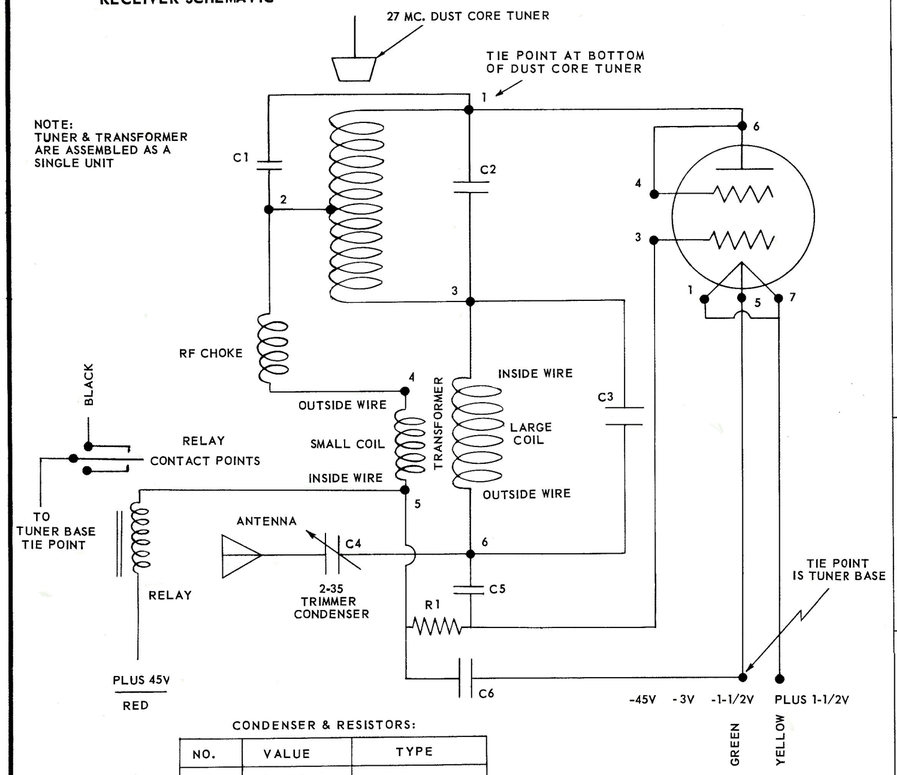
RECEIVER SCHEMATIC

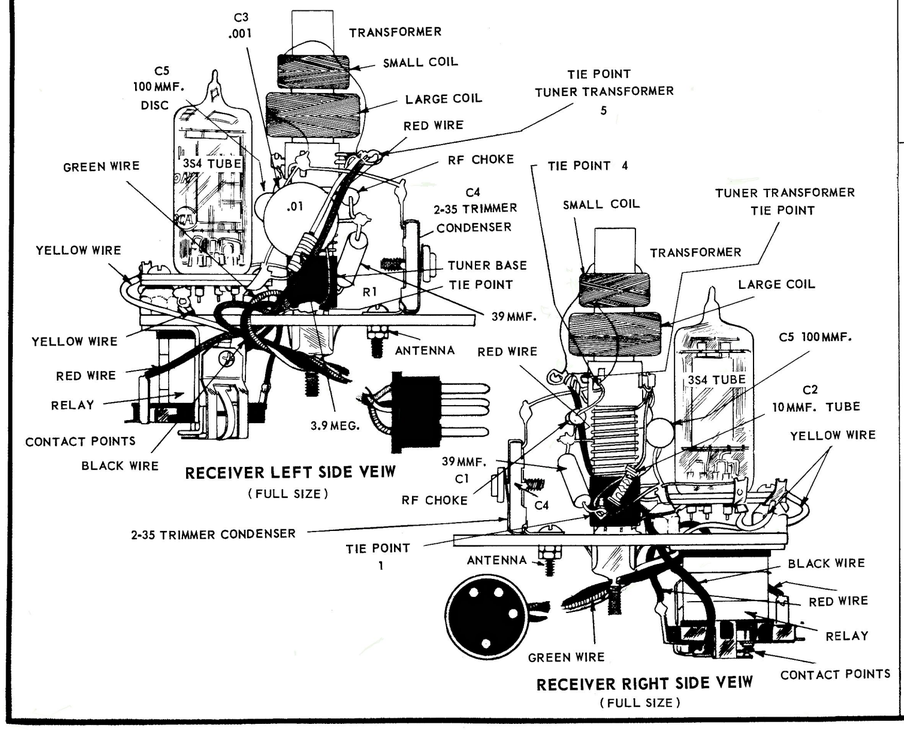


CONDENSER & RESISTORS:

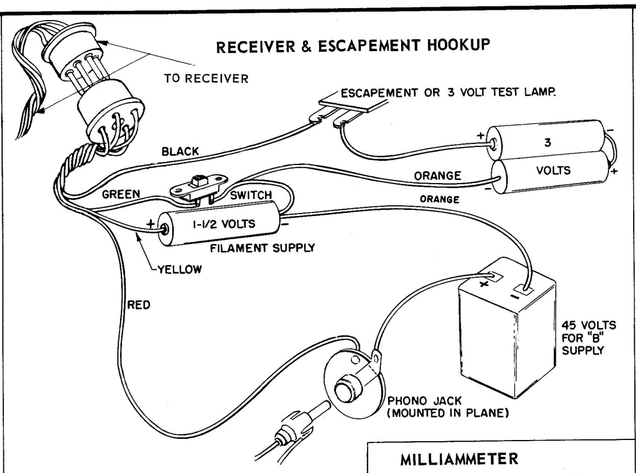
NO.	VALUE	TYPE
R1	3.9 MEG	
C1	39 MMF.	TUBE
C2	10MMF.	TUBE
C3	.001	DISC
C4	2-35 MMF.	TRIMMER
C5	100 MMF.	DISC
C6	.01	DISC

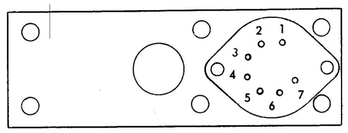
TIE POINTS NO.3,4,5,& 6 ARE BETWEEN TUNER AND COIL NO. 1 IS AT BOTTOM

RECEIVER – LEFT & RIGHT SIDE VEIW



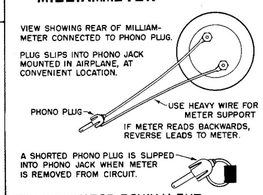
RECEIVER & ESCAPEMENT HOOKUP





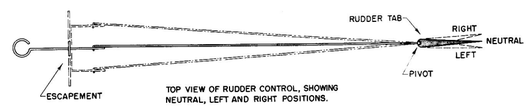
TUBE SOCKET NUMBERING TOP VEIW

MILLIAMMETER

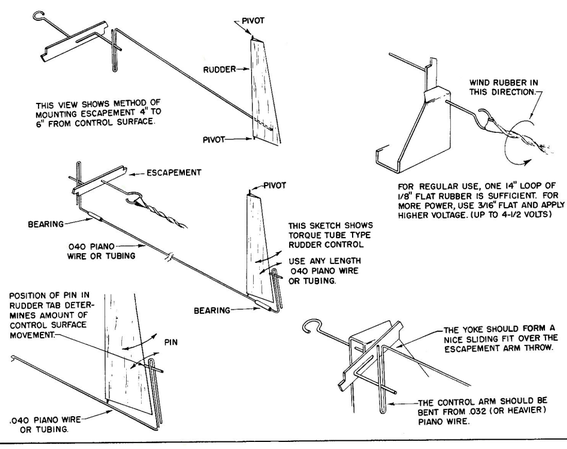


USE A RESISTOR EQUIVALENT TO METER TO MAINTAIN SAME VOLTAGE AT RECEIVER

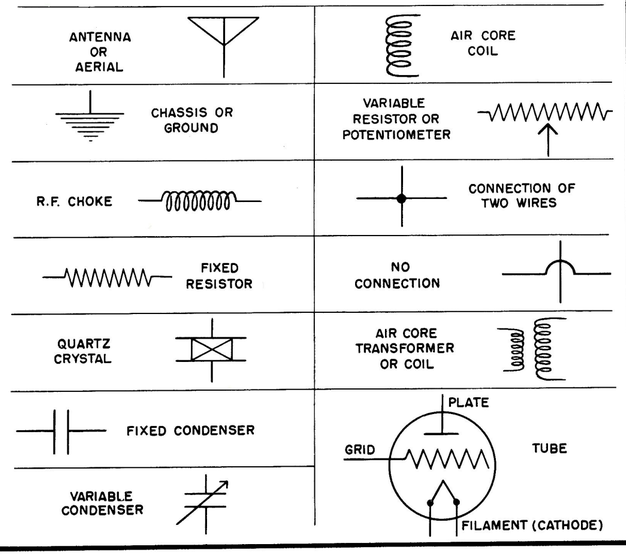
ESCAPEMENT INSTALLATION NOTES



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



SYMBOLS USED IN RADIO CIRCUTS



STEP-BY-STEP ASSEMBLY INSTRUCTIONS:

Check off each step as it is completed.

MARK IV AEROTROL RECEIVER IS SUPLLIED WITH ALL MAJOR COMPONENTS PRE-WIRED. IT IS ONLY NECESSARY TO SOLDER THESE COMPONENTS TOGETHER & TEST THE UNIT.

The following receiver components are supplied in the kit:

a - BASE WITH TRIMMER CONDENSOR ATTACHED
b - TUNER-TRANSFORMER WITH RESISTOR, CONDENSERS AND R.F. CHOKE ATTACHED
c - TUBE SOCKET WITH PRE-BENT PIN LUGS
d - RELAY
e - 3S4 TUBE
f - HARDWARE ENVELOPE CONSISTING OF:
1 - Four prong battery plug
2 - Four hole battery socket
3 - Five different colored wires X 10"
4 - Brown antenna wire x 24"
5 - 2 - Machine screws for attaching tube socket and relay
6 - Six spacer washers for tube socket
7 - Tinned copper wire - 5" long

1 - Attach tube socket and relay to the base with the two machine screws. Put the two screws thru the top of the tube socket, slide three spacer washers over each screw. Then put the screws thru the two holes in the base.
MAKE SURE THE TUBE SOCKET IS IN THE CORRECT POSITION. SEE SPECIAL DRAWING SHOWING NUMBERING OF HOLES.
2 - Screw the relay to the bottom of the base. It is pre-tapped for the screws.
3 - Insert the tuner-transformer into the large hole with the R.F. choke facing towards the trimmer condenser.
4 - At the bottom lug (tie-point no. 1) solder a 2" piece of copper wire to the tie point and thread it thru lugs no. 4 and no. 6 on the tube socket.
5 - Solder a 1-1/2" piece of copper wire from the socket lug no.5 to the base metal stamping on the tuner. (The .01 Disc condenser is already soldered to it.)
6 - Wire disc condenser (C-5) and resistor R-1 thru prong no. 3 on the tube socket and solder.
NOTE: Prong no. 2 has been removed and is not used.
7 - Solder a 1-1/2" piece of copper wire from the lug on the top of the trimmer condenser to the tie-point no. 6 at the top of the tuner. (This is the tie-point at which the .001 disc and the 100 mmf disc are connected.)
8 - Solder a 3" lenght of red insulated wire from the tuner-transformer tie-point no. 5 to the nearest coil lug on the relay. Then solder the balance of the red wire to the other coil lug. (Be sure to solder these wires to the relay coil lugs, - not to the contact point lugs.)
9 - Solder a 1" lenght of yellow insulated wire between tube socket lugs no. 7 and 1 , then solder a 6" lenght of the same wire to no. 7 tube socket lug.
10 - Solder a 6" length of green insulated wire to the stamped metal base of the tuner-transformer.
11 - Solder a 3" length of copper wire to the same stamped metal base of the tuner and connect it to the lug near the base of the relay.
12 - Solder a 6" length of black insulated wire to the OUTSIDE (copper colered) contact point of the relay. (This is the normally closed point) Make no connection to the other relay contact.
13 - Solder the four insulated wires into the holes of the four prong plug. Using the following numbering:
No. 1 - GREEN - COMMON NEGATIVE -45v; -3v; -1-1/2v.
No. 2 - YELLOW - POSITIVE (+1-1/2v)
No. 3 - RED - POSITIVE (+45v)
No. 4 - BLACK - POSITIVE ESCAPEMENT +3v
Twist wires together or braid for neatness
14 - Install the 3S4 tube in the socket. The unit is now ready for operation.
15 - See sketch for wiring of batteries and escapement in the unit to be operated. A socket to fit the plug is supplied and it includes contacts that are supplied separately. Contact is attached to the wire and pushed into cavity. Contact automatically locks into place.
NOTE: The stamped metal base of the tuner-transformer is used as a common solder point for minus (-) connections. This does not show in the schematic.

RECOMMENDED BATTERIES

RECEIVER	"A" Batteries	
Type	Weight	Volt
1 Pencell Eveready Hear. Aid 1016E (two cells in parallel)	1/2 oz.	1-1/2
	1-1/8 oz.	1-1/2
1 Size "C" Cell	1-1/2 oz.	1-1/2
	"B" Batteries	
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

TRANSMITTER	"A" Batteries (1-1/2 volts)
Burgess 4F	
Eveready 742	
R.C.A. VS-004	
	"B" Batteries
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)

SOLDERING:

The most important thing in good soldering is to heat the joint and allow the solder to flow into it. The solder should melt from contact with the joint rather than with the iron. NEVER USE PASTES OR ACIDS IN RADIO WORK.
Use only rosin core solder. Never depend on the solder to hold a joint. Always make a firm connection with the wire before applying solder. To tin a soldering iron (soldering cannot be done with the bare copper) file the suface lightly while the iron is not and then quickly apply a generous amount of rosin core solder while the filed surface is still bright. Wipe off excess solder with a cloth. Tin all four sides of the tip in this manner.
The terminals must be clean, and preferably tinned. On some terminals that are hard to solder to (nickel plated f.i.) it is best to pre-tin the surface before installation or connection. Clean (scrape or sandpaper) the surface, heat with iron and apply rosin core solder liberally. Wipe off or shake off excess solder.

INSTALLATION & SERVICE

The receiver unit can be easily tested after direct installation in the unit for which it is intended. Since operation of radio control in boats and land vehicles is relatively simple, our instructions will deal mainly with operation in model aircraft.

For more complete information on radio control, we recommend that the user read "Radio-Control", published by Berkeley Models, and available for $1.00 from your hobby shop or by mail.

Any model airplane capable of carrying a five ounce or more payload is suitable for Mark IV "Aerotrol". The major portion of the flying weight will consist of batteries. Small models, up to 54" wingspan must be kept as light as possible by using a single pencell battery for 1½ volt supply, and two 22½ volt hearing aid batteries in series for the 45 volt supply. Larger models can use larger batteries. They cost about the same as the small batteries, but have a life in proportion to their increased weight. Always be sure to use tested fresh batteries.

1 - HORIZONTAL MOUNTING: The receiver can be mounted in the fuselage on rubber bands, streched between "S" hooks on the receiver base and small hooks mounted on the fuselage sides. The fuselage must be at least 2" wide on the inside to give clearance on either 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.

The receiver can be mounted with either side up, depending on your own convenience in tuning the dust-core and the antenna trimmer.

VERTICAL MOUNTING: As an alternate, the receiver can be mounted on its side. A slotted frame is made out of balsa with a groove 1/4" sq. around three sides with one side open to slide the chassis in. Fill the groove with 1/4" sq. foam or sponge rubber so that the chassis will slide into the frame snugly and still not touch the frame. Cement the frame into the model.
2 - Hook up the receiver in the model in accordance with the receiver hook-up sketch.
3 - String the antenna back through the fuselage or bring it out the rear of the cabin and stretch it back to the rudder. The antenna should have a length of 24" - (use the brown wire). If the length of the antenna exheeds the length at which the wire can be conveniently mounted, mount the wire where it is convenient and allow the free end to dangle in the windstream. Do not make any sharp bends in the antenna wire as this tends to interfere with proper reception in some positions when the airplane is flying.
4 - Install the batteries in substantial balsa boxes that are readily accessible. It is well to always place the batteries forward of the receiver so they will not damage it in the event of a hard landing or a crash.
5 - Mount the escapement as shown in the accompanying sketches or as indicated on the plans of the model you are building.
6 - Additional control can be obtained by using a COMPOUND ESCAPEMENT (Part No. DE-305 - retail price - $5.95) Instructions for use of the compound escapement are included with the unit.
7 - Follow the test instructions before trying to operate the model.

TEST (AFTER ASSEMBLY AND INSTALLATION)
1 - Keep the radio controlled unit clear of the ground during check-out by placing it on a wooden or cardboard carton.
2 - In order to test out the receiver it is necessary to put a 0-3 or 0-5 milliammeter into the circuit between the B plus connection of the battery (red wire) and the receiver. This is most easily done by installing a phono-jack in the side of the plane. (See sketch)
3 - Adjust the antenna trimmer condenser screw tight (do not force it) and then back off the screw 3/4 turn. Set the tuner-transformer core screw about 10 turns out.
4 - For testing the receiver, adjust the transmitter as follows: Remove the antenna; reduce the "B" battery voltage to 67½ volts by using only one battery. This reduces the transmitter power considerably and makes the receiver tuning easier
NOTE CAREFULLY: It is necessary to reduce the transmitter voltage when not using the antenna to prevent the crystal from cracking due to over – excitation.
5 - Turn on both the transmitter and receiver. Milliammeter should read about 2.5 ma. with the transmitter off. (If the meter reads in the wrong direction, reverse the connections to it)
6 - Adjust tuner-transformer core screw back and forth until you get the lowest meter reading. Then key the transmitter to see if the receiver is operating on the transmitters frequency signals, by watching for a dip in the meter reading on signal. If no dip is noted, re-adjust core screw until the meter reading dips when the transmitter is keyed.
7 - Walk away from the receiver to the point where the meter dips only slightly when the transmitter is keyed. Then re-tune the receiver core screw to get maximum dip.
8 - Turn screw in antenna tuning condenser NOT over a 1/4 turn in each direction until the meter gets maximum dip. Then try to get meter to dip still further by re-tuning the core screw.
9 - Keep repeating steps 7 and 8 until no lower reading can be obtained with the signal on. When properly adjusted, the meter will read approximately 2.5 ma. with no signal and less than 1.0 ma. with a strong signal, using full transmitter voltage and with transmitter antenna in place.
10 - As a final pre-flight check, re-connect the 135 volt "B" battery and attach the antenna. Carry the transmitter a good distance away, keying it at regular intervals to see if the relay is operating. It is best to have an assistant who can watch the rudder operate and call back to you.
11 - Ground testing for range will show you approximately half the distance it will be safe to fly the model away from you in the air. While the plane is at long range on the ground check. check the signal reception while holding the transmitter with the antenna in different positions relative to the model. Have someone give you the meter readings as you move the transmitter around. Remember the weak and strong positions when flying. Usually, holding the antenna broadside to the plane will give the best results.

FLYING: Try to have an experienced R.C. model flyer on hand for your first flights. His experience will be invaluable.
Read up on flying in "RADIO CONTROL".
Before actually test flying the model, check and re-check the movement of the controls and also the installation of the receiver and batteries to make sure that everything is properly secured.

A FEW WORDS OF WARNING ON THE FIRST FLIGHT
1 - Chose a big enough field and a calm day
2 - Make sure nobody else is operating on the same frequency.
3 - Do not overpower the model on the first flight.
4 - Do not maneuver the model to close to the ground or too soon after take-off. (It is often best to let the model fly itself under power on the first flight, using the radio only on the glide.)
5 - It is best to have the model Nose heavy for the first flights. It will be much easier to control.
6 - Remember that the AEROTROL ESCAPEMENT is self-neutralizing. It remains left or right only when signal is on. However if the receiver should malfunction, the escapement will go into permanent left or right and prevent the model from flying away.

RELAY ADJUSTMENT The relay is supplied with the points to operate well within the limits of norinal signal change. By reducing the spring tension the range can be reduced. The rear of the spring can be twisted LIGHTLY with a needle-nose pliers to change the point adjustment.

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

DUST CORE TUNED
MARK IV AEROTROL RADIO CONTROL
FOR OPERATION ON THE 27.255 MC. BAND NO OPERATORS LICENSE REQUIRED.

RECEIVER ASSEMBLY DRAWINGS