Nov. 14, 1961 C. T. STRATTON ET AL 3,009,059

AUTOMATIC EMERGENCY ALERT SYSTEM

Filed Dec. 23, 1959 2 Sheets-Sheet 1

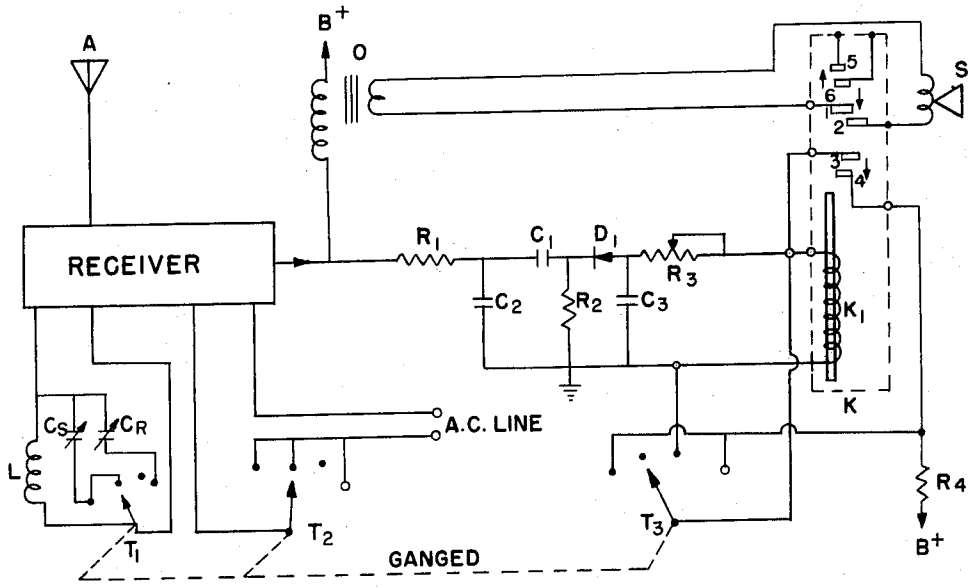


FIGURE 1

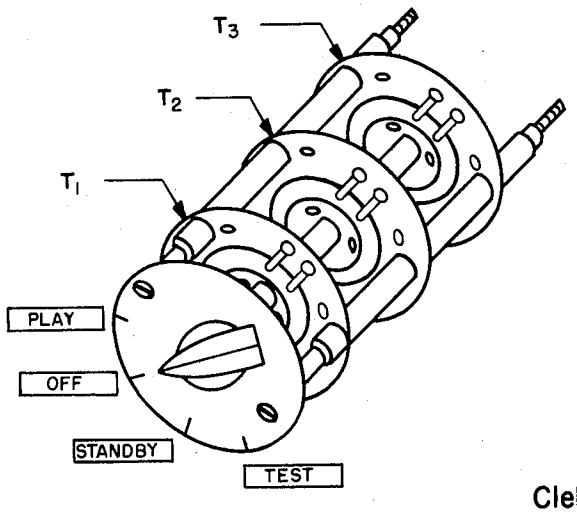


FIGURE 2

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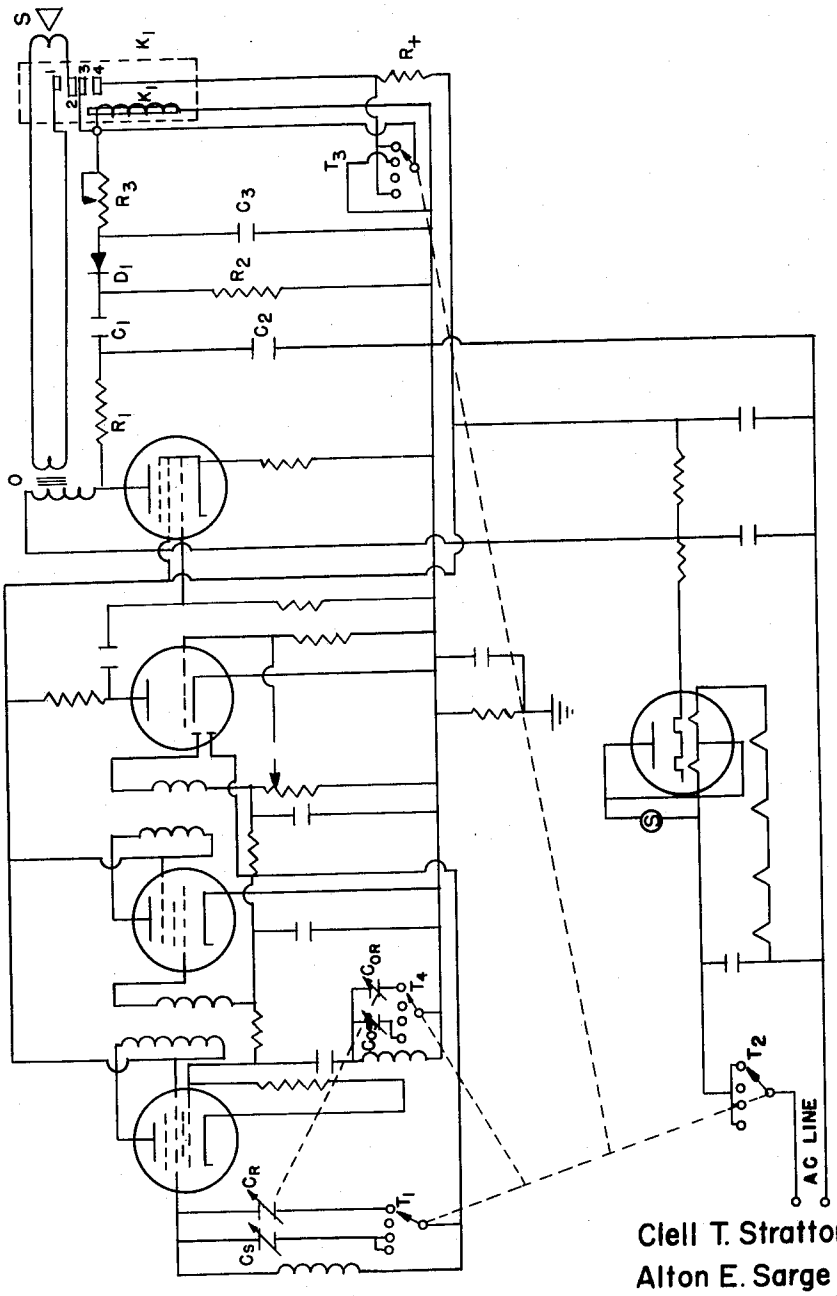


FIGURE 3

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AUTOMATIC EMERGENCY ALERT SYSTEM

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2 Claims. (Cl. 250—20)
(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the United States Government for governmental purposes without the payment of any royalty thereon.

The present invention relates to an alert system which can be used in conjunction with the present Conelrad alert system administered by the Civil Defense Authorities. Under the Conelrad system the Federal Communications Commission has designated the radio frequencies of 640 kc. and 1240 kc. as emergency frequencies and all transmitting stations in the alert area are instructed to switch to these frequencies in case of an alert. These stations will then broadcast instructions to the populace. As presently planned, it is necessary to awaken the populace with a siren or other warning device to enable them to tune their radio receivers to one of the emergency frequencies.

The present invention provides an automatic method of warning all persons who are within hearing distance of a radio receiver by utilizing a receiver that is automatically activated and tuned to an emergency frequency when the local transmitting station switches to the emergency frequency. This operation will occur regardless of whether the receiver is being operated and is therefore especially useful to alert those not listening to their radio receivers.

It is accordingly an object of this invention to provide an inexpensive, extensive and convenient warning system.

Another object of this invention is to provide an alert system which can be incorporated into systems already in operation.

An additional object of this invention is to provide an alert system which will operate continually and automatically.

A further object of this invention is to provide an alert system that will effectively alert a very large portion of the populace without the use of extensive or elaborate equipment.

Other and further objects and features of the present invention will become apparent upon a careful consideration of the following detailed description when taken in conjunction with the accompanying drawings in which:

FIGURE 1 is a functional representation of the invention showing some of the circuit details thereof.

FIGURE 2 is a detailed drawing of the switch assembly illustrating the various switch positions.

FIGURE 3 is a detailed circuit diagram of a particular embodiment of the invention.

FIGURE 1 illustrates a typical radio receiver such as a superheterodyne receiver, a TRF receiver or a FM receiver incorporating the present invention. The antenna A intercepts the radio frequency signal and presents it to the radio receiver. The variable condenser C_R represents the tuning condenser of the receiver which operates in conjunction with a tuning coil L to select any frequency desired. In accordance with the present invention an additional variable condenser C_s is inserted in parallel with tuning coil L. C_s is tuned to the emergency frequency and operates in conjunction with the switch T_1 and the tuning coil L to select the emergency frequency when desired. The tuning circuit L–C_R shown in FIGURE 1 is representative of all the tuned radio frequency circuts in the receiver. If the receiver uses more than one tuning coil and condenser combination, a condenser C_s and a switch T_1 should be used for each such combination. For example, the superheterodyne receiver shown in FIGURE 3 utilizes an additional condenser C_{os} and a switch T_4 for the oscillator circuit which furnishes the beat frequency.

For convenience the power switch T_2 is also constructed with four positions so it may be ganged with the other sections of the switch T shown in FIGURE 2. The power switch can be an ordinary On-Off switch or any other means for controlling the current and any such modification is determined by the design factors concerned.

The output from the audio power tube of the receiver is connected to the primary of an audio output transformer O. The secondary of transformer O is connected to the receiver speaker S through the relay contact points 1 and 2 of the relay K. The output of the audio power tube is also connected to a filter circuit comprised of R_1, C_2, C_1 and R_2. The values for these filter components are chosen to allow only one specific low frequency alerting signal to activate the relay coil K_1. The detector D_1 serves to convert the alternating current from the filter circuit to a direct current to operate the relay K. R_3 and C_3 are chosen with the proper time constant to prevent undesirable transient effects in the relay K. The switch T_3 is connected to K_1 and ground as shown and also to the B^+ of the receiver through a resistor R_4.

The relay K is a double pole single throw type wherein energization of the coil K_1 forces contacts 1 and 2 together and also forces contacts 3 and 4 together. Additional contacts may be provided on the relay to control lights, bells or other instruments which may be necessary in conjunction with the alert system. A pair of additional contacts 5 and 6 are illustrated in FIGURE 1 and the relay shown therein is a triple pole single throw type.

The four positions of the switch T are illustrated in FIGURE 2. The "Play" position permits operation of the receiver in the usual manner. The "Off" position disconnects the power from the receiver. When the switch T is in the "Standby" position the speaker circuit will be open until an alerting signal is broadcast. Then the relay K is energized and the receiver is put into operation to receive the emergency instructions. If the switch is set in the "Play" position when an alerting signal is broadcast it will be necessary to change to the "Test" position to receive emergency instructions. Under the present Conelrad system notification of an emergency will be broadcast by all transmitting stations immediately so there should be no undue delay in switching from the "Play" position to the "Test" position on switch T.

Switch T is an ordinary four position ganged switch. The number of decks or sections required will depend on the number of tuning sections in the receiver. The superheterodyne receiver circuit shown in FIGURE 3 requires four decks for proper operation. The switch T shown in FIGURE 2 has four switching positions, but a switch with three positions will suffice if the off position is omitted and some other means are used to control the power to the receiver. More than four positions can be used to incorporate any additional well known features in the device.

The operation of the present invention when T is in the "Standby" position can best be illustrated by referring to FIGURE 1 wherein the switches T_1, T_2 and T_3 are shown in the "Standby" position. Before broadcasting emergency instructions the transmitting stations will broadcast an alerting signal for a short period of time. This alerting signal will be a low frequency alternating signal modulated upon an emergency frequency carrier. The tuning circuits of the receiver will receive this signal and deliver it to other circuits in the receiver for ampli-

fication and detection. The condenser C_s must be tuned beforehand to form a resonant circuit with the tuning coil L at the emergency frequency to properly select the emergency signal.

The rectified and amplified low frequency alerting signal passes through the filter composed of R_1, C_2, C_1 and R_2 which rejects all frequencies but this alerting signal frequency. This signal is applied to the RC network composed of R_3 and C_3 which is used in conjunction with K_1 to actuate the relay. When K is energized contacts **1** and **2** are joined and the speaker S is connected in parallel with the secondary of the audio output transformer O. The receiver can now receive and reproduce any emergency instructions by the transmitting station.

Since the low frequency alerting signal is only transmitted for a short period of time a holding current for the relay is provided by the B+ of the receiver. This voltage is connected to the relay coil K_1 through the dropping resistor R_4 and the relay contact points **3** and **4**. When the alerting signal energizes the coil K_1, points **3** and **4** are joined as are points **1** and **2**. Therefore a permanent energizing current is furnished to the relay coil K_1 even after the low frequency alerting signal has stopped.

FIGURE 3 illustrates a practical application of the principles of the present invention in a superheterodyne receiver. For a low frequency alerting signal of 1000 cycles per second the values of the filter components can be calculated by well-known methods. These values are:

R_1 and R_2=16,000 ohms
C_1 and C_2=.01 μf.

C_3. R_3 and R_4 are chosen to properly operate the relay K. The values of L_s and and C_{os} can be calculated with the well-known LC resonance circuit equations for a frequency of 1000 cycles per second. The choice of tubes and the values of the other components shown are merely design factors and need not be considered extensively here.

Various modifications and alterations of the invention which have been disclosed herein are possible. The device could be made portable and can be extended to cover other emergencies such as floods, tornadoes, hurricanes or other situations where a warning system is necessary. An adaptor could be made embodying the principles of the present invention and attached to existing receivers. These modifications may be made without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. In a single radio receiver including a speaker, an automatic emergency alert system comprising means for receiving modulated radio frequency signals and isolating the modulating voltages therefrom, and an audio output stage having an audio transformer, said system comprising relay means having a pair of normally open contact points and a relay coil connected to said points for causing the points to move to a closed position upon the energizing of said relay coil, said contact points being electrically connected to the secondary of said output transformer and to the speaker of said receiver, a filter circuit which allows only one specific low frequency alerting signal to pass electrically connected between the primary of said output transformer and said relay coil, a detector connected between said filter circuit and said relay coil to convert alternating current to direct current for energizing said coil, a time constant RC network interposed between and electrically connected to said detector and said relay coil to prevent undesirable transient effects in said relay; and a power switch means having a plurality of operating positions including a "Standby" position in which the receiver is connected to a source of electrical power whereby a low frequency alerting signal is received and passed through said filter and applied to said RC network to actuate said relay coil whereby said pair of contacts are closed, a "Play" position in which said relay coil is energized to place said speaker in the circuit for normal listening, a "Test" position in which said relay coil is not energized unless the emergency alerting frequency is received and permits adjustment of the receiver to the alerting frequency signal, and an "Off" position in which said relay coil is shorted by said switch and the receiver placed in an inoperative condition.

2. The device as in claim 1 wherein there is provided a dropping resistor, a second pair of normally open switch contacts connected into said source of power applied to said receiver, said relay coil also connected into said power source through said dropping resistor and said second pair of contacts whereby a holding current is established for said relay coil.

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