D-E

AERO-TROL

RADIO CONTROL

Instruction Manual

Manufactured Exclusively for

BERKELEY MODELS INC.,

BROOKLYN 22, NEW YORK, U.S.A.

INTRODUCTION

Aero-Trol is the first "flyweight" radio-control unit that opens a new and exciting experience in model flying.

Aero-Trol is so light that it can be used in models as small as 40" wingspan. The flying weight of the unit is less than 5 oz.

Aero-Trol is built with precision jigs and tools to make parts interchangeable. Every unit is tested to exacting standards. The complete familiarization with this manual is important for the owner of this equipment.

Aero-Trol is manufactured exclusively for Berkeley Models, Inc. by the D-E division. All service and repair work should be sent to:

BERKELEY MODELS, INC.
140 Greenpoint Avenue
Brooklyn 22, New York

Operating Instructions

for the

AERO-TROL Receiver

All radio control sets consist of a transmitter, with which a radio signal is generated and sent out into space; a receiver, which picks up this signal, which when detected and amplified operates a sensitive relay, or switch; and an actuating device for control surfaces.

The Aero-Trol receiver operates on a 1 1/2 volt battery and a 45 volt battery. (See Recommended Batteries chart). The size is 1 7/16" x 1 3/4" x 2 3/8" and the weight, complete with relay, is 1.9 ounces.

The receiver employs an RK-61 tube which makes for economical battery use. The entire unit (receiver, transmitter and escapement) has been tested and tuned at the factory and is in perfect operating order when packed for shipment. The relay has been set for best performance at the factory, and therefore will need no adjusting except if accidentally damaged. (See Maintenance Notes). All radio and relay connections are terminated in six color-coded wires, for ease of hook-up. The "S" hooks at each corner of the receiver base are for shock mounting the receiver on rubber bands (See Fig. 2). In addition to the equipment supplied with the Aero-Trol you will need the necessary batteries and a 0-3 or a 0-5 milliammeter (Available at radio supply houses). The 0-3 range is preferred.

The instructions for placing the receiver, transmitter and escapement in operation will be given in step by step sequence, which along with the illustrations, will enable you to place your Aero-Trol in operation readily with maximum efficiency and safety.

Steps for Placing the Aero-Trol Receiver in Operation

1. Remove the receiver from the box and the cellophane bag carefully.

2. Examine it thoroughly and become familiar with the essential parts as described in Fig. 1.

3. For test purposes and in order to become familiar with the set, mount the receiver as shown in Fig. 2.

4. Connect the antenna into the antenna clip, shown in Fig. 1. The antenna for test or flying purposes is a 28" length of number 25 copper enameled wire which is scraped for about $\frac{1}{2}$" at one end in order to make a good connection in the antenna clip. Although the antenna may be placed in any position and is insensitive to your hand or body being near it, it is best to have it suspended by a string or thin wood strip at its free end. It need not be drawn tight.

5. For the best economy, it is better to use an Eveready 455P or a Burgess XX30 for the 45 volt supply, and one large size flashlight cell for the $1\frac{1}{2}$ volt supply. This applies to test purposes only, as smaller cells and batteries are used for flying.

6. The color-coded wires are broken down as follows:

   Radio power: Yellow-$1\frac{1}{2}$v negative
   Green -$1\frac{1}{2}$v positive and 45v negative
   Red -45v positive

   Relay connections: Black - Common ground for relay.
   Orange - Contact in use for present operation.
   Blue - Connected but not in use on present hook-up. (Will be used in future attachments).

7. The small black rheostat in the cellophane bag, also see Fig. 5, is used in the 45v positive lead to regulate the plate current to the proper operating value and also to make adjustments as the tube life increases.

8. With the receiver mounted and the antenna connected (Steps 3 and 4) connect the red, green and yellow wires as described in step 6 and Fig. 11.

   (a) First, connect the yellow wire to the negative terminal of the $1\frac{1}{2}$v cell.
   (b) Second, connect the green wire to the positive terminal of the $1\frac{1}{2}$v cell and the negative terminal of the 45v battery.
   (c) Third, solder red wire to center terminal of the rheostat. Next, solder a short piece of wire to one of the other two terminals, either one will do. (Do not apply soldering iron to rheostat terminals longer than necessary to make good solder joint).
   (d) Fourth, connect free end of wire from rheostat to the negative terminal of the 0-3 or 0-5 milliammeter. (Fig. 11)

9. All connections being made as per step 8, you are about ready to put the receiver in operation by merely connecting the 45v positive terminal of the battery to the positive terminal of the meter. No tuning of the receiver will be necessary except that of the rheostat.

   IMPORTANT: The safe operating plate current of the RK-61 tube should never exceed 2 milliamperes. This set was designed so that the current at its power operating value is between 1.3 and 1.6 milliamperes. (Fig. 8). The lower the maximum (no signal) plate current, the longer the tube life.

10. Connect the 45v positive terminal of the battery

to the positive terminal of the meter. NOTE THE PLATE CURRENT AS SHOWN ON THE METER. Due to variations in tubes the plate current may go up to 2.5 or 3 milliamperes. If this is the case, turn the rheostat so as to bring the plate current down to 1.3 to 1.6 milliamperes. If the current is below 1.3 to 1.6 milliamperes, turn the rheostat so as to bring the plate current up to the desired values. (Fig. 8).

11. Being factory tested and turned, there is no need to adjust the relay or the antenna tuning condenser. With the meter giving the 1.3 to 1.6 milliampere indication, the receiver is operating properly with no signal from the transmitter.

12. If a switch is desired (there should be an external means of turning off the receiver when mounted in a plane), it should be placed in the green lead since this cuts both the $1\frac{1}{2}$v and 45v supply to the receiver. For test purposes, the 45v positive connection (the red lead) may be broken.

TRANSMITTER

The Aero-Trol transmitter operates in the 6 meter band, 50-54 megacycles. The Federal Communications Commission requires that a person operating a transmitter either have an Amateur license or work with a "ham" radio operator. The transmitter requires a $1\frac{1}{2}$ volt battery and a 135 volt battery, or combination of batteries (See Recommended Batteries). The tube used is a 3A5 and the output of the transmitter is sufficient for a range in excess of 2 miles (field tests have been made at a range in excess of $6\frac{1}{2}$ miles). With the di-pole antenna supplied (highest in all around efficiency), the pattern of radiation is as shown in Fig. 19. Bear this in mind when flying, especially at ranges in excess of $\frac{1}{4}$ to $\frac{1}{2}$ mile.

The face of the transmitter consists of a screwdriver slot shaft for frequency adjustments and the black switch for keying the transmitter. The wires from the bottom of the case are color-coded and have all needed terminals attached so there can be no mistake in hookup when the recommended batteries are used. The top of the case consists of the socket for the antenna plug-in. The rear of the case may be removed as described in Maintenance Notes.

Steps for Placing the Aero-Trol Transmitter in Operation

1. Carefully remove the Transmitter from the box and the cellophane bag.

2. Examine it thoroughly and become familiar with the essential parts as described in Figs. 3 and 4.

3. The transmitter is factory tuned and preset to the correct frequency with the receiver, so adjustments will probably not be needed.

4. Connect two $67\frac{1}{2}$ volt batteries in series as shown in Fig. 10 so as to get an output of 135 volts.

5. Attach snaps on the red and blue wires to the corresponding battery connections. Plug in the plug, on the green and yellow wires, to the $1\frac{1}{2}$ volt battery.

6. Although the transmitter was factory tested with an antenna and set to frequency with the antenna attached, it need not be used with the transmitter for test purposes within a 75 foot radius.

7. With the power wires connected as in step 5, the only current being drawn is that of the filament, which is 220 milliamperes. No switch is provided since all current drains will be eliminated by removing the $1\frac{1}{2}$ volt plug.

8. When the black switch button is depressed, the transmitter is in operation and is emitting a signal, the exact frequency of which is given on the transmitter box label. Do not depress this key

any longer than is necessary (See Flying Notes) since the current drain on the 135 volt battery is 30 to 33 milliamperes. When the transmitter has been in use for any length of time the case may become warm.

Transmitter and Receiver Operation

1. Place receiver in operation as previously described..
2. Hookup transmitter as described.
3. Make sure receiver is operating properly per steps 9 and 10 under receiver operation.
4. Depress the key on the transmitter. This puts out a signal which is picked up by the receiver.
5. Upon receipt of a signal from the transmitter, the plate current will drop from 1.3 to 1.6 milliamperes to .5 to .1 milliamperes. This change in plate current operates the sensitive relay (The relay is adjusted to pull on when the plate current rises to 1 milliampere or more and drops out when the current falls below .7 milliamperes).

Escapement

The Aero-Trol escapement is a unit for actuating any control surface. It is SELF-NEUTRALIZING. This means that as it traverses the cycle from left to right or vice versa, it will always return to neutral. This is important in case the plane gets out of range, battery failure or failure of the "pilot" to properly control the plane. The escapement measures 3/4" x 1" x 2" and weighs $\frac{1}{2}$ ounce. It is powered by one loop of 1/8" rubber 12 to 14 inches long and also 2.2 to 4.5 volts. (See Flying Notes). Do not attempt to bend any parts on the escapement. Although designed for Class A gas models, the Aero-Trol escapement is suitable for Class B and C models as well.

Steps for Placing the Aero-Trol Escapement in Operation

1. Remove the escapement from the box and the cellophane bag carefully.
2. Examine it thoroughly and become familiar with the essential parts as described in Fig. 12.
3. For test purposes, mount the escapement in a wooden jig as shown in Fig. 12A. A similar installation may be used in your airplane, race car or boat.
4. Connect a loop of rubber as shown in Fig. 12B and wind so as to turn escapement arm in the direction shown.
5. This escapement was factory tested on $1\frac{1}{2}$ volts but for tests and flying, 2.2 to $4\frac{1}{2}$ volts are recommended. Connect 2.2 to $4\frac{1}{2}$ volts to the terminals of the escapement in order to work the electromagnet. Apply voltage only long enough to actuate the arm. Excessive current flow through the coil results in heating of the coil and lessons battery life.
6. Connect one end of the escapement coil to either the black or orange wire coming from the relay on the receiver. Connect the other end of the coil to either terminal of the battery used to operate it. With the receiver on, connect the other end of the battery to the remaining black or orange wire. See Fig. 11 for hookup. IMPORTANT: Be sure the receiver is operating before hooking up the escapement; otherwise, the relay points which operate the escapement will remain closed and current will flow through the escapement coil at all times.
7. With the escapement connected to the relay of the receiver and to the battery, which will operate it, your Aero-Trol unit is now ready to operate in

its entirety.

OPERATING TECHNIC

1. See that the receiver is operating properly as per receiver directions. The NO-SIGNAL plate current is between 1.3 to 1.6 milliamperes. Variations in maximum plate current, especially when the RK-61 tube is new, are due to differences in voltage in the $1\frac{1}{2}$ volt cell and the 45 volt "B" battery. (See Battery Notes).

2. With the receiver connected and operating, connect the escapement as described.

3. Place transmitter in operation. (No antenna needed for bench tests.)

4. Upon depressing the transmitter key, the receiver plate current will drop from 1.3 to 1.6 milliamperes down to .5 to .1 milliamperes. This change in plate current will cause the relay to close, which in turn closes the circuit for the escapement, thus operating it. Looking at the escapement arm from the front (Fig. 12), the escapement arm throw is in a vertical position. Energizing the coil will allow the arm and the throw to move around a quarter of a revolution. The arm will remain in this position (with the escapement arm throw either to the left or right of the neutral position). Releasing the key will allow the escapement arm to return to neutral. The next depressing of the transmitter key will allow the escapement arm to turn another quarter of a revolution, the opposite direction of the previous keying. Upon releasing the key, the arm will again return to neutral. This cycle, from neutral to left, to neutral to right, to neutral to left, etc., is repeated with each keying of the transmitter.

FLYING NOTES

Up to now you have learned how to operate your AERO-TROL unit for bench tests and general familiarization. Now for notes on a typical model airplane installation. Any model capable of carrying a payload of 5 ounces is suitable for an Aero-Trol installation for radio control. The majority of the flying weight will consist of batteries, so unless your plane is capable of carrying the extra weight, it is advisable to use the smallest batteries available. For Class A models a single penlight cell may be used for the $1\frac{1}{2}$ volt supply and two $22\frac{1}{2}$ volt hearing aid batteries connected in series (45 volts) are used for the "B" supply (See Recommended Batteries). For Class B or C the $1\frac{1}{2}$ volt supply may consist of two penlight cells in parallel of one intermediate or large size flashlight cell. The 45 volt supply may consist of larger hearing aid batteries, for longer life. Hearing aid type cells and batteries are to be preferred because of their longer life due to an improved mix used in construction. BE SURE your batteries are fresh. (The $1\frac{1}{2}$ volt cells may test as high as 1.75 volts. $22\frac{1}{2}$ volt batteries may test as high as 25 volts while a 45 volt battery may go as high as 50 to 51 volts.)

NOTE: It is not necessary to have a complicated wiring job in your ship in order to make the set work more efficiently. KEEP IT SIMPLE. Use a minimum of wire, with just enough slack in it to take up any shock. Complicated and messy wiring only leads to difficulties of one type or another and is unnecessary. Naturally, every type of installation can not be dealt with here but the ingenuity of each model builder will help him discover the best method of installation for his own particular use. Just follow the simple rules and notes and diagrams that are given here.

1. Have everything operating properly before beginning your model installation. The receiver is mounted in the fuselage on rubber bands, stretched between the "S" hooks on the receiver base and small hooks attached to the longerons of the fuselage. A fuselage should be wide enough to accommodate the receiver and still have about 3/8 of an inch on either side of the base of the receiver. The tension of the rubber mounting should be just

enough to securely hold the receiver suspended between the fuselage hooks and still allow the receiver to take up a moderate amount of vibration.

2. Provisions must be made for mounting the rheostat in the RED lead, from the receiver to the positive connection of the 45 volt battery, preferably on the outside of the plane or in a convenient place easily reached from the outside.

3. Provisions must also be made for plugging a meter into the circuit, in the RED lead, for tuning and adjustments. Inasmuch as you wouldn't be able to fly your model with the meter attached, it must be removed from the circuit. When this is done, the circuit through the RED lead is broken. In order for the receiver to operate, the two loose ends of wires where the meter was connected must be connected together. In order to simplify the placing of the meter in the circuit and then removing it, it is suggested that a "Phono" jack and plug be employed and hooked up as per Figs. 23, 24, and 26. When the meter and its plug are removed, another plug which has been shorted is then placed in the jack to complete the circuit. The jack should be placed in a convenient external position on the plane, such as is done with a regular booster connection.

4. Keep all wiring as short and neat as possible.

5. String the antenna back through the fuselage or bring it out at the rear of the cabin, or trailing edge of the wing, and stretch it back to the tip of the rudder. If the length of the antenna, 28", exceeds the length of a Class A fuselage, the remainder of the antenna may be allowed to dangle in free space. DO NOT make large 90 degree bends in the antenna as this tends to make it semi-directional.

6. Make all battery boxes substantial and easily accessible.

7. NOTE: If a wet type cell is used for ignition purposes it may also be used as a source of power for the escapement.

8. Mount the escapement so there is support for the loop of rubber pulling on it.

9. A pivoted control arm must be bent from .040 music wire with a yoke to fit the throw on the escapement arm (Fig. 13). This yoke must be bent so as to provide a nice sliding fit. If too tight or bent out of a straight line, it will bind the action and prevent the control surface from functioning. If too loose, the yoke will "slap" around on the escapement arm throw, thus allowing the control surface to have undue free movement.

10. It is preferred that the escapement be mounted as close to the control surface as possible to minimize the length of linkage to connect the escapement arm throw with the control surface control horn. (Figs. 14, 15, and 16).

11. IMPORTANT: Not a whole lot can be said about the amount of rudder or elevator control surface area. This is a variable factor with radio controlled models and depends on the following:

(a) Speed of the model.
(b) General size and weight of model.
(c) General design and flying characteristics of the model.

A fast model, both under power and with power off, will require less control surface movement and area than a slower flying model. A large heavy model usually requires a little more area and movement than a small lighter model. As a general rule, 10 to 20 percent of the total vertical fin or horizontal stabilizer may be used for the control surfaces. The amount of movement will vary from about 1/16" to 3/16" at the trailing edge of the control surface, the amount of movement being governed by the length and method

of linkage used.

12. Be sure there is free and easy action on the control hinges and the linkage.

13. When testing your radio-controlled model make all adjustments as you would for a regular free flight model. NOTE: Again it is reminded that the battery boxes be substantial and firmly mounted since they are the most apt to break loose in a hard landing.

14. Check the receiver against the transmitter at a range of 150 to 200 feet before flying. Slight adjustments may be needed to bring the two units into correct frequency at this range. This may be done by the tuning control on the transmitter or by a slight adjustment of the antenna coupling condenser on the receiver.

15. DO NOT OVERPOWER your radio model on test flights. DO NOT ATTEMPT MANEUVERS CLOSE TO THE GROUND. Allow the model to gain several hundred feet altitude before controlling it. Allow the engine to run at least 30 seconds on test flights. Longer engine runs can be allowed after the model is adjusted and flying properly and the prime object is to keep it within a given radius when flying, usually no more than $\frac{1}{4}$ to $\frac{1}{2}$ mile.

16. Since Aero-Trol, at present, is but a one channel control unit, additional sets will be needed to work more than one control. Rudder control is preferred since practically any maneuver can be performed with the rudder alone.

17. REMEMBER that the Aero-Trol escapement will remain either to the left or right as long as the transmitter key is depressed. When the key, or switch, is released, the escapement returns to neutral. The key should be depressed only long enough to put the model into the desired maneuver. Practice makes perfect, so the more flying you can get in, the better you'll be able to "pilot" your radio-controlled model.

MAINTENANCE NOTES

Aero-Trol is rugged. You will be amazed at the amount of shock all the individual parts will take. However, all parts of the unit should be treated with care, just as you would treat any fine radio set in your home. Aero-Trol carries a guarantee as to quality of workmanship and inasmuch as the highest quality of parts are used throughout there should be no reason to open the transmitter other than to change a tube. The receiver tube may have to be changed after about 6 to 10 hours of actual use. In this instance, a full explanation is given for the procedure to follow.

TRANSMITTER

The transmitter uses a 3A5 tube which is of the miniature type. This tube is good, under normal use, for about 50 hours or more. The output of the transmitter is approximately 1.5 watts with fresh batteries and a new tube. If for any reason a signal is not received in the receiver when the transmitter button is depressed, you should check your batteries or the tube. When the "B" battery gets below 115 volts, it should be renewed. The $1\frac{1}{2}$ volt "A" battery should be renewed when the voltage drops below 1.1 volts. If the batteries are fresh and there is still little or no output, the tube should be changed. Remove the 2 screws that hold the rear cover on (Fig. 3) and snap off the cover. Pry out the tube, carefully, with a screwdriver and insert a new tube in place. Be careful that the pins on the new tube are straight so as not to damage the tube socket. The open end of the pins on the tube face the front of the transmitter. Place the tube in position and press it into place. The plate current of the transmitter as measured by a 0-50 milliammeter placed in the red "B" plus lead should read about 30 milliamperes, when the antenna is plugged in. No other adjustments are needed on the transmitter other than actual tuning to frequency. This is done with an insulated screwdriver, or preferably with a piece of hard wood or fibre which has been sharpened.

The use of a regular aligning tool or sharpened fibre will allow more accurate tuning.

RECEIVER

The receiver uses an RK-61 tube which is a triode thyratron. The use of this tube allows a much smaller and lighter receiver to be built. As stated before, maximum tube life will result when using a minimum no-signal plate current of as little as 1.2 to 1.4 milliamperes. When the plate current is left to idle at 1.5 milliamperes or more, the tube life is decreased to around 5 hours. When operating properly, a purplish glow will be seen in the plate area of the tube. With the reception of a signal, the color will fade or entirely disappear, according to the strength of the signal. If you receive no plate current reading on your 0-3 or 0-5 milliammeter, either the tube is burned out or there is no continuity from the batteries to the receiver. Continuity may be checked with a regular ohmmeter. If the tube is bad, it is replaced in the following manner:

Remove the black plastic sleeve from the tube, slipping it off over the end of the tube. Carefully work the wire leads of the tube from the tube contacts. On your new tube, you will note a red dot on the glass at one end of the row of wire leads. This red dot (Fig. 21) means that the wire closest to it is the plate connection. Cut the leads of the new tube to 9/16" and bend them as the leads are bent from the tube you removed. (Fig. 21) Insert the tube in the tube contacts, making sure the red dot is facing the right side of the receiver when looking at it from the bottom. Be sure the tube leads do not interfere with one another when they come through on the other side of the contacts. Slip the plastic sleeve over the tube, making sure it goes under the long clip on the receiver base. The receiver is now ready to retune. This must be done after replacing tubes and when the tube has been in use for about 1 hour. A setting of the variable constants will last for about 1 to 1½ hours or more from time of setting.

Steps in Adjusting

1. Be sure tube is properly in place and power leads are correctly connected.

2. With the 0-3 or 0-5 milliammeter in place, the no-signal plate current should read between 1.3 and 1.6 milliamperes. A reading of 1.4 milliamperes is preferred but a new tube may read as high as 1.6 or 1.65 milliamperes for a short time after installation. If the plate current is up around 2.5 or 3 milliamperes, immediately turn the variable resistor so as to lower this current.

3. Set the antenna coupling condenser to minimum capacity, as shown in Fig. 6.

4. With the above taken care of, attach the antenna.

5. The plate current should now read between 1.3 and 1.6 milliamperes.

6. Upon receipt of a signal from the transmitter, the plate current should fall to .5 milliamperes or less. If it does not, adjust the transmitter tuning control slightly until it does.

7. The sensitive relay should pull on (the armature is drawn down to the top of the horseshoe pole piece) at 1.1 milliamperes and fall out (be released from this position) when the current falls below .7 milliamperes due to an incoming signal. The relay has been set at the factory and there should be no need to touch it other than seeing it is free from dirt at the contacts and between the armature and the top of the pole piece. The gap between the armature and the pole should be .004" and the gap between the contacts on the armature and the upper contact should be .003" (Fig. 22). Gap clearances may be adjusted by bending slightly with pliers, the upper or lower contact arms. (The guarantee on Aero-Trol becomes null and void if the set is worked on or tampered with in any

manner, other than the replacement of tubes, batteries or slight relay adjustment. If for any reason you are not getting satisfactory performance from the individual units, they may be returned, post paid, to the factory for our inspection and adjustments.)

8. If more than one Aero-Trol unit is to be used at the same time, the frequency of each should differ by at least 1 megacycle. The transmitter is equipped with a variable tuning control. The receiver is of the fixed-tuned type and in order to change the frequency, the frequency tuning coil must either be squeezed together or pulled apart. The exact frequency of your Aero-Trol is given on the box label. To raise the frequency, the coil is pulled apart a slight amount. To lower the frequency, the coil is squeezed slightly. Adjust the transmitter control as you go along until the proper tuning is accomplished. For example, to change your operating frequency from the middle point of the band, 52 megacycles, to a lower frequency of say, 51 megacycles, the following procedure is followed. Squeeze the tuning coil on the receiver slightly together. Next, retune the transmitter by rotating the variable tuning control to either side until the meter in the plate circuit of the receiver indicates a dip. The antenna coupling condenser may need to be rotated a small amount until a minimum plate current dip is obtained. This will occur near the minimum capacity setting of the condenser. (Fig. 6).

As mentioned before, a radio "ham" may be of some assistance to you in getting your set in working order.

Radio control is the latest and most advanced phase of model building and Aero Spark will always remain foremost in new designs and advancements.

New items are being developed at Aero Spark, that may be added to your Aero-Trol, which will give additional control to your installations.

RECOMMENDED BATTERIES

RECEIVER — "A" Batteries

Type	Weight	Volt
1 Pencell	1/2 oz.	1½
Eveready Hearing Aid 1016E (Two cells in parallel)	1-1/8 oz.	1½
1 Size "C" cell	1½ oz.	1½
Vitamite	1 oz.	2.2

(A 16 ohm 1/2 watt resistor must be in series with one of the filament leads if a wet cell is used.)

"B" Batteries

Eveready 412-412E	1¼ oz.	22½
Eveready 420-E	2-1/3 oz.	22½
Burgess XX15E	4 ozs.	22½
Burgess XX30-XX30E	7½ ozs.	45
Eveready 455P	8¼ ozs.	45

TRANSMITTER — "A" Batteries (1½ volts)

Burgess 4F or 2F
Eveready 742
R.C.A. VS-004

"B" Batteries

Burgess XX45	67½
Ray-O-Vac (4367)	67½
Eveready (467)	67½
Burgess (Z 30)	45
Bright Star (646)	45

(All fresh batteries may be as high as 10% over their rated voltage)

FIG. 1

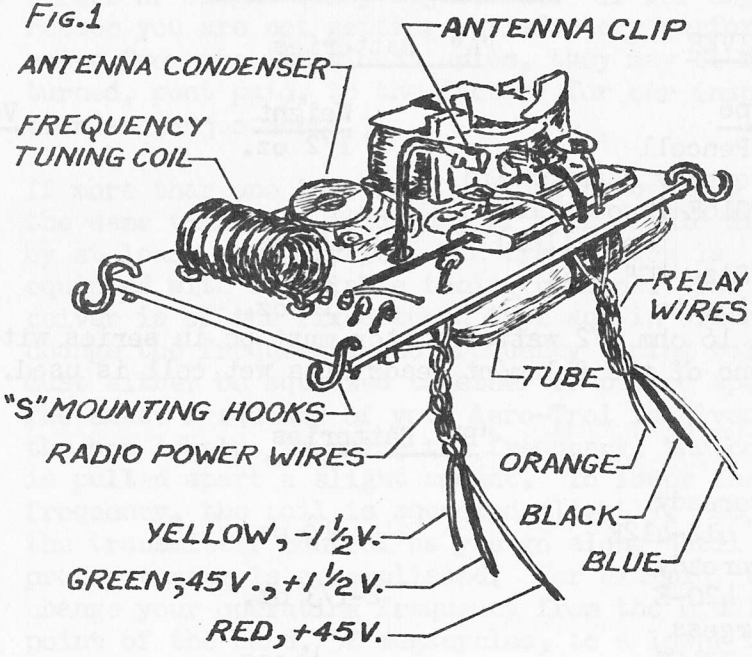


FIG. 2

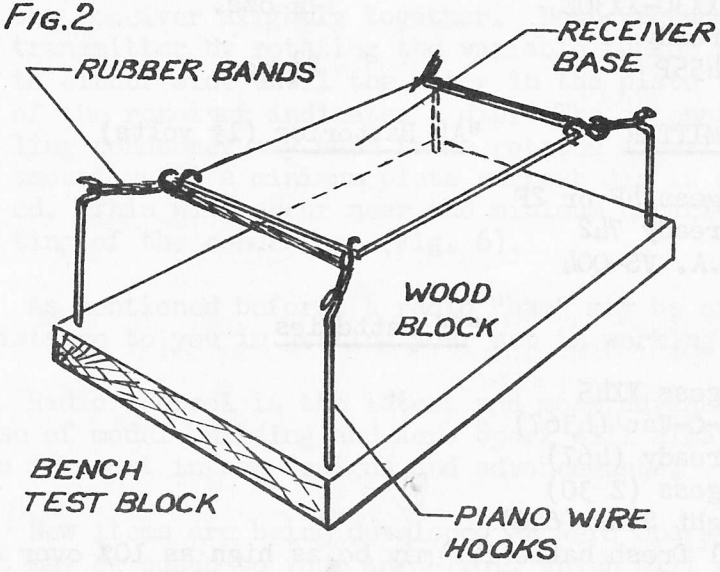
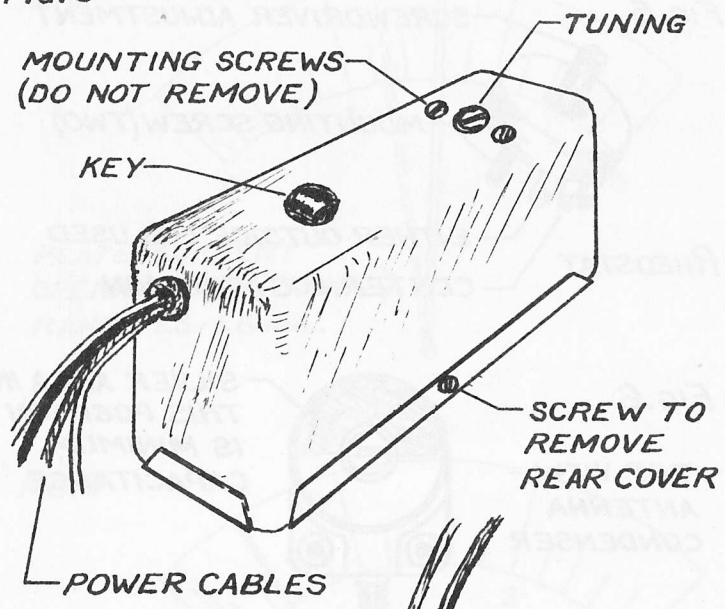
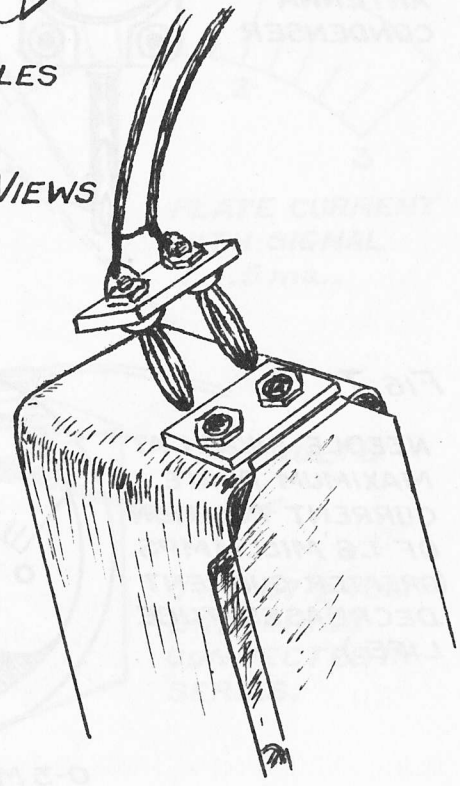


FIG. 3



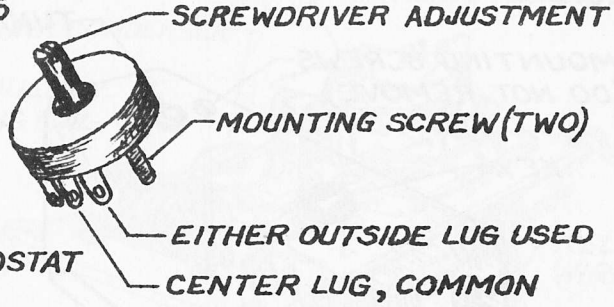
TRANSMITTER VIEWS

FIG. 4



ANTENNA PLUG-IN DETAIL

FIG. 5



RHEOSTAT

FIG. 6

TOP VIEW—
ANTENNA
CONDENSER

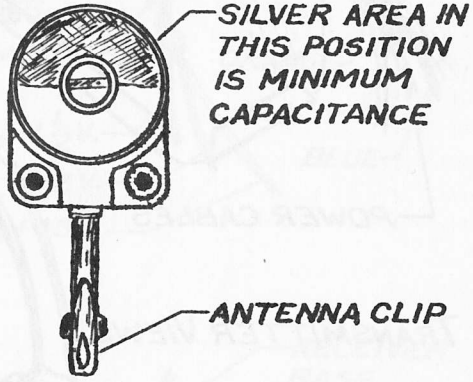
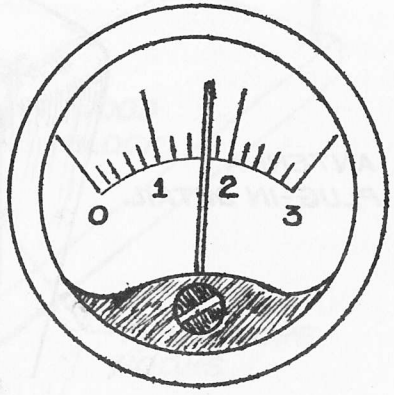


FIG. 7

NEEDLE SHOWN AT MAXIMUM PLATE CURRENT POSITION OF 1.6 MILLIAMPS. (GREATER CURRENT DECREASES TUBE LIFE.).



0-3 MILLIAMMETER

FIG. 8

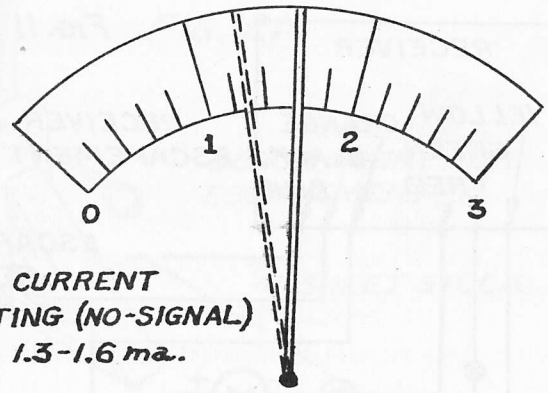


PLATE CURRENT
OPERATING (NO-SIGNAL)
RANGE 1.3-1.6 ma.

FIG. 9

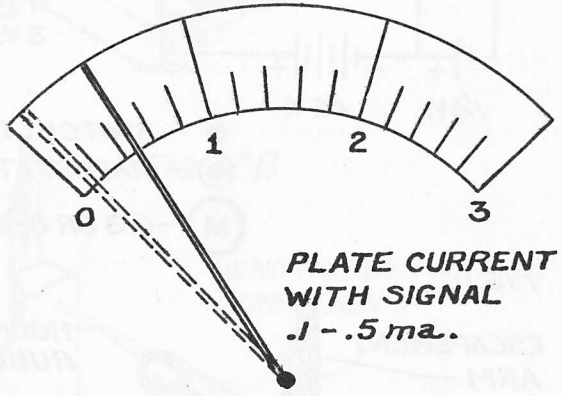
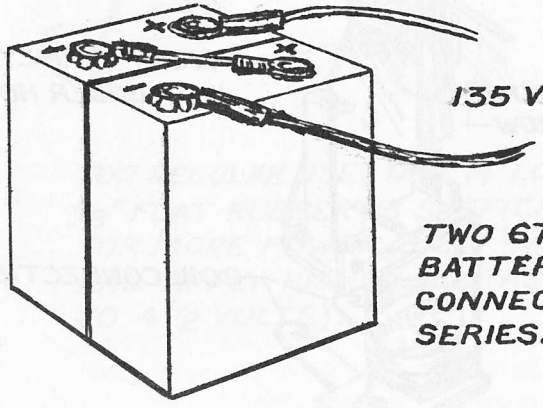


PLATE CURRENT
WITH SIGNAL
.1 - .5 ma.

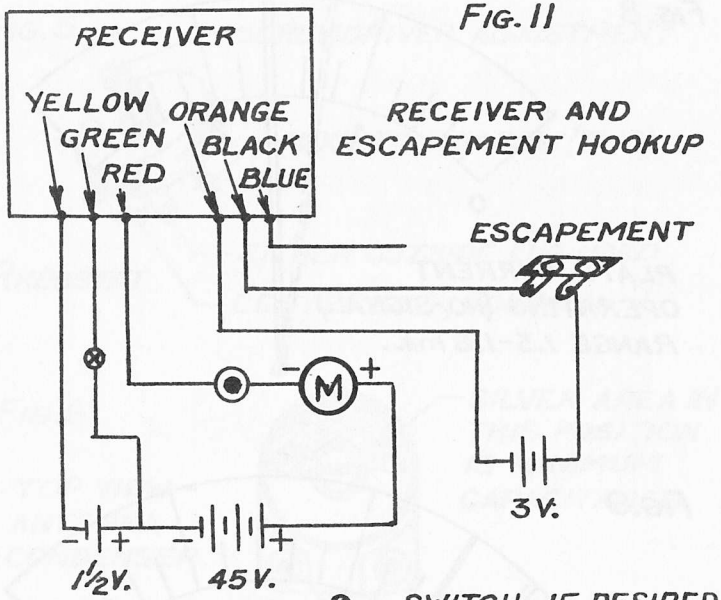
FIG. 10



135 VOLTS

TWO 67½ VOLT
BATTERIES
CONNECTED IN
SERIES.

FIG. 11



⊗ – SWITCH, IF DESIRED

◉ – RHEOSTAT

Ⓜ – 0-3 OR 0-5 ma. METER

FIG. 12

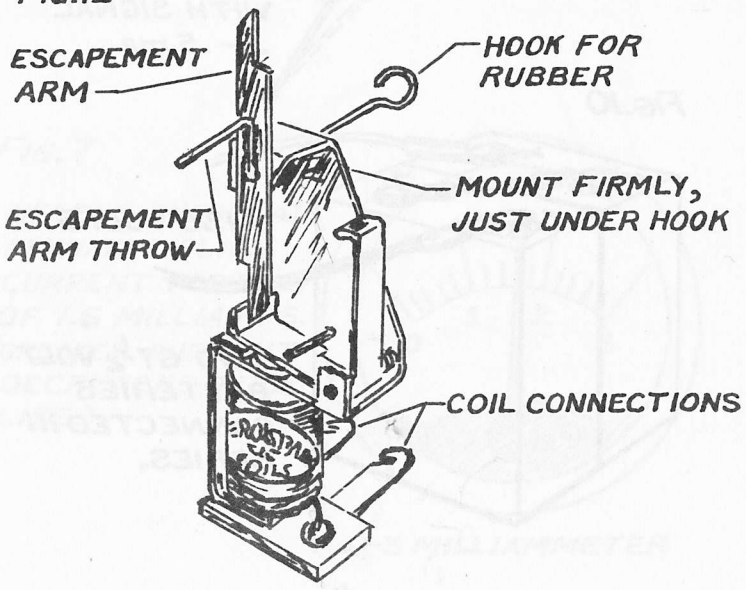


FIG. 12A

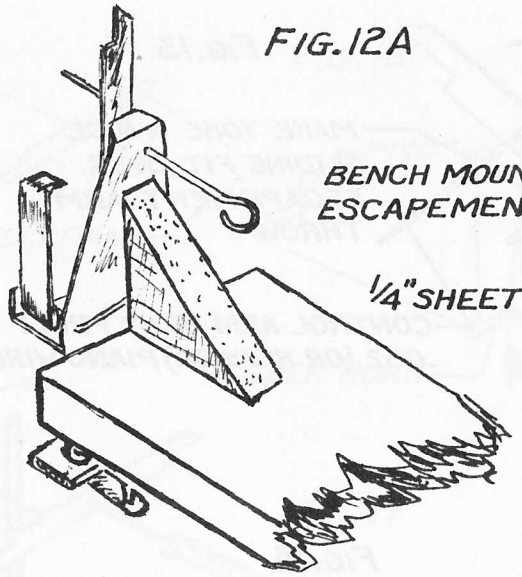
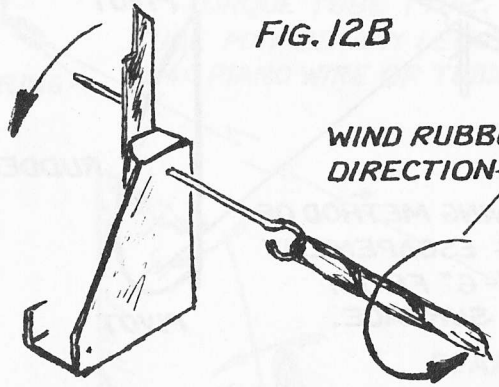
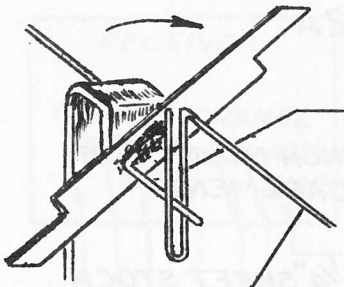


FIG. 12B



FOR REGULAR USE, ONE 14" LOOP OF ⅛" FLAT RUBBER IS SUFFICIENT. FOR MORE POWER, USE 3/16" FLAT AND APPLY HIGHER VOLTAGE (UP TO 4½ VOLTS).

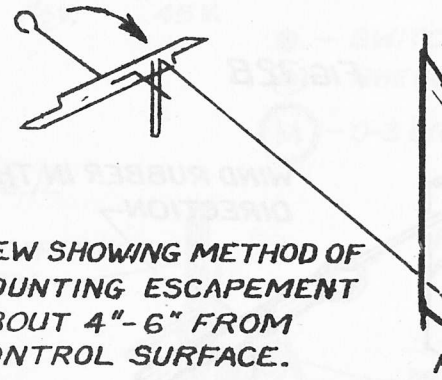
FIG. 13



MAKE YOKE A NICE SLIDING FIT OVER ESCAPEMENT ARM THROW

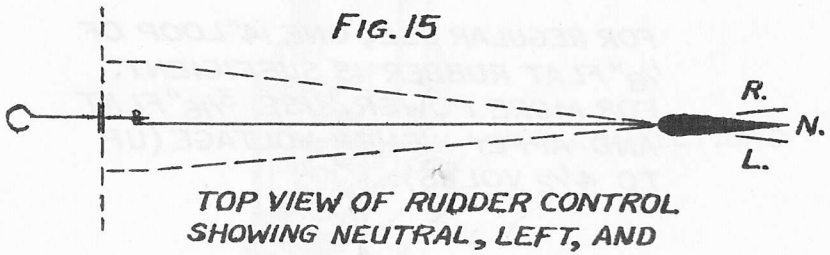
CONTROL ARM BENT FROM .032 (OR HEAVIER) PIANO WIRE

FIG. 14



VIEW SHOWING METHOD OF MOUNTING ESCAPEMENT ABOUT 4"-6" FROM CONTROL SURFACE.

FIG. 15



TOP VIEW OF RUDDER CONTROL SHOWING NEUTRAL, LEFT, AND RIGHT POSITIONS.

FIG. 16

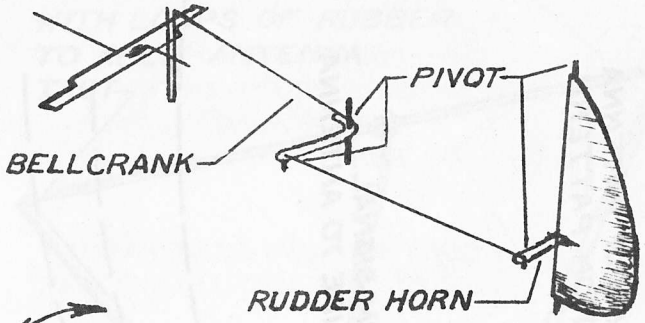


FIG. 17

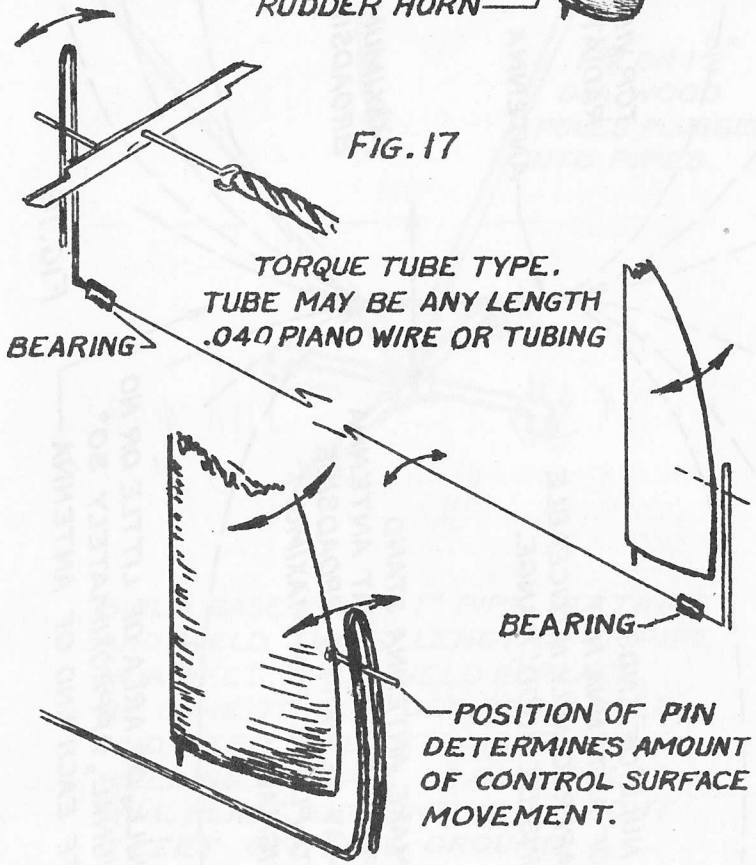


FIG. 18

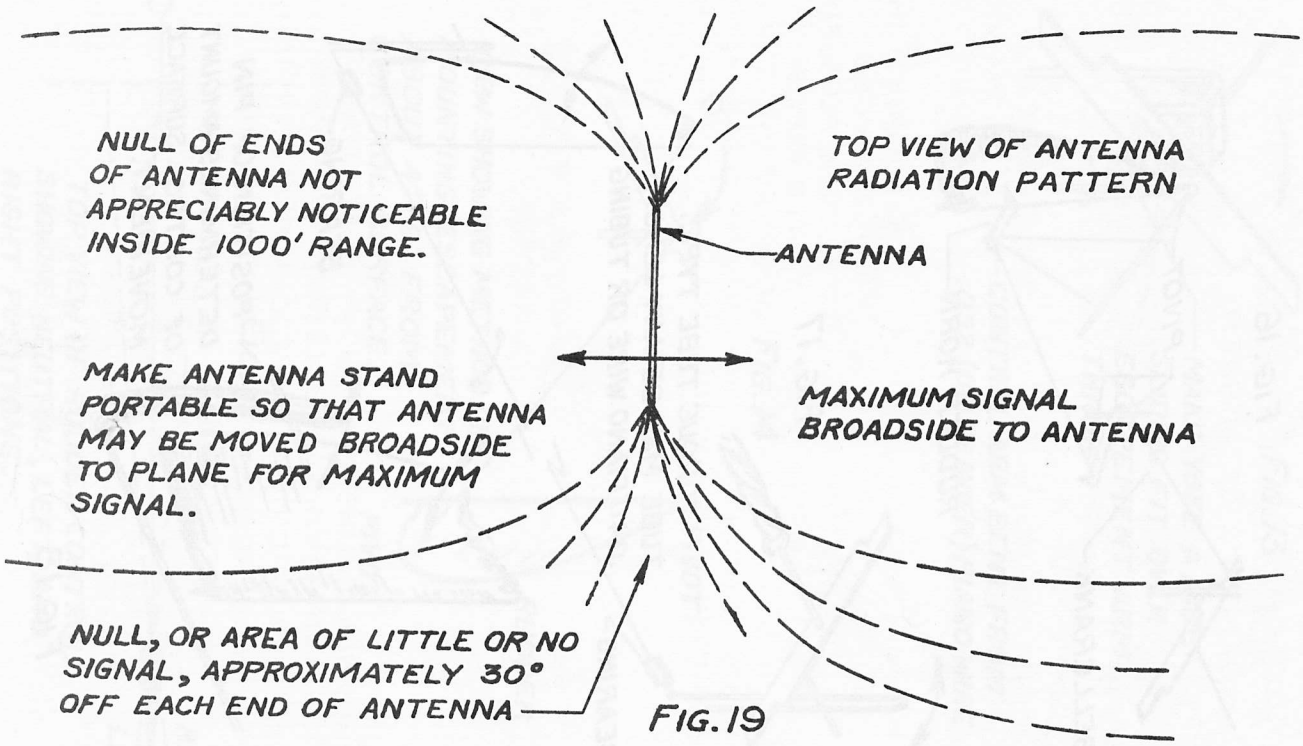
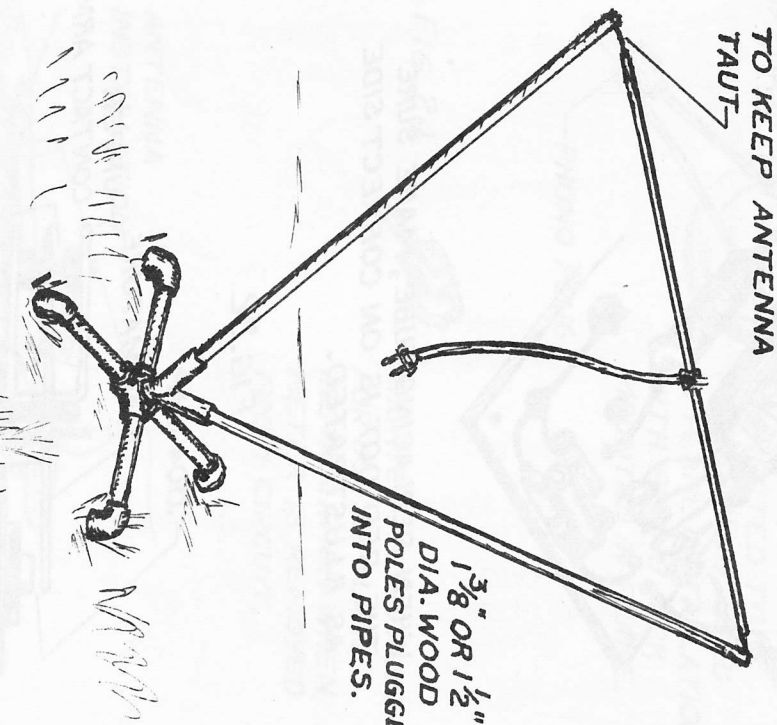


FIG. 19



BUILD BASE FROM 1" PIPE FITTINGS AND WELD TWO 6" LENGTHS OF PIPE IN A "VEE". THEN WELD IN PLACE. BE SURE TO GET DESIRED ANGLE, AND KEEP "VEE" STRAIGHT WHILE WELDING IN PLACE. 8 FOOT POLES WILL PLACE THE ANTENNA ABOUT 7 FEET OFF THE GROUND.

FIG. 20

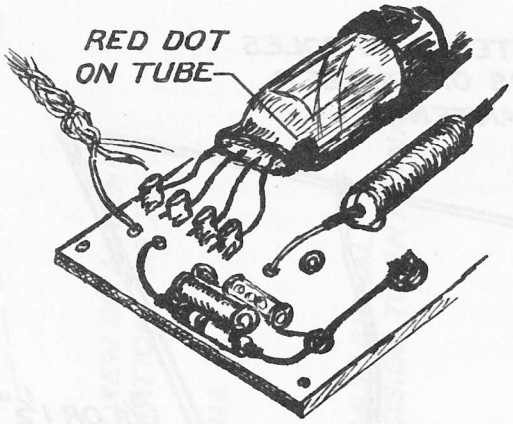
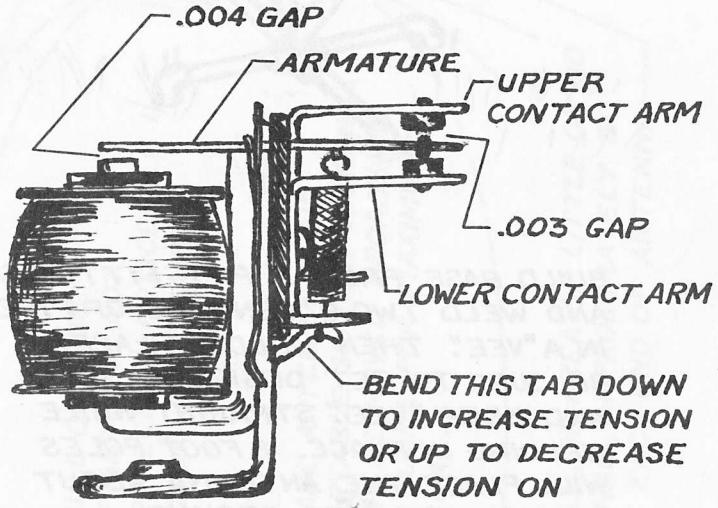


FIG.21

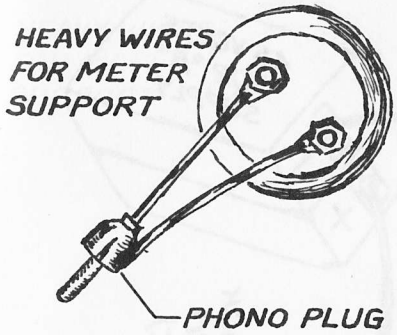
WHEN REPLACING TUBE, MAKE SURE THE RED DOT IS ON CORRECT SIDE AS ILLUSTRATED.

FIG.22



VIEW SHOWING RELAY ADJUSTMENT WITH SET DISCONNECTED.

FIG.23



VIEW SHOWING REAR OF MILLIAMMETER CONNECTED TO PHONO PLUG. USED IN PLANE INSTALLATION, WITH PHONO JACK MOUNTED IN PLANE.

FIG.24

SHORTED PHONO PLUG FOR USE IN PLANE INSTALLATION WHEN METER IS REMOVED FROM CIRCUIT.

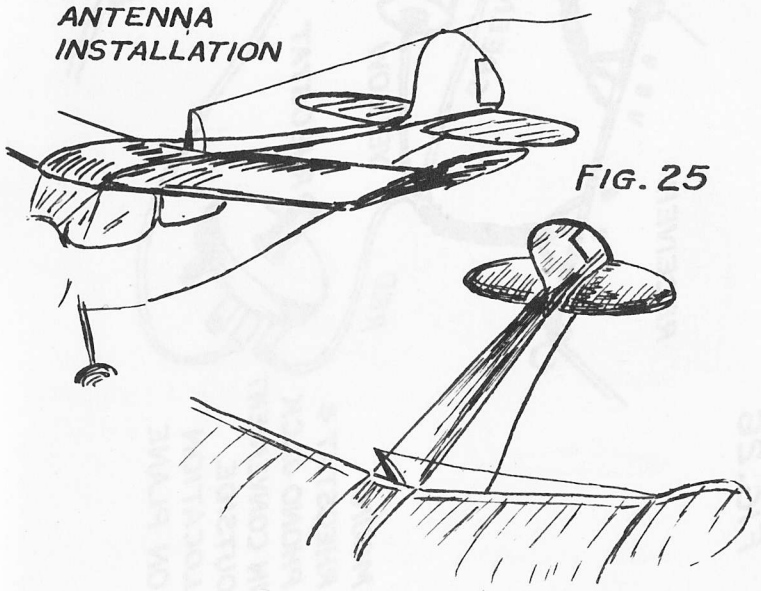
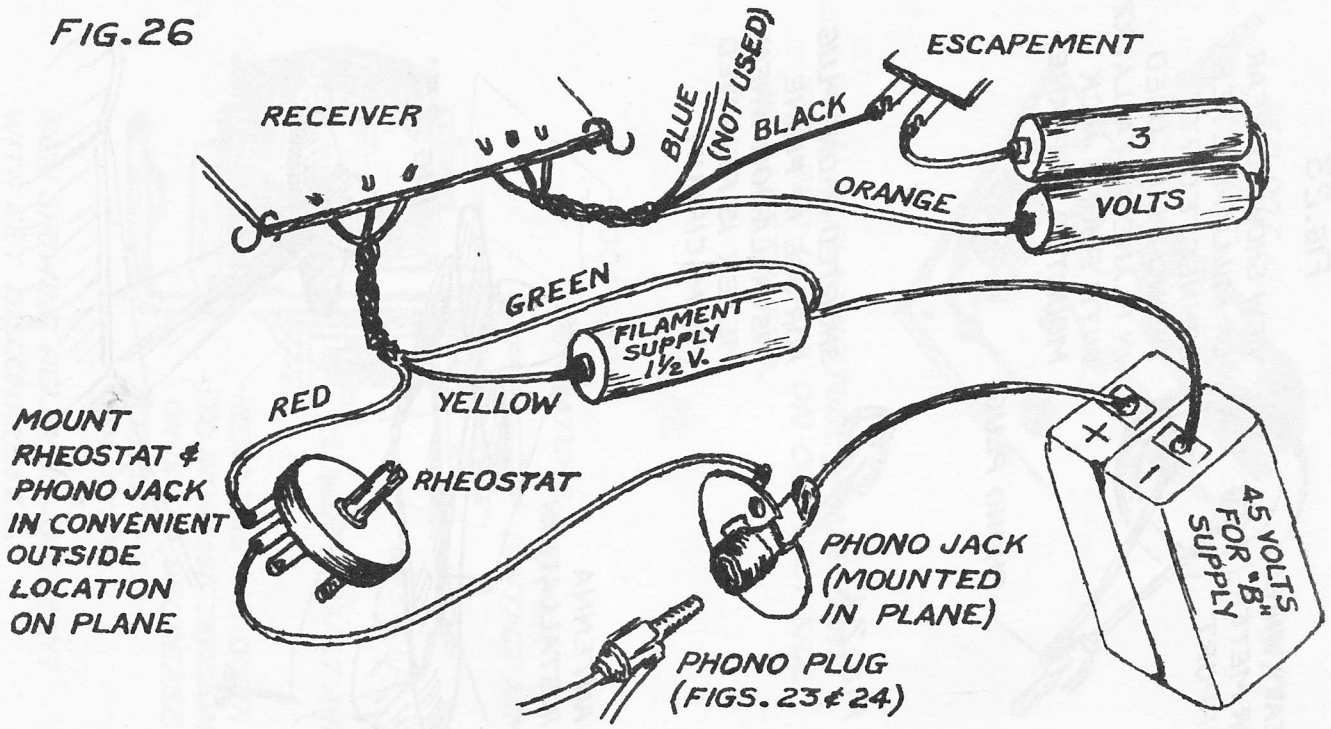


FIG. 25

FIG. 26


RECEIVER
BLUE (NOT USED)
BLACK
ESCAPEMENT
3
VOLTS
ORANGE
GREEN
FILAMENT SUPPLY 1½ V.
RED
YELLOW
MOUNT RHEOSTAT & PHONO JACK IN CONVENIENT OUTSIDE LOCATION ON PLANE
RHEOSTAT
PHONO JACK (MOUNTED IN PLANE)
PHONO PLUG (FIGS. 23 & 24)
+
-
45 VOLTS FOR "B" SUPPLY