What Do You Know About . . . . AERIALS? . . . .

The Technical Editor Explains

IN response to many requests, we propose in a series of articles to review the questions asked in Section "B" of the Radio Serviceman's examination, giving what we think to be the points looked for. These questions are of general interest and their answers, we feel, should help all those who are looking to get better reception. This week we deal with Question 1.—Sketch and give details of the complete outdoor aerial-earth system showing the types and classes of wire, stating any precautions you would take regarding electric power wires.

THE subject of aerials is an old one, and it has been dealt with in this and other publications many times, so there is really little excuse for anyone answering the question poorly. Let us take in order the points we think the question involves.

Situation.—The situation of an aerial is governed by two factors, first the space available, secondly proximity of electric power lines and buildings and trees. The underwriters' regulations state quite clearly that an aerial must not be erected in such a position that, should either the aerial or the electrical wires fall, sag, or sway, they will come in direct contact to one another. Secondly, that they may not be so placed that anyone can make simultaneous contact with them both. There is no stipulated height, nor length, nor do the rules prohibit aerials crossing over buildings, etc., but other factors enter at this point.

Generally speaking, it is best to erect one mast distinct and separate from buildings. This gives the aerial a chance to collect the maximum amount of energy and minimises shielding. It is possible to run an aerial between two chimneys, but it will be in such close proximity to the roof that all power will be absorbed. Similarly an aerial should not be too close to trees or other earthed objects.

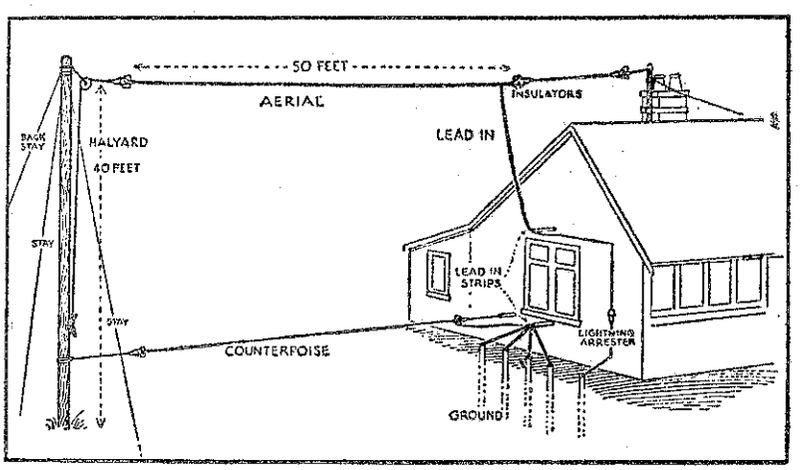
The masts should be well stayed on three sides, one stay being in line with the aerial wire and the other two at right angles. As a matter of fact, the regulations state that all masts shall be guyed in a workmanlike manner, and that the supporting structure shall be of adequate strength to stand the climatic stresses and strains. Quite frequently the mast nearer the lead-in can be supported by the house. If it is, care must be taken that the lead-in is brought in clear of roofs, etc. It is better held out from the wall by a separator of some description.

Generally speaking, in erecting an ordinary aerial directional effects are not worth worrying about. The lead-in should come in from one end and this constitutes the popular "L" type aerial. With the "L" type aerial, the lead-in should slope backward from the aerial, not underneath it. The lead-in, which plays just as an important part in picking up the radio wave as does the horizontal part of the aerial itself, should be well free of the walls of the house. If joins are essential they should be soldered.

To minimise the pickup from electric power mains, the aerial should be erected at right angles to them.

Height and Length.—An aerial should be as high as possible, but the total length of the flat top, plus the lead-in, should not exceed 100 feet, if a multi-valve set is employed. A long aerial causes the selectivity to be unsatisfactory. Generally speaking, an aerial should be as short as possible, consistent with good results. Not only will a long aerial pick up a good deal more noise, but only rarely can the set be opened up fully to make the most of the length.

In a "T" aerial, the length is that of half the flat top, plus the lead-in, which should always be in the dead centre and vertical. Little is to be gained by using a twin-wire aerial, unless the wires are separated from four to six feet. Even then the twin aerial should be erected only in places where it is impossible to get sufficient length from a single "L" aerial. The average dimensions for an aerial are height 30 to 50 feet, length 70 to 100 feet.



A typical aerial and earth installation.

Gauge and Covering of the Wire.—The regulations state that where the span does not exceed 100 feet the size of the aerial shall be 7/029, or No. 14 s.w.g. Where the span exceeds 100 feet the wire should not be less than 7/036, and shall not corrode excessively. This implies the use of rubber or enamelled insulated wire, but for most purposes the latter is the more suitable.

The lead-in must be of copper or other metal which will not corrode excessively, and in no case shall it be of a smaller cross section than 7/029, or 14 s.w.g.

The earth wire may be bare or insulated, and must be not less than 7/029.

Protective Devices.—Somewhere between the earth and the set a lightning arrester of approved design must be installed. It is not essential, though it is preferable, that this should be outside, and it may be run to the same earth as the set—a separate earth is not required by the regulations. It should be installed as near as possible to the point where the lead-in enters the building, and shall not be placed in the immediate vicinity of easily ignitable material, and where exposed to inflammable gases, dust or combustible materials. The use of an aerial/earth switch for shorting out the arrester is not essential. The lead-in must enter the house through a non-combustible tube.

The Earth.—So long as a good contact is made with the ground, it is immaterial what is used for an earth. The usual methods of earthing a set are through the cold water system of the house or a pipe or series of pipes driven into the ground. Other earths comprise buried metal objects, to which are attached the earth leads from the set. The earth must be kept damp, and it is preferable that it be dressed occasionally with salt. Care must be taken that corrosion of the earth-wire at the point of attachment to the actual earth does not take place. Where galvanised pipes are used a clip approved by the fire underwriters must be used. Gas piping shall not be used for earthing devices nor shall the conduit used in the electric wiring system (the third pin of the radio set) be considered an adequate earth. Every radio set should have a separate and distinct earth.

Insulators.—Good insulators should be used at each end of the aerial. Preferably they shall be attached to a halyard so that the aerial may be let down from time to time and the insulators cleaned. Glass or pyrex insulators are the best, though large type porcelain ones are quite satisfactory. As a certain amount of cleaning is occasioned by the use of guy wires, it is advisable to use at least one in every guy wire running from the mast. Particularly is this necessary in the case of iron or steel masts.

Counterpoise.—A counterpoise, which is an aerial slung underneath the regulation one, often can take the place of an earth. It is not nearly as good, but it is very useful in combating noise. It must not be joined to the regular earth of the set to the earth terminal. In the sketch it is shown in conjunction with the ordinary earth, but it is only for illustrative purposes.

Those in brief are the points we think the question involves. Now, how many put everything in? Of course, it would be possible to elaborate all those points, and talk a great deal more about the aerial, but where time is limited one must keep very strictly to the point.

Useful Hints

IF you use the cat's whisker type of crystal set, avoid scratching the crystal heavily. A light pressure is usually far more likely to give good results.

IF your signals tend to fall off in wet weather it will probably be found that the aerial insulators are inadequate in number or that rain is spoiling them and making a conductive path across from aerial to "earth."

THE loudspeaker is one of the most inefficient accessories associated with radio, and even good ones can hand out only about 10 per cent. of the energy that is delivered to them by the radio set!