and socket completed the installation. Use 19 strand #24 flexible hookup wire for wiring. Do NOT use solid wire.

For the battery box we chose a D, one 22½ volt B of the U15 type since the Kraft is very economical in B battery drain, one pencil for filament since it has only a 13 mil filament drain, and three pencils for the VariComp to provide the wallop necessary to carry the 1/4" rubber through its left or right.

A study of the photograph showing a close-up will be very clear on how this installation is done.

Antenna is carried through a notch in the fuselage under wing rear dowel to the rudder and rubber band ended to give it tension.

To assist still further, the circuit is hooked up so that the receiver and battery box can be removed completely. This simply means an unplugging of the 7 pin plug and socket. To facilitate wiring, a diagram is given.

Follow the manufacturer's directions for the installation of the engine you propose to use. This may be either a K & B .09 or Fox .09. Use the fire wall for vertical mount or the beams for beam mount, depending on engine chosen. Observe the offset setting as recommended on the plans. In the one we worked, no down-thrust was required and the balance point with the radio gear installed came out as shown on the plans which was fine for a fast glide and good wind penetration under wind conditions. However, for semi-calm conditions, it was necessary to either add additional incidence in wing or to add weight to the tail to get the necessary added climb.

To complete the installation, simply add the foam rubber to fill the R/C box. This is a very simple installation and may be elaborated on in considerable detail but we were interested in getting our airplane ready as quickly as possible.

Before attempting to fly the Snapdragon 44, several things will need to be done. Among them is the fact that the motor, as supplied, will need to be broken in as per the motor manufacturer's instruction sheet. Some motors require a greater break-in time than others and this should be followed religiously before any flight attempt is made.

The radio equipment should be tested under all conditions with the motor off or with the motor running to check and see if vibration does have a tendency to operate the relay with the receiver turned on and thereby operate the escapement. This indicates that the relay may need adjustment or that further foam padding will be necessary. Make such tests with both receiver and transmitter turned on so that a carrier is present. With the Kraft type of receiver, a carrier is necessary because this puts the receiver at the lowest possible idling current.

Another very necessary item is to check the linkage between the escapement and the rudder which should be done according to instructions on the plan to make sure that the 1/4" rubber which is used, when wound will amply and easily turn the rudder upon each command from the receiver. You will note that the rudder has a variable yoke which allows adjustments for the amount of throw required. This should be for the initial flight set for a fairly light throw and then added to as flights are progressively made.

A complete ground-check or range-check should be made using a pre-flight count-down such as listed in Grid Leaks Volume I, Number 4. It is absolutely mandatory that the radio operate under absolutely all condi-

tions on the ground--even with the motor running--at maximum range because; if it does not operate on the ground, there is no assurance that chucking the airplane into the air will make it work any better. Here is a fallacy that many beginners seem to think that radio troubles will be automatically cured when the airplane is tossed into the air although it is functioning only partially well on the ground. The radio and its associated equipment--relay and escapement--must operate on the ground 100% effectively before an airplane should be given a heave.

It is also wise to check for warps on all covered surfaces and remove these warps with the addition of a coat of clear dope and holding the wing or tail in a slight twist to overcome this warp.

A test glide on the ground should also be attempted. This may be done with the radio in an "off" position. The glide should be at a fair speed comparatively flat and with a fair rate of sink.

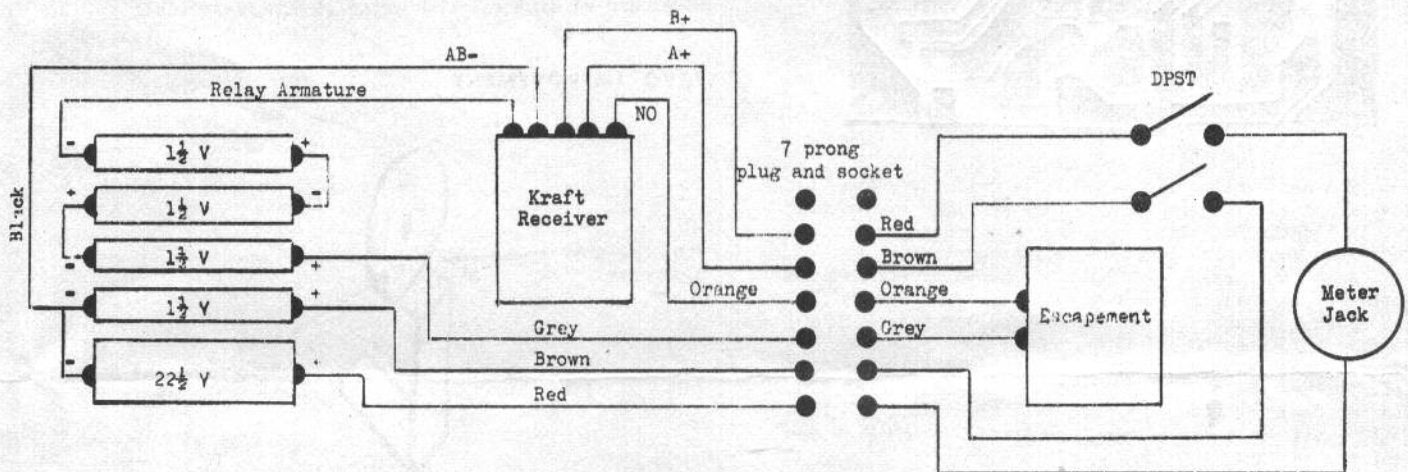
If any appreciable amount of radio checks have been

made on the ground before the initial control flight is attempted, it would be wise to check the batteries under load under operating conditions with a good voltmeter. This is very wise procedure before each session of flying.

The installation of a 0-5 meter in the meter jack, of course, is for tuning operation. When a flight is attempted, the meter is pulled out of the RCA jack and a shorted plug is put in its place.

That's it! We hope you'll find your Snapdragon 44 meets your expectations. We feel that you will find it to be one of the most easily assembled and operating R/C planes ever offered the beginner. Directions by the manufacturer should, however, be followed strictly to the letter for the most fun. Only the "expert" should make any attempts to vary from the plans.

We hope soon to build another Snapdragon 44 and install a Southwestern actuator in the plane and use the Baisden RO pulser in Grid Leaks Volume II, Number 8 at the transmitter for some proportional fun.



Schematic above shows the hook up in the Snapdragon. While it is for the Kraft Single Audio Receiver, it may be modified to suit other light weight dependable units. Installation allows complete removal of battery box and receiver without any unsoldering.

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If you have ideas you would like to share with other R/C fans through out the world, we welcome them. All ideas are given careful consideration from the point of view of trying to help R/C by sharing experimental--and sometimes not fully developed--ideas among a growing subscription list.

If you want to insure your getting every issues of Grid

Leaks, but your dealer is out, subscriptions are available on a ten issue basis for \$2.00. Some back issues, primarily of Volume 2 are also available. Price of the back issues, however, is 35¢ per copy.

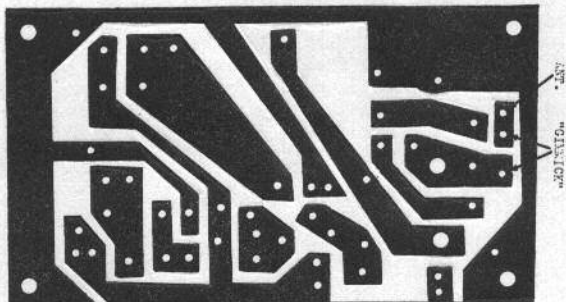
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READER COMMENTS

PETE BLISS WRITES

Just returned from a trip to Tennessee and found Grid Leaks waiting. We made two changes in the Marcy. If you look closely at the PC board, you will see the 1 mmf coupled directly to the grid instead of tank. The trial receiver was built this way and everything was fine but we changed the PC board and 1 mmf location to be sure. I am enclosing a new PC layout.



The next change was to use a "gimmick" capacitor instead of the 1 mmf. We made the "gimmick" by twisting two 1" lengths of wire together and bending them in a "U". Use solid wire so it is self supporting.

As to the results--wonderful; as to myself--what a job! It is amazing how a grown mature man cannot take the added 1/10 second to allow good solder (Ersin 60/40) to flow into a sound joint.

We ended up making two changes in the transmitter too. We changed the balance pot to 100K instead of 500K and replaced the two 47K dropping resistors to 10 - 15K's (multi-vibrator dropping resistor) on the PC sides near the center.

We made stick boxes using 2 x 3 x 5 Mini boxes and again PC for filter networks.

We also made servos using Mighty Midgets. We have a tool and die maker and he made dies to stamp gear frames and form spring switches. We used fiberglass PC board for the base and put the rudder and elevator on one board thus saving wires.

This is how we have made out to date:

1.) George Luchaco - using one regular Marcy 5 channel receiver but club built transmitter and stick box - using Bonner servos - he has flown solid - has complete simul to 300 to 400 yards. (Flies a L.W. Super Cut).

2.) Vance Way - built club 6 channel and servos - built Marcy dual transmitter - flown solid but no simul.

3.) Tony Romat - complete club 6 channel outfit. Finished around August 1 and had trouble with intermittent right. Replaced the .25 uf across relay transistor - he is flying up a storm. He flies a L.W. "Champ Bipe".

4.) Andy Anderson - club, never get around to fly her - a complete club 6 channel outfit working on a board.

5.) Al Darfett - club 6 receiver and transmitter using Bonner servos and flying an "Ascender" - we had trouble with this unit due to poor soldering and wire stripping. After this, we added 6" to 8" on his antenna and now he is having a ball.

NOTE: Three, four, and five have full simul.

We also have two newcomers who got wind of the project and started modeling.

One is flying a T-100 with 3 channels (rudder and motor) and the other a L.W. Trainer with two channels

(right and left rudder). They use club servos and transmitter with one tone generator. Both plan to add this winter. They are both flying very nicely with no trouble.

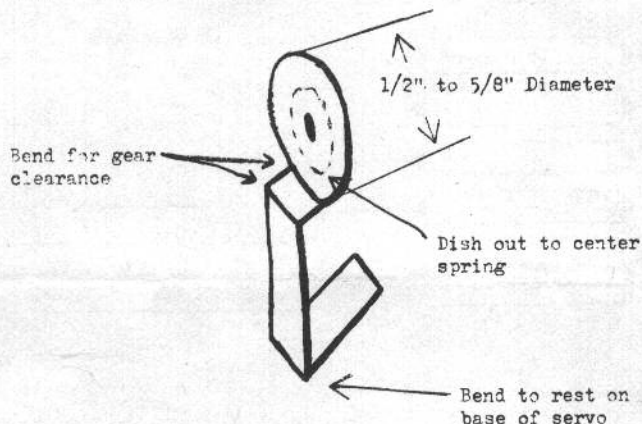
We have five other 6 channel units, one 9 channel on 53 mc and one 2 channel under way. The 2 channel should fly next week. The rest are held up for funds until spring.

This may not sound like much success to you but when you look at last year and George Luchaco was the only one of the above who flew, it is!

One other thing, Paul, harmonics bother. I used a sine wave for early checking and thus no harmonics but, after the receiver chops it up, the harmonics are deadly. We are still using the original tone setup. The highest tone is 3600 cps.

You can get lower channels by placing two forms together and winding and also using .5 mfd capacitors.

SERVO IMPROVEMENT



We had some trouble with some Jap built servos. The drag brake was hard to set and lock accurately. We removed the drag washer and made an aluminum washer with arm:

Only one adjusting nut is now enough (not necessary to lock) and adjustment can be made by tightening nut against spring until unit stops running through.

Bob Penko
Willoughby, Ohio

ON EDITORIAL CONTENT

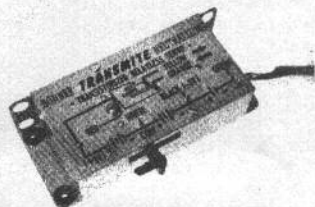
Concerning the controversy over your editorial policy, I think your magazine is just about as good as it could be. It seems to contain just about the right mixtures of elementary and advanced material and I think that, until a good elementary manual such as has been suggested, is available, your editorial policy should remain the same. But, if a handbook like the one proposed is ever available it would be rather foolish to put too much elementary material in your magazine when you could go on to more advanced subjects.

Personally, I like your mag very much as it is and you have a long term subscriber whatever your policies may be.

Roland Friestad
West Salem, Wisconsin

Preview of Coming Attractions

BONNER TRANSMITE SERVOES



As mentioned in the last issue of Grid Leaks, the Bonner relay-less servo is about due on the market by the time this issue of Grid Leaks is scheduled to appear.

The units will be in approximately the same configuration as are the regular Duramite servos but they will have built into them the integral transistor switchers designed to work off the regular reed bank compatible with any conventional reed system available and no special hookup or gadgetry in addition is required. Weight of the unit including the motor and switcher will be 3 ounces.

A letter from Howard Bonner states "we will honestly make an effort to have our new Transmite servos available by the end of October." They will be offered in two models. The trimmable model designed for channels where trimmable action is required will list at \$27.95. The self-neutralizing model designed for applications where self-neutralizing is a must will list at \$29.95.

Also available will be a small L shaped printed circuit board which will contain the transistors and all components completely wired, epoxi encased, just ready to be dropped into your existing Duramite to convert it for relay-less reed operation at \$19.95.

NEWS FROM BLACKWELL

Initially announced as being available at a later date is the Snapdragon 44 by Blackwell Models Manufacturing Company, manufacturer of the T-100 and S-10-W. This should also be ready and on your dealer's shelf by the time you read this issue of Grid Leaks. A brief review of its physical characteristics are that it has 44" wing span, designed for .09 power. Further details may be had from the article featured elsewhere in this issue. The price has been finalized at \$7.95 and, considering the caliber of kit, we would say that it represents a good buy.

The Hurricane 600 is progressing nicely. This is a low wing--strictly stunt and expert job--and it, too, should be ready before too much longer. Please keep in touch with your regular hobby dealer on this.

KRAFT 6-4 INSTRUCTIONS

Because of many demands from our customers who thought that there were excellent tips for all reed unit users particularly those in the beginner's class, the Kraft 4-6 Multi-Fli receiver and transmitter instruction brochures are available on a separate basis.

These are, by far, the most deluxe and extensive instructions that have ever been offered to the R/C builder. They contain step-by-step highly illustrated and well-drawn pictorials and otherwise "goof-proof" type of instructions. Either receiver or transmitter instructions are available at the cost of \$1.00 each.

ORBIT RELAYLESS

Orbit Electronics, 11612 Anabel Avenue, Garden Grove, California is currently in the manufacturing program of a superregen relay-less 10 channel receiver that will list for \$69.95 completely built-up and ready to go. According to word from the field, the receiver can be used with all standard Orbit transmitters of the 10 channel variety that are in the field.

It is expected that shipments will be begun to dealers soon. The Orbit rig is designed to operate with the Bonner Transmite servos which are announced in another portion of the "What's New?" department and, considering the excellent reputation that the Orbit equipment has in the field, if you want one, suggest that you get your dealer to contact Orbit Electronics directly for delivery on these since there is a jam on the delivery situation.

More will also be coming, it is said, from Orbit about superhet relay-less receivers and matching transmitters.

AIRPLANE KIT OFFERS CHOICE



From Eck-Babcock, Newport Beach, California, comes a word about their new R/C Plane kit. It's something that is new as far as we know--the choice of building either a shoulder wing or low wing plane from the same kit!

The Breezy Jr., is a standard favorite with many, built and flown, designed by Dick Schumacher. Breezy-L is the low-wing design for top performance.

Both units are for .049 to .09 engines and have 42" wing span. Price is \$6.95 for the kit, from which either model may be built. Will be available from your dealer, who can get kit through his hobby jobber nearest him. Or if not available write to address above for a catalog.

TMP FIBER GLASS

Available now from Technical Model Products are two special fiber glass cloths which have been designed for model airplane use and offer advantages for this particular application. The one is "Regular" which is a rough, heavy weave. The other, "Super-Lite", for which there has been an increasing demand. This, along with the catalyst and resin will make a valuable addition to the modeler's building bench.

The Super-Lite glass cloth is available in 24" x 36" sheets as is the Regular glass cloth. Each of them list at \$1.25 per sheet. The TMP fiber glass resin and catalyst is available in 1-pint cans at \$2.50. These items will be stocked by your hobby dealer or also will be available from Ace Radio Control.

PREVIEWS, CONTINUED

NEW BETA BOXES



Beta Box Company, the manufacturers of Beta's A and B which are aluminum boxes and have found a good reception among modellers everywhere have announced the immediate availability of three additional boxes.

C holds one 22½ volt (BL-015) battery and two pencells.

D holds one 9 volt (BL-006) and two pencells.

E holds four pencells.

Either of the foregoing are \$1.75 each. They each measure 2½" x 2½" x 5/8" thick.

In the works from Beta also are their F which will hold 8 pencells, and their G which is designed to hold 10 pencells. These will be \$1.95 each when they become available.

STRADER PLANS

We've had the pleasure to review the plans of a new plan service which was announced recently in Flying Models and contains some of the designs by old-timer Ted Strader, popular R/C columnist of Flying Models. They are available from Special Edition Plans, Box 144, Massena, New York and the printing is limited. The concern requests that special mailing should be added if special handling is desired such as 12¢ for first class and 21¢ additional for air mail per plan.

The plans we've seen were the new Whirlwind which is a 46" .09 power low wing job designed for Intermediate or Rudder Only which is claimed to be a hot stunt ship defying many old wives' tales about low wing jobs. Price of these plans per set is \$1.75.

Another that we've had the opportunity of looking at has been the South Wind which is classed as a ½A. Has 42" wing span and is designed for .049 to .075 power and is a high wing job priced at \$1.00 per set.

Among others that are either ready or in the works are the Dust Bipe which is a 46" wing span for .09 to .15 power, sport or stunt, \$2.75 per set; Miss-L, 44" wing span which is designed for .059 to .074 power at \$1.50 per set; World War II Favorite, the P-51 Mustang R/C scale designed for stunt or sport for an .09 to .15 engine, 49" wing span, \$2.50 per set.

All of these plans look like good buys based on the two samples that we have seen. They are available only from the publishers at the aforesaid address.

BAISDEN GG PULSER KIT

Ace Radio Control is busy engineering a kit for the Baisden GG Pulser featured in this issue. There have been a number of requests for a dependable mechanical unit. Baisden's has been flown for quite some time and in spite of extreme simplicity provides an easy approach to the "Gallop Ghost system". Price and delivery has not been finalized, but early demand indicates wide acceptance.

KRAFT NEWS

Because of many requests from customers as to the probable availability of the Kraft multi receivers and transmitters in both the 8 and 10 channel versions, the following announcement is being made: The Kraft is daily winning friends because of its extreme simplicity in building and due to the fact that it is performing exceptionally reliably.

In the works now are the simultaneous or triple simultaneous transmitter in either the 8 or 10 channel version. It will be housed in an anodized aluminum case which will feature a plug-in chassis for the pot deck so that interchangeability may be had for various receivers that the one transmitter is to be used with. This will be a considerable added feature and the construction of this particular unit is unique in the industry in that it does not extrude on the back of the cabinet but is an integral part of the cabinet. It is still too early to tell effectively what the prices of the simultaneous and triple simultaneous 8 and 10 channel transmitters will be. We should have more information on this in the next issue of Grid Leaks.

Also under way now are the 8 and 10 channel receivers in both the relay and relay-less forms. The demand from the field makes it mandatory that a relay version also be made. The relay-less unit in the superregen version will be housed in an Aluminite case measuring 1 15/16" wide x 1 15/16" tall x 2 9/16" long. As with the 6-4 channel units, a power converter supply will be furnished on the bottom deck as an extra optional feature utilizing the 4.8 servo batteries to provide the B voltage. It will also feature a vacuum tube front end with 3 transistor amplifiers for the extra drive that will be required to operate the unit simultaneously. While prices of the relay version are still tied up, it is safe to estimate that the kit for the superregen including a 10 channel reed bank with a double deck epoxi glass copper laminate type of construction less power converter parts will sell for less than \$50.00. Delivery date is not definite. Watch the next issue of Grid Leaks for further details as to availability and finalized prices.

NEW RC BOOKS

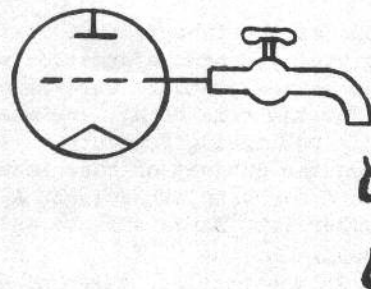
Several new books will pop up on the R/C horizon of general interest to R/C fans. One will be published by Kalmbach Publishing Company--publishers of Model Railroader--and associated publications which have been quite a boon to the model railroad fan. This book is by Howard McEntee and, while the price has only been tentatively set, it promises to be a real boon for the R/C fan and particularly the one who is a beginner in the program. It will be written in Howard's usual down-to-earth realistic style and be profusely illustrated. The schedule for delivery is some time during the month of November.

Also on the horizon to be released some time during the month of December is a "Manual of Radio Control" by E. L. Safford. This will be published by Gernsback Library, Inc., publishers of the R/C Handbook and Model Radio Control.

Quote from Martin Clifford on this book says, "The price title, and cover art are kept for last. We don't do this to be arbitrary but have found, from experience, that this is best. A sort of advance announcement without giving too many details."

Both of these books will be available at your hobby shop and Ace Radio Control. We suggest watching future issues of Grid Leaks for exact details on prices and availability.

Grid Leaks At Play



Although this is Volume II, Number 9 of Grid Leaks and encompasses almost four years of publishing of this particular R/C Data Service, we must admit that this issue is, in a manner of speaking, an experiment. We have felt for some time that when we have had construction articles which covered the construction or building detail in some depth that it would be advisable to use more than a single or double-page spread and have, in this particular issue, taken the three major articles and given them the expanded coverage that we feel the editorial material needs. Further, this material is slanted directly to hit what we hope is a broad cross-section of readers. One is designed with the beginner in mind, one is designed for the reed fan, and the other is designed for the proportional gang.

We are constantly striving to make this R/C Data Service not into a magazine but strictly what the name implies--a data service for exchanging information among leading R/C'er's in the country to help advance the radio control art--not among one group alone but along the entire cross-section, so that more people at various stages in the game of radio control can enjoy the art faster and with a great deal more pleasure.

One of the great pleasures that we get as an adjunct to gathering together the material presented to you every other month in Grid Leaks is the exchange with a number of club papers. We've been extremely pleased at how well most of the clubs seem to take their duty of advising at least their own club members of the news in their areas. We feel, by and large, that most clubs (and we can't offhand think of a one that isn't doing this effectively) are providing their club members with the best information on a local basis. To go through the list of our exchanges and single out only a few, we feel would be a disservice. We merely mention this on the basis of the fact that, if you belong to a club and you feel you want an added spark, it might be that a club publication might provide it. Granted, it will probably prove a great deal of work for some person or persons, but it's our individual thinking that this work will pay off in terrific additional club interest.

We appreciate very much the comments from a number of our readers on our comments relative to the interference and licensing problems which made up the bulk of Grid Leaks at Play in the last issue. Some readers have suggested 50-54 mc operation as providing a fairly effective answer. This, of course, means that those who want to do this will need to obtain at least a novice class license before this is a legal type of operation. We must stress here again that the FCC did the R/C'ers a service by making radio control available on a non-fee basis. It's up the radio controllers to live up to their end of the bargain and to abide by the ground rules which are established by the FCC. Unless and until we do, we are in no position to ask the FCC for further considerations of frequencies for our radio control purposes.

One further point has come to light since then and that is, while Class D two-way voice telephone communications apparently is still booming and literally thousands of these units are finding their way to the market rapidly, many of these users are reporting dissatisfaction because their concept of what the two-way voice communications is under most normal circumstances and what it actually is is a disappointment considering the money that they're tying up in this equipment. Whether or not this will spell a slow-down on the Class D use if, of course, speculative and, again, this does not affect Class C operation from the standpoint of removing any of the liability that we are obligated for in the form of applying for licenses and permits to operate our radio control transmitters. This also means if Class D operation will stay at the same power input as now. If the petition by Class D users now before the FCC to be allowed to go to 25 watts is put into effect, this will make it anybody's guess--including present Class D equipment. No immediate action on the petition, however, is expected.

We have, of course, a recurring request that Grid Leaks go monthly. We wish we could accede to this request but, as it is now, there simply isn't time enough in the day to complete the normal routine tasks and do Grid Leaks, too, and the point that we made as far as club publications are concerned as labors of love, we must also mention this fact concerning Grid Leaks. We have deliberately tried to steer clear of advertising which many

of you, at the inception of Grid Leaks, advised that we do. We have acceded to requests for giving you new information whether this was of immediate benefit to Ace Radio Control or not as new products were released regardless of who made them.

For the time being, we must still say that Grid Leaks will have to maintain a bi-monthly publishing schedule.

On the subject of back issues, and we get requests for these virtually daily, all of Volume I has been exhausted. A limited number of Volume II still exists with the exception of Number 1. These will be on a "first come, first serve" basis to new subscribers at 35¢ per copy.

In the previous issue of Grid Leaks, we mentioned the fact that at the 1960 Nationals in Dallas, the PA system carried the rather brief and cryptic announcement of the U.S. positions held at the Internationals in Switzerland to the effect that Ed Kazmirski placed first, Harold DeBolt placed seventh, and Bob Dunham placed tenth.

In subsequent club papers, as well as the current issue of Radio Control Models & Electronics for October, 1960 published in England, we find considerably more details than were available at the Nationals.

Bob Dunham's "Volts Wagon" was marred by engine troubles but, according to information from RCM & E, a subsequent demonstration exhibition that Bob produced all agreed to be THE flight of the meeting.

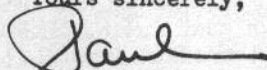
Radio control as an exact science including the aerodynamic responses of models has progressed tremendously in a few short years. Many builders are content to let radio gear be completely assembled and have to tackle only the installation. Higher pre-fabrication by manufacturers of radio control airplanes also is making the task of making an airplane easier. It is a far cry from the early days of the art when an occasional good flight was the exception to the rule. Now, the occasional loused up flight at most every meet is the exception under most all normal conditions. Performance today is, by comparison, absolutely spectacular over what it was just a few short years ago. This includes almost every aspect of the R/C field from radio to servos to actuators to engines to airplanes themselves.

While the interest in built-up gear is increasing constantly, so is, we feel, the interest in building up one's own gear increasing directly. Builders who, a few short years ago, would not have attempted to build a radio kit of any type now are confident that, with the improved instruction techniques that are being brought forth by the various "how-to" articles in magazines that they can tackle receivers or transmitters of their own.

In looking over entry lists of the recent Nationals at Dallas, we were impressed by the number of builders and designers, when it came to the question of radio gear, who marked succinctly "own".

This, we feel, speaks well for the future of the art. This also, we believe, will help Grid Leaks fill an ever-increasing need in the field of radio control. It will not be our purpose to attempt to sway editorially any one flier to fly in any given way--be it by reeds, by Galloping Ghost, by TTPW (two tone-pulse width), by cascaded compounds, by highly effective electrical and mechanical beep boxes. It will be our continued purpose during 1961 to bring you, we hope, an ever-growing experimental type of philosophy which will let you, as our reading public to delve into the many fascinating facets of radio control. That there are being successful flights made with virtually every type of equipment attests to the fact that the tinkerer and his needs must constantly also be met. The fact that there is disagreement among R/C'ers we think is a healthy sign. Not only does this disagreement lead to new circuits but prevents stagnation of the old circuitry because there will always be the tinkerers who want to build their own equipment.

Yours sincerely,



Paul F. Runge

Reed Trouble Shooting Chart

BY PHIL KRAFT

PROBLEM	PROBABLE CAUSE
Reed is hard to drive (make vibrate).	<ol style="list-style-type: none"> 1. Excessive clearance between reed and coil pole piece. 2. Improper tuning. 3. Inadequate driving voltage from receiver. 4. Inadequate or improper modulation of transmitted signal. 5. Reed coil polarity reversed.
Poor simultaneous reed drive.	<p>All of above plus:</p> <ol style="list-style-type: none"> 1. Poor mixing of simultaneous tones in transmitter or improper balance between tones mixed. 2. Trying to drive reeds immediately adjacent to each other. 3. Frequency of reeds in reed bank unevenly spaced, i.e., improper manufacture of reed bank.
Adjacent reeds tend to drive together. Reeds do not drive cleanly.	<ol style="list-style-type: none"> 1. Reeds spaced too close to coil pole piece. 2. Reed tuned to too high a frequency.
Third reed starts vibration caused by harmonics generated by driving two others simultaneously.	<ol style="list-style-type: none"> 1. Simultaneous tones need slight readjustment. 2. Offending reed needs to be bent up farther away from reed coil pole piece. 3. Extreme cases may require placing a dab of solder on one or more reeds to tune out harmonic.
Reed drives readily but has trouble vibrating against contact, starting sometimes but not always.	<ol style="list-style-type: none"> 1. Contact spacing too wide.
Vibration of engine causes reed to drive.	<ol style="list-style-type: none"> 1. Contact spaced too close to reed. 2. Improper mounting--reeds should be mounted vertically. 3. Receiver packed in too tight. 4. Insufficient foam rubber around receiver. 5. Rough engine, loose mounting, poorly balanced prop, etc.
Relay does not close even with good reed drive.	<ol style="list-style-type: none"> 1. Relay is improperly adjusted or damaged. 2. Relay coil open. 3. Filter capacitor across reed is defective. 4. Dirty reed contacts.
Reed contacts are excessively.	<ol style="list-style-type: none"> 1. Too high a reed current. 2. Defective or inadequate filter capacitor.

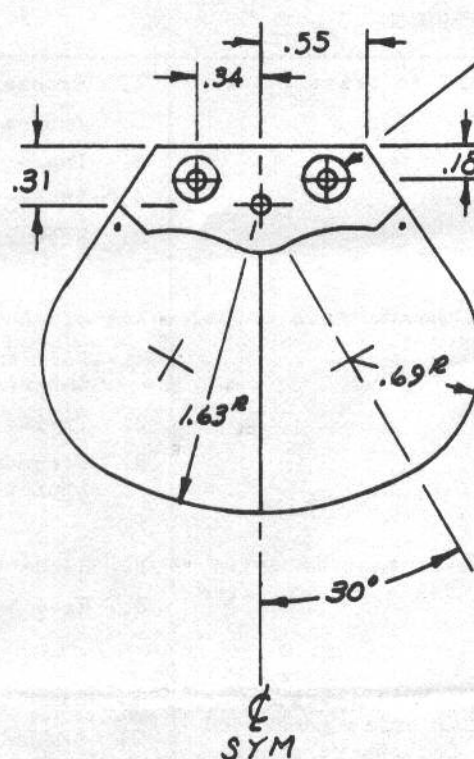
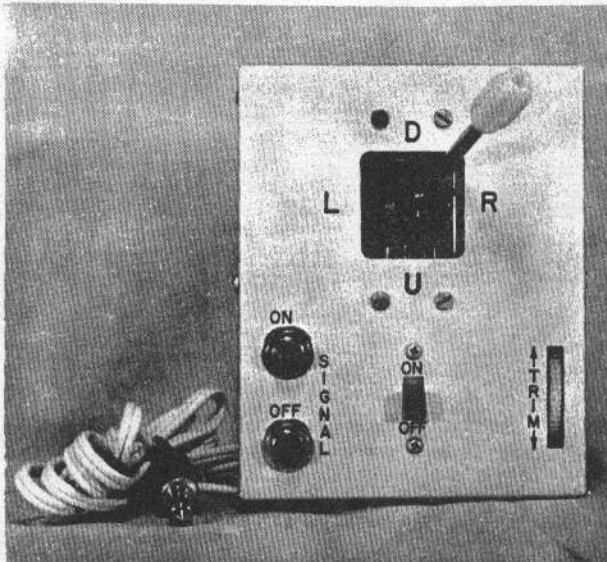
Mechanical "GG" Pulser

SIMPLE RUDDER-ELEVATOR ALA GALLOPING GHOST

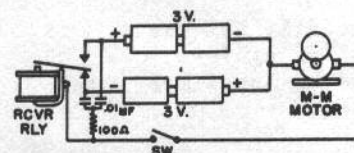
COPYRIGHT 1960 BY GRID LEAKS AND DON BAISDEN

WIPER CONTACT BOARD

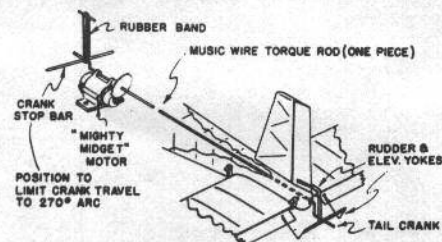
7/64 DRILL ~ 3 HOLES
C'SINK FOR 4-40
2 PLACES ~



FULL SIZE



BASIC GALLOPING GHOST WIRING



BASIC GG INSTALLATION

Do multi-vibrator circuits leave you cold? Are you bamboozled by interaction, size, weight, or cost of electronic pulsers? If so, this is for you! Once adjusted, this unit will require only a periodic cleaning to provide many hours of reliable service.

Begin construction by fabricating the brackets. These are made of .040 half-hard aluminum with the exception of the motor and stick brackets which are .050. Try to keep hole sizes and locations as closely coordinated as possible to insure a smooth working unit. Cut the shaft of the rate pot such that 1/4" of the flat area is left. Flatten one end of a 2 3/4" long piece of 3/16" O.D. brass tubing which forms the stick and drill 3/32 holes in the stick and rate pot to match the stick bracket. The stuck unit is assembled using 2/56 screws and nuts. Before attaching the rate pot to the stick bracket, mount it to the rate pot bracket, hand tightening the mounting nut.

Cut the contact board to shape from 1/16 PC board material and drill the three mounting holes. For perfect coordination, lay out the center line and drill the center pivot hole. Then pre-assemble the board to the rate pot bracket and transfer the two outer holes from the bracket. Scribe the outline of the portion of copper to be removed with an X-Acto knife and peel back enough on one corner to provide a grip for needle nose pliers. The copper may then be rolled back in the same manner in which you open a coffee can. Note that the piece should be deeply scribed but the copper need not be completely cut through. Scribe the center line separating the two faces of the board, this time being sure to scribe completely through the copper so that no electrical contact exists between the two faces. Counter sink the board on the contact side and attach it to the rate pot bracket with two 4/40 flathead screws and nuts.

Mount the pivot brackets to the assembly using 4/40 screws and elastic stop nuts with washers between the moving parts. Tighten the pivot screws until the parts rotate smoothly with a slight amount of drag. Final adjustment will be made later.

Lay out the top cover and cut out all openings with the exception of the four pivot bracket attachment holes. Position the assembly over the stick opening and clamp the parts together. Check the alignment and freedom of

movement and then transfer the four holes from the pivot brackets to the case top. The assembly is attached to the case with four self tap sheet metal screws. The case top is now ready for deburring and lettering if you so desire, after which the bracket assembly, switch and push buttons are installed. Lettering on the anodized case may be done with India Ink after thoroughly cleaning the surface. Going over the portions to be lettered with a typing eraser helps the ink take to the surface. Spray or brush on a light coat of fuel proof clear dope or DuPont Krylon to prevent smudging.

Drill the ends of the 3 x 4 x 5 case for the motor bracket, trim pot bracket, battery box, and rubber grommet. Install these parts with the exception of the

BOTTOM VIEW of TOP COVER \swarrow $\frac{9}{64}$ DRILL ~ 4 HOLES

NOTE: DRAWINGS ON THIS AND THE FOLLOWING PAGES ARE TO SCALE-- BUT THEY ARE NOT FULL SIZE.

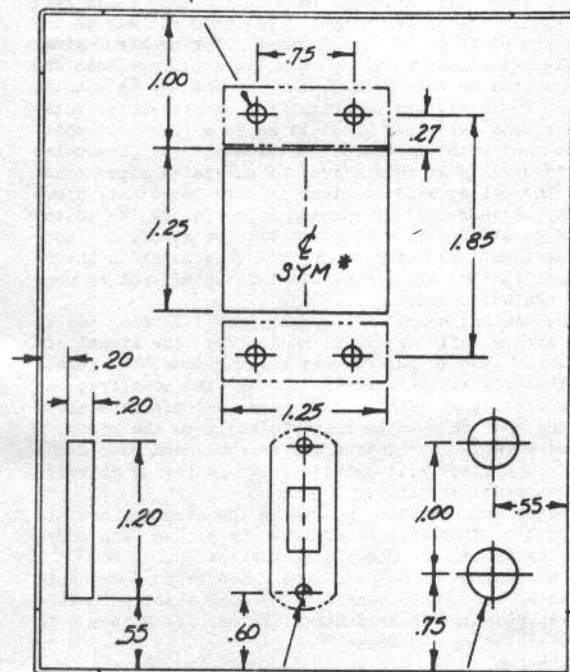
motor bracket. Install the trim pot on its bracket after cutting the shaft to $\frac{1}{2}$ ". Position a $1\frac{3}{4}$ " (80 tooth) nylon gear to line up with the slot in the case top and Pliobond it to the pot shaft as a trim wheel.

Remove the large gear and countershaft of the Mighty Midget to facilitate soldering of the wiper assembly. The wiper mount is a portion of a round head paper fastener or a scrap of .020 brass. The wipers are made of .006 phosphor bronze or beryllium copper. Pre-tin the parts at points of contact and clamp together with a clothespin for ease of assembly. Reassemble the shaft and gear and mount the motor on its bracket with two $\frac{4}{40}$ flathead screws and nuts. Mount a two point tie lug under one of the motor nuts and bend the tie eye at the pulley end of the motor until it is pointing toward the countershaft. Bend the pulley wiper in an arc to provide pressure on the pulley and solder it to the eye along with the external plug leads and the leads to the push buttons per the pulser wiring pictorial.

The box is now ready for final wiring and assembly. Check the contact board to insure that it tracks perpendicular to the box centerline; when viewed from the side, the board should have no fore and aft movement as the stick is moved from side to side. Adjust the pivot screws until resistance of the stick, when moved in side to side positions, seems to match that of the fore and aft movements. To adjust the rate pot, move the stick to the full down position, rotate the pot against its internal stop and tighten the mounting nut. Attach one wire to the center terminal of the pot and the other to the outside terminal which corresponds to minimum resistance at full down stick. Attach the wires to the trim pot so that the resistance is decreased when down trim is applied. The above procedure should, of course, be altered correspondingly if you intend to use fast pulse for up elevator.

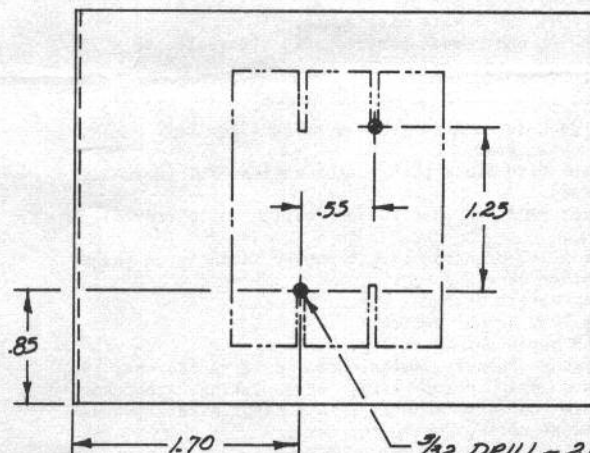
Wiring should be done per the pictorials and is somewhat simplified if the motor and its bracket is left out until last. The three wires to the rate pot and contact board should be very flexible and left long enough to permit full stick movement with slack left. (Use 19 strand wire.) Solder the motor leads to the switch and trim pot, cut to length and solder terminals or ground lugs on the ends to attach to the motor terminals. After all other wiring is complete, set the motor and its bracket in the box and solder the two wires from the tie lugs to the push buttons. Attach the motor bracket to the case end and run the zipcord external lead through the grommet and out of the box. Use phone plug or other device to connect the GG box across the transmitter key. The GG box is your mechanical thumb.

A three penzell battery box is shown attached to the case with $\frac{2}{56}$ screws. This will accomodate regular pencells or the new Eveready N46 nicads (which are recommended). Two medium cells may be substituted quite readily since the $4\frac{1}{2}$ volt supply is only used to increase the pulse rate range to make inverted flight a bit easier. To utilize an external power source such as a 6 volt power supply battery, place the trim wheel and

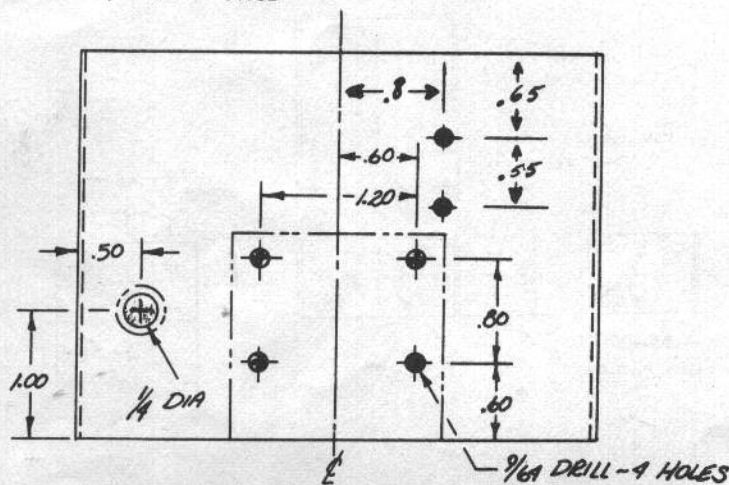


$\frac{1}{64}$ DRILL ~ 2 HOLES

$\frac{3}{8}$ DIA ~ 2 HOLES



END VIEWS ~ CASE



the stick in the full down positions and rotate the rate pot away from its internal stop until the pulse rate comes within the usable range. The trim pot may be any linear pot of from 10 to 20 ohms. For normal flying, the rate pot should be a 50 ohm linear; for those who desire a greater rate change, a 75 ohm may be substituted. Check battery polarity for correct motor rotation and bend the wiper until it makes a light but positive contact with the board; motor stall at low pulse rates is usually an indication of excessive wiper pressure. The pulley wiper contact is very important; pressure may be increased by running solder along the bottom surface to stiffen it a bit. A bit of electrical contact lubricant is also useful at this point to insure proper contact at all times but this should not be used on the contact board.

The contact board is symmetrical allowing you to choose either left or right rudder as the signal off condition. The author chooses right rudder, the reason being that signal off seems to be the most frequent failure condition (unless you have interference problems) and most ships spin less violently to the right.

Use care in fabricating and assembly and your mechanical GG pulser will provide a lot of flying in spite of its apparent simplicity.

Rudder and elevator hookup in the airplane are ala John Worth's Simpl-Simul article presented and copyrighted by MAN and reproduced by permission.

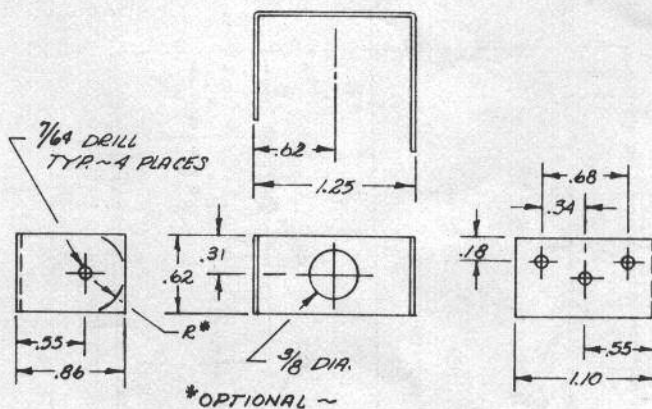
The addition of motor control may be done mechanically or by electronic means. One such electronic circuit was presented in Grid Leaks, Volume II, Number 7 in the POD system by Jim Shows.

Have fun!

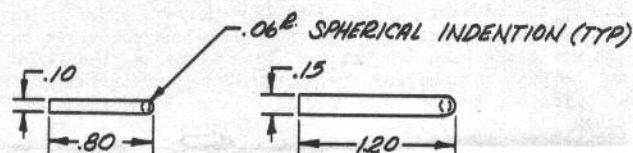
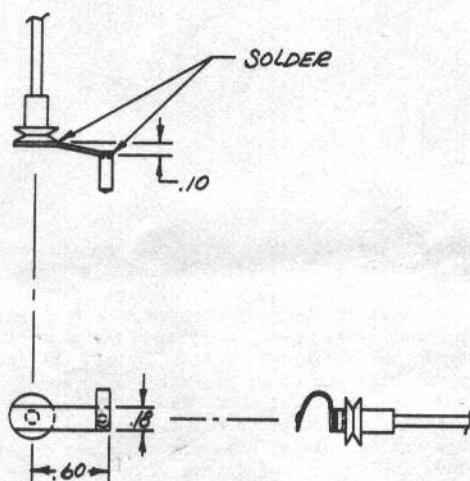
PARTS FOR BAISDEN GG PULSER

- Box - Aluminite 3 x 4 x 5, Ace #2.
- Trim Pot - 15 ohm 2 watt wire wound.
- Rate Pot - 50 ohm 2 watt wire wound. (May also be a 75 ohm--see text)
- Acme #7 battery box.
- 6 feet zip cord.
- Plug and jack to connect cord to transmitter key.
- 80 tooth nylon gear.
- Switchcraft #103 black push button switch SPDT (normally closed).
- Switchcraft #203 red push button switch SPDT (normally open).
- One piece 1/16" printed circuit copper laminate on paper or other base 2 x 2 1/2".
- One Mighty Midget motor.
- One slide SPST on-off switch.
- One two or three point tie lug.
- Miscellaneous brackets, bolts, nuts, self tap screws, 19 strand #24 hookup wire, brass tubing, phosphor bronze contact material, and other miscellaneous items as called for in the text.

Rate Pot Bracket



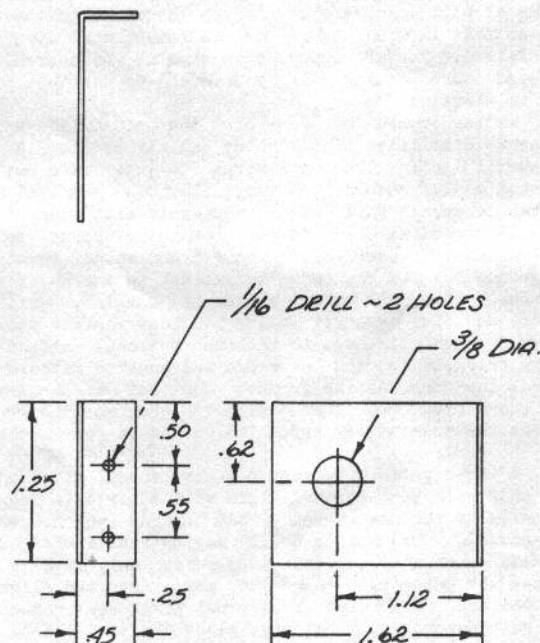
WIPER DETAILS & ASSY



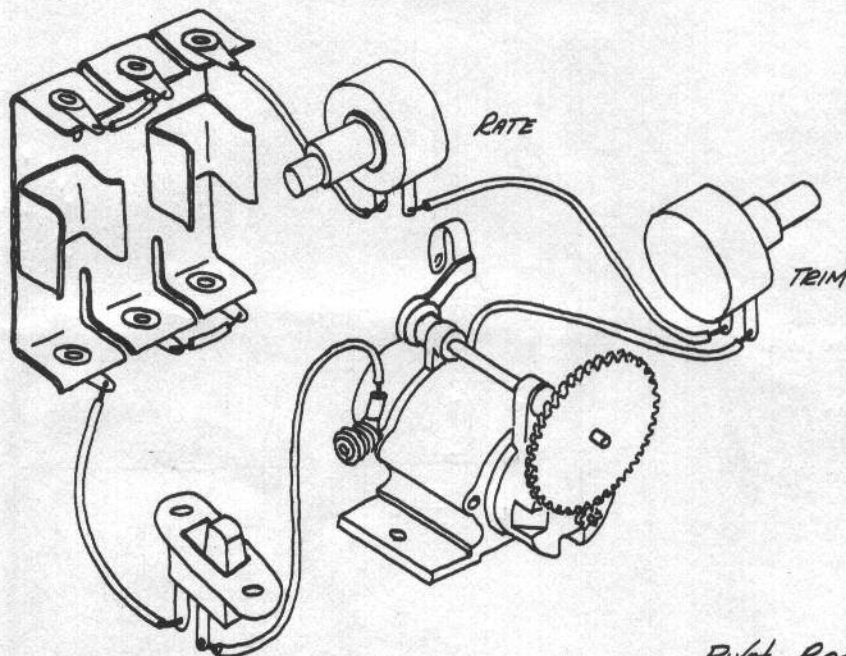
BOARD WIPER

PULLEY WIPER

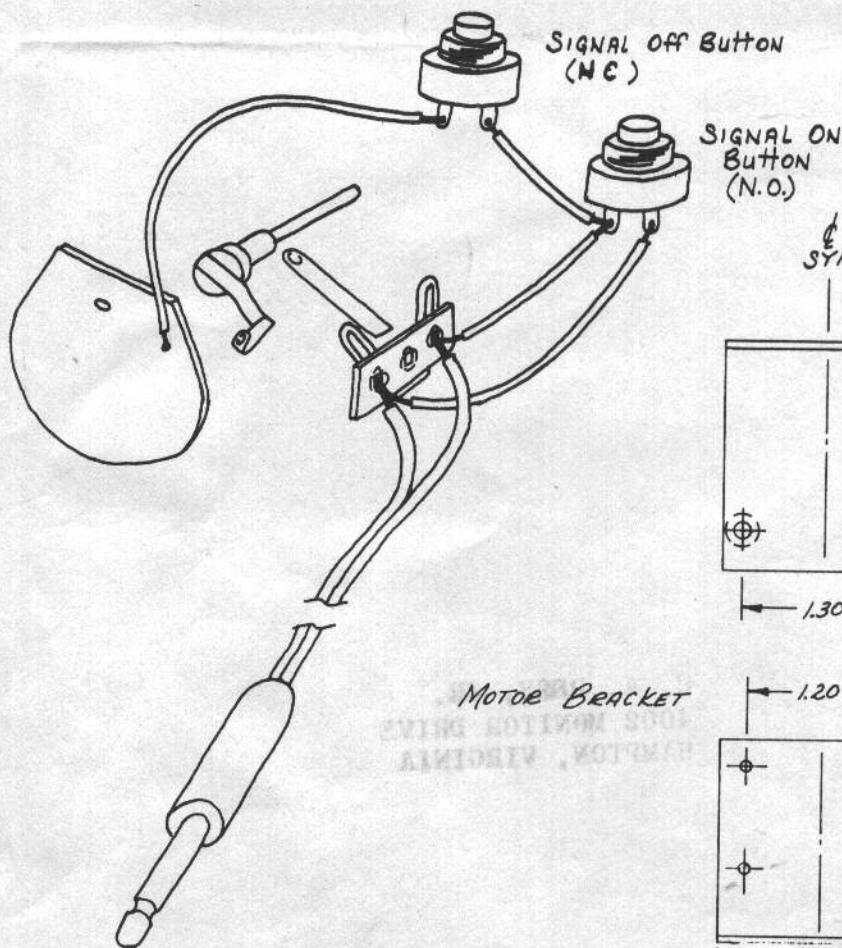
Trim Pot Bracket



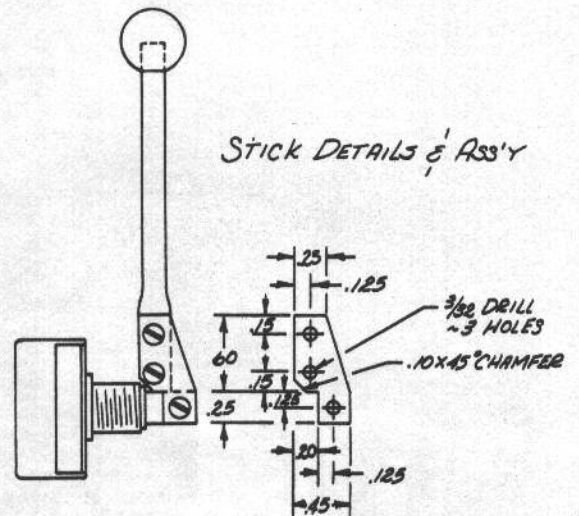
Wiring Pictorial (Motor)



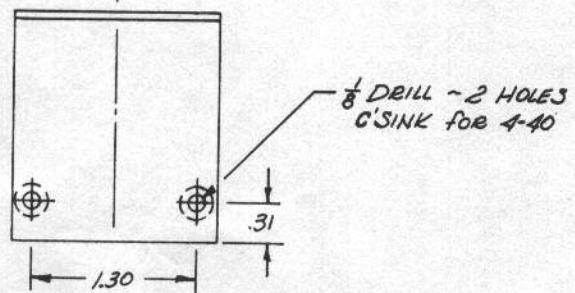
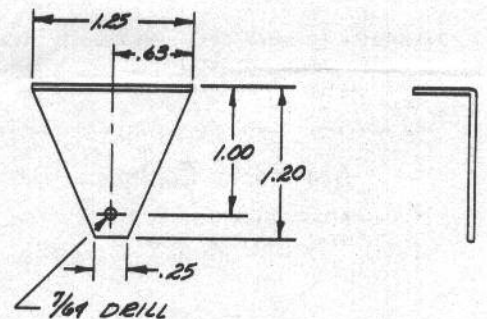
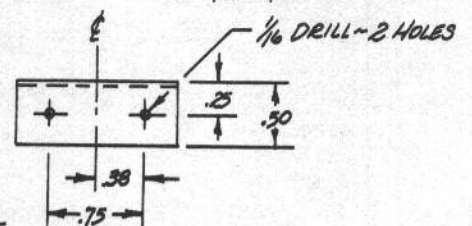
Wiring Pictorial



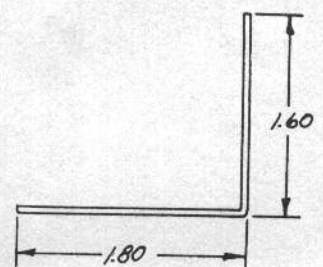
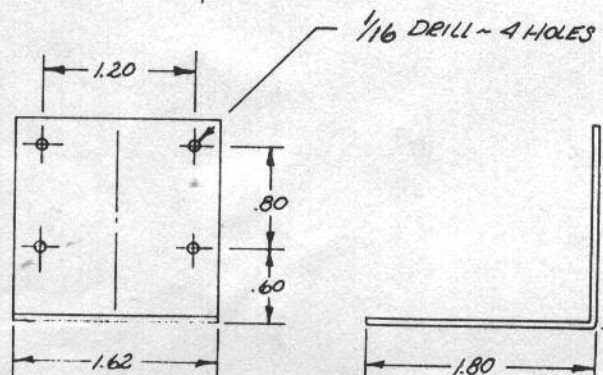
Stick Details & Ass'y



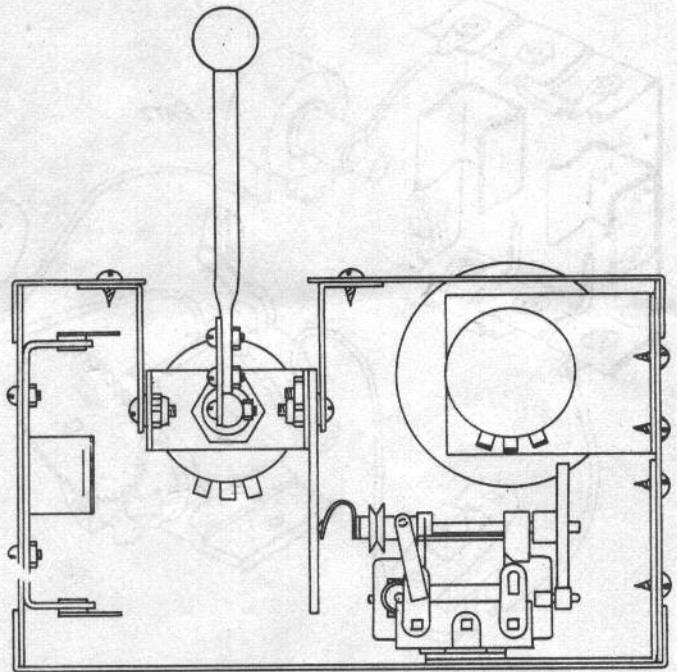
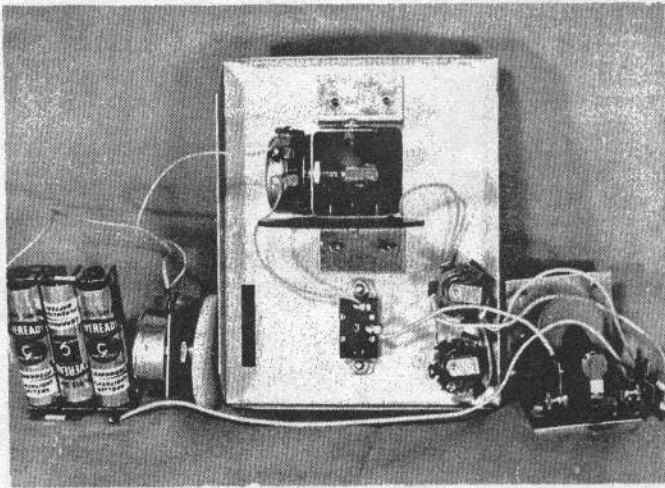
Pivot Bracket



MOTOR BRACKET



INBOARD PROFILE



Ace Radio Control

BOX 301
HIGGINSVILLE, MO.



C. A. DESS, JR.
4002 MONITOR DRIVE
HAMPTON, VIRGINIA