Testing Marconi V T's

The Electrical and Mechanical Tests That Are Necessary to Insure Efficient Tubes

WITHOUT doubt, there are but few of the readers of this magazine who have considered the care and effort that is required to produce uniformly good vacuum tubes. A summary of the tests through which the Marconi VT's pass will be of interest to those who use vacuum tubes in their experimental work.

In addition to the electrical inspection, these tubes are also carefully inspected for mechanical defects to insure that the internal elements as well as the glass and base itself are all properly constructed and in line.

The electrical inspection—which is made to determine the operating characteristic of the tube—calls, first, for a filament which will pass a certain standard current under given conditions; second, the plate voltage required for the tubes must not fall below or exceed given values; next, the insulation resistance is measured between the plate and grid and filament terminals, this latter measurement being made only after the tube has been operating for a considerable period of time at normal current.

The sensitivity of the tube as a detector is also carefully noted and checked against a standard in the test laboratory, and finally the tubes are connected in a circuit as shown in figure 1, for the oscillation test, where they must oscillate at a wave length of 250 meters, in a satisfactory manner, at a plate potential not greater than that required for the greatest sensitivity as a detector.

The Class II tubes are all subjected to a plate potential of 350 volts, which they must withstand for a certain

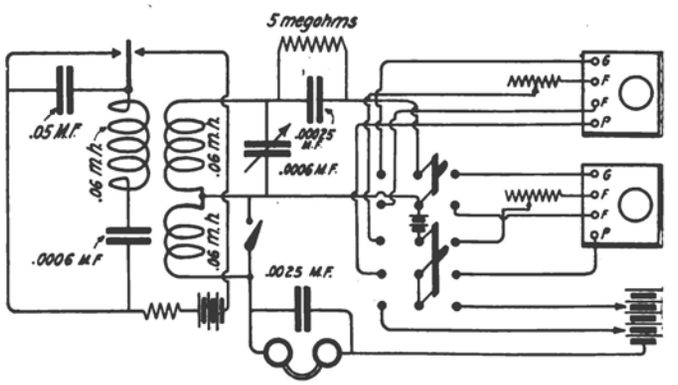

Figure 1—The circuit for the oscillation test at 250 meters

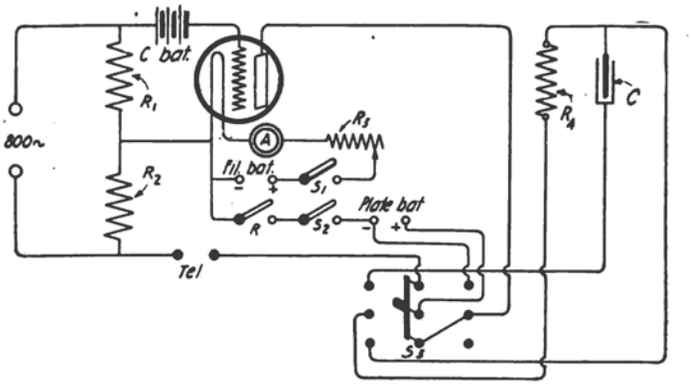

Figure 4—Circuit diagram of the Miller's bridge

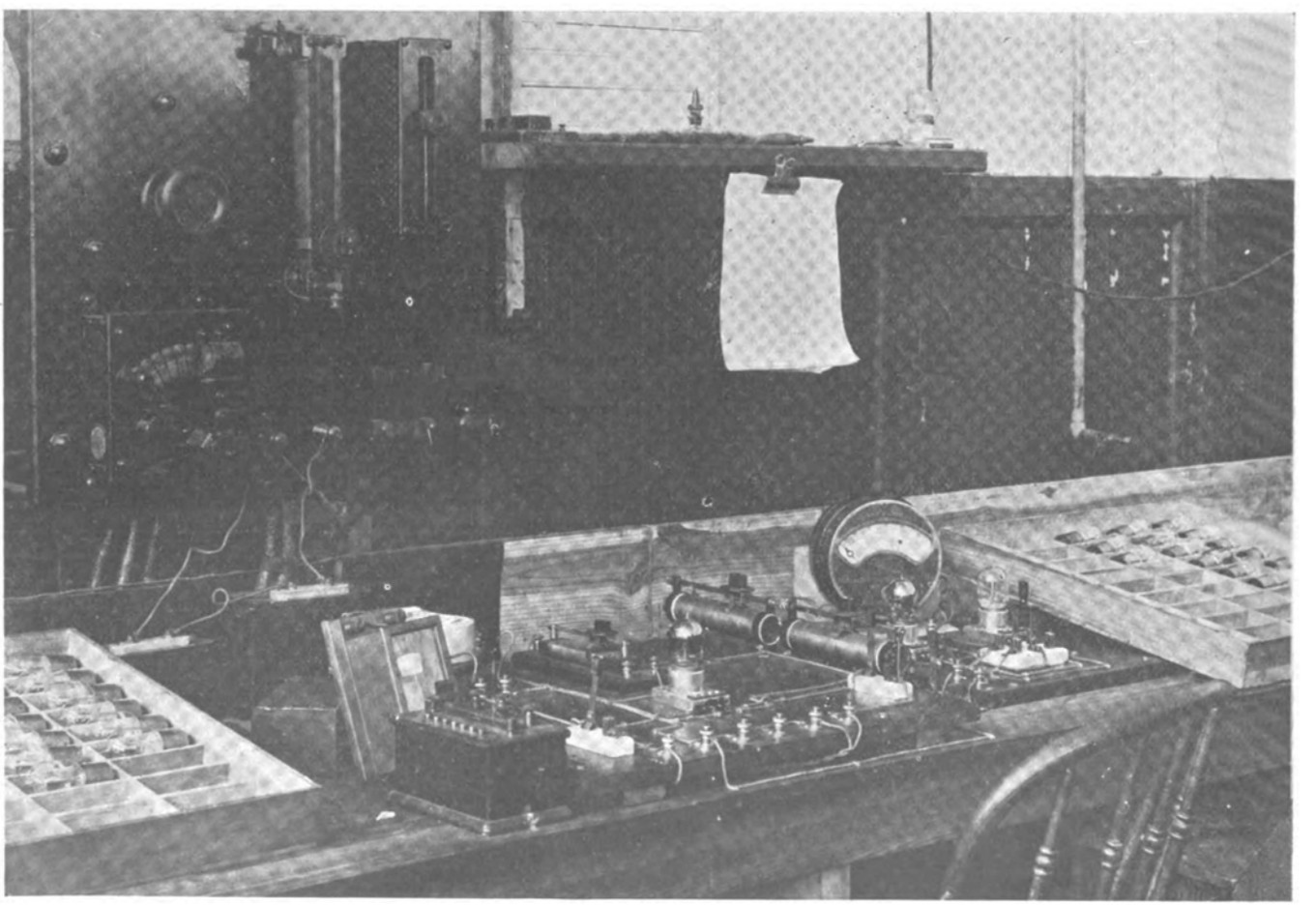

Figure 2—The layout used in the test for Class II tubes, subjected to a plate potential of 350 volts

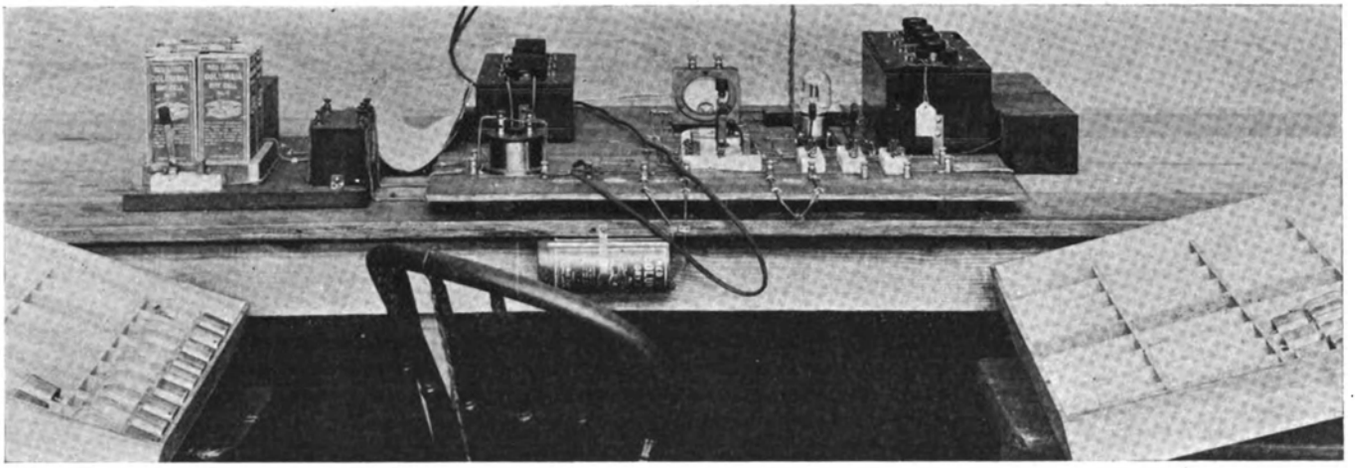

Figure 3—The instruments which make it possible to obtain the amplification constants, the internal resistance, and the voltage amplification of a tube when used with a resistance in its plate circuit

period of time or be rejected. Figure 2 is a photograph of the layout for this test. To the right is seen the plate circuit voltmeter (shunted) as well as the rheostats for the regulation of plate potential. Filament current rheostat is shown directly behind the left hand vacuum tube and the galvanometer for indicating grid current is shown beneath the generator board and directly behind a shunt resistance, the latter being connected across the terminals of the galvanometer in order to protect it in case of shorted connections within the tube under test. Figure 3 shows a photograph of a Miller's bridge set up by the use of which it is possible to obtain the amplification constants, the internal resistance, and the voltage amplification of a tube when used with a resistance in its plate circuit. A circuit diagram of the Miller's bridge is shown in figure 4. The action and operation of this bridge is described in Volume 6 of the Proceedings of the Institute of Radio Engineers. In figure 5 is shown a set-up for the oscillation test and for the detector test. A standard Navy short wave receiver as well as a standard Navy vacuum tube control box as manufactured by the Marconi Company and General Electric Company, respectively, are used in this test. A damped oscillation is supplied by the small oscillation generator on the left.

To summarize, all tubes are first tested for gas and classified as either soft tubes (Class I—detectors and oscillators) or as hard tubes (Class II—amplifiers, oscillators and detectors). The soft tubes are then tested for sensitivity as detectors, and either passed or rejected. The hard tubes are tested for amplification constant, and for oscillations, and either accepted or thrown out.

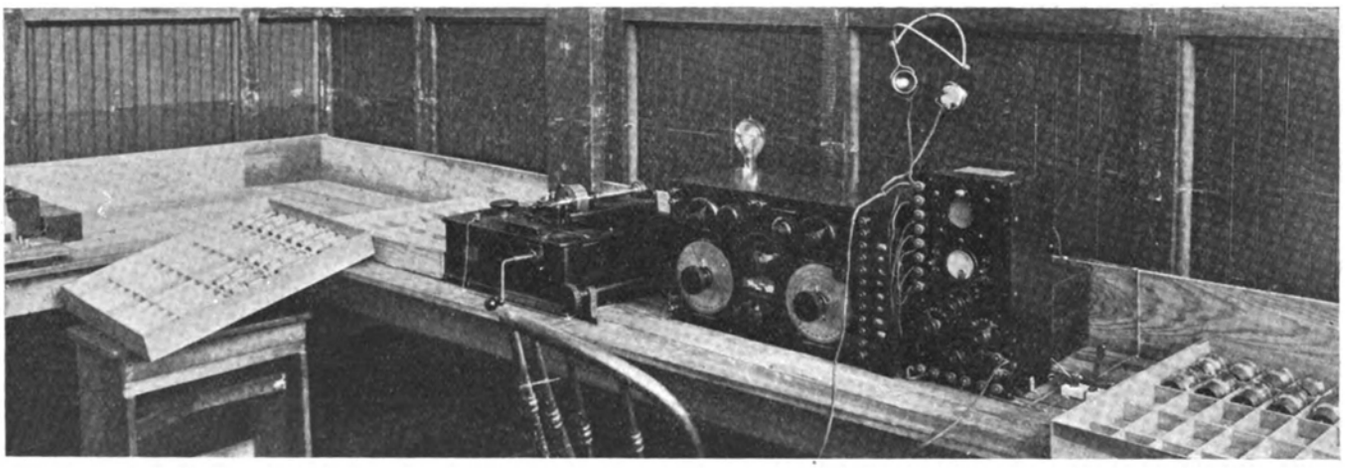

Figure 5—Apparatus for making the oscillation test and the detector test

If You Were the Editor—

It is an axiom in any magazine publisher's office that every reader is certain that the publication would be improved if the ideas he holds were adopted.

We like this spirit. We want to hear those who think THE WIRELESS AGE is not quite as good as it should be.

Let us have all those fine suggestions. It will be worth your while, for we are going to give you whatever it is you think you want.

The majority will rule, but all reasonable requests for departments or articles will be given most careful attention. —THE EDITOR