

electronic ALARM

The device described below was originally used as a "baby alarm," but may be adapted to a large number of different uses. Readers will immediately think of a burglar alarm, "open sesame" door opener, and others. An excellent point is that the apparatus can also be used as a pre-amplifier.

By J. S. WORTHINGTON

THE apparatus described was designed and constructed to meet the need of a warning that a baby was awake and crying, the bedroom being some distance from the sitting room and cries very difficult to hear (especially with the radio on!). It could also be arranged to give a warning in the garden or anywhere else required. The sensitivity is such that a low moan or whimper two feet from the microphone will cause a relay to close, so operating a buzzer at the remote point.

The heart of the unit is the rectified feedback stage shown in Fig. 1. The valve is biased so that the relay will just release after being operated. When a signal is impressed on the grid it is amplified and fed back via C2 and the rectifier—R2 network. Due to the rectifier a D.C. voltage is built up across R2, in opposition to the fixed negative bias. This is applied to the grid through the de-coupling resistor R1. Increased plate current passes and the relay operates. The rectifier used was of the metal type but there seems no reason why a 6H6 or other tube should not be equally good.

Using a carbon microphone with 20 Ma. current through it, good results were obtained with this circuit, but sensitivity was hardly adequate for the purpose, though normal speech one foot from the microphone gave reliable operation. The relay used was of 1,000 ohms resistance, operate current 2.1 Ma., release current 0.5 Ma.

No doubt a more suitable relay would improve the sensitivity, but such things are not easy to obtain in wartime.

To obtain adequate sensitivity an amplifying stage was added, resistance-capacity coupling being used with a high- μ triode. This resulted in the circuit arrangement shown in Fig. 2. The amplifying stage is normal in every way; neon-bulb stabilization of H.T. voltage was incorporated, and the adjustable bias necessary for the relay tube was obtained from a potentiometer across the supply. The neon lamp was of the pilot lamp type and was actually mounted behind an aperture in the panel.

The apparatus at this stage performed its duties very satisfactorily, but it was realized that it also contained the essentials of an efficient pre-amplifier. In these days of shortage the prospect of combining several functions in one piece of apparatus had great attractions. By providing an input volume control and arranging to use the feedback condenser C2 and the impedance of the relay winding as output coupling components and disabling the rectifier network, at high gain, high quality amplifier was available. These changes were made very simply, by incorporating an output jack which was made to perform the necessary switching as shown in Fig. 3. The cathode by-pass capacity was also increased and a dual purpose input transformer installed.

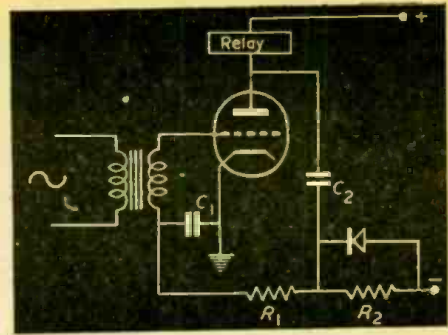


Fig. 1—A rectified feedback unit builds the signal up to trip the alarm-energizing relay.

An additional refinement incorporated at this stage was the inclusion of a resistor in the negative return lead to provide microphone energizing current and so eliminate the microphone battery. The heater supply was used to operate the remote buzzer to make the unit completely self-contained. When used as a straight amplifier the bias control for V3 should be set so that the tube draws its normal plate current for class-A operation. An attempt was made to improve the device by including a coupling choke in series with the relay winding, but the improvement was negligible and operation as a relay was impaired owing to the consequent slowing of the D.C. rise and fall due to the inductance, so it was omitted in the final version.

Adjustment is very simple, all that is necessary being to reduce the bias on V2 by the variable resistor until the relay operates, then, making sure the microphone is plugged in and the input volume control at maximum, increase the bias slowly until the relay just releases. After this the input volume control can be set at any level.

The power supply used for this apparatus is fed directly from the A.C. line. This A.C.-D.C. circuit is only suitable where one side of the supply mains is grounded and care must be taken to see that the grounded side is so connected that it becomes the negative side of the output as one side of the microphone circuit is directly connected to negative high-voltage.

A single-section filter proved adequate to reduce the hum sufficiently for relay working though an additional filter section

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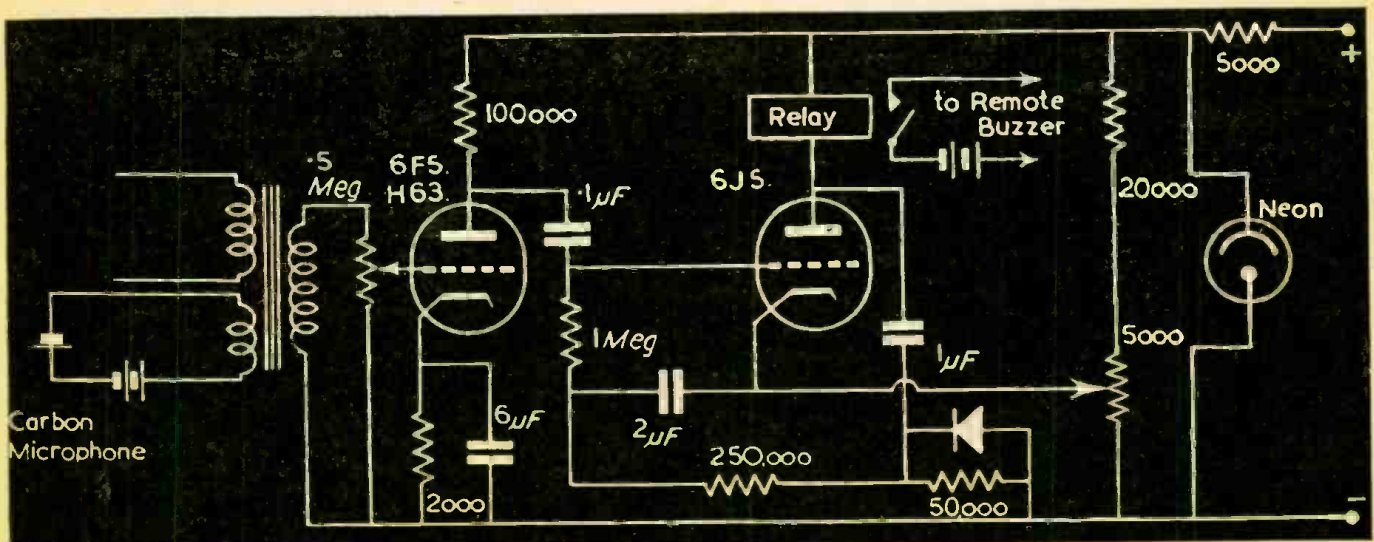


Fig. 2—Complete diagram of the relay circuit, showing the combination input transformer, which permits operation as alarm or amplifier.

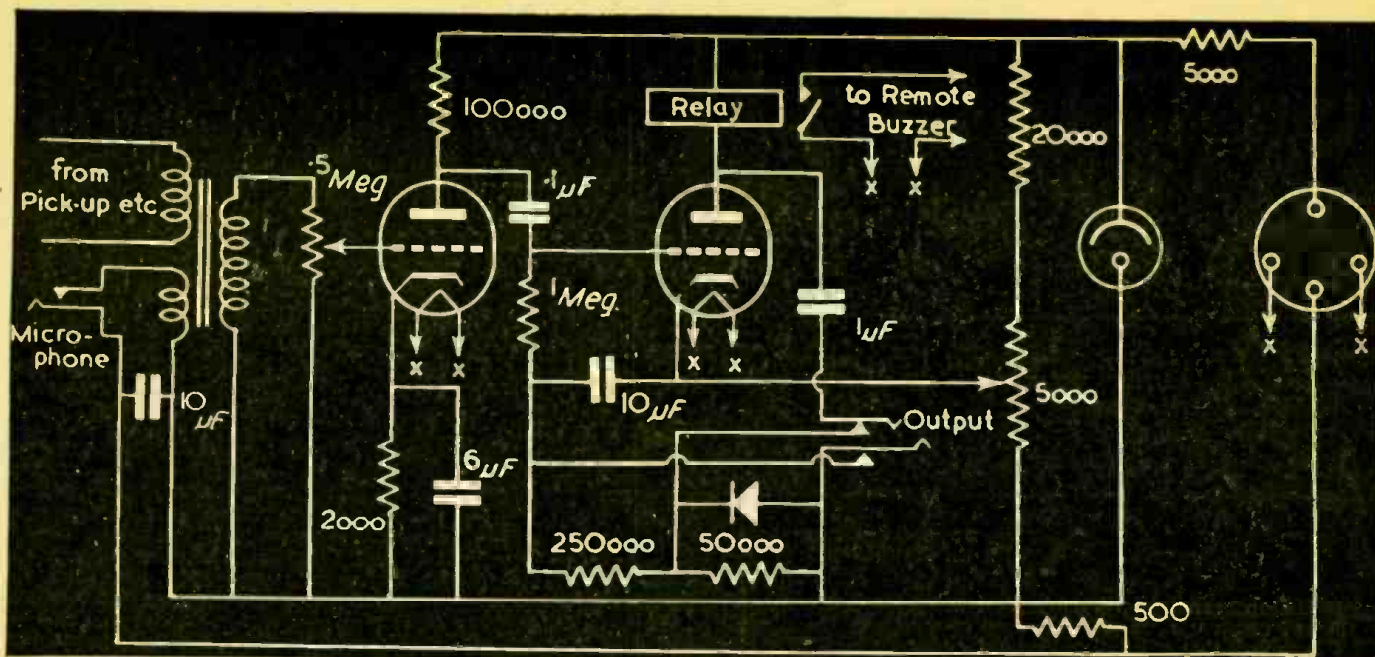


Fig. 3—By a switching arrangement, the alarm becomes an audio amplifier when not in use as an alarm. This makes it two devices in one.

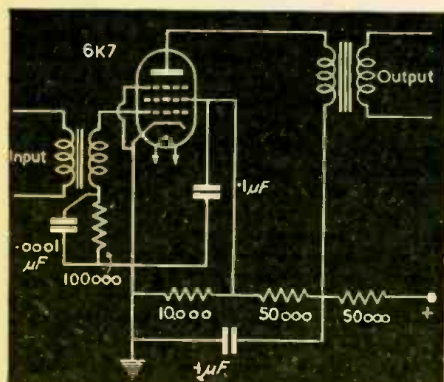


Fig. 4—Supplied with a limiter, as above, the apparatus will operate a tape recorder.

is desirable for use as an amplifier. For this reason the power supply was built as a separate unit, both units being provided with tube sockets for termination of supplies and connected together by a multicore flexible cable fitted with a tube base "plug" at each end. When operation as an amplifier is desired a high quality A.C. power supply, normally used for other purposes, is plugged in place of the simple unit described above. This system of inter-connection has long been adopted as standard on all the writer's apparatus and has proved very flexible.

By using the amplifier on a power supply which can also be used for other purposes, and by also having it fitted up so that it can be used as both alarm and amplifier, a multiplicity of uses can be secured from a small amount of apparatus.

The uses to which the Rectified Feedback Relay Amplifier can be put are many. For instance, it is very suitable for controlling a tape recorder from the output of a receiver. High level input is not essential, reliable operation being obtained with a peak A.C. input to the stage of 1 volt. In such an application it is advantageous to use a limiter stage between the receiver output and the relay stage to smooth out any variations in signal strength. Such a limiter stage is usually of the plate saturation type where low plate and screen voltages are used to limit the plate current at high signal amplitudes. A suitable circuit is shown in Fig. 4.—*Electronic Engineering, London.*

South Seas "Radio City"

THE crude board shack illustrated is more important than its appearance would suggest. It is the central (and at present, the only) station of the Mosquito Network, of Guadalcanal and the South Seas.

The new studios and transmitter, set up under direction of the Armed Forces Radio Branch of the Morale Services Division of the War Department, are housed in a typical muddy grove of coconut trees in a central section of the island. The studio, a 20 by 40 foot board shack, is the last word in Guadalcanal luxury. Consisting at present of two rooms, a combination office and control room and the studio, its plans immediately call for soft-color decorations, involving a mosquito motif, in keeping with the "Mosquito Network," name adopted.

Broadcasts are regularly scheduled each day from 5:30 to 8:15 a.m.; 11 a.m. to 1 p.m., and 5 to 10:05 p.m., times most suited for listening by the troops. The programs, under direction of Captain Spencer M. Allen, include news, entertainment and spiritual talks by chaplains, as well as recorded music and variety shows shipped in

from the United States. Local special events, band concerts, religious ceremonies, and prize fights are also presented.

All equipment, including a horizontal Marconi antenna, strung between two 60-foot coconut trees, was installed by Army engineers and signalmen under supervision of Captain Wilford H. Kennedy, formerly with WKRC, Cincinnati, Ohio. Inside units include a Rosen console, two Audax turntables, two RCA ribbon velocity and two Astatic dynamic microphones. All equipment is impregnated with a special compound against the excessive humidity.

The transmitter, an RCA 1 kilowatt high efficiency rating unit, powered by a Signal Corps 7½ KVA generator run by a jeep motor, radiates a strong signal from 35 to 50 miles. Reception at night under favorable conditions, however, extends several hundred miles. The assigned frequency carrier is 730 kilocycles.

The Guadalcanal station is the second of its kind in the South Pacific. Another, in Noumea, New Caledonia, has been in operation several months.

