The Elimination of Static

The Story of Man's Accomplishments in His Struggle against Nature

IF all the problems that have confronted radio engineers since wireless was, the elimination of static, has been the most baffling. To-day its successful elimination remains an unsolved problem though static-reducing devices by the score have come on the market. Certainly static has been reduced, but at the expense of the signal-strength. Those which have attained moderate success have been very complicated and add greatly to the cost and complication of the receiver. The fundamental problem lies in the very nature of static.

A few months back there appeared in the "Radio Record" an article explaining the phenomenon as it is known at the present time. Static, to briefly reiterate, is a charge of electricity at liberty in the air. It is entirely different to the electricity known to us by use. Static is a charge, while electricity in use is a flow. Alternating current of the latter type is used to convey the signals from their point of origin to our receiving sets. Alternating current signifies a rapidly fluctuating voltage which rises and falls at a definite rate. This definite rate (frequency) particular to each station permits of selectivity.

Static electricity on the other hand is not a flow, and for this reason cannot have a frequency. Were it to be of a definite frequency it could be tuned out of any set just as an unwanted station can be.

Static Elimination.

FROM its very nature then, the elimination of static is a problem of some dimensions. As it enters the set with the signals, it is difficult if not impossible to separate it from the signals, for anything that tends to reduce static will reduce the strength of the signals. The most logical method of reducing this annoyance it to increase the power used in broadcasting. If the signal strength can be made considerably greater, then the amplification may be reduced while still giving satisfactory signals. This explains why those situated near a powerful station do not suffer with the annoyance like a listener situated more remotely from the transmitting station. There is, however, an obvious limit to this method of control.

CORRESPONDENTS have asked for means of reducing static, and, after an exhaustive search, the following article is presented as a brief resume of the accomplishments of man in his struggle against unsympathetic Nature. While some of the methods may sound a little technical to some listeners, yet an endeavour has been made to use as few technicalities as possible and to give, where possible, the suggestions of those who have pioneered the field. There are great possibilities and opportunities for those interested to do some interesting research work.

Underground Antennae.

OF the various devices to combat static the most successful is perhaps the underground antennae. In this direction great research has been carried out by Dr. J. H. Rodgers, Hyattsville, United States, and to him one has to refer for the most authentic information on the subject.

The principal claim covering this type of antenna defines the system "comprising an antenna extending horizontally, substantially parallel to the surface of the earth, and insulated therefrom, a metallic covering the antenna but insulated therefrom, and in intimate contact with the earth throughout its length, signal instruments associated with the antenna and a balancing connection at the other end." Such is the definition given by the inventor.

Actually the antenna consists of a length of insulated wire enclosed in a metal sheath, such as a lead cable buried sufficiently to that the sheath makes good contact with the ground, and parallel to its surface, the lead-in being brought to one side of the coupling inductance, or, as is usual, the aerial coil. The other end of the coil is grounded in the usual manner.

Of this there are many variations. One can place the shielded cable on top of the ground, but in contact therewith, the cable on supports so that it is supported a few inches above the earth, and several arrangements, including the grounding of the farther end of the cable. In another type the ground connection is replaced by a length of cable, as is used for the antenna.

There are many other variations of the underground antenna, but most of them have proved less satisfactory than the original Rogers antenna.

Experiments.

EXPERIMENTS with a real Rogers antenna, using a sensitive heterodyne, showed that a range of 500 miles at night in the winter might be expected with loudspeaker volume, from a station having a power of 1000 watts. The static level was very much lower than when using an aerial 40 feet above the ground and 80 feet long. Although the volume on distant stations was much less than with the aerial a well-defined reduction of static was noted.

However, when using the underground antenna with a seven-valve tuned radio frequency set of a well known make the results were much poorer than those obtained with the superheterodyne, due to the lower sensitivity of the r.f. set. Stations 500 miles away which came in well with the aerial could not be heard with the underground antenna, and this was made with the underground antenna arranged in such a manner as to receive the signals of the station to the best advantage. On the local stations, however, the performance of the set was very satisfactory, and while the static level on the aerial was so far down as to be barely noticeable, a difference could be noticed when the underground antenna was employed.

Experimenting with other than the Rogers system proved them (the Rogers) vastly superior to any other.

Other Underground Antennae.

A CORRESPONDENT to "Radio News" suggested another underground antenna, or rather two. The first was to consist of four four-inch cylinders; around each was to be wound 60 feet of insulated rubber-covered wire, these to be soldered to the lead-in wire. This lead-in wire was to be protected from atmospherics by a lead tube running from one foot under the ground to the aerial terminal of the set. The apparatus was to be buried five feet under the ground in porous soil.

Secondly, a rubber-covered wire was to be lowered into a well 75 feet deep, the lower end to be sealed to make it impervious to water. The receiver was to be shielded to prevent the picking up of static.