A SENSITIVE VACUUM TUBE RELAY

By
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Say, gang, how would you like to hook up a very simple relay that doesn't cost a small fortune, yet one that will operate a sounder or buzzer or some other form of mechanical noise-maker or recorder? During the past few years there has been nothing that would fit the pocket-book of the average amateur, but here is a vacuum tube relay that is very sensitive and it can be made up from the usual parts laying around the shack. With a signal strength of R-5 or R-6, this relay will operate a sounder, buzzer, auto horn, or bell and the whole thing can be put together in a very short time. It will also operate a call system.

Now let us have a peep into this call system business and see what we can do with it. Suppose you have schedules with a number of amateur stations and these schedules run over a period of hours and late into the night or into the "wee sma' hours of the morning." Of course, you would like to get as much sleep as you can between schedules, but maybe the old 'larm clock doesn't talk up when it should or maybe your man forgets to keep his schedule at the appointed time. But what of it in these days of modern radio and wireless and whatnot! Throw the alarm clock in the river (if you haven't got a river handy, throw it out the window) and if your man doesn't call you at the appointed time--sleep on. Well, how do you do this? Simple!

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Make up the vacuum tube relay and get it perking right. Then set your receiver on the frequency of the transmitting station and crawl in your bunk. When your man calls you, the relay will operate your relay and if you have an auto horn hooked to the output and the auto horn located within ten or fifteen feet of where you are sleeping, you are going to snap out of it. If your man forgets to call you at the appointed time, you are not going to lose any sleep over it. The drawback is that some other station may happen on this particular frequency and set the thing off. Don't forget, too, that it is best to work this sort of arrangement with stations using crystal controlled transmitters and not with one that has a habit of roaming all over the amateur band. Write your own ticket on what may befall you in the latter instance.

For those who are experimenting with the Jenkins photo machine, this relay will be of immense help as it is a decided improvement over anything we have seen thus far.

And remote control! From 9BMY, operating on 40 meters, we controlled the 80 meter transmitter at 9EK-9XH. This distance is about 3 miles and 9BMY used a 7.5 watt tube. The more power, the greater the distance, allowing for skip distance etc. French FW and WIZ made the relay chatter for all it was worth as did many amateur signals from several districts. Constant frequency is of utmost importance unless the operator is content to twist the dials and chase the signal around. Had an ink recorder been available, many signals could have been recorded during the entire transmission. Some of them wouldn't be so

good to see in print, especially of those who try to disguise their fists. It is worth all you put into it to make your transmission as clean-cut as you can.

The present relay grew out of a few hours of experimentation with the hook-up that appeared in a recent issue of the Wireless World. It required adjustment of a regenerative circuit very close to the point of oscillation. The audio output was fed to the grid circuit of the tube in the regenerative circuit and when properly adjusted the incoming signal would throw the circuit into oscillation, thereby causing a change in the plate current. A sensitive relay in the plate circuit would then operate. A special circuit arrangement was necessary to balance out the plate current when no signal was being received. Because an extremely sensitive relay was not available and because the whole circuit was too fussy and critical for general use, it was modified with results far in excess of those originally obtained.

The arrangement of the apparatus is shown in the photo, figure 1, and the circuit diagram in figure 2. The input terminals are connected to the output of the audio amplifier in place of the head phones. Two stages of audio amplification are desirable, but not necessary on very loud signals. The audio choke (AC) and condenser (C_1) connected to the input terminals form a parallel feed to the primary of the audio frequency transformer (T) which feeds the grid of the tube. This arrangement gives slightly better results than when the primary of the audio frequency transformer was connected direct to the input terminals. A pair of head phones may be connected in place of (AC) and

these can be used for listening to the incoming signal at the same time.

The grid of the tube is connected in series with the secondary of the audio transformer (T), one terminal being connected to the slider or moving part of the potentiometer(P). Across the potentiometer is connected the "C" bias battery. The relay and milliammeter are connected in the plate circuit. The "B" battery supply, relay and milliammeter are bi-passed by the condenser (C_2). The resistance (Rs) is connected in series with the condenser (Cg) and these are connected in shunt across the relay armature contacts to prevent sparking and sticking when the tension adjustment is very light for weak signals. The relay itself is mounted vertically to permit finer tension adjustment of the relay armature.

To operate the relay: heat the tube filament to normal temperature and adjust the potentiometer (P) until the plate milliammeter falls to zero when no signal is being received. The signal is then fed to the input terminals, when the milliammeter will show a deflection for each dot and dash of each letter. The spring tension of the relay armature is then adjusted until it responds to the incoming signal. With a little care this can be adjusted to handle WIZ at 40 words per minute. All that remains is to connect the buzzer or sounder to the output and the way she goes. Yes, heavy static and other forms of interference will operate the relay, therefore the incoming signal should be above this noise level before best results are obtained. However, judging from the many reports we hear of "ur sigs fb om r8" there

should be no difficulty in finding plenty of signals to work on. It is possible to lower the noise level when the incoming signal is very strong and louder than the interference. Move the slider of (P) toward the negative side of the "C" battery until the milliammeter deflection from the interference is reduced to zero. In other words, the noise value is reduced to some value which will not produce a change in plate current and permit the relay to operate. Then, when the strong signal is tuned in, there is sufficient change in plate current which will operate the relay.

There is no end of application in this work. It is presented "as is" in the hope that other amateurs will show enough interest to carry out further experiments. Better to have the whole amateur fraternity working on it when development will possibly bring about a further exchange of information for presentation in future issues of QST.

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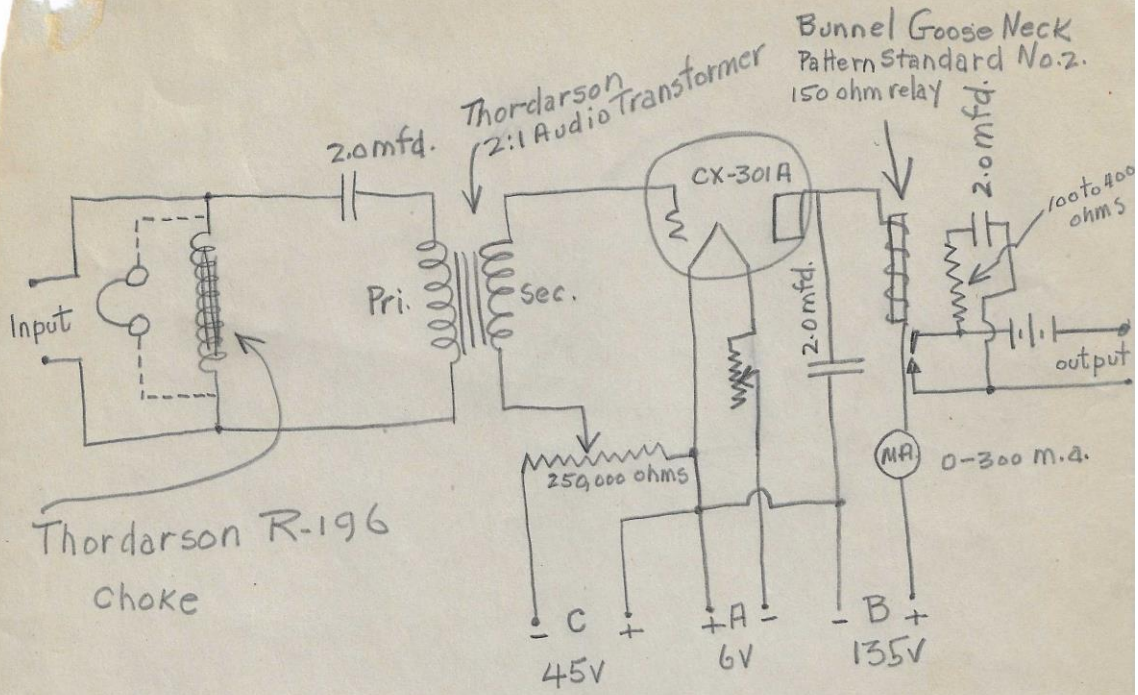

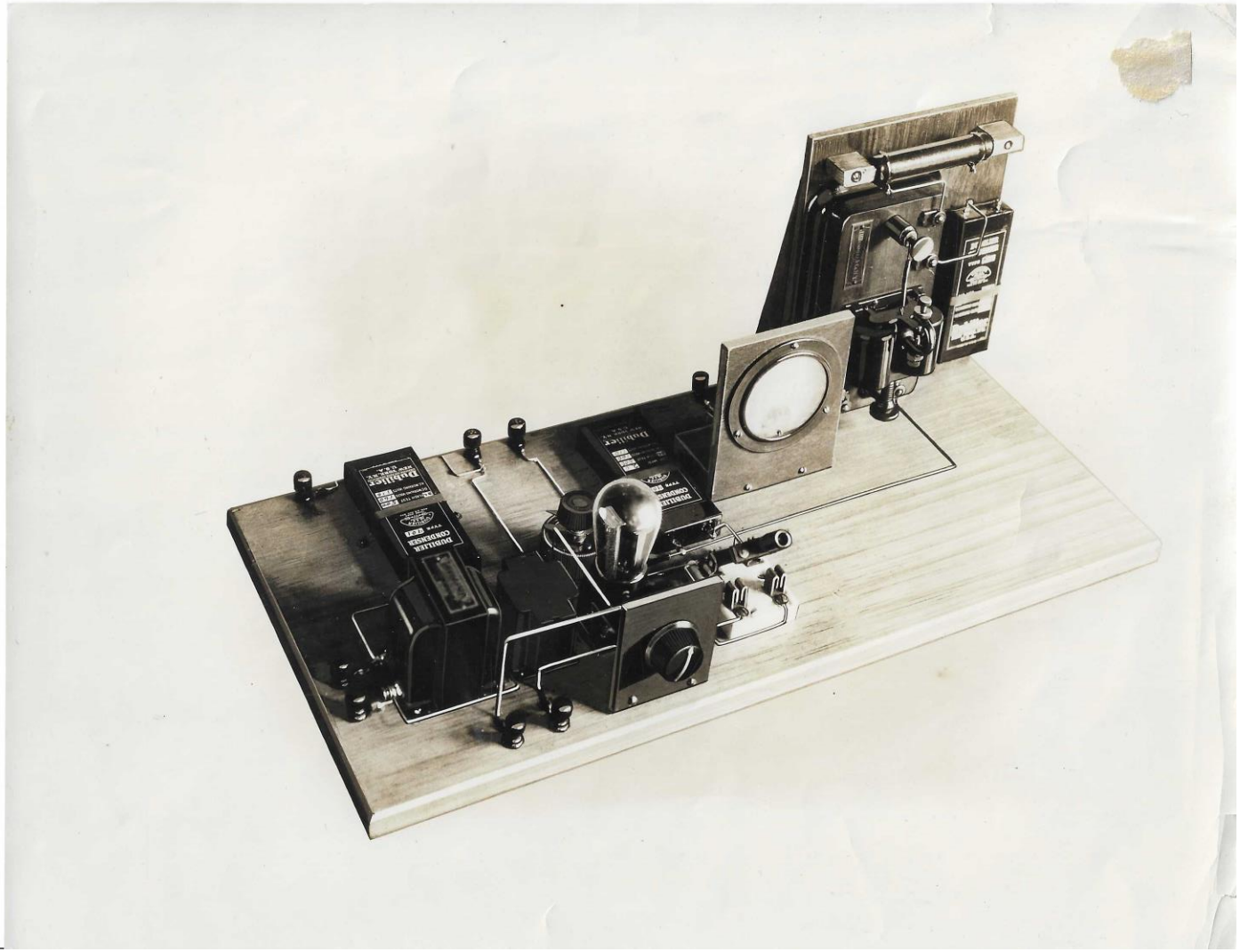
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