

D-E
AEROTROL
RADIO CONTROL

**INSTRUCTION
MANUAL**

FOR

"AEROTROL" & "SUPER AEROTROL" UNITS

Price
\$1.00

Manufactured Exclusively for

BERKELEY MODELS INC.,
WEST HEMPSTEAD, NEW YORK, U. S. A.

INTRODUCTION

AEROTROL was the first "flyweight" radio-control unit and opened the field of radio control models to airplanes as small as 38" wingspan.

SUPER-AEROTROL has the first kit-built transmitter that can be operated, maintained, and adjusted without a Federal Communications Commission operator's license.

The SUPER-AEROTROL receiver employs a dust-core tuner that eliminates the frequent adjusting normally necessary in flyweight receivers.

All AEROTROL components are made by leading radio manufacturers. No war surplus or job lot parts are used. Each component is warranted by its individual manufacturer. Parts made by Berkeley Models are made with precision tools and each part is interchangeable.

It is suggested that this manual be read from cover-to-cover before operating any Aerotrol unit. Then it should be followed step-by-step when learning to operate each part of the unit.

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

BERKELEY MODELS, INC.
25 RAILROAD AVENUE EAST,
WEST HEMPSTEAD, L.I. NY.

SUPER AEROTROL may be operated without an operators license. However, a Form #555 which is included with each transmitter must be filed with the Federal Communications Commission.

Aerotrol which is not crystal controlled must be operated only with an F.C.C. Operator's License. Information on obtaining a license may be obtained by writing to the Federal Communications Commission, Washington 25, D.C., or to the American Radio Relay League Inc., 38 LaSalle Road, West Hartford 7, Conn.

This manual has been prepared by Joe Dale and Bill Effinger and is a revision and improvement on the original Aerotrol Instruction Manual. Art work and sketches by Don McGovern.

We offer our thanks to Howard McEntee of Air Trails Magazine; Bill Winter of Model Airplane News, for their suggestions as to the content of the manual.

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Operating Instructions

for the

SUPER-AEROTROL TRANSMITTER

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, amplifies it, and operates a sensitive relay; and an actuating device for the operation of the control surfaces and/or engine.

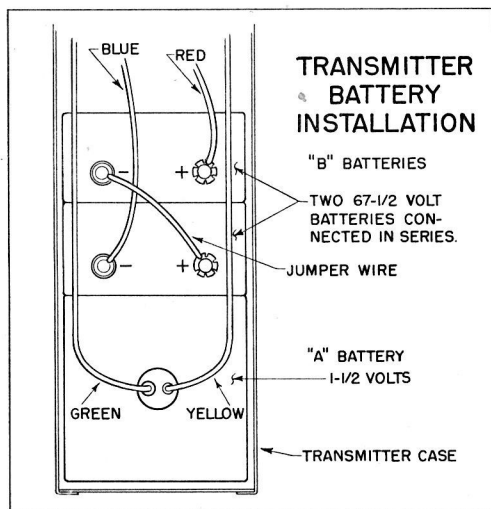
The SUPER-AEROTROL transmitter is crystal controlled and will not operate except on 27.255 megacycles (plus or minus .04%) in accordance with Federal Communications Commission rulings for the Citizen Service Band. The transmitter requires a 1-1/2 volt "A" Battery and 135-volt "B" battery supply. The 135-volts is supplied by two 67-1/2-volt batteries in series (see Recommended Batteries). The tube used is a 3A5 and the output of the transmitter is less than the maximum permitted under F.C.C. rulings. Normal range of this transmitter is about 1800 feet on ground and 1/2 to 3/4 mile in the air. This range is sufficient for all regular ground-to-air radio control model flying and for the operation of model boats and vehicles.

While no operator's license is required, the owner of a crystal controlled transmitter must apply to the F.C.C. for Class C Station Authorization.

The transmitter must be built in accordance with the separate instructions and installed in its case with the antenna attached. In other words, all the steps listed on the assembly instruction sheet are assumed to have been followed.

The following steps must be followed when placing the transmitter in operation:

1. Connect two 67-1/2-volt Batteries in series by using jumper between the "plus" on one battery and the "minus" on the other.
2. Attach the snaps from the red and blue wires to the corresponding battery connections.
3. Plug the connector from the green and yellow wires to the 1-1/2-volt "A" Battery.
4. The batteries are then inserted in the bottom of the case. (see sketch)



5. To adjust the transmitter so that it will operate on the frequency of the crystal, follow these steps:

- (a) Install temporarily a 0 to 50 milliammeter in series with the red lead.
- (b) Adjust the tuning condenser for the lowest reading on the meter. (Approximately 20 milliammeters).

NOTE: Be certain that the tank coil and the antenna coil are in relation to each other as shown on the assembly drawings.

6. Put rear cover on case using two sheet metal screws. Caution: Be sure that wooden block is properly attached to the rear cover. Otherwise batteries will short out against the case.
7. Be sure that the switch is in the "off" position while the batteries are being installed. When ready to use or test the transmitter turn switch "on".
8. No signal is sent until the "Key" button is depressed. There is no drain on the 135-volt supply except when the Key is depressed. By using the switch and key only when necessary, you will find that your batteries will last for many days of flying.

Complete instructions for the field checking of your transmitter are included in "FLYING NOTES".

Operating Instructions

for the

SUPER-AEROTROL RECEIVER

The SUPER AEROTROL receiver operates on a 1-1/2-volt battery and a 45-volt battery. (See Recommended Batteries). The receiver uses the Hyvac XFG-1, or the Raytheon RK-61 tube. The relay included with the kit has been pre-tested and is factory adjusted. No attempts to adjust the relay should be made unless it is accidentally damaged. (See Maintenance Notes).

All radio and relay connections are terminated in five color-coded wires.

In addition to the equipment supplied with SUPER AEROTROL KITS, the user will need the following:

- 1 - XFG-1 Tube (or RK-61)
- 1 - 0-3 or 0-5 Milliammeter
- 1 - 45-volt battery
- 1 - Short plastic tuning rod
- 3 - 1-1/2-volt batteries
- 2 - Toggle, Slide or Snap Switches

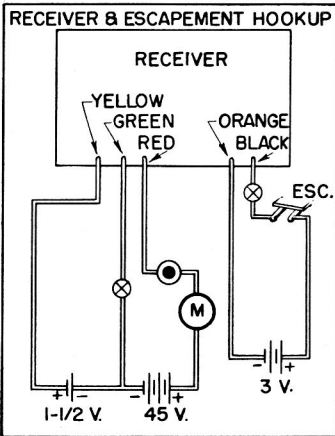
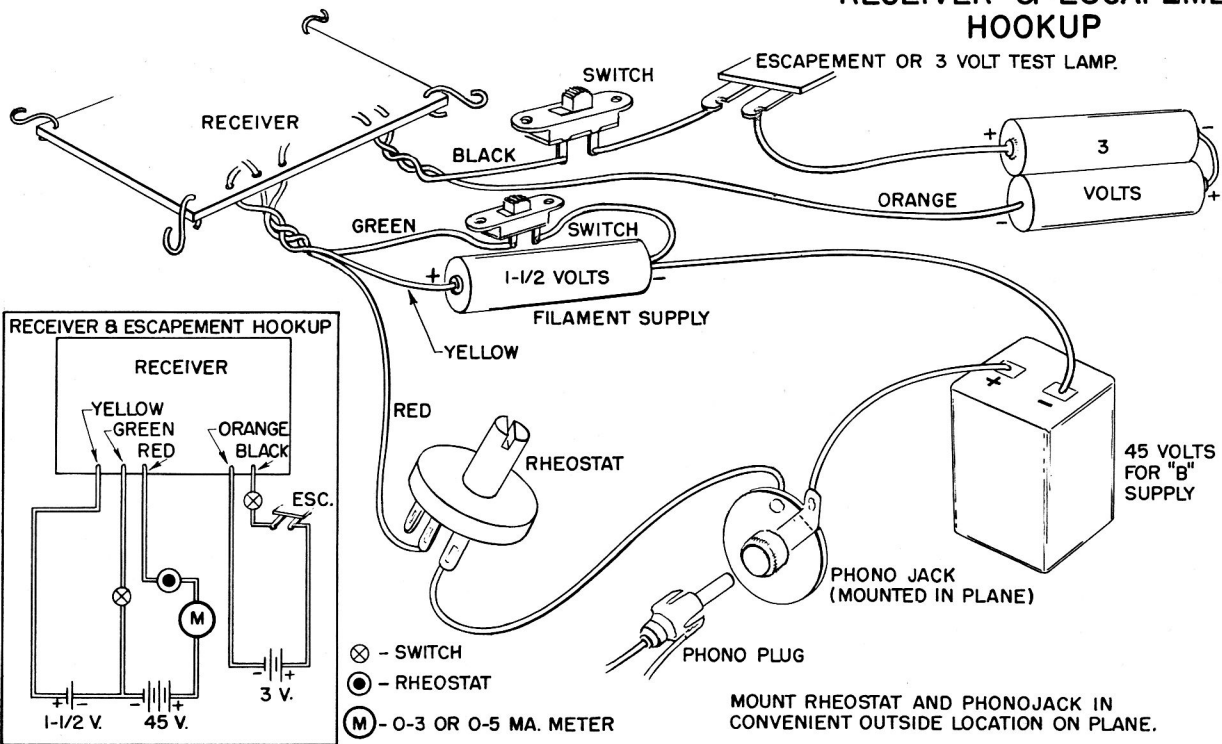
All the above items except the tube are readily obtainable at local radio supply stores and many hobby shops.

The following steps must be followed when placing the receiver in operation:

1. Insert a straight pin in each of the corner holes of the receiver base. Snip off point, making the pins about 5/8" long. With a round nose pliers, bend the pins to an "S" shape.
2. For test purposes and in order to become familiar with the unit, mount the receiver as shown in the sketch. By hooking a test lamp in the circuit, the operation of the receiver can be checked at a distance.

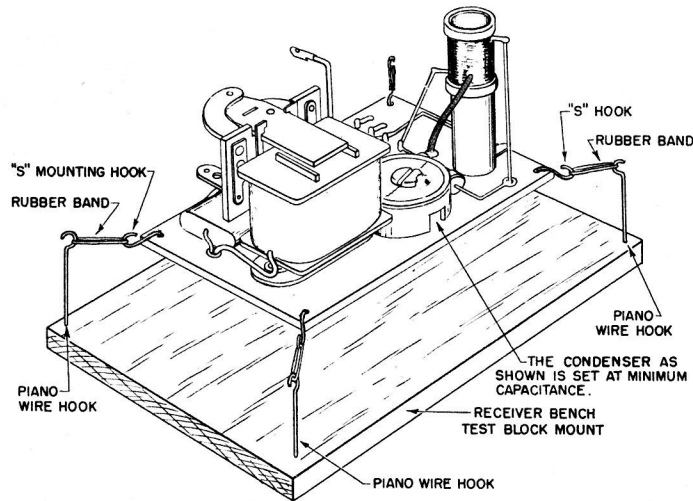
YELLOW WIRE, +1-1/2 VOLTS GREEN, -45 VOLTS, -1-1/2 VOLTS RED, +45 VOLTS

RECEIVER & ESCAPEMENT HOOKUP



MOUNT RHEOSTAT AND PHONOJACK IN CONVENIENT OUTSIDE LOCATION ON PLANE.

BENCH TEST BLOCK MOUNT



MILLIAMMETER

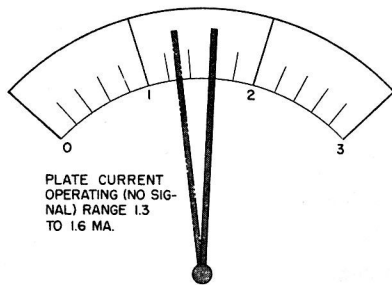


PLATE CURRENT
OPERATING (NO SIG-
NAL) RANGE 1.3
TO 1.6 MA.

VIEW SHOWING REAR OF MILLIAM-
METER CONNECTED TO PHONO PLUG.

PLUG SLIPS INTO PHONO JACK
MOUNTED IN AIRPLANE, AT
CONVENIENT LOCATION.

PHONO PLUG — USE HEAVY WIRE FOR
METER SUPPORT
IF METER READS BACKWARDS,
REVERSE LEADS TO METER.

A SHORTED PHONO PLUG IS SLIPPED
INTO PHONO JACK WHEN METER
IS REMOVED FROM CIRCUIT.

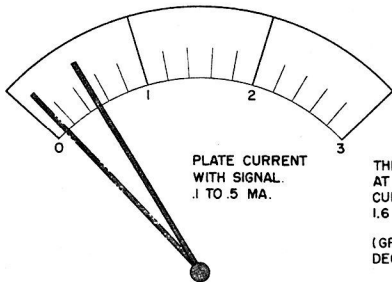
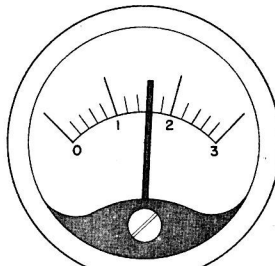


PLATE CURRENT
WITH SIGNAL
.1 TO .5 MA.

THE NEEDLE IS SHOWN
AT THE MAXIMUM PLATE
CURRENT POSITION OF
1.6 MILLIAMPS.

(GREATER CURRENT
DECREASES TUBE LIFE.)



0-3 MILLIAMMETER

3. Connect the antenna into the antenna clip. The antenna for test and flying purposes should be about 28" long of insulated copper wire. The end inserted in the antenna clip should be bared and cleaned for good contact. The antenna may be placed in any position. It is best to have it suspended by a string or thin wood strip at its free end. It need not be drawn tight.
4. For the best economy when testing, use an Eveready 455-P or a Burgess XX30 battery for the 45-volt supply and a standard size flashlight battery for the 1-1/2 volt supply. Smaller batteries can be used when flying, depending on the size of the model.
5. The color coded wires are broken down as follows:

Receiver-Battery Connections:

Yellow - 1-1/2-v. - Positive

Green - 1-1/2-v. - Negative and

Negative 45-v.

Red - 45-v. Positive

Relay Connections:

Black - To escapement or test lamp

Orange - To escapement or test lamp
power supply.

6. The small rheostat is used in the 45-volt positive lead to regulate the plate current to the proper operating value and also to make adjustments as the tube life decreases.
7. With the receiver mounted and the antenna connected, (Step 3) hook up the unit as follows:
 - (a) Connect the green wire to the negative terminal (zinc) of the 1-1/2-volt flashlight battery.
 - (b) Connect the yellow wire to the positive (plus) terminal of the 1-1/2-volt flashlight battery.

- (c) From the connection in (a) jump a wire to the negative (minus) terminal of the 45-volt battery.
- (d) Solder the red wire to the center terminal of the rheostat.
- (e) Solder a short piece of wire from the right hand terminal lug of the rheostat (viewed with adjustment slot facing you), to one connection of the phono jack.
IMPORTANT: The rheostat (also called a potentiometer) should be set with the slotted screw turned as far as possible in the counter-clockwise direction before the set is placed in operation.
- (f) Connect the phono jack to the positive terminal of the 45-volt battery.
8. The receiver is now ready for operation. By plugging in the milliammeter the set will be in operation.
9. Plug the milliammeter into the phono jack.
NOTE THE PLATE CURRENT AS SHOWN ON THE METER. Turn the rheostat in a clock wise direction to bring the plate current up to between 1.3 and 1.6 milliamperes.
IMPORTANT: The safe operating plate current of the XFG-1 or RK-61 tube should never exceed 2 milliamperes. This set was designed so that its power operating value is between 1.3 and 1.6 milliamperes. The lower the maximum plate current ("no signal" current), the longer the tube life.
- NOTE: The antenna tuning condenser should be set at minimum capacitance (with the dot 1/2 turn away from the antenna post). As the tube ages increase the setting to raise the plate current. Re-adjust the dust core tuner each time the setting of the antenna tuning condenser is changed.
10. To bring the receiver into tune with the transmitter, the dust core must be adjusted by screwing the slotted screw back and forth until maximum deflection (minimum scale reading) is

obtained. (Screw will extend approximately 1/2 inch below the base).

11. When operation at close range is satisfactory it will be necessary to recheck the operation at a distance of about 500 feet or more. Test at night with a test lamp in the escape-ment side of the relay circuit or with a suitable hand signal system from an assistant. It will be necessary to re-adjust the dust core at this distance for maximum deflection of the milliammeter (minimum scale reading). This is the tuning which will be used for actual operation. Use the lock nut on the tuning screw to lock the tuner in position.

AEROTROL 52 mc. TRANSMITTER and RECEIVER

This Aerotrol unit operates in the 6 meter band, 50-54 megacycles. The Federal Communications Commission requires that a person operating a transmitter on this frequency must either have an Amateur Radio Operator's license or work with a "ham" radio operator. It should never be operated except in the immediate presence of the licensed operator.

The general operating technique is similar to that for the 27 mc. SUPER AEROTROL unit except that the 52 mc. unit has a multiple plate condenser with a screwdriver slot shaft extending through the face of the case for frequency adjustment.

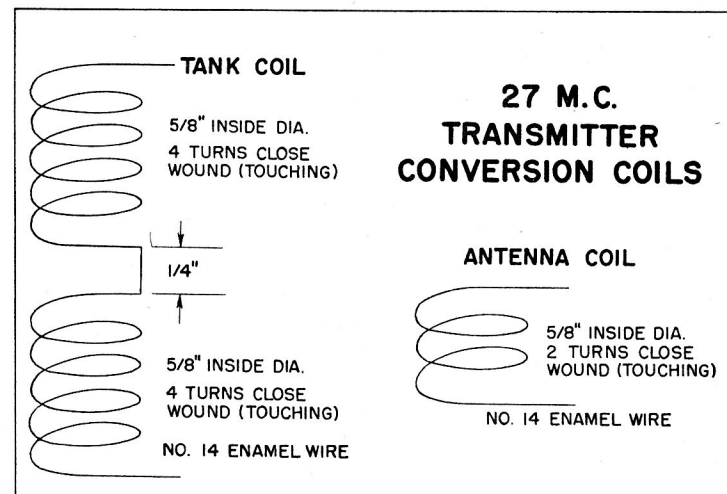
No switch is provided on this unit. All current drain is eliminated by removing the 1-1/2-volt battery plug.

The 52 mc. receiver is equipped with a tuning coil. Using the same adjustment testing technique as for the 27 mc. SUPER-AEROTROL, the receiver frequency tuning is adjusted by squeezing or expanding the tuning coil.

CONVERTING the 52 mc. AEROTROL

TRANSMITTER to 27 mc.

The 52 mc. AEROTROL TRANSMITTER can be converted to the 27 mc. band by substituting a tank coil made to specifications shown below.



The transmitter when changed in this manner cannot be operated without a license. To operate license-free, it is necessary to use the crystal controlled SUPER AEROTROL transmitter.

* * * * *

CONVERTING the 52 mc. AEROTROL

RECEIVER TO 27 mc.

This conversion permits the owners of 52 mc. AEROTROL receivers to operate the receiver on 27.255 mc. in conjunction with the SUPER-AEROTROL Transmitter.

The conversion kit is a separate unit and includes instructions for the modification. The kit retails for \$2.50.

AEROTROL ESCAPEMENT

The AEROTROL 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.

It is powered by one loop of 1/8" rubber 12 to 14 inches long and actuated by 2.2 to 4.5-volts. Do not attempt to bend any parts on the escapement. Although designed for Class 1/2A and A gas models, the Aerotrol Escapement is suitable for Class B and C models as well.

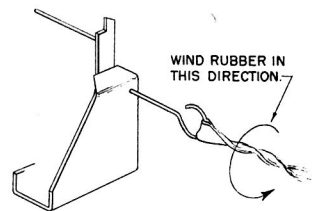
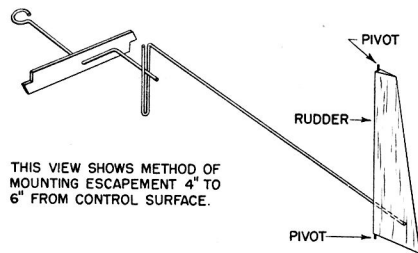
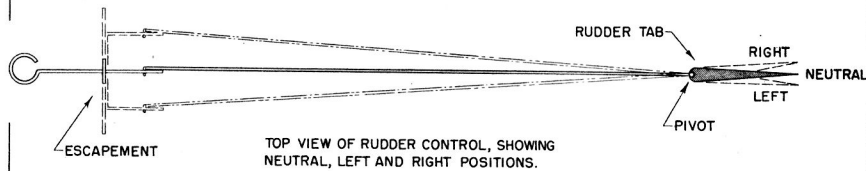
ESCAPEMENT OPERATION

1. Mount the escapement for testing as shown in the accompanying sketches.
2. Connect the escapement to a loop of 1/8" rubber and wind so as to turn the escapement arm in the direction shown.
3. The escapement, when properly assembled will work on 1-1/2-volt but 3 to 4-1/2-volts are recommended. Apply voltage only long enough to actuate the coil. Excessive current flow through the coil results in heating of the coil and lessens battery life.
4. Connect escapement as shown in the receiver hook-up sketch. A Switch in the escapement circuit is necessary.

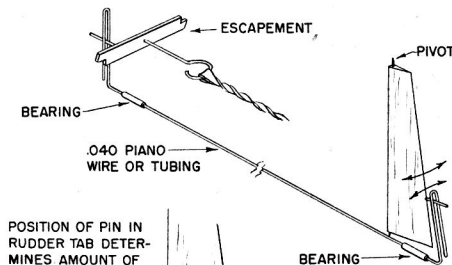
IMPORTANT: Be sure the receiver is operating before turning on the escapement switch or connecting the escapement circuit; otherwise the relay points which operate the escapement will remain closed and current will flow through the escapement continually.

5. In checking the complete unit, by pressing the transmitter key, the receiver plate current should drop from about 1.3 milliamperes down to .5 milliamperes. This change in plate current will cause the relay to open. This, in turn, closes the circuit for the escapement and operates it. Looking at the escapement arm from arm throw side, 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 until the key is released. It will then return to neutral. The cycle of operation for the arm throw will be neutral-left, neutral-right, neutral-left, etc., each time the transmitter is keyed.

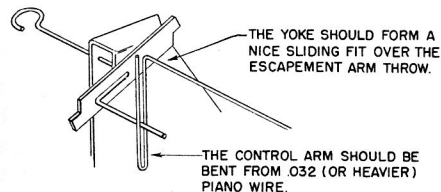
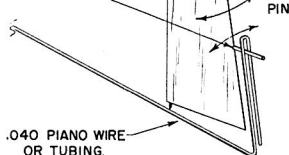
ESCAPEMENT INSTALLATION NOTES



FOR REGULAR USE, ONE 14" LOOP OF 1/8" FLAT RUBBER IS SUFFICIENT. FOR MORE POWER, USE 3/16" FLAT AND APPLY HIGHER VOLTAGE. (UP TO 4-1/2 VOLTS)



POSITION OF PIN IN RUDDER TAB DETERMINES AMOUNT OF CONTROL SURFACE MOVEMENT.



FIELD OPERATING NOTES

Only after the unit has been properly bench-tested and the operator is generally familiar with its operation, should any attempt be made to install and operate it in a model airplane or vehicle in the field.

Since the operation of radio control in boats or land vehicles is relatively simple, our manual will deal mainly with the operation of the unit in model aircraft.

Any model airplane capable of carrying a payload of 5 ounces or more in free flight is suitable for Aerotrol radio control. The major portion of the flying weight will consist of batteries. For "1/2A" Class engines and Class "A" engines up to .099 cubic inch displacement, a single pencil cell may be used for the 1-1/2-volt supply with two 22-1/2-volt hearing aid batteries in series for the 45-volt supply.

For models with engines of .19 cubic inch and larger, the 1-1/2-volt supply may be two pencil cells in parallel, one medium size flashlight cell, or one standard size flashlight cell. The 45-volt supply may consist of larger size hearing aid batteries, for longer life and economy. Hearing aid batteries are recommended because of their longer life than regular portable radio batteries. Always be sure the batteries are fresh. (Fresh 1-1/2-volt should test at 1.6 to 1.75-volts. 22-1/2-volt batteries should test at 24 to 25volts).

NOTE: Keep the wiring in your model as simple as possible.

1. Be sure that your unit operates properly on the test rig before installing it in your model. The receiver is mounted in the fuselage on rubber band, stretched between the "S" hooks on the receiver base and small hooks mounted on the fuselage sides. The fuselage should be wide enough to accommodate the

receiver and still have about 3/8 of an inch clearance on each side of the base. The tension on the rubber bands should be just enough to securely hold the receiver suspended between the fuselage hooks but still allow the receiver to "float".

NOTE: An alternate method to mount the receiver is to make a "bed" of foam rubber about 1" thick and strap the unit to it.

2. Hook up the receiver in your model in accordance with the receiver hook-up sketch. Mount the rheostat and the phono plug at a place that is readily accessible.
3. 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 rudder. If the length of the antenna (28") exceeds the length at which the wire can be conveniently mounted, mount wherever convenient and allow the free end to dangle in the wind stream. Do not make any sharp bends in antenna wire as this tends to interfere with proper reception in some positions of the airplane.
4. Install the batteries in substantial balsa boxes that are readily accessible. It is well to place the batteries forward of the receiver so they will not damage the receiver, should they break loose in a hard landing or crash.
5. Mount the escapement as shown in the accompanying sketches or as indicated on the plans of the model you are building.
6. IMPORTANT: Unless you are building a model with the control surfaces already designed, careful consideration must be given to the amount of surface area and the movement of the controls.

The following factors affect the size of rudder or elevator and the amount of its movement:

- (a) Speed of the model
- (b) General size and power of the model
- (c) Design and flying characteristics of the model.

A fast model will require less surface movement and area than a slower flying model. Heavy models will require more area than light models, a good general rule is to make the moveable surface about 15% of the fixed fin area, with a movement of about 3/16" at the trailing edge in either direction.

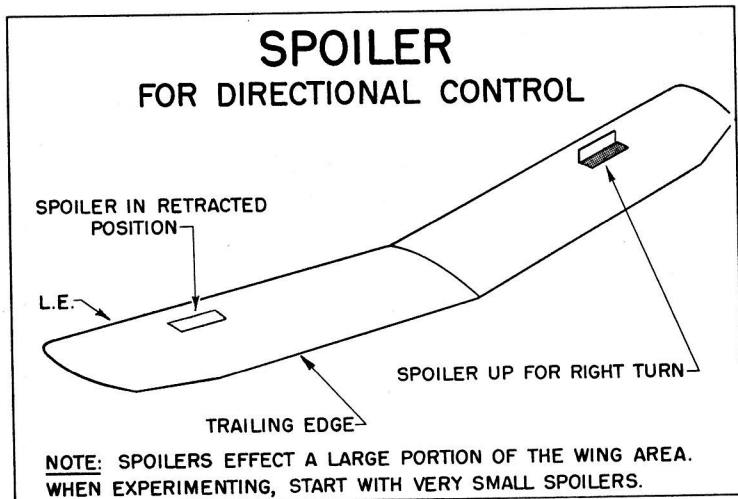
Elevator control can only be used in conjunction with another frequency transmitter to handle rudder control, or with a selector system not commercially available at the time of this writing.

Elevator controls should be very small with little or no control in the downward direction. It is a good idea to link throttle control and elevator control together. Engine speed should be reduced to idling when model is given "down" elevator.

Another method of directional control, not generally used but offering excellent possibilities for development, is aileron or spoiler control surfaces in the wing. Ailerons must be rigged similar to full size aircraft. To obtain the proper turn, the aileron must have a differential linkage to make the "up" aileron have more travel than the "down" aileron. This is necessary because the drag of the "down" aileron is greater than the drag of the "up" elevator.

A simpler method than the aileron control is to use spoilers on the wing. (See Sketch)

This spoiler when raised breaks up the life of the wing and also increases the drag, thus causing the model to turn inwardly in the direction the spoiler is lifted.



close to the ground or too soon after the take-off. It is often best to allow the model to fly by itself under power for the first flight, using the control only in the glide.

NOTE: It is always best to have the model nose heavy for the first flights. While the model will glide faster, it will be very much easier to control.

It should be remembered that, when a model is taking off or climbing steeply, the wing is close to the stalling point. As in a full scale airplane, excessive rudder control at this time will cause a tailspin!

7. Check the receiver-transmitter operation at a range of 150 to 200 feet before flying. Elevate the model a few feet above the ground when checking to eliminate ground interference. Slight adjustments may be necessary to correct tuning of the receiver at this range. Check the receiver with the milliammeter plugged into the phono jack. Change the setting of the antenna tuning condenser slightly in either direction until maximum drop is obtained when the transmitter Key is depressed.

8. When testing your radio-controlled model, make all adjustments as you would for a free flight model. Some flyers prefer to test-hop the model with the receiver removed and the controls neutral. This is only necessary with an untested design.

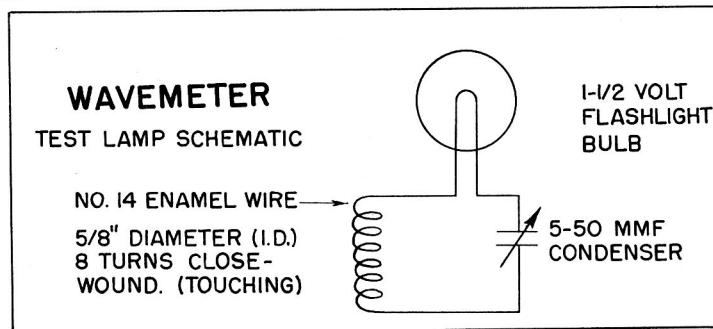
Before actually test flying the model, check the movement of the controls and double check the installation of the receiver and batteries to make sure that everything is properly secured.

9. Do not overpower your model on the first test flights. Do not try to maneuver the model too

10. Remember that the Aerotrol Escapement is self neutralizing. It will remain either to the left or right only as long as the transmitter key is depressed. When the key is released, the escapement returns to neutral. Only by actual flight practice can you become an expert radio control pilot. **THERE IS NO SUBSTITUTE FOR EXPERIENCE.**

HOW TO BUILD A WAVEMETER

In order to check the output of the transmitter, a simple wavemeter should be made. The sketch shows the schematic layout.



The following materials are necessary:

- 1 - 1-1/2-volt flashlight bulb
- 1 - 50 mmf. variable condenser
(a small plate condenser can be obtained in any radio store)
- 1 - 24" length of #14 enamel wire

Wind a coil with the enamel wire on a 5/8" diameter form, making 8 complete turns. Solder one end to the moveable plate terminal on the condenser and the other to the case of the 1-1/2 volt bulb. Then connect the other terminal of the bulb to stator terminal of the condenser.

MAINTENANCE NOTES

Aerotrol equipment is rugged. However, all parts must be treated with care. Undue usage and rough handling will not do the units any good!

The following maintenance notes covers normal adjustments and the checking of the tubes, relay, and dust core tuner:-

If any of the components have failed, it is necessary to check the values.

TRANSMITTER TUBE and BATTERY CHECK

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 1-1/2-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 screw-driver 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. 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 20 milliamperes, when the antenna is attached.

TUNING and ADJUSTING

the CRYSTAL-CONTROLLED TRANSMITTER

The 27.2 mc. transmitter being crystal controlled will only operate on frequency. It is therefore necessary to have the tuning condenser at the proper setting and the tank and antenna coil at the proper relative spacing.

With the chassis removed from the case and the 0-50 milliammeter in the plate circuit (in series with the red wire), adjust the tuning condenser to give lowest reading of plate current when the key is depressed. (Should be approximately 20 milliamperes).

Hold the wave meter with its coil on the same axis with the antenna coil and about 1" away. Hold the key on the transmitter. Then adjust the tuning condenser on the wavemeter until the light glows. It is then in resonance with the transmitter and indicates that the transmitter is operating.

Now install the transmitter in the case and solder belden braid wire to the lug on the antenna bracket. Recheck the plate current with the key depressed and be sure it reads the same as before. If it reads higher, take a short plastic tuning rod and spread apart or push together the right side turns of the tank coil until plate current returns to minimum.

TUNING and ADJUSTING

27. or 52 mc. AEROTROL TRANSMITTER

No special adjusting is needed on the 27 or 52 mc Aerotrol Transmitter that does not have crystal control. The only adjustment is the actual tuning to frequency. This is done with an insulated screw-driver and turning the screw in the plate condenser. A wavemeter should be used to check the output of the transmitter. The wavemeter for 52 mc. is described on the instruction sheet for the assembly of the DE-102K Transmitter Kit.

RECEIVER TUBE CHECK

The receiver uses an XFG-1 or RK-61 tube which is a triode thyratron. Both the XFG-1 and the RK-61 are similar electrically. The XFG-1 is a sub-miniature tube and the RK-61 is a miniature tube.

As stated before, maximum tube life will result when using a minimum no-signal plate current of as little as 1.2 or 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 rubber band from the tube, slipping it off over the end of the tube. Carefully work the wire leads of the tube from the flea 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 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. Insert the tube in the tube contacts, making sure the red dot is facing the choke. Be sure the tube leads do not interfere with one another when they come through on the other side of the contacts. Slip the rubber band 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 will last for about 1 to 1½ hours.

TUNING and ADJUSTING THE RECEIVER

1. Be sure tube is properly in place and power leads are correctly connected.
2. With the 0-3 or 0-5 milliammeter in the phono jack, 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 above 2.5 milliamperes, immediately turn the variable resistor so as to lower this current.
3. Set the antenna tuning condenser to minimum capacity. (See receiver test set-up diagram).
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 dust core tuner control slightly
7. The sensitive relay should pull on (the armature is drawn down to the top of the horse-shoe 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 the relay becomes null and void if the set is worked on or tampered with in any manner.

RECOMMENDED BATTERIES

<u>RECEIVER</u>	<u>"A" Batteries</u>	
Type	Weight	Volt
I Pencil	1/2 oz.	1 1/2
Eveready Hearing Aid 1016E (Two cells in parallel)	1-1/8 oz.	1 1/2
1 Size "C" Cell	1 1/2 oz.	1 1/2
	<u>"B" Batteries</u>	
Eveready 412-412E	1 1/4 oz.	22 1/2
Eveready 420-E	2-1/3 oz.	22 1/2
Burgess XX15E	4 oz.	22 1/2
Burgess XX30-XX30E	7 1/2 oz.	45
Eveready 455P	8 1/4 oz.	45
<u>TRANSMITTER</u>	<u>"A" Batteries (1 1/2-volts)</u>	
Burgess 4F		
Eveready 742		
R.C.A. VS-004		
	<u>"B" Batteries</u>	
Burgess XX45		67 1/2
Ray-O-Vac (4367)		67 1/2
Eveready (467)		67 1/2
(All fresh batteries may be as high as 10% over their rated voltage)		

RECOMMENDED MODELS

BERKELEY AIRPLANE KITS

<u>Name</u>	<u>Span</u>	<u>Engine Size</u> ,	<u>Price</u>
Custom Cavalier Twin	108"	2-.45to.65	\$20.00
Custom Cavalier "108"	108"	.60-1.20	17.50
Super Buccaneer	90"	.60-1.20	10.95
Buccaneer C Special	72"	.45 to .65	7.95
Skybuggy	42"	.45 to .65	4.95
Super Brigadier	58"	.19 to .36	4.95
Buccaneer B Special	56"	.19 to .36	3.95
Bootstraps "A-RC"	56"	.065to.099	3.95
Bootstraps "1/2A"	40"	.035to.049	2.50
Brigadier "RC-38"	38"	.035to.065	1.95

OTHER RECOMMENDED AIRPLANES

<u>Name</u>	<u>Source</u>	<u>Price</u>
Windy Joe (Plans only)	Model AirplaneNews 551 - 5th Avenue New York N Y	\$.50
"Mac's Robot" Plan#R-101	Air Trails Magazine 575 Madison Avenue New York N Y	.35
"Live Wire" Kit	DeBolt Engineering	6.95
"R-C Master" Kit	Jasco	9.95

