Marconi Wireless Apparatus

For Experimenters and Amateurs

COMMERCIAL DEPARTMENT

Marconi Wireless Telegraph Company of America

Woolworth Building

233 Broadway, New York City

The Marconi V. T.

THREE-ELECTRODE OSCILLATION VALVE OR AUDION

THE remarkable distances over which wireless signals are now transmitted may be attributed in a large measure to the amplifying properties of the *vacuum tube*. Although continent-to-continent wireless communication has been established with oscillation detectors of lesser degrees of sensitiveness, the Marconi V. T. (three-electrode valve) permits the same distances to be covered with smaller amounts of power.

High power stations often employ several hundred kilowatts of electrical energy, whereas the experimental station is required to operate on a restricted wave length and with the relatively small antenna current of amateur transmitters. A sensitive oscillation detector such as the Marconi V. T. is therefore an essential to communication between low power amateur wireless stations; in fact, this *ultra-sensitive oscillation detector is absolutely necessary to bring the signals up to the point of audibility* when receiving over great distances.

Amateur wireless stations using power inputs of ½ to ¾ kw. and operating at the wave length of 200 meters, *have established wireless communication with similar stations*

up to 2,000 miles. These records were directly due to the use of the vacuum tube either as a *detector* or as an *amplifier*. Such work cannot be duplicated by any other type of oscillation detector known today.

STANDARDIZATION OF VACUUM TUBES

In the earlier days of vacuum tube manufacture, the experimenter always faced uncertainty as to the quality of the tube he purchased. Some vacuum tubes were very sensitive, but had short life; others possessed varying degrees of sensitiveness and could not be relied upon for steady working. The majority of the so-called "good" bulbs had to be operated at such critical filament temperatures to bring in strong signals, that their life was only a matter of a few hours.

All these objections have been overcome in modern manufacturing methods, for engineers now know the materials best suited for the filament, grid and plate, and have developed improved methods of exhausting the tubes to a uniform vacuum.

It is now possible to design vacuum tubes, structurally, to meet any desired requirements, so that all possess identical operating characteristics. The era of standardization has arrived, and the Marconi V. T. enters the market as a highly standardized product. This insures to all purchasers a uniform degree of sensitiveness and eliminates one of the chief objections to former types of vacuum tubes.

THE EXPERIMENTER'S REQUIREMENTS

The amateur experimenter requires a three-electrode tube of universal operating char-

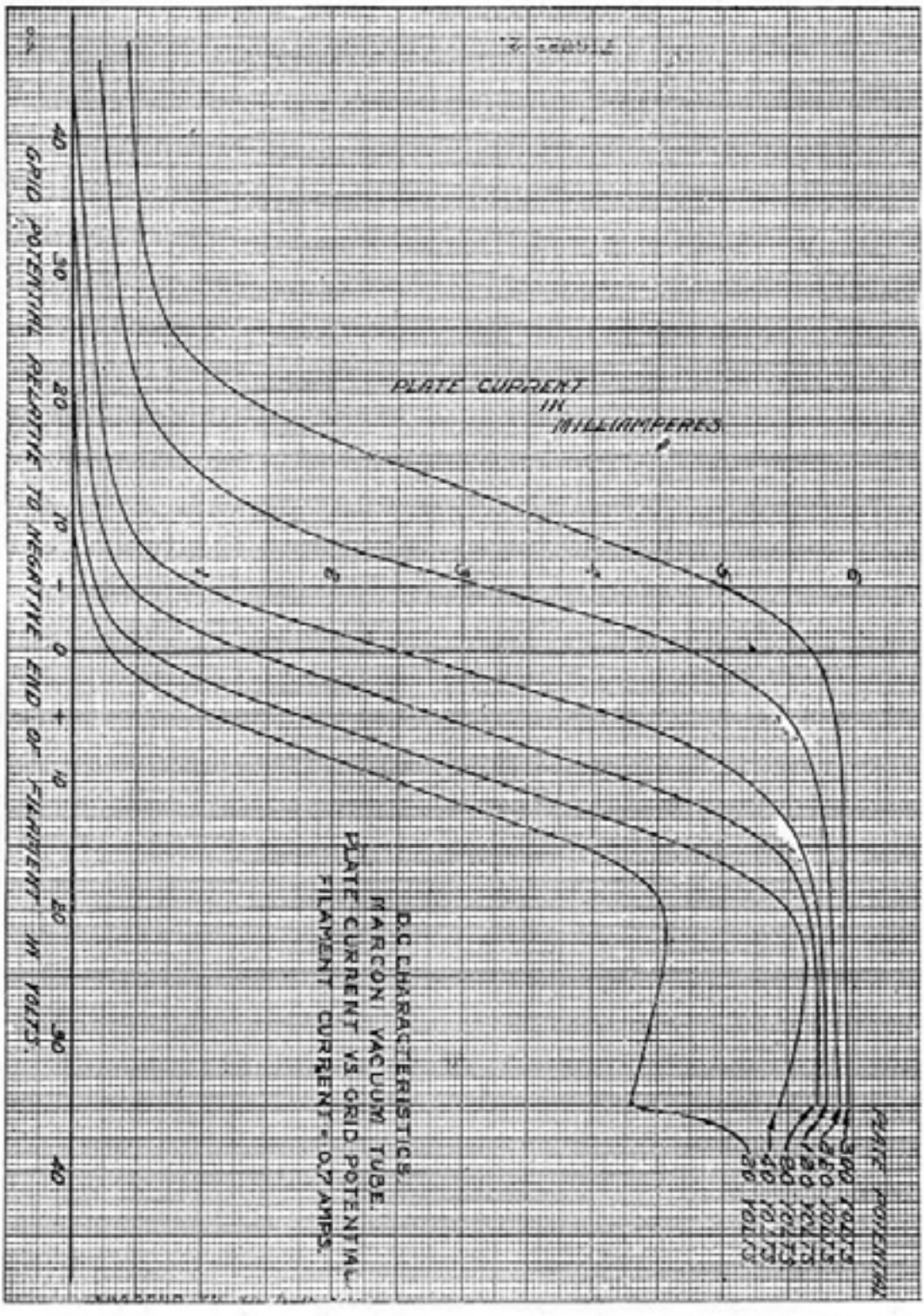

Figure 1.—Characteristic curves of the Marconi V. T.

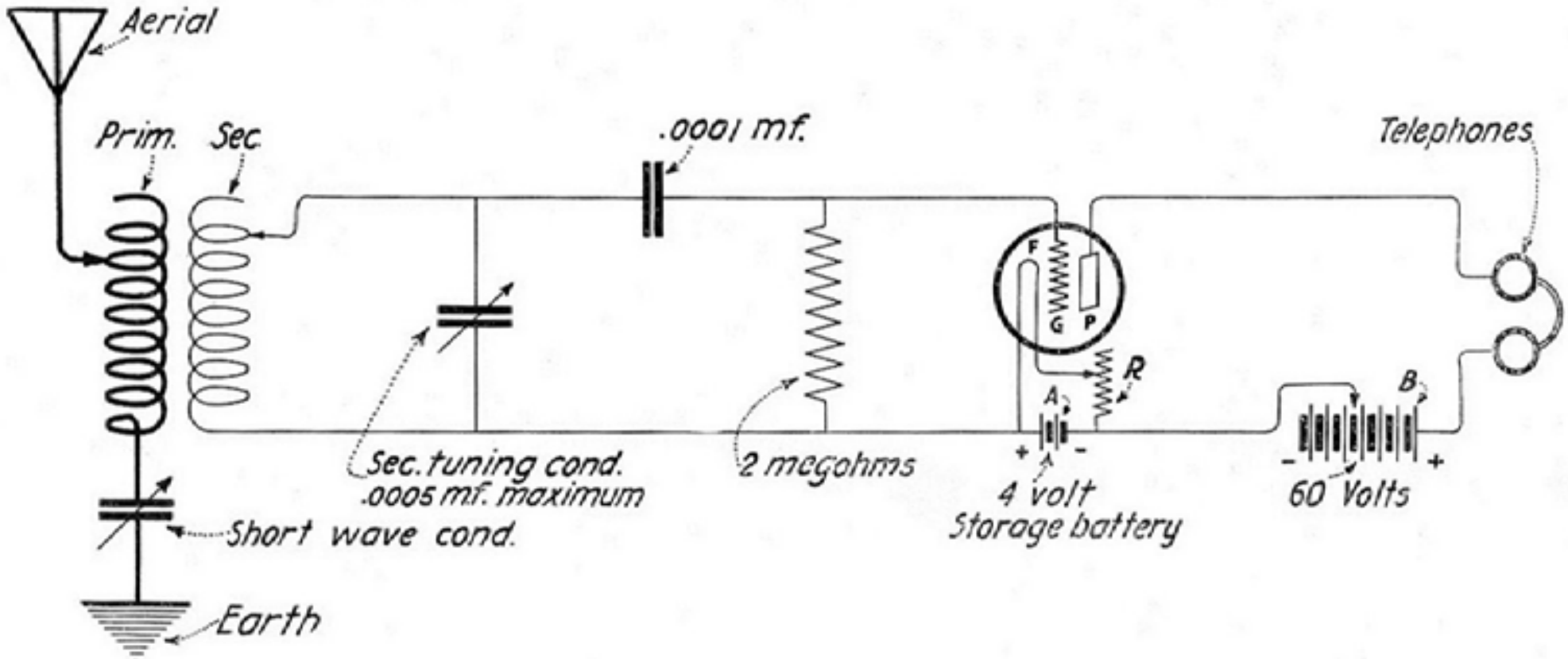

Figure 2.—The preferred detection circuit for the Marconi V. T.

acteristics—tubes designed for specific services are not suitable. The Marconi V. T. is an all-around detector, one which can be used in any sort of a detection or amplification circuit.

It operates efficiently over a wide range of plate voltages and at sufficiently low filament temperatures to insure long life.

An inspection of the accompanying characteristic curves in figure 1 will reveal desirable operating characteristics.

THE MARCONI V. T. OSCILLATION DETECTOR

No better detector for the amateur's station has ever been devised. With proper care it will function for at least *1,500 hours* with marked uniformity. It gives excellent results in amplification circuits.

The filament, grid and plate are made from materials from which *all occluded gases can be readily removed* during the process of manufacture. This prevents ionization and insures stable operation.

The Marconi V. T. is built to take the standard 4-contact base which makes all connections to the grid, plate and filament when the bulb is inserted.

PREFERRED CIRCUITS FOR THE AMATEUR STATION

The amateur experimenter is satisfied with only the best. Attention is therefore called to the *preferred detection circuit* for the *Marconi V. T.* shown in figure 2, where an inductively coupled tuning transformer is indicated. The secondary coil of the tuner is shunted by a variable condenser of 0.0005 mfd. maximum capacity. The *grid condenser* is of 0.0001 mfd. capacity. It may be fixed or variable. A *grid*

leak of *two million ohms* is connected between the grid and filament. These leaks can be made by drawing several lead pencil lines between two binding posts on cardboard, or can be purchased mounted ready for use.

The filament is rendered incandescent either by a *4-volt storage battery* or by ordinary dry batteries. The storage battery is preferred, but the filament may be operated from dry cells for brief periods with good results. If dry cells are used a series parallel connection of the cells will prolong their life. If a battery in excess of 4 volts is used a *10-ohm rheostat* should be used in the filament circuit.

The plate voltage may be furnished by a bank of *flashlight cells* giving an E. M. F. of approximately 60 volts. The telephones should be of approximately 2,000 ohms.

OBSERVE THESE PRECAUTIONS IN OPERATING

If you use a battery in excess of 4 volts, be careful not to exceed the stated filament current of 0.7 ampere.

If a low reading ammeter is not available an approximate adjustment of the filament current can be made by cutting in all the resistance at the filament rheostat and putting 60 volts on the plate circuit. The resistance is then gradually cut out (with resulting increase of the filament temperature) until the telephones indicate the strongest signals.

Then try other values of plate potential and different filament currents, keeping the filament current within the stated limits.

Do not burn the filament at higher temperatures than are necessary for strong signals, as lower temperatures tend to prolong its life.

If the filament battery exceeds 4 volts it may recuperate sufficiently while standing still so that it will burn out the filament the next time it is used. Cut in all of the filament rheostat before closing the filament circuit.

STORAGE BATTERY

A 4-volt, 20 ampere hour, storage battery is sufficient for the filament circuit of a single bulb, but a 40 ampere hour cell is preferred when several bulbs are employed in cascade amplification. But even here dry cells may be used for temporary operation.

CASCADE AMPLIFICATION CIRCUIT FOR THE MARCONI V. T. DETECTOR

The amplifying circuit in figure 3 has been found especially suitable for the Marconi V. T. It gives *60 times the strength of signals* that can be secured with a single detector tube; and because of the uniform properties of these tubes, all may be operated from the same filament and plate batteries. This saves experimenters the purchase of additional filament and plate batteries.

The "A" BATTERY—the source of filament current—should have an E. M. F. of 4 volts. The current consumption of the three tubes in parallel is approximately 2.2 amperes. Dry cells may be used for temporary operation.

The "B" BATTERY—the source of plate current—for the most successful operation should have with this circuit an E. M. F. of 80 volts.

The primary and secondary coils of the receiving transformer are indicated by the usual notations. Inductance L-2 and the shunt con-

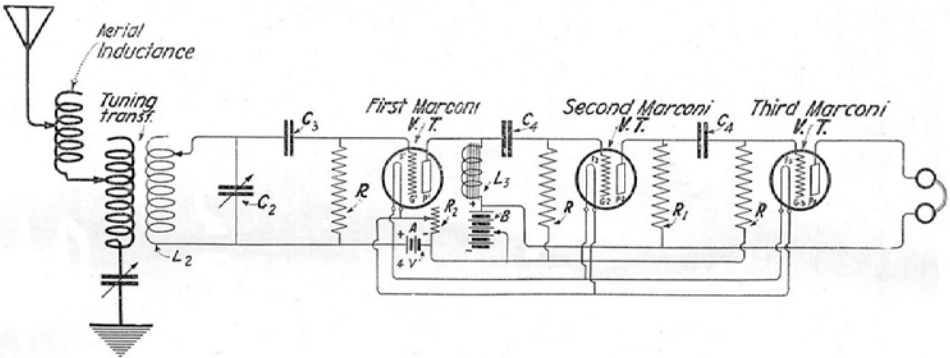

Figure 3.—Cascade amplification circuit for the Marcon V. T

denser C-2 constitute the secondary oscillation circuit. C-3 is the grid condenser of 0.0001 mfd. capacity.

The leak resistances, R, have resistance of 2 megohms each. R-1 is a coupling resistance of 2 megohms. The choke L-3 has inductance of approximately 20 henries. It can be made by winding 10,000 turns of No. 36 enamelled wire on a core of silicon steel or iron wire $\frac{5}{8}$ of an inch in diameter and 3 inches long.

Condenser C-4, should have .005 mfd. capacity. The leak resistances may be made from graphite rods or lead pencil marks on cardboard.

The circuit of Figure 3 gives remarkable results on short wave lengths and will in time become the amateur standard.

Sold only for experimental use

Fleming Pat. No. 803684
De Forest Pats. Nos. 841387-879532 3

Price of the detector, singly or in quantities, each - - -	$7.00
Price of the base - - - - -	1.50
Price of the 2-megohm resistance, mounted ready for use	1.00

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The Marconi V. T. Oscillation Detector

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