

Amplifying the Current.

If the wireless signals are to be heard from the loudspeaker there must be some means of increasing the output. As the input is an electrical current there is one suggestion, add more current, and this is done by means of the battery. Batteries then are an essential if the current is to be magnified; naturally by batteries, any form of battery eliminator which serves the same purpose is implied.

But batteries themselves cannot be applied to strengthen the current and some device has to be used to split up the battery current so that the incoming signals may be mixed up in it. Such a device is found in the radio valve. There are, then, two essentials of magnification—the valve and the battery. The remaining components that go to make up the amplifier are added according to the special need of the circuit in question.

With the addition of the valve there is possible a little more variation in the form of the circuit. The valve may be made to amplify the current before or after it has passed through the detector. According to its position it receives the name radio or audio amplifier or magnifier. The former denotes that the valve is magnifying the current before it is detected, the latter that it is being magnified after it has been through the detector.

The owner who wishes to amplify the output of his crystal set has then the choice of two positions of the valve.

Generally the valve comes after detection, and is consequently an audio valve, or, as one may say more technically, one stage of audio, has been added. Apart from these two variations in the position of the valve there is little choice in the placing on the components.

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Our Crystal Corner

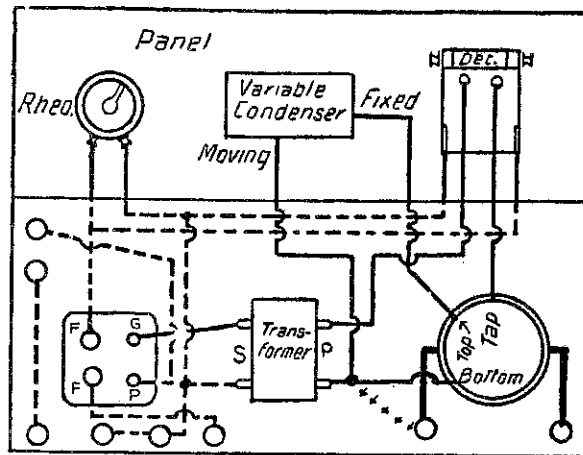
By "Galena"

The Audio Amplifier.

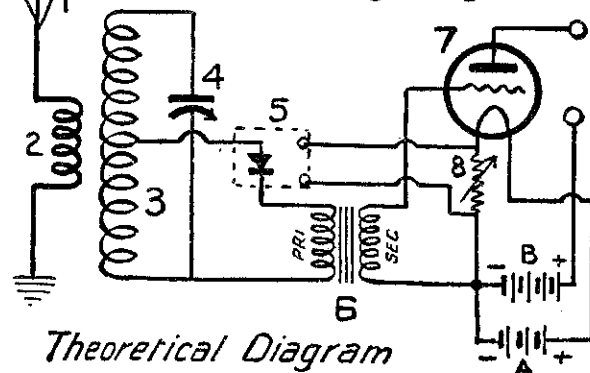
THIS is the most used and will be described first. Of audio amplifiers there are generally two types—the transformer and the resistance coupled. To enter into the respective merits of these two types would be beyond the scope of this corner, but the crystal owner who is interested will find much assistance in "Pentode's" notes on the construction pages of this issue.

replaced by B. This signifies that in inter-valve coupling the P terminal is usually connected to the plate of the preceding valve, while the high tension or, as we call it, the B battery passes into the transformer through the B terminal.

These letters, of course, mean nothing to the crystal set owner, who has no other valve to connect the transformer to, so the connections are



+45 -B -A +A' E A
Wiring Diagram



Theoretical Diagram

Generally, too, the transformer coupling is necessary for the single stage amplifier, as to get reasonable strength the maximum must be obtained from the one valve, so that the transformer, which itself steps up the output, is an amplifier.

Considering an ordinary four point valve or, more correctly, a three electrode valve, the orthodox connections are as in diagram 2. That is, the transformer immediately follows the crystal, the 'phone terminals being connected to the primary winding.

In the older makes of transformers the lettering on the terminals of the primary was IP, OP, standing for input primary and output primary. Now the transformers are differently marked, but are nevertheless the same inside. The IP has been replaced by P for plate, while the OP has been

made to the 'phone terminals which bear the signals he wishes to amplify. The manner in which these are connected matter little, but it is most consistent to connect them thus—the 'phone terminal direct from the crystal to the IP or P.

How a Valve Amplifies.

THE secondary of the audio transformer transfers the signals to the valve. The terminal marked "G" on the newer type of transformer, or O S on the older type, always goes to the grid of the following valve.

The signals then coming in from the primary pass through the magnetic field in the transformer to the secondary winding. By the action of the transformer, they are stepped up or magnified, and in this condition go to the grid of the valve. Through the re-

mainder of the filament circuit a continuous flow of electrons is supplied from filament of the valve to the plate. This, mingling with the electrons on the grid, which carry the signals, magnifying them, and take them on to the plate.

From this one would expect the lead from the plate to go to the speaker on the telephones. This it does, and the filament circuit then remains.

The remaining terminal of the transformer, that is the one marked ISP or GB, is connected to the A battery or C battery if bias is to be used. This seems to trouble quite a number of our constructors. In constructing a larger type of receiver, grid bias is an essential, and as this is placed between the A battery and the grid via the secondary of the transformer, the letters GB on the transformer indicate this battery, or the negative of this battery, is to be connected there. To complete this circuit, the C positive is connected with the negative A.

Is a "C" Essential?

EVEN in constructing a one-valve amplifier, it is advisable to incorporate a grid bias battery. This not only improves the tone, but prevents the B battery running down too quickly. If the diagram the constructor is using does not contain a reference to the C battery, it is quite simple to break the lead between the negative A and the secondary of the transformer, and insert the C battery, remembering that the negative must go direct to the transformer and the positive to the A negative.

The A negative connects to the filament of the valve, passes through the filament, and then to the A positive; thus the filament circuit is completed, and current can flow from the positive through the valve back to the negative, and so cause the stream of electrons to be issued from the filament.

How to Break the Circuit.

THIS process, naturally, cannot go on for ever, otherwise the A battery would not last long, so it is necessary to make some adaptation in this circuit to prevent the current flowing all the time.

There are principally two methods of doing this: by insertion of the switch or a rheostat. The latter is to be preferred, as the use of a switch can be likened to the repeated application of breaks to a car without having first turned the benzine off. The car will stop and the flow of benzine will stop, but the sudden jar is detrimental to the machine.

Exactly the same takes place here, and it is better by using a rheostat, to gradually turn off the current. The use of a rheostat, too, has the decided advantage that a valve with a different filament voltage to the battery may be used. If this is the case, care must be taken that the rheostat is not turned on full.

The rheostat may be placed anywhere on the A circuit, but it is usual to place it between the A negative and the filament. The grid bias, of course, will go direct to the A negative terminal, and not between the rheostat and the filament, although this will not make much difference, but the former position is more simple in point of wiring. So much then for the filament circuit.

(Continued next week.)