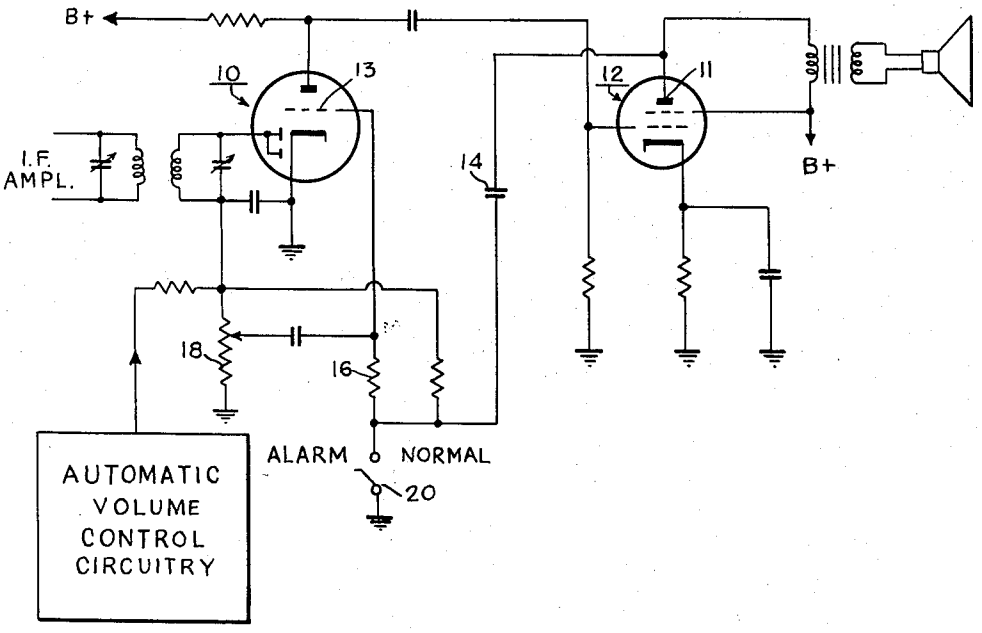
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ALARM SYSTEM

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ALARM SYSTEM

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This invention relates to alarm systems, and more particularly to a system which will sound an alarm when a carrier wave is interrupted.

Carrier wave interruption, whether accidental or intentional, is a condition which requires immediate attention. Accidental interruption may occur during transmittal of a program from a remote location, or when a program is being picked up for rebroadcast by slave equipment. Intentional carrier wave interruption is utilized in the procedure known as a "Conelrad alert."

In order to clearly illustrate the purposes and advantages of my invention, I will describe its operation in terms of a Conelrad alert, although it will be realized that this situation is merely a particular, although important, usage of my invention.

In case of a Conelrad alert, each station announces that it is going off the air, and that the listener should switch his radio to one of the Conelrad frequencies. The stations leave the air temporarily, but return for a short interval of time to broadcast a 1000 cycle tone. The station again leaves the air, and now each switches its broadcasting operations to one of the Conelrad frequencies, according to a predetermined plan in order to disseminate information to the populace. Any listener, either at home or at work, who has the radio turned on will hear the instructions broadcast as described above.

However, an entirely different situation arises at the transmitting studio of police forces, taxi systems, fire fighting networks, amateur operators, and others who have their own transmitters. It is essential that all of these transmitters also go off the air, but unfortunately it is impractical for their operators to have a radio furnishing a background program while they are working, because the program tends to be disconcerting to them, and confusing to the individual receiving their messages. It has therefore become essential that some other type of alarm system be provided to notify the operator of this type of transmitter that a Conelrad alert has been sounded.

Of the alarm systems which have been proposed, most react to the 1000 cycle tone which is broadcast as part of the switching over operation. Systems of this sort usually require sensing networks, relays, and other equipment which ordinarily is in a standby state, and at best is very infrequently used. Many are therefore expensive modifications of existing equipment, or expensive and complex circuitry which must be newly purchased. A simpler alternative system proposes that an ordinary radio be tuned to one of the Conelrad frequencies, and be left on continuously. This proposed solution, while simple, has several drawbacks. The first is that the attempt to tune the radio to 640 or 1240 kilocycles while nothing is being transmitted on those frequencies is extremely difficult, because there is no indication that the radio is properly tuned. In addition, the volume control must be set very high to assure that if a Conelrad alert is sounded, the radio loudspeaker will reproduce it. The high volume setting inherently develops a great deal of

audible noise and static, which could be as disconcerting as a background program.

Proposals of these types are specifically designed to react to a Conelrad alert, but would be useless as an indicator of carrier wave interruption or failure.

It is therefore the principal object of my invention to provide a simple carrier failure alarm system.

It is another object of my invention to provide a circuit which may be incorporated into an ordinary radio, which may thus act as a Conelrad alarm system.

The attainment of these objects and others will be realized from the following specification, taken in conjunction with the single figure of drawings, which illustrates the basic concept of my invention.

My invention contemplates a circuit which senses when the transmitter leaves the air, and reacts by completing a feedback loop which causes an audible oscillation to occur.

The drawing illustrates a radio circuit which is widely used. Tube **10** is an audio stage, while tube **12** is the power tube which is coupled to a loudspeaker. Ordinarily, the audio stage drives the power stage, and it is undesirable to have any energy feeding back in the opposite direction. In accordance with my invention, however, I provide a feedback link from the output anode **11** of power tube **12** to grid **13** of audio stage **10**. This feedback link comprises capacitance **14** and resistance **16**.

When the usual radio program is being received, a voltage known as the automatic volume control voltage is produced by the circuitry of the radio. I apply this voltage to grid **13** of audio stage **10**, thus biasing the tube to cutoff. Under the condition, this tube is inoperative and passes no signal to the power stage or the speaker, and the set is therefore muted. When the radio station goes off the air, as it would during a Conelrad alert, the automatic volume control voltage disappears. The disappearance of this voltage removes the cutoff bias from grid **13**, and awakens audio stage **10**. Since no external signal is being received, there is no output from tube **10**. However, the inherent eternally present noise is applied to grid **13** by the feedback circuit. This noise is amplified by tube **10**, and applied to the control grid of tube **12**. After reamplification a portion of this amplified noise is fed from anode **11** back to grid **13** through the feedback network. It may thus be seen that a regenerative loop is produced, and that the various parameters determine the frequencies and amplitude of the audible oscillations which are produced. These are preferably raucous to attract attention.

A switch **20** is also provided, its action being such that in the "Conelrad" position it permits the above described action to occur, while in the "normal" position it prevents tube **10** from being cut off, and thus allows the radio to function in its ordinary manner.

A potentiometer **18** acts to control the volume of the radio. Since the regenerative action bypasses volume control potentiometer **18**, the audible oscillations are substantially unaffected by its setting, and cannot be locked out.

It may thus be seen that a radio using my invention may have its switch positioned for normal usage, and the set will therefore operate in its usual manner. In order for a radio incorporating my invention to act as a Conelrad alarm the radio is placed in the transmitting studio, and with the switch in the normal position, any station may be tuned in, sharply, clearly, and as loud as desired. The switch is then turned to its Conelrad position, and the set becomes muted, but still operative. However, should this station go off the air for a Conelrad alert, the aforementioned audible oscillations will be set up, and the set should then be turned to 640 or 1240 kilocycles. The same audible oscillation will appear if

this station goes off the air at the termination of its broadcasting day, and this warning would advise the transmitter operator to tune in another station which is still on the air, in order to get the benefits of the Conelrad alarm inherent in the radio.

While the foregoing discussion has been presented in terms of a radio receiving an amplitude modulated carrier wave, my invention is not limited thereto. For example, in an F. M. radio there is present in the limiter stage a direct voltage which has characteristics similar to the A. V. C. voltage; namely its amplitude is related to the strength of the carrier wave. This voltage may therefore be utilized to mute or awaken the set as hereinabove described. Despite the fact that my invention has been described as forming a regenerative loop between an audio stage and a power stage, it will be realized by those skilled in the art that any suitable stages may be utilized. It will also be obvious that various elements and values thereof, as well as circuit modifications, may be used to control the amplitude and tone of the audible oscillations. It will further be apparent that switch **20** may be modified to energize indicators (such as lights) to show whether the mode of operation of the radio is set for normal or alarm.

My invention has another advantage, namely that it may be quickly checked. Even though the radio is muted, snapping the switch to its normal position will bring in the desired station, thus showing that the set is operating properly.

In addition, due to the fact that my invention does not require a 1000 cycle tone to activate it, my invention will indicate carrier wave interruption or failure.

Having disclosed the principles and one embodiment of my invention, I desire to be limited not by the foregoing illustrations, but rather by the appended claims.

What is claimed is:

1. A radio having two cascaded tubes, each said tube having an input electrode and an output electrode; a non-switchable regenerative feedback link from the output electrode of said second tube to the input electrode of said first tube, said link comprising a capacitance; an automatic volume control circuit which produces a voltage when a carrier wave is received; means to bias said first tube to cutoff, said means including a connection between said automatic volume control circuit and said input electrode of said first tube whereby when said carrier wave is received said automatic volume control circuit cuts off said first tube to mute said radio, and when said carrier wave is interrupted said radio is awakened, and said link feeds back a signal which is regenerative and causes said radio to produce audible oscillations, thereby warning of carrier wave absence; and means to simultaneously disable said feedback link and said bias means bypassing said bias signal and said regenerative signal around said first tube, said means comprising a switch.

2. An alarm producing circuit comprising a regenerative loop comprising two tubes whereby a regenerative signal may be produced; means energized by a carrier frequency for producing a bias signal; means causing said bias signal to cut off one of said tubes whereby the absence of said carrier frequency energizes said tube and completes said regenerative loop to produce an audible alarm; and means comprising a switch to bypass said bias signal and said regenerative signal around one of said tubes whereby said switch determines whether said alarm producing circuit is operative.

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