

quite definite to go upon, and we could arrange that interference would be very much less than it is at present. All that we can do now, however, is to agree that in future all stations put up shall conform to a proper scheme devised to give the greatest possible freedom of operation to itself and to all stations in its neighbourhood.

CONCLUSION.

None of these three partial solutions is alone sufficient to enable wireless telegraphy to do the work of point-to-point communication with regularity and freedom of operation. The first and the second, the Directional Solution and the Selective Solution, can be nullified by the blaring notes of the "radio hog"—the person who uses far too much power and upsets everybody else. The third, the Organisational Solution, is really our only

certain hope of being able to carry on. We want a policeman to regulate the traffic, and we must not blame the Post Office or other authorities if they, in doing so, occasionally put up their hands and stop us. The problem is absolutely international. It would be to the advantage of all interested and connected with radio telegraphy if everybody would agree to what is practically a code of manners in the use of power, wavelengths and purity of waves for every station according to the distance it has to transmit and receive and the position in which it is situated.

In putting these considerations before you I hope that I may stimulate you to give what you can of your thought, ingenuity and experiment to such subjects as the "wipe-out" in continuous waves, the limits of interference in radio telephony and generally to the furtherance of the solution of the greatest problem in radio.

TRANSATLANTIC TESTS THE PRIZE-WINNING DESCRIPTION

BY W. R. WADE.

Below we publish the article which has gained the prize offered by Messrs. Burnham and Company for the best description of apparatus used in the attempt to receive the signals from American Amateurs in the recent competition organised by this magazine in conjunction with the American Radio Relay League.

OWING to atmospheric and radiating waves from valves, probably local, on account of their intensity, reception was almost impossible, and it is quite likely that the signals recorded are not the American amateur signals at all. They were, however, on 200 metres wave and were continuous wave signals. The receiving set had not only been calibrated with a wavemeter, but a local transmitting station, with a 200 metre calibrated set, sent out signals on several occasions, and it was found that the receiving station was in perfect tune.

On February 4th atmospheric were not bad, and all was fairly quiet until 3.15, when many valves started radiating; only a few,

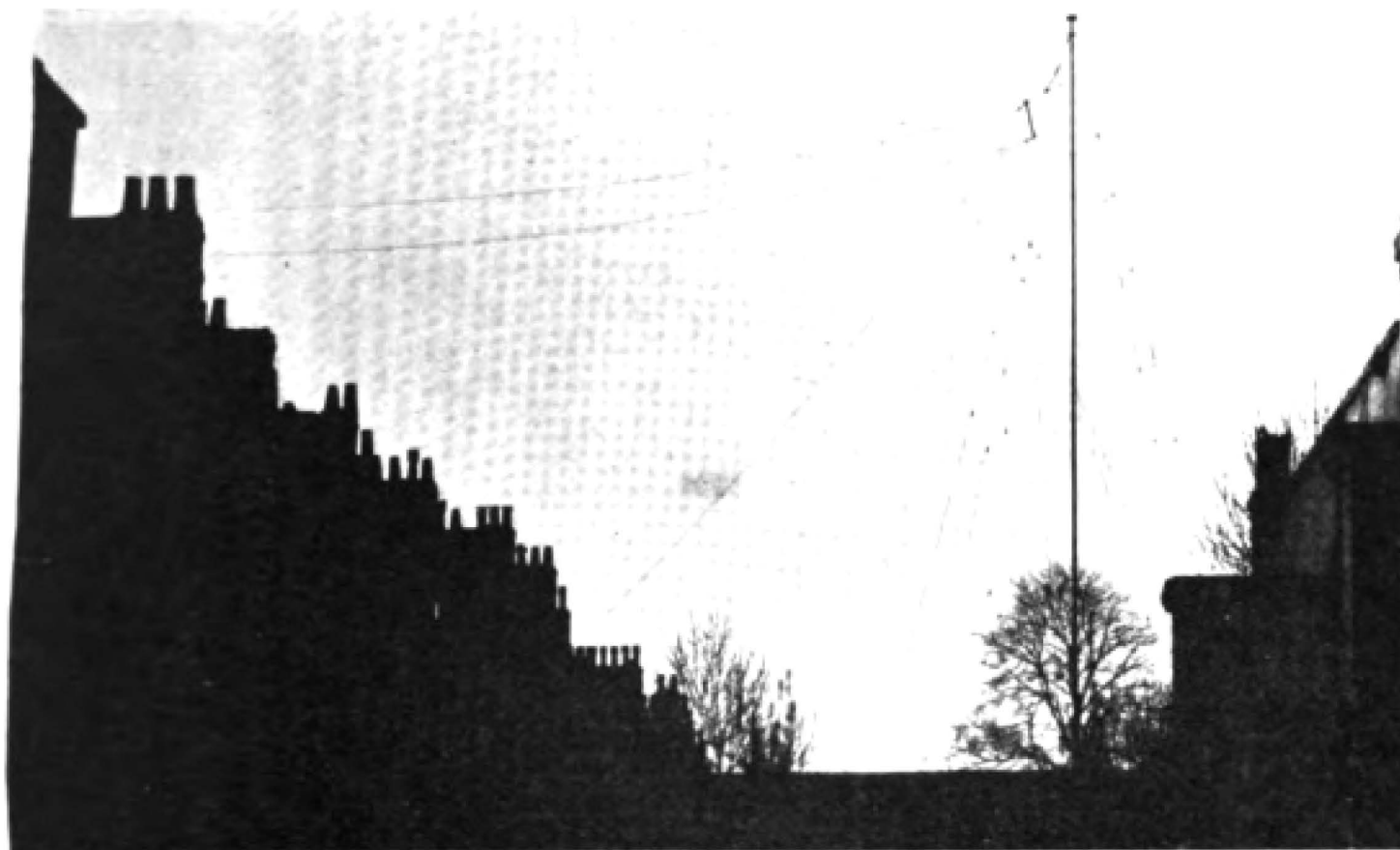
however, were objectionable, and these are marked down for destruction before the 21st inst., when it is hoped I shall have a better chance.*

It is almost impossible to give any estimate of the strength of the signals as so few were received, but I should call them very weak and only just readable.

The commercial stations which interfered with the reception of signals were transmitting on waves above 600 metres, so it was probably a harmonic of their wave which caused the trouble.

* Mr. Wade here refers to the experiment conducted by the American Radio Relay League on this date.
—ED.

TRANSATLANTIC TESTS



The Mast and Aerial.

The ship stations were not well tuned and caused severe jamming.

The set was not placed in a cabinet but laid out on a board, so that all parts were easily accessible. The aerial circuit consists of a variable condenser in series with the aerial and a lattice-wound coil as primary inductance, also connected to the earth lead.

The *Aerial*, shown in the accompanying photograph, is semi-directional for America, and is a flat top twin wire L-shaped aerial of seven-stranded enamelled copper wire, stretched on spreaders 9ft. long, and 45ft. long and 60ft. high, with a single wire lead in, and is the full length allowed by the P.M.G. It is very well insulated and shows no leakage on a sensitive galvo until over 50 v. are put into it.

The *Earth lead* is connected to the water mains, but has an additional connection to a copper wire laid 3ft. deep in the ground following the line of the aerial above.

The *Secondary* circuit, included in the diagram of connection, is coupled to the

oscillator, and consists of a secondary lattice-wound coil with a variable condenser, a coupling coil to the oscillator, a vacuum valve detector, with grid condenser, grid leak, and the usual L.T. filament battery of 6 volts and resistance, and 50 volt H.T. battery.

The *Oscillator* forms part of the secondary circuit and consists of grid and anode inductances, attached to the coupling coil of the secondary inductance, a large variable condenser to adjust the beat frequency and a small vernier condenser to adjust the beat to the critical point, and a vacuum valve oscillator, served from the same batteries as the detector.

The 5-step *Amplifier*, with intervalve resistance couplings, is of the usual type, and is coupled to the secondary circuit by means of primary and secondary tuned coupling coils, each fitted with a variable condenser. These coils are lattice-wound and are of equal value. The first and three subsequent valves are amplifiers and the last, a soft valve, is

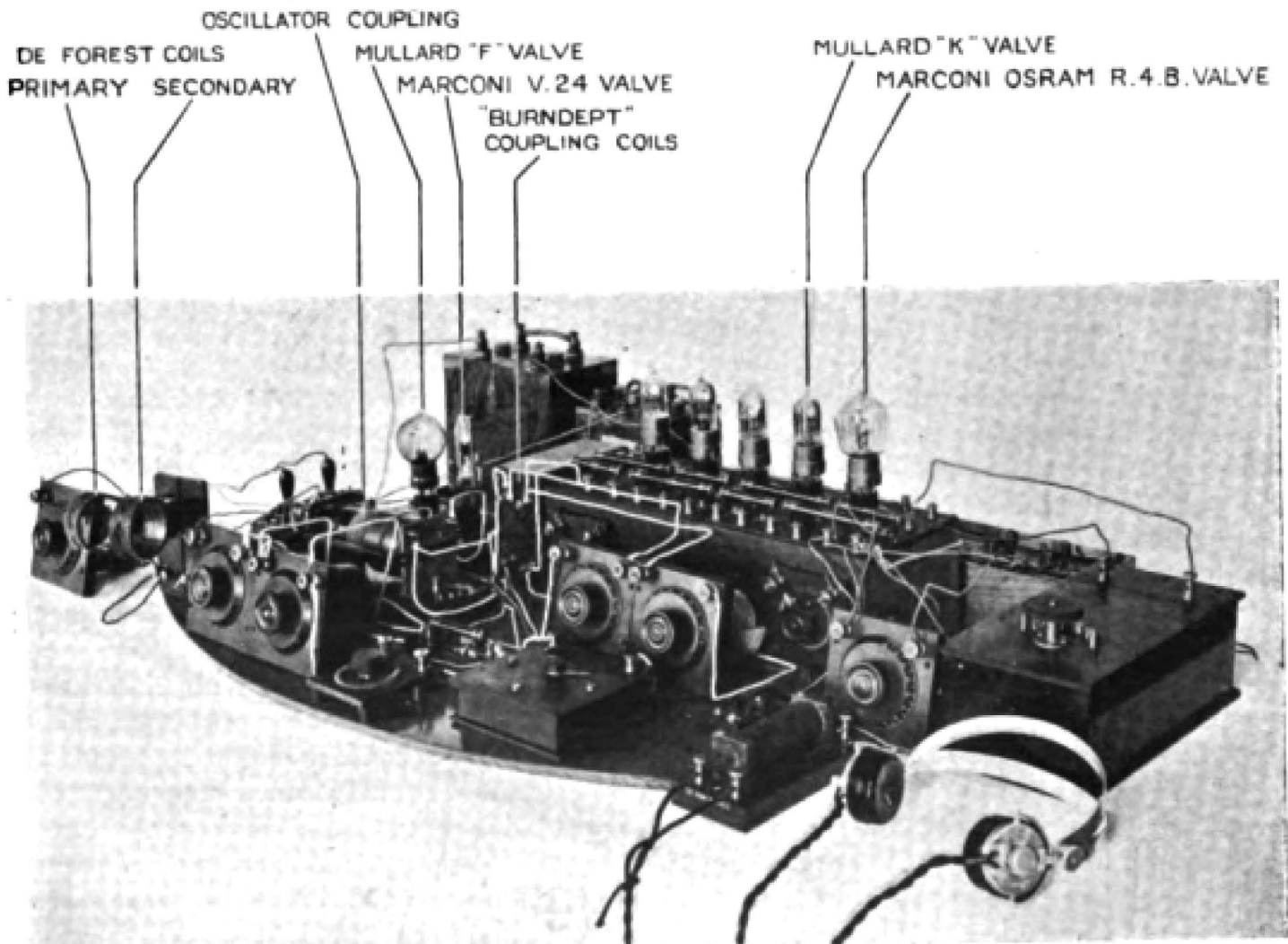
the rectifier, and is controlled by a separate filament resistance ; the amplifier also has a separate filament resistance. The whole of the valves are fed from a 4-volt filament lighting battery and an anode battery of 120 volts. The telephones are of 120 ohms and are used with a transformer. There are two condensers across the telephones, a variable and a fixed ; the fixed is provided with a short circuiting switch.

A large number of different Valves were tried, and the final selection was: for the detector, a Mullard F. ; for the oscillator, a Marconi V.24 ; for the amplifier, 4 Mullard K. valves ; and for the rectifier a Marconi Osram R.B. 4. At first sight these looked a mixed lot, but for some reason or other they gave the best results in this circuit.

The set used was not a bought one, but a home-made affair, quite crudely constructed and more efficient than ornamental. The parts used were supplied by the following firms :—

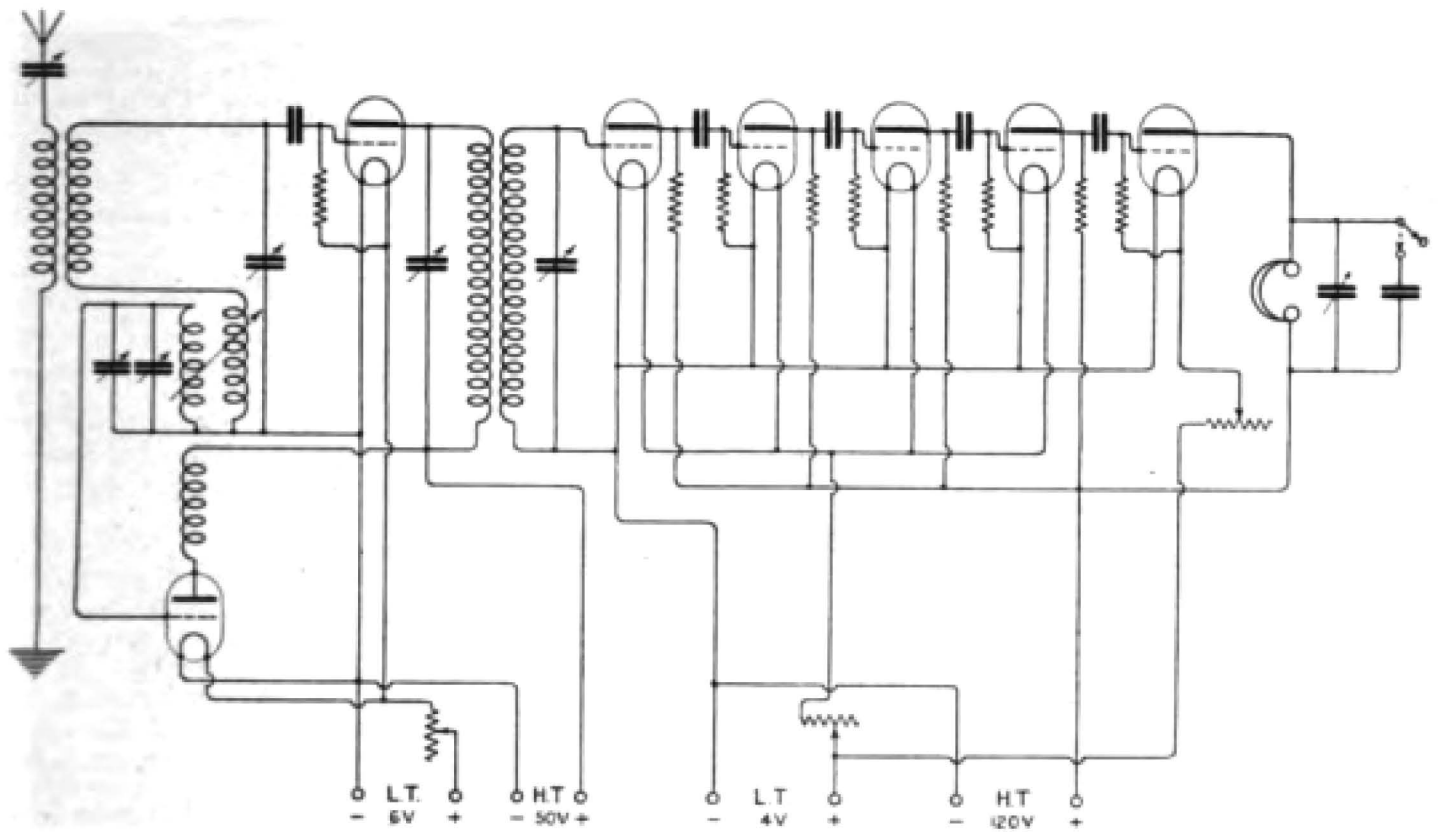
Primary and secondary lattice-wound coils, made by De Forest, were supplied by Messrs. Burnham and Co. The amplifier coupling lattice-wound coils were Messrs Burnham's "Burndept" coils. The oscillator, grid, anode and coupling coils were home-made. The condensers and rheostat were ex-Disposal Board, rebuilt. The V.24 valve and holder, the grid condenser and leak, the resistances and leaks and other parts were from Messrs. The Marconi Scientific Instrument Company, The Marconi Osram R.B. 4 valve, was supplied by Messrs. Burnham and Co., the Mullard F., 4 Mullard K. valves, valve bases terminals, 4 accumulators, 2 high-tension batteries, Brown's telephones and telephone transformer, as well as other materials and all the wire were supplied by Messrs. King and Co., of Bristol.

The station is situated on almost the highest point of Clifton, Bristol, within a few hundred yards of the Suspension Bridge, the chains of



The Apparatus Employed.

TRANSATLANTIC TESTS



which bridge used to span the Thames at Hungerford. The bridge is 300 ft. above the tidal river Avon, and the station is on about the same level. At a point about a mile away and on the same level as the station, there is, looking west, an uninterrupted view of the Bristol Channel. It has been noticed on several occasions that when particularly good signals are received the river is on the flow.* The station is surrounded by houses, but as the aerial is well above them no screening has been experienced. Although the station is so near to the Suspension Bridge the signals do not seem to be influenced by the huge mass of metal of which the bridge is built.

In conclusion, I am much indebted to my friend, Mr. A. L. Megson, of the Wireless Society of London and Chairman of the Manchester Radio Scientific Society, for coming to Bristol to help me to receive these tests, and also to Mr. Maurice Burchill, of the Bristol Wireless Society, for his assistance in receiving the test signals and for sending me test signals for tuning purposes.

* Perhaps some readers could suggest an explanation of this phenomenon or quote similar experiences — Ed.

Although the tests, as far as I am concerned, have been a failure, chiefly on account of the want of consideration, or the gross ignorance of other amateurs, probably local ones, in preventing me from hearing the signals, I have derived a considerable amount of experience which will help me in the next test.



The photograph illustrates the three-valve, low frequency amplifier which Messrs. Burnham and Company are awarding to Mr. Wade.