A Diagnosis of Radio

Descriptive Non-technical Talks on the Elements of Radio

by

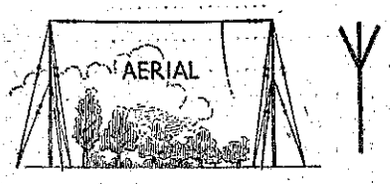
The Technical Editor.

This week we are starting a series of illustrated articles on the fundamentals of radio. We propose to take all the common parts of a wireless set and show both, by pictorial and theoretical diagrams, what they are, and in a few brief, non-technical sentences, to define them and then to say something about the working of each. It might be added that this series of articles is the outcome of several requests that we go back to the more elementary stages of home-construction, and we cannot do this until we have told constructors-to-be what it is all about. But these articles are not written up solely from a constructional point of view. They are intended to interest everyone who is interested in radio. We would like the expressed views of correspondents concerning them; whether they are too technical or not technical enough. If there is anything we appear to miss, and if the interested reader will merely write in and ask for it, we will give every consideration to its being included in this series. And now we start.

The Aerial

THE word "aerial" implies something to do with the air, so that the proper definition of an aerial would be "a wire or collection of wires in the air to collect waves that come from the broadcasting station."

Generally speaking there are two types of aerials—an inside one and an outside one. An inside one may consist of wires slung about the room.



underneath the carpet or in the attic. but no matter how good an indoor aerial may be, it is not nearly as efficient as a good outdoor aerial. Of the outdoor aerials, there are two main types, the "T" aerial, the lead-in of which comes from the centre, and the "L" aerial, the lead-in of which comes from one end. The lead-in connects the aerial with the set, and when measuring it must be counted as part of the aerial. Here are some facts about aerials:—

1. The best aerial is vertical without any horizontal portion whatever.

2. The next best is the "L" shape as high as possible, with the top portion short in comparison with the lead. Altogether the total amount of aerial should not exceed 100 feet, although for small sets, it is sometimes advisable to have 200 feet or even more.

3. The more aerial you use the less selective your set becomes—in other words, you will find difficulty in separating one station from another.

4. If the "T" aerial is used the effective length is that between the set and one mast, i.e., the flat top is equal to half the length of actual aerial minus the lead-in.

The aerial must be as clear from trees and buildings as possible. Trees have a screening effect upon the radio waves.

6. If there must be joints, see that they are soldered.

7. Have the aerial so that it can be let down for cleaning without lowering the masts.

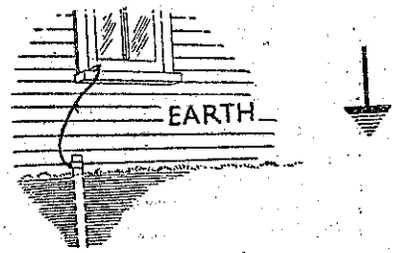
8. Use plenty of insulators and arrange so that the aerial proper is well away from the mast.

9. The most satisfactory wire is 7/22 enamelled.

The Earth

THE Americans call it "the ground."

The aerial may be regarded as a set of condenser plates and the earth as the other set. Therefore, it is as important to get as good a connection to the ground as to the aerial. Many modern sets automatically make their ground connections through the a.c. mains or through an eliminator. Sometimes you will find that by grounding an a.c. set you will get less strength



than if that connection is left off. Sometimes by putting the ground wire on the aerial terminal, better results are obtained. Here are some facts about the ground:—

1. The ground can be a water-pipe, a series of pipes or any metal buried in the ground.

2. In fillings, refuse, etc., is the best place to make an earth connection, gravel is the worst.

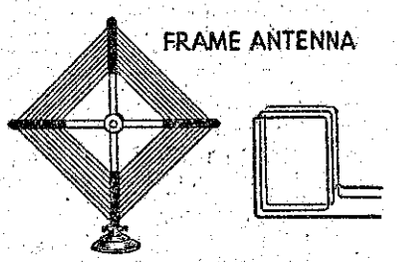
3. The earth connection must be kept damp and fairly warm. Throw a bucket of salt water on it every few weeks.

4. The diameter of the pipe used for ground connections is not important, but see that its connection with the earth wire is a good one. It is difficult to solder to a galvanised pipe, so use a clean clamp. Take it off and polish it up occasionally.

There is little to be gained by driving a pipe more than 6 feet into the ground, or by filling a copper or any hollow conductor with charcoal or any carbon. It is a bad conductor.

The Frame Antenna

THE frame antenna is a device used indoors for picking up the waves from the wireless station. It is a kind of aerial, but it works on a totally different principle from the other types. It is really an enlarged coil of the set, and for this reason it cannot be connected between the earth and the earth terminals. It must supplant the

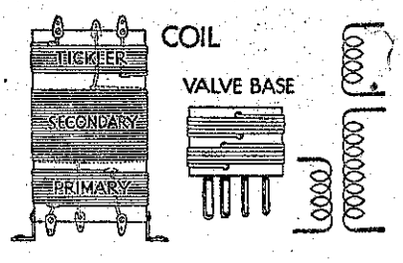


aerial coil and, like it, be tuned by a condenser. One side of the frame goes to the grid of the first valve and the other side to earth. When regeneration is used, that is, a system whereby energy is fed back into the detector coil to get greater strength, the frame antenna is tapped as is shown in the theoretical sketch alongside. A frame antenna is strongly directional and must point in the direction from which the radio waves are coming.

Coil Tuning

THE tuning coil may take one of very many forms, but the most common are those illustrated. The one on the left is usually known as a three-coil tuner, while the one on the right is a valve base coil. Two others are shown, a spiderweb coil and a tapped coil. Of course there are many others, and often there are only two coils, or even one, on the one former.

One of the functions of coils is to connect two circuits together electric-



ally, in such a way that there is no mechanical connection. Thus we have a primary and secondary, and energy is transferred from the primary to the secondary without any connection between the two. It sounds rather wonderful, but it is one of the things that makes radio possible. To get the most out of a set, a coil, which possesses "inductance," and the condenser, which possesses "capacity," must be combined. When a coil of known induct-