REMOTE TUNED ANTENNA

Motor-operated extensible members of rotatable dipole provide for covering range between 46½ and 215 mc

Television receiver engineers know that installation of antennas in metropolitan areas presents difficult problems, which are daily becoming more complex.

Technical opinion is largely agreed upon the conclusion that it is not possible to set up a dipole antenna in mid-town New York which will receive satisfactorily from more than one station without adjustment. However, if provision is made for orienting the antenna when desired, reception may be realized from the three stations.

A major complication encountered with fixed antennas is reflection, leading to ghost images, which can be largely eliminated by proper antenna orientation. It has been determined that in special cases, it is of advantage to tune the antenna for optimum reception.

Such an antenna, which may be both oriented and tuned by remote control has been developed, and is illustrated. It is a horizontally polarized assembly, containing two motors and associated mechanical trains.

In operation, the antenna is rotated in azimuth, and the dipole arms extended or retracted until the strongest direct signal is received with the reflected signals attenuated to the greatest possible extent.

The antenna has a three-section arm extension with a frequency range of two and one-half to one, from 46½ to 117 mc has been developed by Farnsworth Television and Radio Corp., Fort Wayne, Ind. Extensible members of the dipole are designed as three sections of telescopic tubes, controllable from 26 to 66 in.

Motor assemblies have been specially designed for the application, and mechanical details of the design of a two-section antenna are illustrated. Four push-buttons on a control board allow the operator to control motor rotation from a remote position. An automatic stop limits the angle of rotation to plus or minus 190°, so that the antenna cable will not be twisted beyond its elastic limit.

The smaller antenna has two sections of telescoping tubes, with a frequency range of 1.8 to 1, from 46½ mc to 85 mc. Length of the antenna may be varied from 36-in. to 66-in. Should a greater frequency range be desired, additional telescopic sections may be installed. A five-section antenna, for example, affords a frequency range of 3.6 to 1, from 46½ to 167 mc.

With N sections to the extensible member of length L, with mechanical overlap b, the approximate tuning range is to be:

$$R = NL/(N_b + L)$$

and substitution of values for the three-section antenna gives:

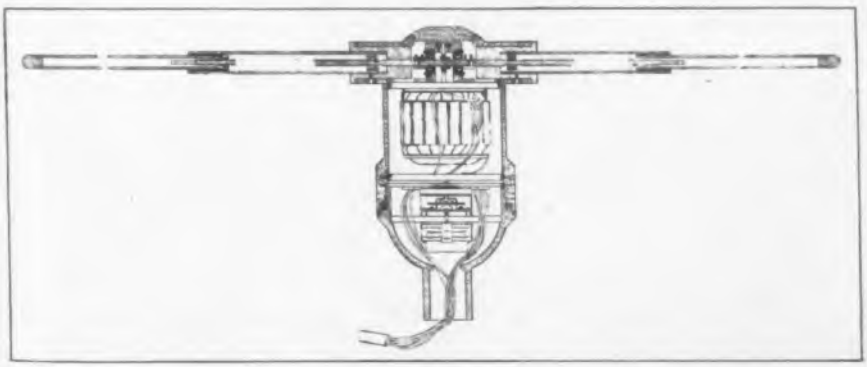
$$R = 3x26/(3x1.5 + 26) = 2.56$$

The number of sections required to cover a tuning range greater than this goes up quite rapidly with the range. The top frequency determines the value of the section L. For example, it requires four sections for a tuning range of three, if the top frequency is approximately 215 mc.

A simpler antenna design features orientation control alone, since the tuning control may constitute unnecessary complication in some installations.

The theoretical resistance of the antenna varies from 36 to 160 ohms, and works into a 95-ohm twinax line. Using 170 feet of line to the receiver, matching has been found satisfactory for all channels in group A.

Receivers having various input impedances not matched to the line have been used, with good results. Experiment shows that orientation is a far more important factor in "ghost-free" reception, than mismatch between dipole, transmission line, and receiver input.



Above is a cross sectional view of the tunable rotable antenna showing location and connection of the two motors. Right is a general view of the antenna as it appears when installed