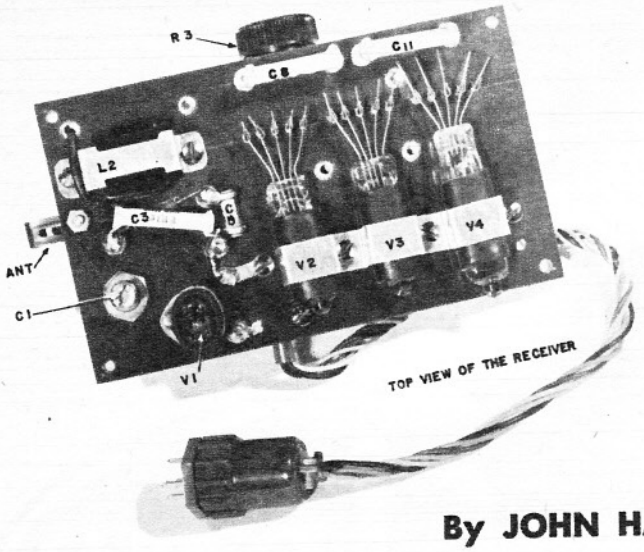
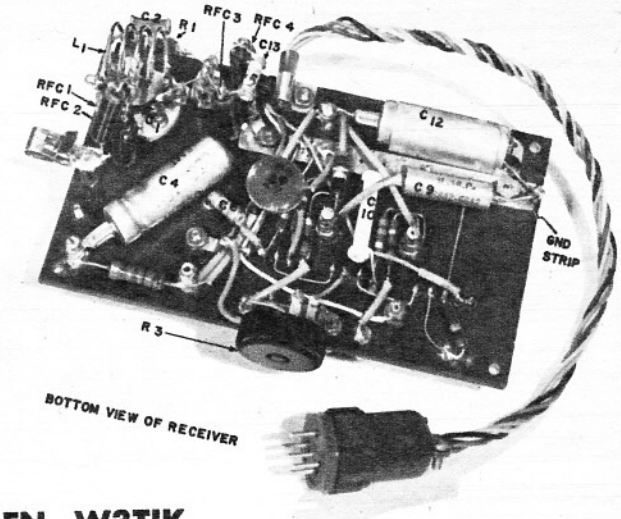


TOP VIEW OF THE RECEIVER



BOTTOM VIEW OF RECEIVER

By JOHN HAMBLEN, W3TIK

Radio Control On The Technician's Band: 220 MC. RECEIVER

Flash the good news to all R/C fans—here's a rig for a perfectly wonderful frequency that most everybody's overlooked. Avoid the crowd, hams, try 220!

Radio control has grown to such proportions that the number of modelers trying to operate on 27¼ mc. is getting unwieldy, even at Sport flying sessions. It seems smart to utilize every spot frequency or band we can, therefore, so that as many models as possible can be put into use at the same time. Aside from the "Citizen's Radio" spots of 27¼ and 465 mc., the ham 50 mc. band has been quite widely used, but there are other ham bands which offer real possibilities—one of them being 220 mc., and construction of equipment for this band is described herewith. "220" has the added incentive that it is a legal band for the Technician licensees; and as another suggestion, the same circuits shown herewith might well be adapted to the 144 mc. ham band, thereby affording another frequency for the Novice licensees. Let's spread out, men—THE EDITORS.

■ If you'll spend a little time to learn the code at only 5 words per minute, and can pass a rather simple technical test, we have the answer for lots of unhampered radio control activity—the ham 220 mc. band. Regular amateur activity in this band is limited, and from several viewpoints it offers excellent possibilities for R/C. In addition to reduced possibilities of interference from other transmitters, 220 offers other advantages. Antennas are much shorter, for one thing; the average 27¼ rig uses a 9½-ft quarter-wave vertical, many of which are none too efficient, while on a 220 transmitter you can use a very efficient half-wave radiator measuring only 2 ft. or so. Receiving antennas can be short, too.

The equipment to be described has given excellent results, and should be easily duplicated by any ham; it can be used legally by those with any class of ham license, except Novice.

Receiver. The receiver circuit consists of a super-regen detector V1, two audio amplifier stages V2 and V3, and a relay tube, V4. Use of two audio tubes actually doesn't increase current drain to any extent, for the filaments of these tubes are connected in series; they take only .625 V. each—*don't* connect them across the full A voltage!

The receiver is designed to operate on a modulated signal, with the RF signal from the transmitter turned on continuously. The detector tunes from about 220 to 225 mc., and is essentially a Colpitts oscillator. RF chokes in the filament leads aid in removing hand capacity effects when you are tuning. R1 and C2 determine the quench frequency, in this case about 50 kc. L2 and C3 form a resonant circuit which passes the audio modulation through, but bypasses most of the quench voltage to ground. Further filtering by R2 and C5 removes the remainder of the quench voltage.

V2 and V3 form a straightforward audio amplifier, the output of which is directed to the grid of V4, a triode-connected relay tube. The original receiver was used with an 8000 ohm Sigma 4F relay, but any resistance from 5000 to 8000 will do.

Construction. The receiver, minus the relay, is mounted on a 4 1/16 x 2 5/16 x 3/32" thick linen bakelite base, the layout being shown full size on page 53. Many of the components are identified in the photographs. In the bottom view, V1 and its tuning circuit is at upper left. The tube is put through a hole cut in the base, and the leads are clipped short and soldered directly to its circuit components; this form of construction cuts lead lengths and stray capacity to a minimum.

L1 is four turns of #18 wire wound on the shank of a ⅜" drill, and spaced out to fit across the stator terminals of C1. The plate lead runs to the nearest stator post of C1, while R1 and C2 go from the other stator post to the grid lead of V1. RFC2 connects to the exact center of L1, and RFC1 is attached one quarter turn from this center tap toward the grid end of L1.

Don't think you are seeing a mistake, in the way RFC1 is placed in the circuit; it is used as an antenna coupling impedance, and provides just the right amount of coupling for reliable and non-critical operation. Be sure to use the exact choke specified in the parts list.

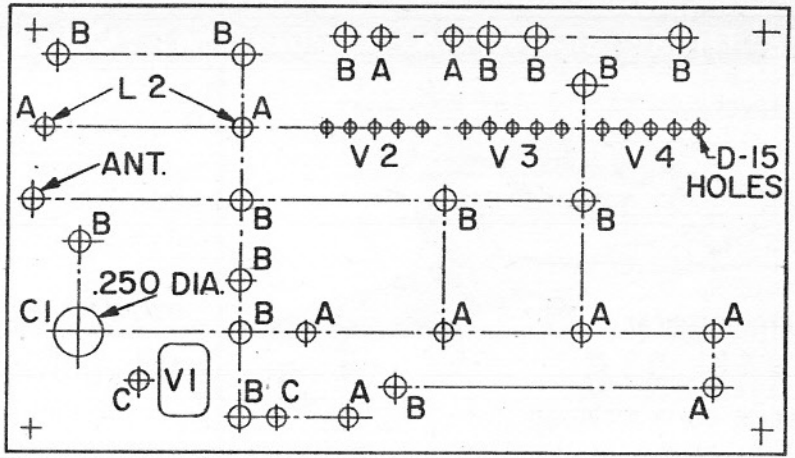
Both RFC3 and RFC4 are mounted vertically, the lower ends being soldered to tie points; eyelets in the chassis will serve for the latter. Tie points or eyelets are used at other points to anchor loose ends of some of the small parts.

Note in the underside view that there is a thin metal strip running ⅔ of the length of the base; this serves as a ground strap, and if made thick enough, can be tapped to hold the screws that fasten the aluminum tube clamp. The gain control, R3, is held on a small aluminum bracket.

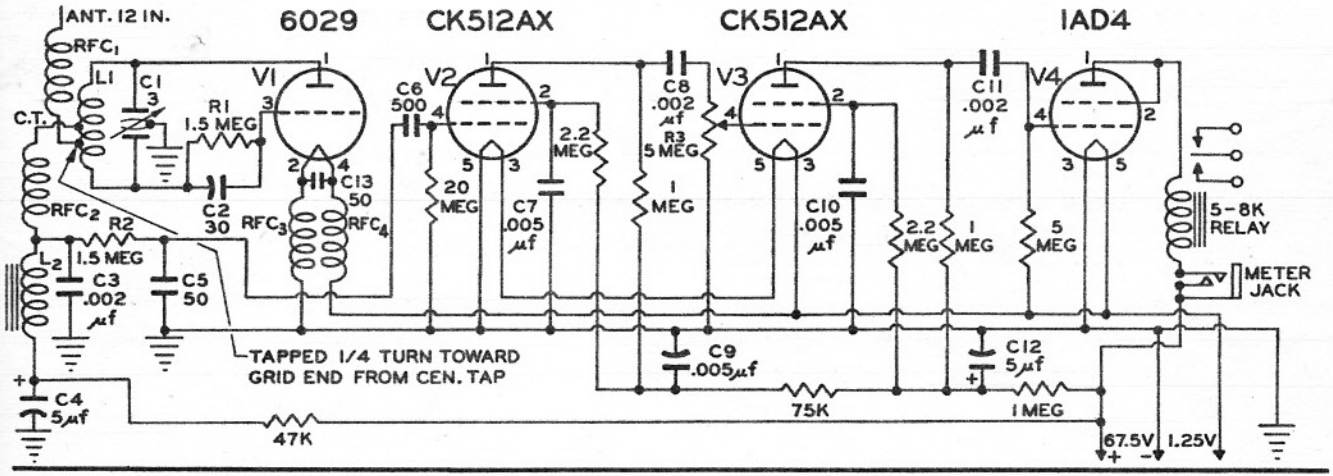
Adjustments. All the tubes in the receiver are intended for use on 1.25 V., so if you expect to use regular dry A cells, a series resistor of 0.82 ohms is required. Open the plate lead of V4, and turn on the power. A meter in series with the

B plus lead should show about .6 ma. Touch the grid end of L1, and note if the current jumps to about 3 ma. Then turn C1 through its full range; if the meter reading stays at about .6 ma., all is well.

Now complete the plate circuit of V4, putting a 5 ma. meter in the lead to the relay. With R3 at about mid-position, the plate current meter needle should vary rapidly from about 1 to 2 ma. Turn the transmitter on (with the modulation on) and tune C1 to see if you can get a sharp dip in plate current. With the transmitter tuned in, turn R3 toward the low side till the plate current of V4 is about 1 ma., then increase it slowly, until further increase fails to reduce the relay current. The meter should now read about .1 ma. and this is the correct setting of (*Continued on page 88*)



Full-size top view of receiver chassis; 1/16" thick linen Bakelite. For holes use following drills: A—#38 (.101); B—#31 (.120); C—#42 (.093); D—#52 (.063).



220 mc Rcvr

(*Continued from page 53*)

R3. When the modulation is switched off, the current should jump instantly to about 3 ma.

Mounting. Holes are shown in the four corners of the receiver base for the conventional rubber band suspension. Be sure to provide a clearance of at least ¾" on all sides of L1. The receiving antenna is not at all critical; a 12" length of music wire will do nicely.

In a subsequent issue we will present the "220" transmitter.

Parts List

All resistors except R3 are ½ W. carbon: R1-R2—1.5 meg., R3—5 meg. Centralab No. B16-128 miniature variable; two 1 meg., one 4700, two 2.2 meg., one 20 meg., one 5 meg., one 75,000. CL—3 mmf., Johnson Type 3MB11, C2—30 mmf., C3-C8-C11—.002 mf., C4-C12—5 mf. electrolytic Aerovox SRE 150 V., C5-C13—50 mmf., C6—500 mmf., C7-C10—.005 mf., C9—.05 mf. C-D Type ZNW 150; C2, C5, C6, C13 are Erie Ceraminon GP; C3, C8, C11 are Erie Type 801; C7 and C10 are Erie Type 811. L1—see text, L2—43 henry hearing aid choke (Stancor type HH100). RFC1—1 meg. ½ W. carbon resistor wound full of #32 en. wire, RFC2, RFC3-RFC4—1 microhenry National type R-33. 15 flea clips, eyelets, hardware, etc.