

# HAM TIPS



A PUBLICATION OF THE RCA TUBE DIVISION

Vol. XVII, No. 1

© 1957, Radio Corporation of America

February, 1957

## AUTOMATIC CONELRAD ALARM

Provides Constant Guard for Conelrad 'Alert'

by G. D. Hanchett, W2YM

RCA Tube Division, Harrison, N. J.

The recent rulings by the Federal Communications Commission on Conelrad provide an excellent opportunity for amateurs who are interested in practical gadgetry. The writer, being one of those practical gadgeteers, and desiring to comply with the recent FCC ruling, constructed the automatic Conelrad alarm unit described in this article. This alarm unit can be used with any of the popularly-priced, five-tube, ac-dc broadcast receivers. Only one minor modification of the receiver is required, and this modification in no way affects its utility as a home receiver.

This Conelrad alarm unit does not require the use of relays. In addition, it emits a sound which is distinctive—there can be no mistake when the Conelrad "Radio Alert" is in effect.

The alarm unit consists of an oscillator of approximately 400 cps, which is keyed by a multivibrator at about 1 pulse per second. The multivibrator is controlled by a dc amplifier operated by the automatic-volume-control voltage of the broadcast receiver. Heater power is obtained from a miniature 6.3-volt, 1.0-ampere transformer. The "B" voltage (120 volts minimum, 250 volts maximum) is borrowed from the receiver.

When the receiver is tuned to a broadcast station which provides 4 volts or more of ac voltage, the multivibrator triode section ( $V_{1b}$ ) in series with the dc amplifier is held non-conducting. The second triode section ( $V_{2a}$ ) of the multivibrator, consequently conducts continuously. Because the cathode resistor of the second triode of the multivibrator is in

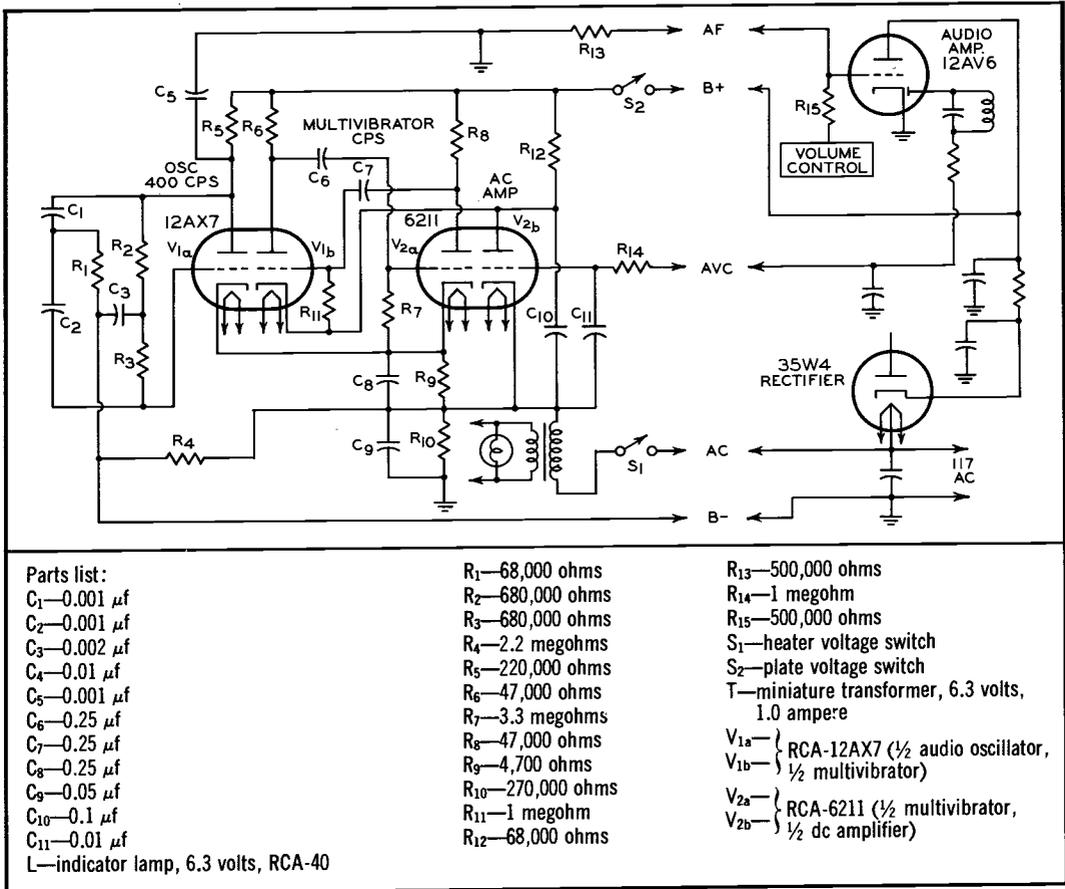


The automatic Conelrad alarm unit shown with the RCA model 6X5 series broadcast receiver. All components, except those visible in this view, are mounted on the underside of the cover plate.

common with the cathode of the audio oscillator triode section ( $V_{1a}$ ), the voltage drop across the cathode resistor is sufficient to cut off the audio oscillator and no audio tone is generated.

When the Conelrad "Alert" is in effect, or when the broadcast station's carrier leaves the air and there is no AVC voltage, the dc amplifier starts to conduct and sets the multivibrator into oscillation.

The multivibrator RC constants were picked so that it will oscillate at approximately one cycle per second. Therefore, the audio oscillator is keyed "on" and "off" at this rate. The output of the oscillator is connected to the control grid of the audio amplifier of the receiver and a series of "beeps" is emitted.



Schematic and parts list for automatic Conelrad unit.

### Construction

Any broadcast receiver which will produce at least 4 volts avc can be used. The author used the popular RCA model 6X5C radio. This receiver is a 5-tube, ac-dc set which utilizes printed-wiring manufacturing techniques. Conversion is extremely simple.

The grid lead to the first audio amplifier, 12AV6, should be opened and a 500,000-ohm resistor ( $R_{15}$ ) inserted, across which the audio output from the oscillator is impressed. This resistor permits the Conelrad alarm to operate regardless of the position of the volume control. Aside from this resistor and the external connections, no other alterations are required.

For convenience, an octal socket is placed in the center of the back of the receiver. This socket is used for connecting or disconnecting the Conelrad alarm unit without affecting normal operation of the receiver.

Wires from the ac, avc, B+, B- and grid of the first audio amplifier are connected to this socket. Shielded wires are, of course, used for all audio connections.

One triode section of a 12AX7 ( $V_{1a}$ ) is used as the audio oscillator, while the other section of the 12AX7 ( $V_{1b}$ ), together with one section of a 6211 ( $V_{2a}$ ) is used as the multivibrator. The remaining section of the 6211 ( $V_{2b}$ ) is used as the dc amplifier.

This tube arrangement was chosen because the audio oscillator needed a high-mu tube, and the dc amplifier needed a tube which has good control for cutoff characteristics. The 6211 was chosen because it is a twin triode especially designed for accurate "on-off" control of signals in applications such as electronic computers. Its grid cutoff characteristics are accurately controlled in manufacture. A 12AU7 could also be used in this socket, but the 6211 is designed to provide considerably superior performance in applications of this kind which may involve long periods of operation under cutoff conditions.

The alarm unit is constructed on a piece of aluminum 4"x6", and mounted on a 4"x6"x3" chassis. All tube parts and components are attached to the cover with the exception of the control switches and pilot light.

The right-hand switch ( $S_1$ ) turns on the heaters of the alarm unit, while the left-hand switch ( $S_2$ ) controls the plate voltage. The heater switch enables the operator to activate the Conelrad alarm unit whenever he desires. The plate voltage switch is provided to eliminate the annoyance of an audible alarm signal as the receiver is tuned between stations. This feature is especially useful when it is desirable to have the alarm ready for instant use after tuning in a different station.

Since nearly all plastic-case, ac-dc sets have "hot-chassis" construction, a  $0.05 \mu\text{f}$  capacitor ( $C_5$ ) and a 270,000-ohm resistor ( $R_{10}$ ) are connected between the B- and the metal chassis to eliminate the possibility of shock. If a transformer-type radio receiver is used, these components can be omitted and the B- can be connected directly to the metal chassis.

The components ( $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $C_1$ ,  $C_2$ , and  $C_3$ ) of the "T bridge" audio oscillator were selected to produce a frequency of approximately 400 cycles. Other frequencies can be obtained by increasing or decreasing the values of the resistors or the capacitors. Increasing the values of both types of components or decreasing these values, respectively decreases or increases the frequency.

The rate at which these 400-cycle "beeps" will be produced is controlled by the time

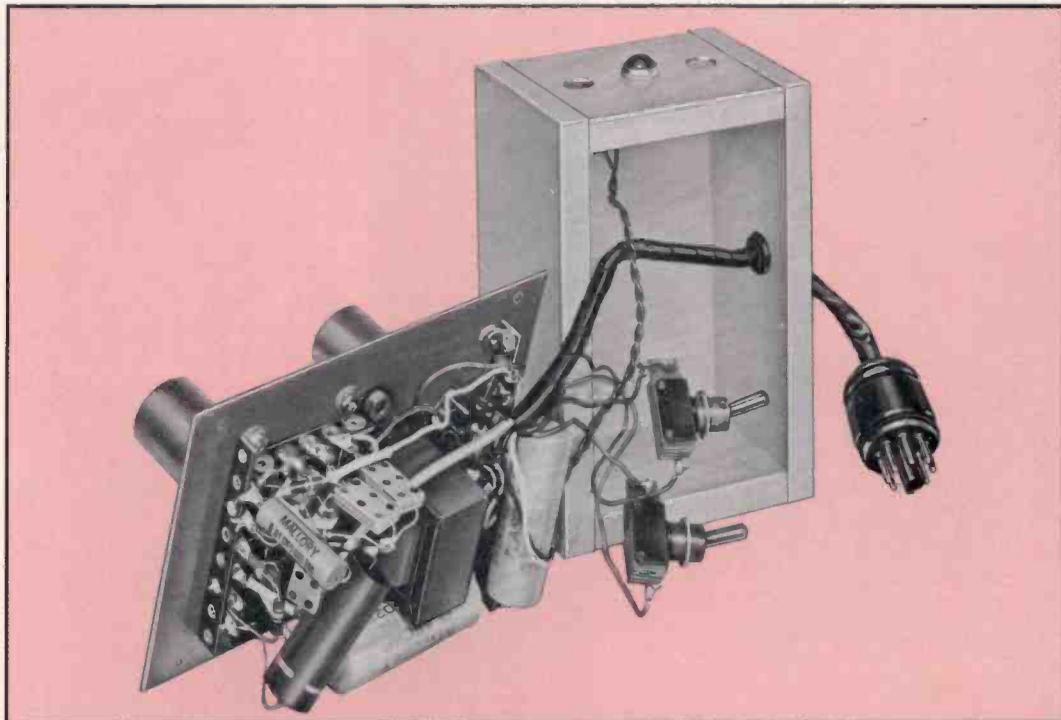
constant of the multivibrator ( $R_{11}$ ,  $C_7$  and  $R_7$ ,  $C_6$ ). Again, increasing or decreasing the RC time constant will, respectively, decrease or increase the repetition rate.

A 68,000-ohm resistor ( $R_{12}$ ) across that section of the 12AX7 used as a multivibrator insures that leakage currents from the 6211 will not start the system in operation.

This all-electronic, automatic Conelrad alarm unit fully satisfies the recent ruling (Docket 11488) of the Federal Communications Commission. It is simple, inexpensive, and easy to construct.

### New Mike Box

The "make-your-own microphone" article by G. D. Hanchett, appearing in the September, 1956, issue of HAM TIPS (Vol. XVI, No. 3) described the construction of an aluminum box for housing the microphone. Bud Radio, Inc., manufactures a box which is ideally suited to the requirements of the transistorized microphone. Measuring  $4'' \times 2\frac{1}{4}'' \times 2\frac{1}{4}''$ , the box is available in gray (CU-2103) or etched (CU-3003) finish. Using this box, the base response of the microphone will be slightly higher than that described in the original article.



Placement of components under the cover plate. Note position of transformer. Resistors and capacitors are mounted on three terminal strips as shown.



From your local  
RCA distributor,  
headquarters for  
RCA receiving  
and power tubes.

**RCA HAM TIPS**  
is published by the  
RCA Tube Division,  
Harrison, N. J.  
It is available free  
of charge from  
RCA Distributors.

Harvey Slovik, Editor  
Robert Leedy,  
Technical Editor

FORM 3547 REQUESTED



WHEN MAILING  
PLACE POSTAGE HERE

Devices and arrangements shown or described herein may use patents of RCA or others. Information contained herein is furnished without responsibility by RCA for its use and without prejudice to RCA's patent rights.

Close-up view of the MB-560-A final, using an RCA-6146



Beam Power RCA-6146, 90 watts input, CW; 67.5 watts on phone. Full input to 60 Mc.

## Leading Amateur Designs ...USE RCA TUBES



New versatile MORROW MB-560-A Transmitter— for mobile, portable, and fixed-station operation

Featuring simplified tuning for greater operating flexibility, high-level audio for more "talk power," and compact design for all "round mobile, portable, and fixed station operation, the new MORROW MB-560-A is making real transmitter news across the amateur bands. An RCA-6146 "final" packs the punch!

Why do most transmitter designs specify RCA power tubes? Here's the answer: RCA power tubes have met and passed the "shake-down" test of years of amateur operation on-air. RCA Power Tubes have great reserve of emission. Most RCA power tubes for amateurs have high-perveance—a basic design advantage that enables you to get high power output at lower plate voltages. RCA has a comprehensive line of high-perveance beam power tubes and triodes to meet every amateur power-input requirement—up to a "gallon." They're available at your RCA Tube Distributor. For technical data on the 6146, write RCA, Commercial Engineering, Harrison, N. J.



NEW TRANSMITTING TUBE MANUAL T1-4 236 fact-filled pages on power-tube data, theory, application, installation, and operation. Ask your local Distributor. Order \$1.00 by RCA, Commercial Engineering, Harrison, N. J.



**TUBES FOR AMATEURS**  
Radio Corporation of America • Harrison, N. J.