

than the capacity reactance and the current will lag behind the applied oscillating voltage, and its value will be limited by the impedance of the circuit—the difference between the inductive and capacity reactances. If however, the wavelength is above the natural wavelength of the amplifier, the capacity reactance will be greater than the inductive reactance, and the current will lead the applied oscillating voltage, and will be limited by the impedance of the circuit—the difference between the capacity and inductive reactances.

It will thus be seen that in passing from below to above the natural wavelength of the amplifier the direction of the current flow has been reversed. Hence in order that the set may oscillate, the reaction coil must be reversed.

A little thought will show that for a multivalve transformer amplifier to oscillate with one reaction coil having either one, two, three, or more valves in circuit it is necessary to so design the reaction coil that the set will oscillate satisfactorily with one valve. Then as the number of valves is increased, and the current changes become larger, the coupling between the reaction coil and main inductance may be weakened, by separating them, in order to obtain the best results.

The amplification value of a transformer amplifier.

A valve is said to have an "amplification factor" of say 5 when a unit change of grid potential gives the same change in the anode current as a change equal to 5 units in the anode voltage would do. With a multivalve amplifier, if the first valve gives a voltage magnification of 5, the second valve will give a voltage magnification of 5 times 5 = 25, because the voltage change of its grid is

5 times the voltage change on the first grid. A third valve will give 5 times 5 times 5, equal to 125 voltage magnification. This assumes that there is no loss in the transformers. However, with copper wire transformers, the loss will be very small at the resonance wavelength, and the amplification per valve will almost equal the amplification factor, but with a resistance transformer, owing to loss due to the resistance of the windings, the voltage amplification per valve is considerably less than the amplification factor. For example, the voltage amplification of a valve with an amplification factor of 5 will be about 3 when used in a resistance transformer amplifier. This difference will be appreciated when it is realised that instead of 5 times 5 times 5, equal to 125 quoted above, this would become 3 times 3 times 3, equal to 27. From this the importance of making extremely efficient transformers for resistance amplifiers will be realised. To obtain the best efficiency the resistance of the transformer should be approximately equal to the anode resistance of the valve when the grid is at the normal working potential. This valve is of the order of 30,000 ohms, and therefore, to obtain an efficient transformer, the winding must be done with the finest wire obtainable so that the required resistance may be obtained on a small former, and thus keep down the self capacity of the winding.

In the next issue we hope to deal with the method of measuring the voltage amplification at different wavelengths, and thus obtaining the true maximum wavelength of the amplifier. Also we hope to deal with two or three types of transformers.

(To be continued.)

SHORT WAVE ATLANTIC SIGNALS

A PLEA FOR GENERAL CO-OPERATION IN A GREAT EFFORT TO
ATTAIN SUCCESS.

Date and Time of the Signals.

As announced in the September 17th issue of *The Wireless World* these Test Signals will

will be transmitted by American experimenters each evening commencing at midnight, G.M.T. from Dec. 8th to Dec. 17th, inclusive.

SHORT WAVE ATLANTIC SIGNALS

Wavelength and Power of Transmitting Stations.

The wavelength which will be used by American transmitting stations is 200 metres, and the power will not exceed 1,000 watts. It is to be expected that there may be some slight divergence from the exact wavelength, but this is unlikely to exceed about 15 metres either way.

Number of Transmitting Stations.

It is understood that, at a Convention of the American Radio Relay League held in Chicago, August 31st-September 3rd, the wildest cheering greeted the announcement of the Transatlantic Tests, and applications to take part were made in hundreds. We are informed by the American Radio Relay League that there will be, in all, ten or fifteen thousand transmitters, both spark and C.W., taking part in a preliminary distance test to be carried out in America, and those who are the most successful will be chosen to transmit for the Transatlantic Tests.

Prizes for Successful Competitors.

A number of valuable prizes are being offered by various manufacturers of wireless apparatus to be awarded to those who are successful in the reception of the signals. Particulars of these prizes will be given in a later issue of *The Wireless World*.

The Importance of the Tests.

One can hardly over-estimate the scientific interest which the successful reception of short wave signals over this distance would create.

How to Enrol for the Tests.

All who wish to take part in the endeavour to receive the Transatlantic Signals should send in their names to Mr. Philip R. Coursey (who is the organiser on this side of the Atlantic), c/o The Wireless Press Ltd., 12-13, Henrietta Street, London, W.C.2. The following particulars are all that is required :—

1. Name.
2. Address.
3. Type of receiver to be used.

4. Size of aerial.

5. Greatest distance from which short wave signals (*i.e.*, under 300 metres) have been heard.

America's Enthusiasm.

American amateurs have considered the question of sufficient importance to vote a considerable sum of money, through the American Radio Relay League, to send over to this country one of America's experts in short wave reception, in order that, in endeavouring to get the signals, he may know for himself the difficulties to be encountered.

There is no doubt that the American amateurs, in sending over a representative to this country, do so with a feeling of considerable assurance that he will meet with success.

Now it is not to be thought of that English amateurs should stand aside and watch our American friends achieve the success so far denied to us, who have already had the advantage of a rehearsal in the Tests conducted last year. The American magazine *Q.S.T.* commented on the lack of success in the Tests carried out last year in the following words :—

Such reception is a new field for British experimenters, and they hardly can be expected to show the same performance as an American dyed-in-the-wool ham who has learned how to get amateur DX only after years of patient struggle. We have tested most of the circuits used by the Britishers, and find them one and all decidedly inferior to our standard American regenerative circuit using variometer tuning in secondary and tertiary circuits. We would bet our new spring hat that if a good U.S. amateur with such a set and an Armstrong Super could be sent to England, reception of U.S. amateurs would straightway become commonplace.

We do not mean to deprecate the loyal co-operation shown by our English confrères, however. For the admirably complete way in which they go into a problem we have the greatest respect, and we are most sincerely grateful for their interest and enthusiastic co-operation in this, our first attempt to get overseas on schedule. We will all hope for better luck next time.

If our efforts were so criticised then, one dares not think what will be said if a "good U.S. Amateur" must come over here to show us how it should be done !