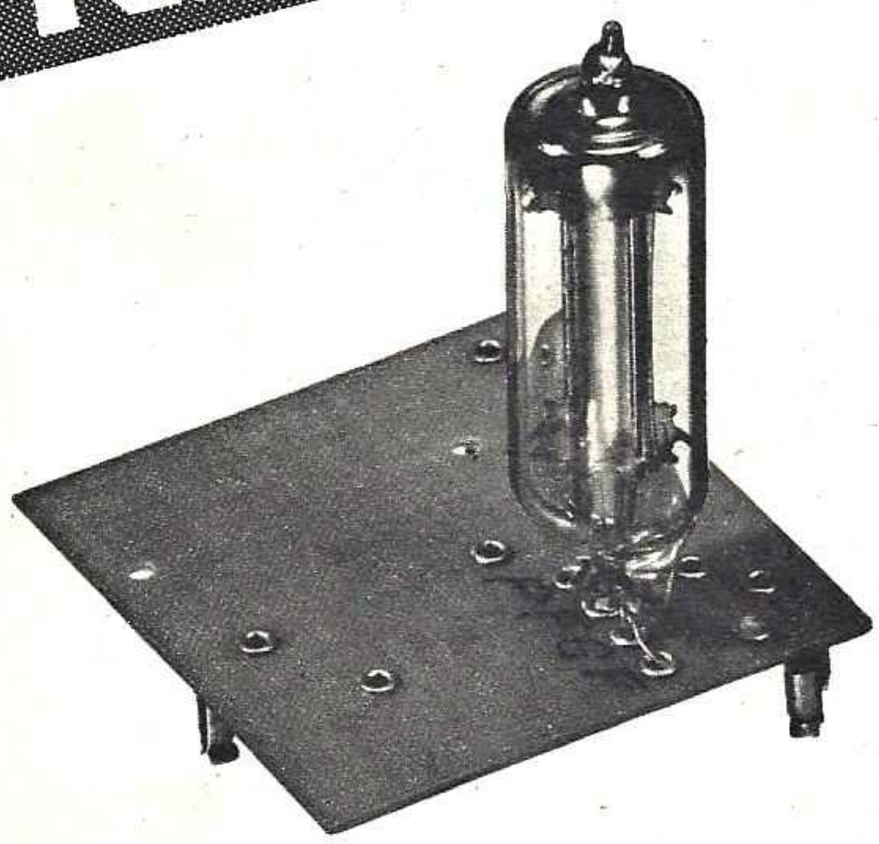
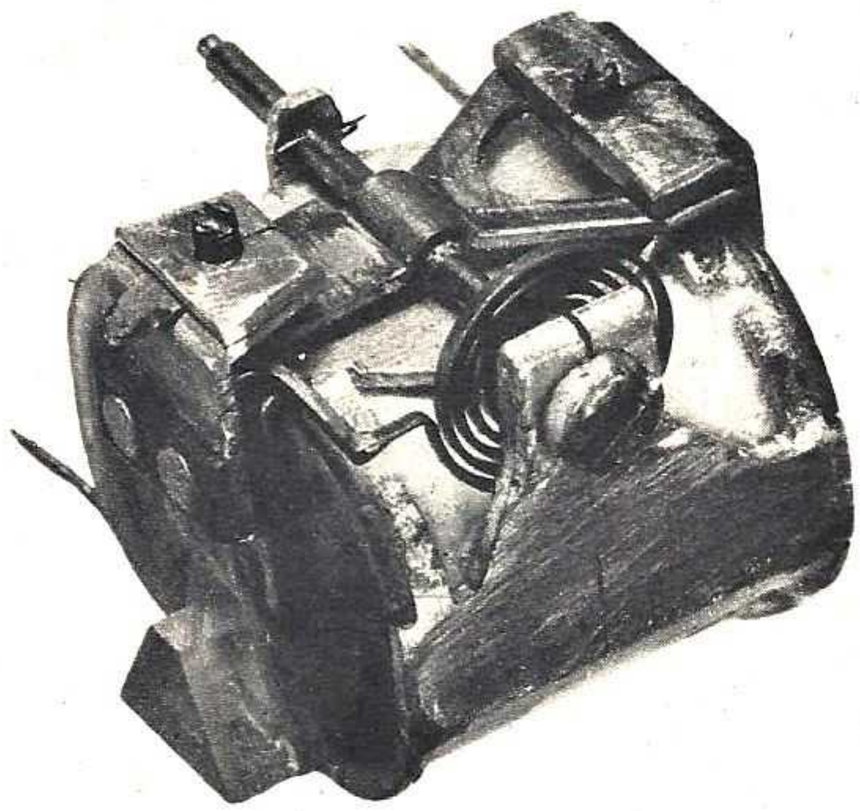
R.C. RELAY

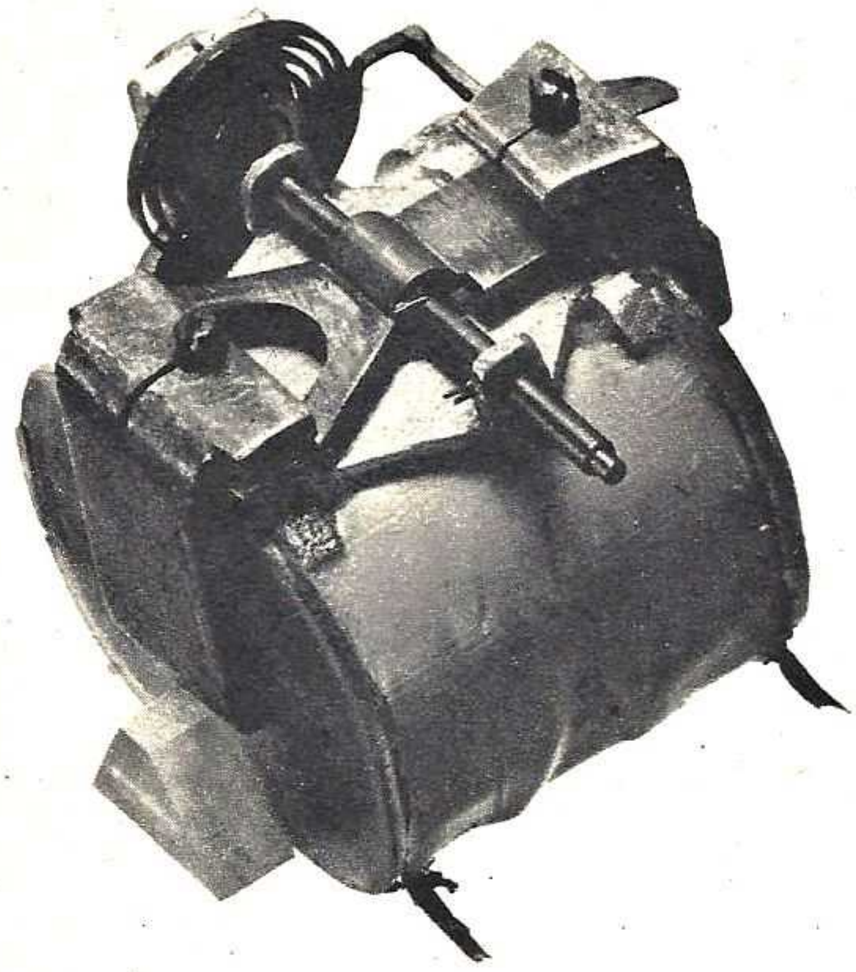
More lightweight parts for your radio control model



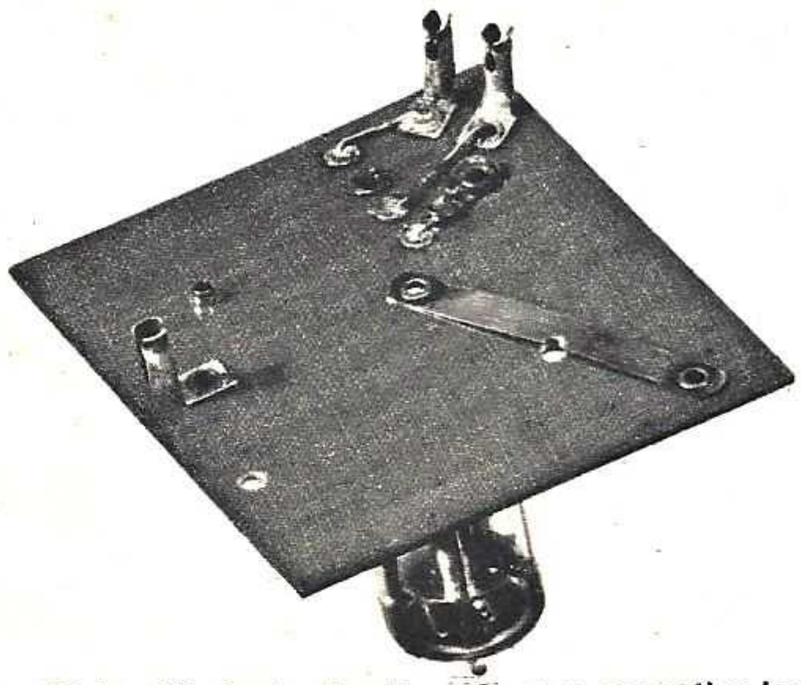
Base of the complete receiver with holes for mounting the relay



Finished relay; this illustration is about 1½ times full size



A spiral spring is used in this version of the relay



Underside of "chassis" showing location of power connection jacks

by E. J. LORENZ

IN THE July issue we gave you plans for a midget escapement unit. This unit was made primarily for Class A and small Class B radio controlled models. This month, in keeping with the theme of a Class A radio controlled model, we present plans for a small and lightweight relay to be used in a radio receiver employing RK-61 or RK-62 tubes. This relay is compact and lightweight, and due to its construction it is not easily affected by vibration or sudden jarring.

Plans for a pre-tuned receiver, using an RK-61 tube, are partially given now and will be concluded in the next issue.

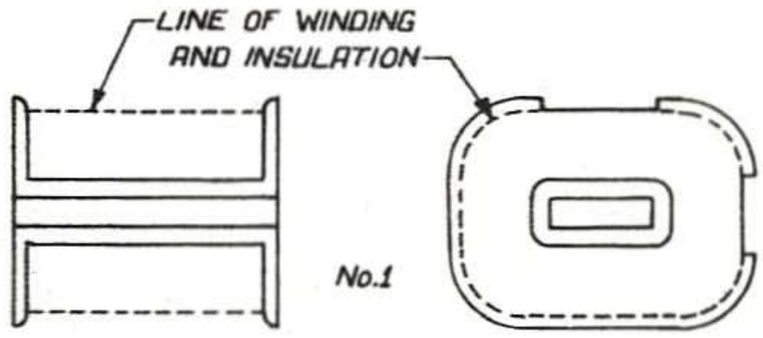
As the relay for a simple super-regenerative receiver, such as is employed for the ordinary radio control unit, constitutes the greater part of the weight exclusive of batteries, a special relay was constructed. It is one of a series made by the author in an effort to produce a small, lightweight and dependable one. There are several excellent commercially-made relays that may be used if no problem of size or weight is involved.

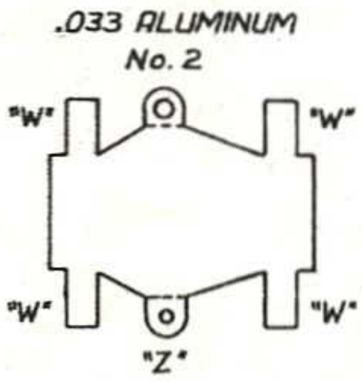
Specifications of the relay presented here are as follows:

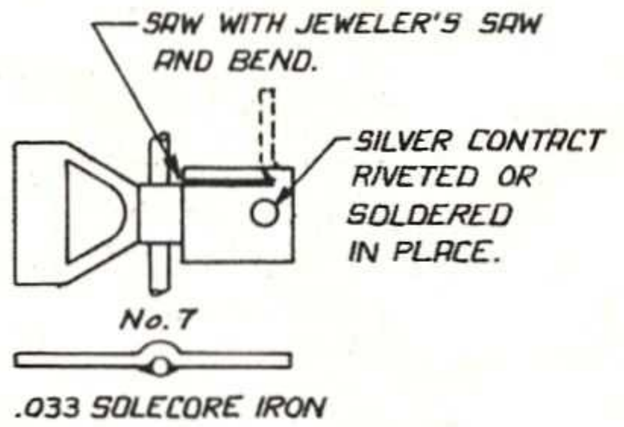
Size: 1-1/16" x 1-1/16" x 1-1/8"
Weight: 1.7 ounces
Resistance: 8000-10000 ohms
Type: Balanced armature

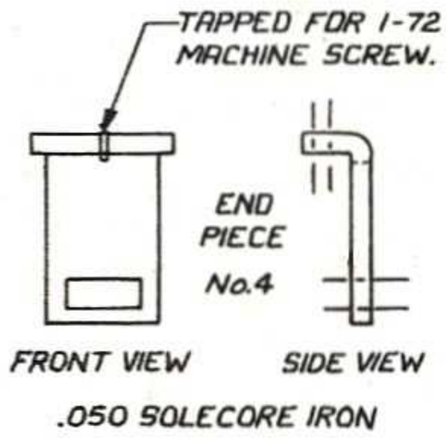
In addition to the relay's requiring a DC resistance of at least 8000 ohms (for RK-61 and RK-62 tubes), it must be capable of working on a very small change in plate current. This change in plate current ranges from .4 to 1 milliampere. To get a relay this sensitive requires a winding producing the maximum number of ampere turns. Since there is little current flowing through this winding the wire can be very small, approximately No. 44. It is this small size wire that offers the biggest problem to the builder who attempts to wind his own coil. If the builder wishes, he may wind his own coil or bobbin by building up a plastic coil form and winding it with No. 44 enameled copper wire until the desired resistance is obtained. The coil and iron parts used in this model were obtained from Sigma Instruments, Inc., 70 Ceylon St., Boston, Mass.

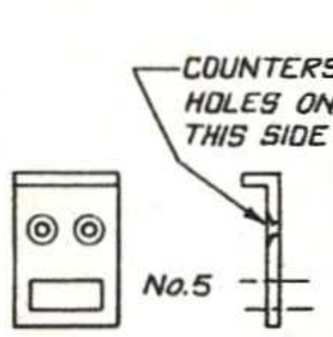
(*Turn to page 77*)

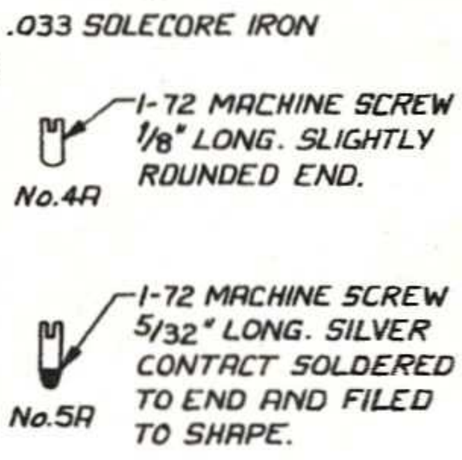


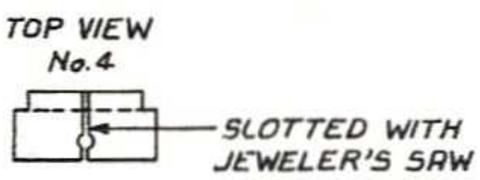


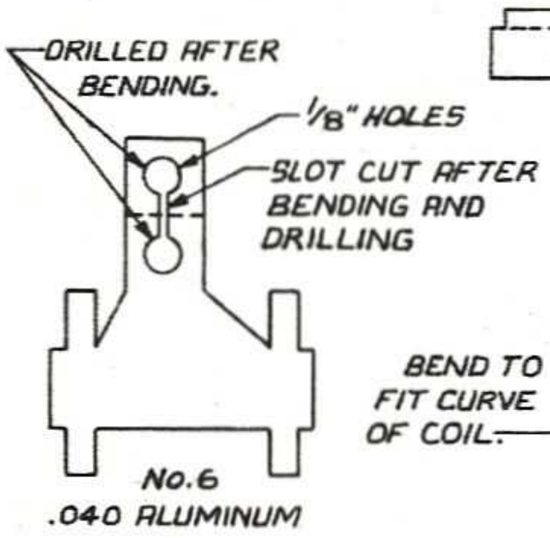


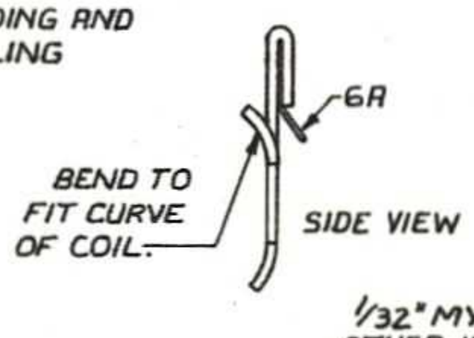


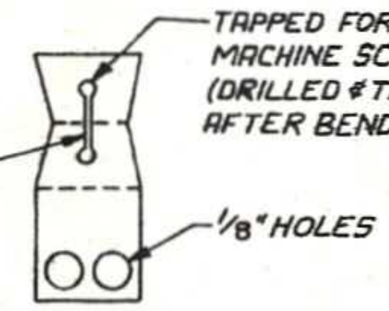


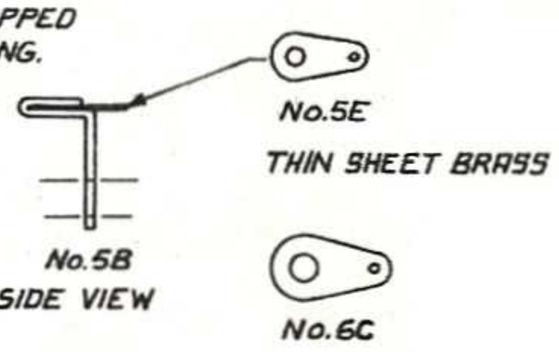


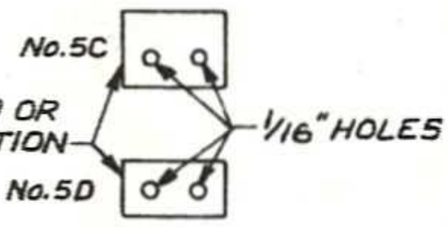


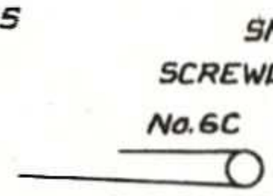


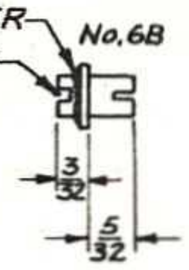


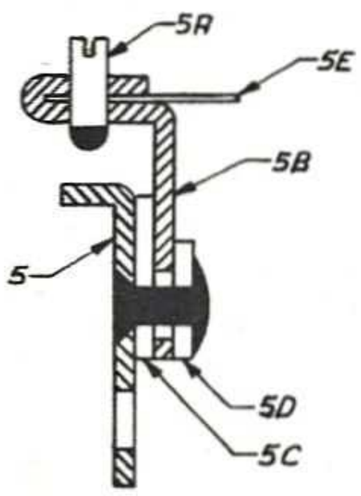


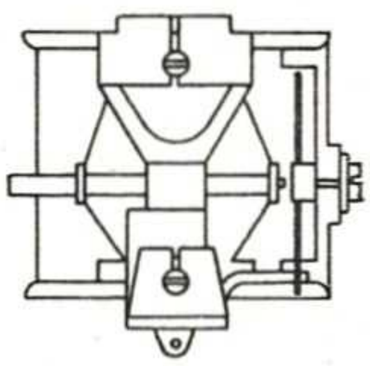


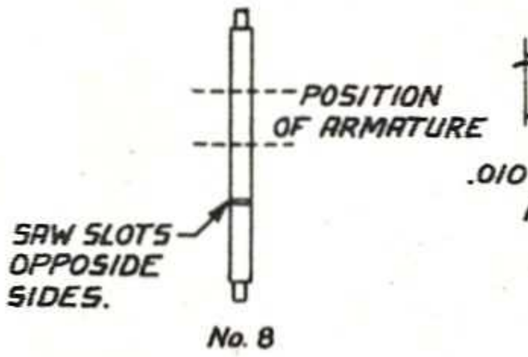


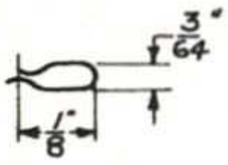


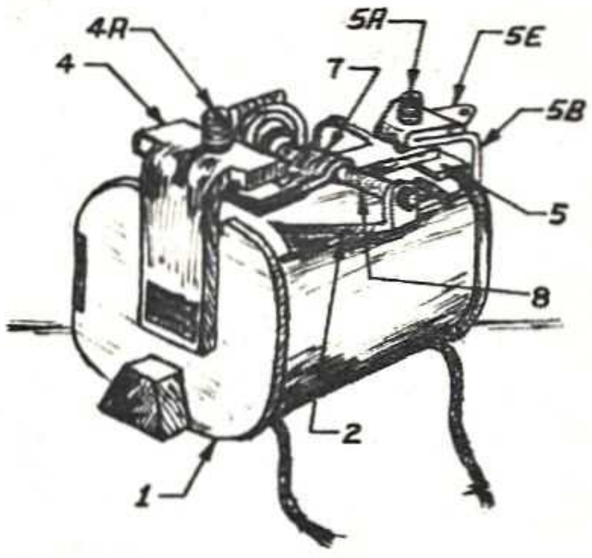


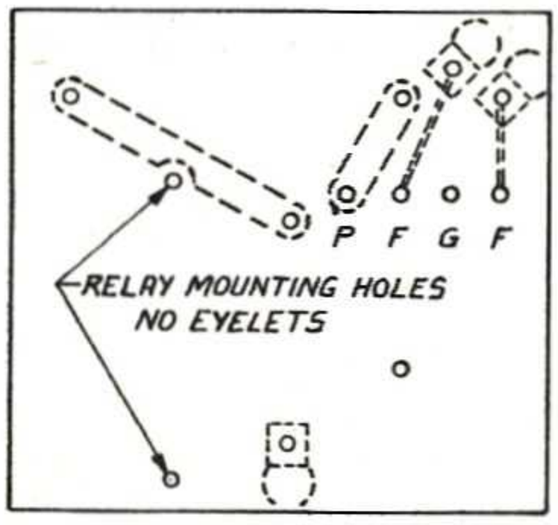


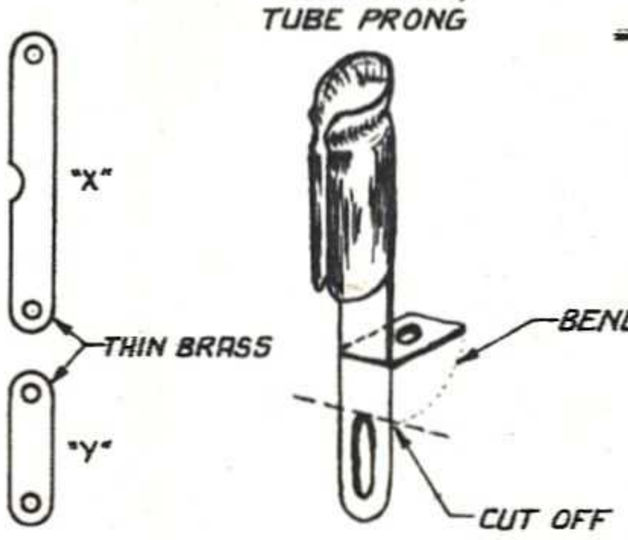












RADIO CONTROL
RELAY & PRE-TUNED RECEIVER

DESIGNED & DRAWN BY
E. J. LORENZ
SCALE 1" - 1"

Radio Control Relay

(*Continued from page* 34)

The price for either an 8000 or 10000 ohm coil complete with core, end piece and armature is one dollar. Needless to say, it is well worth the cost.

The metal parts are cut down from the original pieces to conform to the new model. The drawings are self-explanatory, and by following the text a very suitable relay and receiver can be made. The drawings are exact and full size except where noted.

Before starting construction on this relay you'll want to know about tools and materials required. In addition to the usual outlay of vise, hammer, drills, etc., a small jeweler's saw, several small files and a 1-72 machine screw tap will be needed. If the builder purchases a ready made bobbin coil and parts he will then only need a few scraps of brass, wire and aluminum. If a ready made bobbin is not purchased he must wind his own and cut the core, end pieces and armature from solecore iron or transformer laminations.

To start construction, first mark the ends of the bobbin (1) as shown in the drawing. The slots are 1/32" deep and are on top and side of the coil form. These slots are for the placement of parts (2) and (6). Care must be taken when filing these slots in the plastic so that the wire under the insulation is not damaged. The two wires come out from the bottom. Next cut the armature bracket, part (2), from .033 aluminum and bend to shape. Tabs W are bent so as to fit the curve of the windings. Tab Z is not bent to a complete right angle until after the armature is put in place. This piece (2) is next cemented in place with the end tabs fitting firmly in the top cuts.

In remaking the core (3) and end piece (4) it is necessary first to separate them. This is in order effectively to lengthen the core piece so that another end piece can be riveted to the other end. It can be removed by filing away part of the crimping and knocking the core out of the end piece with a hammer. The plain end of the core piece is then filed at the corners to produce a shoulder similar to the end from which the end piece was removed. Do not cut this shoulder deeper than 1/16". This is the end that will later be fastened back on the end piece which was just removed.

The end piece (4) is now heated and bent straight. Take care that the slot for the core piece is not pushed out of shape. Rebend to shape as shown in the drawing, being careful to keep the proper dimension between top of the slot and bottom of the bend. Drill and tap for a 1-72 machine screw as shown, then make cut with a jeweler's saw. This slot allows the piece to be squeezed together, thus making a tight fit for the machine screw (4a). The other end piece (5) is cut from .030 solecore or similar iron. The bend on this piece fits over and rests on the top of the armature bracket (2). Complete the assembly of 5, 5a, 5b, 5c, 5d and 5e using two 1/16" aluminum rivets about 3/16" long. Countersink the inside of the holes in (5) so there will be a smooth fit against the end of the coil. Use a thin coating of cement on the rivets and on the inside of the holes in piece (5b) as a means of insulation. In assembling these pieces make sure the rivets are in the center of the holes in piece (5b), otherwise a short circuit may occur. This assembly is not riveted to the core piece until the armature is in place.

The armature spring holder (6) is cut

and bent as shown, from .033 aluminum. Drill the 1/8" hole after bending and cut slot with a jeweler's saw after the hole is drilled. Cement this piece in place in the side slots of (1), making sure it is at right angles to the armature bracket. The armature spring (6a) is bent from .010 music wire as shown. The tension spring screw (6b) is made from a short length of 1/8" brass tubing with a washer soldered in place as shown. Take care not to get solder on the inside of the washer (long end of the tubing). A slot is cut in the short end for screwdriver adjustment. A small slot is cut in the long end in which one end of the armature spring is fastened. If you are lucky enough to get hold of a small phosphor bronze hair spring, such as is used on commercial relays, it should be used instead of the music wire type. The photographs show this bronze type spring.

The armature (7) is cut down to size as shown. Cut out the center of the wide end so as to balance the armature at the pivot point. A silver contact is riveted or soldered in the position shown. This contact is 1/8" diameter and about 1/32" thick and may be cut from a dime if no regular silver contact is available.

If the coil and parts are purchased there is no need to change the armature pivot (8) in any way, except for two small cuts as shown. In order to keep the pivot in place between the armature brackets, two light saw cuts are made with a jeweler's saw on opposite sides of the pivot on the inside of the bracket. The shoulder one one end of the pivot will keep it from sliding out of the one mounting bracket and a small .010 music wire catch (8a) will prevent it sliding out the other way.

The adjusting screws (4a) and (5a) are cut from a 1-72 brass machine screw; (4a) is 1/8" long, slightly rounded on one end and has a small screwdriver slot in the other end; (5a) is 5/32" long and has a tip of silver soldered to one end as a contact point.

Now for the final assembly and adjustment. Pieces (2) and (6) have already been cemented on the bobbin. Insert the armature in place in the armature brackets, after the pivot has been soldered in place as shown. After inserting, bend tab Z up to a right angle. Note that the armature bracket and the armature spring holder are slightly off center. When inserting the armature, the wide end goes toward the long end of the bracket. The protruding end of the pivot may be used for attaching an arm for an additional contact point. The tension spring screw is inserted in the bracket (6) with the washer on the outside. The spring (6a) is soldered in place as shown. The upper half of the hole is squeezed together in order to get a tight friction fit. Rivet the original end piece to the core as previously described. Insert this in the coil with the bend going over the wide end of the armature.

The other end assembly is then put in place, with the small end of the armature going between the iron piece and the aluminum screw holder. Rivet this in place, taking care not to spring any of the parts out of shape. The 1/8" long machine screw (4a) is inserted in the iron core end and the 5/32" long silver tipped screw is inserted in the aluminum piece. Adjust the tension spring screw so that the contact end of the armature is pushed upward. Next, adjust the screw contact point so as to force the armature down. Allow about .015" between the

(*Turn to page* 80)

armature and the top of the end piece on the assembly and the bottom of the wide end piece. The armature itself may have to be bent slightly in order to accomplish this.

Experimenting with the adjustments of this relay will give the desired results. It will work on a current change of as little as .25 milliamperes. Do not use too great a current load through the contact points. If a large current load is anticipated, larger contact points should be installed. A small piece of plastic is cemented to each end of the bobbin, as shown in the photographs and the perspective drawing, as a means of mounting the relay.

Now your relay is finished, ready to install on the base of the receiver. The base of the pre-tuned 144-148 mc receiver is made from 3/64" Mycarta or bakelite. Cut this to size as shown and drill all holes with a No. 51 drill. Mark tube connections as shown for the filaments, plate and grid. Strips X and Y are cut from a piece of thin brass and laid aside until assembly is started. From a miniature tube socket, such as used for Hytron miniature tubes, remove three of the prong connectors; then cut and bend as shown. Next, rivet 1/16" eyelets or "ship portholes" in the holes indicated, inserting them from the top side of the base. Place strips X and Y and the prong connectors over their respective eyelets before these eyelets are riveted down. The leads of an RK-61 tube are next inserted in their proper holes and all except the grid connections are soldered. Bend the two filament leads over and insert them in the proper holes and solder. Trim off the excess wire on the plate and filament leads after all soldering has been done. Leave the grid lead unsoldered and extending about 1/16" out of the eyelet.

No support for the RK-61 tube is used other than the leads being soldered in position. This tube is light enough and the leads are parallel with the longitudinal axis of the plane so that there is little need for any other type of socket or support. (The next issue will carry plans for completing this receiver and for building a transmitter.)

Remember, this is a very lightweight and compact radio control unit designed primarily for Class A models. A neat job on it will repay you with many hours of flying a pocket sized radio controlled model.